



# STUDIES OF AFRICAN ECONOMIES

FROM PAST TO FUTURE

Vol. **4**

Editors

Elie Ngongang

Youssef Oukhallou

KSP BOOKS



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From Past to Future

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*Studies of African Economies: From Past to Future, Vol.4*

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# Preface

**C**h.1) This chapter assesses the impact of road infrastructure investments on the structural competitiveness of Burkina Faso's economy. After retaining the period from 1980 to 2015, the estimate of the Model to Error Correction (ECM) revealed that investment in road infrastructure positively and significantly affects the structural competitiveness of the economy. However, this incidence varies over time. In fact, the elasticity of structural competitiveness compared to road investments is 0.06 in the short term and 0.32 in the long term. In view of these results, it appears that the implication of economic policy that emerges is that an increase in investment in road infrastructure is a policy of gaining structural competitiveness of the country's economy.

(Ch.2) Natural resource redistribution and ownership transfer programs are introduced as a way of improving income distribution and alleviating poverty in rural areas of most developing countries. In the case of South Africa, these redistributive policies are implemented in line with the national development plan targeting extreme poverty alleviation and reduction of wide income disparities by 2030. This paper analyses the distributive effects of the land redistribution policy which is a

shock in the agriculture sector on poor household income in South Africa by applying a multiplier decomposition and structural path analysis. The study contributes to the existing literature by providing a microscopic analysis of the global multiplier to show the transmission mechanism of household income from a shock into the agriculture sector and show how income moves across sectors, factors and households by dividing the multiplier effects into all its components. The results showed that poor households received higher direct effects and the rich households received high indirect effects from the shock in the agricultural sector. The structural path shows that a significant portion of the global influence of the shock in agriculture is transmitted through the path of factor income which in turn increases poor household income.

(Ch.3) The stock exchange price is the value of a security which is determined when supply meets demand in the stock exchange market at a given time  $t$ . In this paper, we attempt to define shares evaluation models based on accounting variables. The family of these models goes from the referential theoretical model with its empirical variants to the models of practitioners. Our models make it possible to establish the pertinence of diverse or variables in the cross-sectional explanation of the differentiations observed in Sub-Saharan Africa between the price of a share and its accounting value. We show 9 rival models which integrate two models that are widely accepted in the North American justice system. Our tests show that accounting variables which affect the cross-sectional distribution of stock exchange prices, take account of the book value of the share, invested capital and flow variables.

(Ch.4) We provide the first spreadsheet data series and legislative history of Zanzibar's Board of Commissioners of Currency (1908-1935) and examine to what extent it operated as an orthodox currency board. The paper makes the annual balance sheets and monthly financial statements of the currency board available in machine-readable form for the first time, in a companion spreadsheet workbook and also offers a summary of legislation related to currency and banking for further analysis of the period.

(Ch.5) From 2007-2009 Zimbabwe underwent a hyperinflation that culminated in an annual inflation rate of 89.7 sextillion ( $10^{21}$ ) percent. Consequently, the government abandoned the local Zimbabwean dollar and adopted a multi-currency system in which several foreign currencies were accepted as legal tender. The most prevalent currency in that system is the U.S. dollar. Without official recognition of dollarization, however, the government enacted laws allowing Zimbabwe to evade the budgetary discipline required from a dollarized economy, exposing itself to more potential monetary crises. This paper highlights important Zimbabwean government actions post-April 2009 and analyzes their effects on the Zimbabwean economy. It also explains Zimbabwe's general financial situation and the major reforms needed to avoid another crisis.

(Ch.6) We provide the first spreadsheet data series for the Cassa per la Circolazione Monetaria della Somalia (loosely translated, Somalia Currency Office), which operated in what is now southern Somalia from 1950-1960, and examine the extent to which it operated as an orthodox currency board. The paper makes the annual balance sheets and income statements of the currency board digitally available and translated into English for the first time. These are included in the companion spreadsheet workbook, along with a summary of legislation related to the Cassa and history of the territory, which are contained in the appendices.

Editors  
**E. Ngongang & Y. Oukhallou**  
December 10, 2019



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# 1

## Impact of road infrastructure investments on the structural competitiveness of the Burkina Faso economy

Moussa Sigue<sup>†</sup>

### Introduction

Depending on transport infrastructure in general and road infrastructure in particular are considered as key instruments for promoting the structural competitiveness of the economy since the roads pave the way for structural transformation of economies. In fact, for an economy to develop and for wealth to be generated and distributed, people and goods must be able to move. As pointed out by INGER (2013), the economy's dynamism depends on the movement of people, goods and services and these movements in turn depend on the existence of quality transport infrastructure.

Despite the ever-growing interest of the economic literature in the study of the competitiveness of economies, it must be emphasized that this is one of the least understood concepts on which there is no unanimous vision on both its definitions and determinants. However, we define structural competitiveness as

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the capacity of the national economy to impose itself on the domestic and external markets with the aim of improving the living conditions of the populations. In this perspective, structural competitiveness refers to the ability of the national economy to create and maintain an environment that supports the creation of more wealth for the economy and more prosperity for people. In fact, a competitive economy aims to improve average per capita income over the long term.

An examination of the economic literature reveals that the question of the productive role of road infrastructure expenditure has been renewed, thanks in particular to the developments of endogenous growth theorists. From the development of Meade (1952) through that of Aschauer (1989a) and (1989b) to those of Barro (1990) and Kopp (2007), spending on road infrastructure are considered an essential tool to have quality road infrastructure capable of providing optimal spatial coverage so as to create both direct and indirect effects on economic productivity gains.

Particularly in Burkina Faso, the geographical reality makes it a country in the grip of a constraint of isolation. As a result, the country is seeking road infrastructure to conduct its trade. In doing so, it undertook important reforms between 1992 and 2009<sup>2</sup> to modernize its road transport sector to make it more productive and competitive.

Despite these reforms, Burkina Faso still has a low coverage of its road network, road infrastructure of lower quality and poorly distributed in space. Also, the country remains less competitive. According to the Banque Mondiale (2009), the poor quality of road infrastructures in Burkina Faso means that the cost of road transport remains high compared to some the West African Economic and Monetary Union (WAEMU) countries. Indeed, per kilometer of road, Burkina Faso records 55 F.CFA against 31 F.CFA for Cote d'Ivoire and 34 F.CFA for Mali<sup>3</sup>. For the author, this situation does not favor a gain in economic competitiveness for the

<sup>2</sup>Adoption of the PSEC-T in 1992, PST-2 in 2000, the Land Transport Sector Orientation Law in 2008, the creation in 2009 of the National Office of Road Safety and the establishment of a virtual freight market in favor of the CBC.

<sup>3</sup> This country is landlocked just like Burkina Faso.

country. In agreement with the MID and the MT (2011), this situation could be partly due to the poor performance of road infrastructure and partly to the poor spatial distribution of road infrastructure, which poses a problem of regional accessibility especially in rural areas. In this regard, the data analysis of the MIDT (2015) reveals that out of the thirteen (13) regions of the country, the Center and Hauts Bassins regions were the best equipped paved roads in 2013. The percentages of paved roads in the total classified road network of these regions are respectively 50.90% and 43.41%. Added to this, in 2013 paved roads were in the order of 52.34% for national roads, 2.14% for regional roads and only 0.87% for departmental roads (MIDT, 2015). Land roads accounted for 47.66% for national roads, 97.86% for regional roads and 99.13% for departmental roads (MIDT, 2015). Also, the Banque Mondiale (2015), in its report on competitiveness in Africa reveals that among WAEMU member countries<sup>4</sup>, Burkina Faso is one of the countries with the least developed road infrastructure and also the lowest Global Competitiveness Index (GCI). Indeed, the country recorded between 2011 and 2015 an average GCI of 3.23 against 3.7 for Senegal, 3.68 for Cote d'Ivoire, 3.58 for Benin and 3.41 for Mali. Regarding the quality of road infrastructure over the same period, the ranking of the Banque Mondiale (2015) shows that after the Cote d'Ivoire and Senegal are removed, Mali and Benin were the top third and fourth grades roads. As for Burkina Faso, it obtained the lowest quality of road infrastructure over the period 2011-2015.

But while in general the impact of road infrastructure investments on competitiveness is undoubted, very few studies exist in Burkina Faso. For this country, the literature on the specific role of road infrastructure investments in the country's structural competitiveness remains rather limited. Most of the authors who have been interested in the road infrastructure question have studied their influence on the transport chain (Sirpe 1994, 2003). However, the Banque Mondiale (2009), Sirima *et al.*, (2001), Sirpe (2003), and Christel *et al.*, (2010) found that investment in transport infrastructure in general and road infrastructure in particular is a

<sup>4</sup> Niger, Togo and Guinea Bissau are not concerned by this study.

key instrument for increasing the growth country's economy. However, these authors emphasize that the expenditure on road infrastructure is not made optimally. Therefore, they do not allow tent good coverage of Burkina Faso road network, which would explain the poor spatial distribution of road infrastructure.

The overall objective of this article is to make a quantitative assessment of the impact of road infrastructure investments on the structural competitiveness of Burkina Faso's economy. More specifically, it is a question of assessing the long-term relationship between road infrastructure expenditure and economic competitiveness and of analyzing the contribution of road infrastructure investments to the country's commercial performance in the WAEMU space.

## **Theoretical approach of the role of public infrastructure spending in economic performance**

### **Theoretical frame**

The theoretical framework referential retained in this article is the theory of endogenous growth. Indeed, economic models dealing with the role of public infrastructure spending in general and road infrastructure spending, particularly in the competitiveness of the economy, are based on the endogenous growth model. In this context, the role of road infrastructure in the competitiveness of economies is based on an analysis of the determinants of economic growth. This framework explains the mechanism by which improved public infrastructure investment can increase factor productivity and ensure strong economic competitiveness. Here, spending on road infrastructure is likely to play directly on the stock of road infrastructure in the short term and therefore on the productive capacity of the economy. In the long term, the indirect effects of road investments can record a gain in overall productivity.

It was not until the work of Aschauer (1989a) and (1989b) to observe a rereading of the contribution of infrastructure spending to economic performance. His work laid the foundation for an explosion of new endogenous growth models which now consider investing in public infrastructure as a self-sustaining growth factor

productivity and competitiveness in the long term. Among these developments, the reference model is that of Barro (1990). This model makes it possible to highlight the role of the road transport chain in the competitiveness of the economy. In this chain, road infrastructures intervene as well in the sphere of production as in that of marketing. When road infrastructure is poor or inefficient, this leads to higher direct transport costs and longer delivery times, which significantly increases trade costs and thus reduces competitiveness. Later, Barro & Sala- I-Martin (1996) have shown that public infrastructure spending plays a leading role in improving the marginal productivity of private factors which, in short, enhance the overall productivity of the economy. Therefore, an improvement in investments in infrastructure in general and in road infrastructure in particular contributes to reducing transport costs and thus contributes to the improvement of the volume of the country's trade (Lima & Venables, 1999). For Veganzones (2000), improved investment in road infrastructure is a driving force for the competitiveness of the economy in the long term.

### **Direct and indirect effects of public infrastructure spending**

In the economic literature, spending on road infrastructure is assumed to increase the productivity of public and private capital through its direct effects on the public capital stock and its indirect effects on improving overall productivity. In this model, any expenditure in road infrastructure allows, either the building of new roads or to maintain existing ones. Road infrastructure can thus contribute to economic growth through increased trade, which in turn promotes specialization and allows for economies of scale and comparative advantages. This argument was developed by Adam Smith (1776) who gave the mechanisms. His idea is based on the idea that improving road infrastructure reduces the cost of transporting raw materials and thus the costs of production, which makes it possible to offer low selling prices and to improve regional and interregional trade. In fact, according to the author, quality road infrastructures favor the improvement of the transport system which results in lower transport costs and a reduction in distances between the different localities.

This representation highlights the multiplier effect of expenditure on road infrastructure. Indeed, the construction of new roads makes use of the branch of Buildings and Public Works (BPW). However, this branch employs a large volume of labor and therefore distributes income. Thus, the transmission mechanism of road investment to the productive capacity of the economy can be broken down as follows: the increase in investment causes an increase in employment, especially in the construction industry, which in turn increases consumption distributed income, and consumption increases the productive capacity of the economy. Moreover, in the logic of the Keynesian multiplier, the increase of investment in road infrastructures entails effects of propagation of this investment on the productive capacity of the national economy. Road construction and maintenance is therefore a preferred tool to have direct effects on the productive capacity of the economy.

However, this transmission mechanism has limits in most developing countries like Burkina Faso. Indeed, the increase in employment generates additional income. These incomes partly increase the demand for imported consumer goods, which in fact contributes very little to the productive capacity of local industries.

Abraham (1961) summarizes to a number of four, the direct effects of road investments on the competitiveness of the economy. For him, an investment in road infrastructure produces in the short term the following consequences:

- reduction in traction expenses: a road investment makes it possible to ensure the availability of quality roads, helping to reduce the consumption of fuels, lubricants and tires. Also, it helps to slow the wear of rolling stock;
- saves time: an investment in road infrastructure helps to reduce waiting times and then contributes to the increase in average journey speed;
- Improving safety: new road investments reduce the number of accidents per vehicle-kilometer and consequently reduce the severity of accidents;
- Increased road capacity: This is probably the direct effect of the most obvious road investment. The construction or

maintenance of a section of road allows in the short term to increase the capacity of the road in terms of traffic.

In terms of long-term indirect effects, they are generally the product of short-term direct effects. They increase the competitiveness of the economy by causing both a spatial diffusion of externalities (external economies and productivity gains) and an attraction of new activities.

The construction of a road is synonymous with the acquisition of sustainable public capital as an "appropriate factor" to increase the productivity of the economy (Henner, 2000). On the economic side, the expenses incurred for the construction and maintenance of the roads are justified by the fact that they facilitate the production process in the short and long terms by ensuring a better circulation of products and factors of production and by improving trade relations between economies. Thus, investment in road infrastructure is considered as a source of external savings by Barro (1990) and Tefra (1996) since it reduces the decrease in marginal productivity of traditional factors and consequently generates returns to scale.

The role of road infrastructure in spreading externalities across regions has been established through several approaches. Many of these approaches have highlighted the triggering nature of the regions' commercial performance. In fact, Creightney (1993) states that, in general, access to the regions is all the easier in terms of cost and time as the road infrastructure is developed. For him, the accessibility of rural areas in general is more difficult because of the weakness or lack of quality road infrastructure. As a result, increased investment in road infrastructure connects with other economies, increasing trade intensity between these regions. Focusing on road transport in rural areas, Sirpe (2003) supports the hypothesis that road infrastructure is a source of regional diffusion of externalities by noting that regional potentialities, constituting the driving force in the analysis of Reggiani (1999), are sources of the provision of road infrastructure. For him, the difference in the economic performance of the regions within the same country lies essentially in their respective levels of accessibility.

## Methodological approach

The methodological approach aims at defining the econometric model, the variables as well as the source of the data that are used in this work.

### Specification of the theoretical model

The theoretical model chosen is an extension of Barro's model (1990). This model considers spending on road infrastructure as a self-sustaining factor of private factor productivity and overall productivity. Thus, starting from Kopp (2007), the competitiveness gain model is given by:

$$\frac{d\rho}{\rho} - \frac{d\bar{\rho}}{\bar{\rho}} = S_G^* \frac{dG}{G} - S_{\bar{G}}^* \frac{d\bar{G}}{\bar{G}} + \varepsilon$$

In the equation  $\rho$  indicates the overall productivity gain,  $S_G^*$  represents the contribution of road infrastructure spending to productivity gains,  $G$  infrastructure spending country roads,  $\bar{G}$  infrastructure spending road and competing countries and  $\varepsilon$  the error term.

The left-hand side of the equation represents the difference in productivity gain between Burkina Faso and WAEMU's competing countries. If this term is positive, it shows that the country has a greater competitiveness face to its competitors. The right-wing member, on the other hand, shows the difference between the elasticity of overall productivity in relation to Burkina Faso's road infrastructure investment and that of its WAEMU competitors. According to Kopp (2007), the share of  $G$  in  $\bar{G}$  is all the greater as the ratio between the expenditures made by the country compared to its competitors is high. For him, if investments in road infrastructure are productive, it would seem logical that the country that invests more in road infrastructure benefits more than competing countries. These benefits are measured by the productivity gain or the level of competitiveness.

### Presentation of the variables

As Rouse (1992) has pointed out, theoretical developments in measuring the structural competitiveness of an economy in the

aggregate sense are rare and relatively new. However, several indicators measure structural competitiveness in the macroeconomic sense. But, it should be noted that each indicator is established according to the focus of the study and that, in general, each indicator used to assess the competitiveness of the economy depends on the facts highlighted in the definition of concept. As a result, the relative income gap is used as an indicator of structural competitiveness in this article.

Structural competitiveness is equivalent to the capacity of the national economy to improve living conditions of the population by creating an important part of wealth compared to that of its competitors in the Union. Thus, the relative income gap makes it possible to compare the country's per capita income as a percentage of that of its main competitors. In addition, the relative income gap is a proxy for the productivity gap in the equation above.

The relative income gap is obtained from the following equation:

$$ERR = \frac{PIB_{bf} - PIB_{pc}}{PIB_{pc}}$$

With *ERR* the relative income gap, *PIB<sub>bf</sub>* Burkina Faso's constant price real GDP and *PIB<sub>pc</sub>* constant prices average real GDP of Burkina Faso's competitors in the UEMOA. The latter is obtained by performing a weighted average of the real GDP of the competing countries of Burkina Faso in WAEMU. The main purpose of weighting is to take into account the weight of each economy in the Union.

In agreement with Rouse (1992), the factors that may affect the structural competitiveness of an economy are those that affect its external and internal performance. These variables can therefore be grouped according to the export rate and the foreign penetration rate. In this work, two groups of variables are retained. On one side there is the variable of interest and on the other side there are the control variables.

The variable of interest is:

*Investment in road infrastructure:* it represents all the expenditures for the construction, maintenance and technical operation of the road network. It is also equivalent to the transportation price for the community. An increase in investment in road infrastructure contributes to a certain extent to lowering the cost of road transport borne by the carrier and therefore a reduction in the transport price per unit of traffic. In the short term, it improves the stock of public capital, the productivity of the transport function and generates a multiplier effect. In the long term, indirect effects help to improve the productive structure and commercial performance of the economy and hence its competitiveness. The expected theoretical sign is therefore positive.

Despite the richness of the literature presented above, we are far from knowing all the factors that affect the structural competitiveness of the economy. To solve this problem, it is important to limit one self to the factors that directly affect commercial performance (Lachaal, 2001). Thus, in addition to the variable of interest, other variables are retained under the label of control variables likely to affect the structural competitiveness of the economy through its commercial performance component. This is the

- *export rate:* it represents the share of exports by volume in real GDP. This variable captures the share of GDP devoted to meeting foreign demand. According to Bceao (2015), an increase in this rate means that the country's competitive position is favorable. Otherwise, an increase in the export rate results in a higher market share abroad and a better external competitiveness. The expected sign is positive.

- *rate to foreign penetration:* It is measured by the ratio of imports and absorption<sup>5</sup>. Domestic demand is used as a proxy for absorption. An increase in the foreign penetration rate indicates a drop in performance, acquired in the domestic market. For cons, the low rate induces a gain in competitiveness in the domestic market. The expected sign is negative.

<sup>5</sup> $tx_{pe} = \frac{import}{C+I+G}$  with  $C$  household consumption,  $I$  business investment and  $G$  public expenditure.

## Data

The data used in this article are essentially secondary and cover the period from 1980 to 2015, which is thirty-six years (36) years coverage and come from three databases. Data on expenditures on common infrastructure were collected from the Ministry of Infrastructure of Burkina Faso. The export rate and the foreign penetration rate come from the West African States Central Bank (WASCB) database.

## Hypothesis tests and presentation of the econometric model

In the presence of time series, several preliminary tests are necessary. This is mainly the normality of errors, the stationarity of series and their cointegration.

### Normality test

Given the dynamics of investments in road infrastructure and that of the competitiveness of the economy, it is necessary to verify the normality of the errors in order to have reliable statistics to perform Student's tests on the parameters of the model. The test of Jarque and Bera (1984), based on asymmetry and flattening, makes it possible to check the normality of the errors. Based on the assumption of the normality of the errors against the alternative hypothesis of their non-normality, the result of the test gave a probability of 0.64. Since this probability is greater than 0.05, the null hypothesis of normality of residues is not rejected. Thus, this empirical evidence makes it possible to conclude that the errors are normal and this allows the continuation of the tests on the time series.

### Stationarity analysis

The analysis of a time series requires, at first, the study of the stationarity of the variables concerned. This section develops the two most used tests for stationarity studies. In order to appreciate the stationarity of the studied series, we apply the ADF test of Dickey & Fuller (1981) and that PP of Philips & Perron (1988). The ADF test makes it possible to take into account the correlation

between the different series and that PP improves the ADF test by providing a correction to the nonparametric test, correlation and heteroscedasticity problems. The combination of these two tests makes it possible to have more appropriate results since when a variable is stationary in level for the ADF test and as a first difference for the PP test, it is the PP test which is retained. The hypothesis that is tested is the presence of a unit root against the alternative hypothesis of the stationarity of series. The result of these two tests (confers annex 2) indicates that all the series are stationary in first difference. Thus, they are integrated of order 1.

### **Cointegration test**

The study of cointegration aims to identify the true relationship between series by looking for the existence of a cointegrating vector and eliminating its effect, if necessary. The idea of cointegration is needed and shared by all in macroeconomic analysis because it is an approach that derives from the multidimensional model of unit root systems.

In the application of the cointegration test, it is first necessary to establish the order of integration of the variables. This is because cointegration is only possible for non-stationary variables. To determine the number of cointegration relationships, Johansen (1988) proposes two tests based on the eigenvalues of a matrix derived from a two-step calculation. The first test proposed by the author is that of the trace and the second is based on the maximum eigenvalue. In this work, we apply the test of the trace which consists in testing the null hypothesis of absence of cointegration, if the rank of the matrix is statistically equal to zero; against the alternative hypothesis of the presence of cointegration, if the rank of the matrix is greater than or equal to one.

Having established previously that the series were all stationary in first difference, it is now necessary to show that there is a cointegration relation between them. In other words, it is necessary to verify that in the short term the series may be divergent but in the long term, they evolve towards a balance. The Johansen trace test (1988) on the series provided the result in the annex 3. This result indicates that the rank of the trace is significantly equal to one (01) at the 5% threshold. It is at this

threshold that the trace begins to be lower than the critical value of the chi-square statistic. Thus, the result of Johansen's (1988) trace test concludes that series are wedged with the presence of a single cointegrating vector. This result reveals that, in the long run, there is an equilibrium relationship between the structural competitiveness of the economy and investment in road infrastructure. From there, it is possible to perform a representation of the error-correction model.

### Error Correction Model (ECM)

The results of the econometric tests revealed that the series retained for the analysis are non-stationary and integrated with a single cointegrating vector. Thus, their relationship must be estimated using an error-correction model (Bourbonnais, 2011).

$$\begin{aligned}\Delta ERR_t = & \beta_1 \Delta Inv_t + \beta_2 \Delta Te_t + \beta_3 \Delta Tpe_t \\ & + \lambda (ERR_{t-1} - \beta_4 Inv_{t-1} - \beta_5 Te_{t-1} - \beta_6 Tpe_{t-1} \\ & - \beta_0) + \epsilon_t\end{aligned}$$

The equation can model both short-term and long-term dynamics. In other words, it represents the ECM that is estimated in this work. As a result, the parameter  $\lambda$  must be negative and meaningful so that there is a return of  $ERR_t$  to its long-term equilibrium value. The recall force indicates a catch-up possibility that allows for a long-term relationship between road infrastructure investments and the competitiveness of the economy.

### Estimation method

For the estimation of the ECM, the approach adopted is the one-step estimation of Hendry (1980). In contrast to Ganger's (1983) two-step estimation, the one-step method reduces the loss of information. The approach of Hendry (1980) is to jointly estimate the short-term dynamics and long term by the ordinary least squares.

Results and interpretations

In this part, it is a question of presenting the results of the estimation of the ECM, to study their validity and to interpret them.

Resultsof the estimated ECM

The estimate of ECM gave the following result:

Table 1. Results of ECMestimation

Variables	Coefficients	Standards Errors	t-Student
Diff_Inves_IR	0.0630134***	0.0185913	3.39
Diff_TX_EXP	0.0242403***	0.0073125	3.31
Diff_tx_pe	0.0639621	0.1140897	0.56
ECRR_1	-0.1497372***	0.0257974	-5.80
Diff_Inves_IR_1	0.0476044***	0.0135482	3.51
Tx_Export_1	0.0853174***	0.0171359	4.98
Tx_Pe_1	-0.0144635	0.12166	-0.12
_cons	0.322374***	0.3492666	9.11
Adjusted R <sup>2</sup>		0.9149	
long term elasticities		$\beta_4 = 0.32$	
of exogenous variables		$\beta_5 = 0.57$	
		$\beta_6 = -0.1$	

Note: \*\*\* significant at 1 %

Source: Author's estimate.

The MCE estimate provided a negative and significant recall force (ECRR\_1). Its coefficient is -0.1497. This result confirms the presence of a long-term relationship between economic competitiveness and spending on road infrastructure. This coefficient indicates that 14.97 % of an imbalance occurred over a year are absorbed during the same year. The inverse of the absolute value of the value of the recall force gives a period equal to 6.68 years. This indicates that following a short-term imbalance caused by a shock on investment in road infrastructure, it takes about six (6) years and eight (8) months for structural competitiveness and investment in road infrastructure to find their long-term equilibrium. Also, the model is adequate since 91.49 % of the variations of the structural competitiveness are explained by the selected explanatory variables.

## **Validation of the estimate**

The validation of the estimate requires the verification of certain essential tests obtained after the estimates.

### *Overall meaning of the estimate*

This test is based on the null hypothesis of all coefficients against the alternative hypothesis of existence of at least one non-zero coefficients, the overall significance test gave a P-value zero. This result makes it possible to reject the null hypothesis and to conclude easily that at the 5% threshold, the model is globally significant.

### *Specification test*

Ramsey's (1969) specification test makes it possible to judge the relevance of the functional form chosen. This test also makes it possible to judge the absence of a relevant explanatory variable in the model as well as the correlation between competitiveness and the error term. The result of the test gave a P-value of 0.2622. Thus, at the 5% threshold, the null hypothesis of good specification of the model is therefore not rejected. In other words, the model is well specified. Thus, it is possible to conclude in general that the functional form of the model is relevant and more particularly, that the estimated model did not omit other relevant variables that could explain the structural competitiveness of the model.

### *Autocorrelation test of the series*

This test is based on the Lagrange Multiplier (LM) which checks the autocorrelation of an order greater than one (01). The null hypothesis of no autocorrelation of errors is not rejected at the 5% significance level since the BREUSCH-GODFREY LM-test provided a P-value of 0.123. This result makes leads to the conclusion that there is no autocorrelation of the series studied.

Similarly, the application of the DURBIN-WATSON test, based on the null hypothesis of no autocorrelation of errors against the alternative hypothesis of autocorrelation, gave a probability of 0.756. At the 5% threshold, the null hypothesis is not rejected and this confirms a lack of autocorrelation of the errors previously obtained.

### ***Heteroscedasticity test***

The test of White (1980), built around the null hypothesis of homoscedasticity of errors against the alternative hypothesis of heteroscedasticity, gave a P-value of 0.4192. At the 5% threshold, the null hypothesis is not rejected. This empirical evidence leads to the conclusion that there is homoscedasticity of errors.

### ***Endogeneity test***

For this test, the procedure of Nakamura & Nakamura (1981) was adopted. In agreement with these authors, it is initially a question of regressing the investment in road infrastructures on the other explanatory variables of the model and to recover the residues. In a second step, the recovered residues are introduced into the estimation of the structural competitiveness. Road infrastructure investment is endogenous when the "residual" variable is significantly correlated with structural competitiveness. The result of the appendix of the test leads to the rejection of the hypothesis of endogeneity between investment in road infrastructure and the relative income gap since its coefficient is not significant.

### ***Stability test***

This test help assessing the stability of the model over time for forecasting purposes. The null hypothesis that is tested is the instability of the model against the alternative hypothesis, its stability. The results of the CUSUM and CUSUM square tests (annex 6) show that the curves are both included in the corridor. Therefore, the model is stable.

The various tests carried out above validate the result of the estimation of the ECM. Now, the results obtained must be interpreted.

## **Interpretations of the results**

The results of the estimation show that in the short and long term, the investment in road infrastructure and the export rate significantly and positively affect the structural competitiveness of Burkina Faso's economy.

***Impact of investment in road infrastructure***

The estimation results show that spending on road infrastructure has a positive effect on the structural competitiveness of Burkina Faso's economy, whether in the short or long term. Table 2 shows the elasticity of the structural competitiveness of the economy relative to investment in road infrastructure in the short and long term.

**Table 2.** *Comparison of short-run and long-run elasticities*

Period	Short term	Long term
Elasticity	0.06	0.32

**Source:** Author.

The comparison of elasticities shows that investment in road infrastructure positively affects structural competitiveness in the short term and in the long term. An increase in investment in road infrastructure of 1% improves the structural competitiveness of the economy by 0.06 % in the short term and by 0.32 % in the long run, all other things being equal. Thus, it is in the long term that investment in road infrastructure has a greater impact on structural competitiveness.

This result confirms the hypothesis of the dynamics of the contribution of road infrastructure investments to the structural competitiveness of the economy and corroborates the hypotheses of the endogenous growth theories of Barro (1990). The explanation of this result lies in the specificity of the road infrastructure. Indeed, following a shock on road infrastructure investment, positive externalities and the spatial diffusion of externalities take time to promote the transformation of the structure of Burkina Faso's economy. In the present case, this time is estimated to six years and eight months.

***Contribution of the export rate***

The ECM estimate has established that the export rate affects the structural competitiveness of the economy in the short and long term. It represents a key factor in promoting the structural competitiveness of Burkina Faso. This result is in line with economic theory which establishes a positive relationship between a country's export rate and its external performance. Moreover, it

is established that the increase in investments in road infrastructure ensures in the short term, a better accessibility to the regions and thus a better circulation of products and in the long term, a transformation of the structure of the economy.

As a reminder, the export rate of the economy measures the share of the country's exports in its real GDP. Its growth is synonymous of a rise in market share abroad. However, an improvement in the market share abroad requires upstream a structural transformation of the economy in this case, a strengthening of the productive structure. This structural transformation takes time to take root. As Droin (1991) and Djahini (2015) have pointed out, an increase in investment in road infrastructure produces long-term driving effects, which contributes to improving the productive capacity of the economy and thus its competitiveness. To understand this link it is necessary to break down the export performance following two types of factors.

On the one hand, there are the demand factors that specify the conditions of market accessibility and, on the other hand, the factors relating to the productive capacity of the economy. In terms of demand factors, improved market access is driving increased export profitability through higher value added net exports of road transport costs. This has already been mentioned by Sirpe (1994). Increasing the profitability of exports in turn contributes to the improvement of Burkina Faso's market share in the Union. Factors relating to productive capacity include the reduction in the cost of production resulting from the improvement of the productivity of the road transport sector. For this purpose, the impact of investments in road infrastructure can go even beyond the impact of capital expenditure. In sum, it is clear that by its direct and indirect effects, investment in road infrastructure increases the export rate, which in turn improves the competitiveness of the economy.

### *The foreign penetration rate*

The estimation results show that the foreign penetration rate is not significant in the econometric sense. Despite its econometric

non-significance, it seems useful to give economic explanations for this result.

Indeed, the foreign penetration rate measures the weight of the import in the absorption of the country. On the theoretical level, its increase reflects a decline in competitiveness, especially in the domestic market. The sign obtained by the estimate is consistent with the sign established by the theoretical literature but the variable remains insignificant. A decomposition of the import of Burkina Faso shows that over the period 1980-2015, that from the WAEMU area accounted for only 9.24% of the total import against 90.76% from the zone outside UEMOA (Bceao, 2016). This means that in its domestic market, domestic production competes with products from the UEMOA zone. Therefore, imports from EU countries do not pose a threat to local production; which justifies the non-significance of this factor.

## **Discussion of results**

It has been established through the results of the estimations that the increase of road investment in Burkina Faso is a source of gain of structural competitiveness of the economy. The purpose of this section is to perform a cross-sectional analysis of the results obtained in order to draw similarities or controversies to those of other authors if necessary. To achieve this, it seems to us indispensable to put the results obtained in a logic of analysis of the various ways in which the improvement of road investments affects the competitiveness of the economy.

### ***Effects on existing traffic and induction of new traffic by lowering costs***

The effects on traffic are the main effects observed in the short and medium term of an investment in road infrastructure. The improvement of road investments makes induces an "economic surplus", essentially related to the reduction of the cost of road transport, an immediate result of the decrease in travel time, the increase of safety and the reinforcement of 'accessibility. Overall, road investment induces two types of road traffic. On one side there is the traffic derived representing the traffic and other modes of transport or other routes, and is constituted by freight traffic,

attracted to the newly developed road infrastructure. This traffic appears in a relatively short time. On the other hand, there is the induced traffic. In this case, it concerns the traffic of goods which is carried out thanks to the facilities offered by the road investment whereas it did not take place because of the absence of the road infrastructures, their bad quality or the cost of high road transport. These effects partly explain the elasticity of competitiveness in relation to investment in road infrastructure in the short term.

### *Effects related to economic flows*

Knowledge of the effects of road investment on structural competitiveness is likely to come from increased economic flows. These economic flows are the result of a short-term improvement in the productivity of the transport branch described above.

Our results indicate that in Burkina Faso's case, the economy takes time to integrate all the effects of investment in road infrastructure. The time required is estimated at six years and eight months. Thus, it is only after this time that the investment in road infrastructures allows the national economy to have an integral productive capacity and to improve its external position. Improving external competitiveness requires effective interaction between the sphere of production, marketing and consumption.

Indeed, in Burkina Faso, like the other WAEMU countries, the spatial coverage of the road network is low. The vast majority of asphalt roads are moving towards large urban centers to the detriment of rural areas. However, it is the latter that supply the major industries with raw materials (usually from the primary sector).

### *Stimulation effects and long-term impact*

In view of the estimation result, and following the reasoning of Kopp (2007), investments in road infrastructure are undoubtedly productive for Burkina Faso. In other words, the investment in road infrastructure has the effect of stimulating the development of the national economy, or even to completely change the economic structure through the strengthening of its productive capacity and "train" it towards a structurally competitive economy. Long-term

stimulus and impact effects are most often the end result of all short-term direct effects.

The comparison of short-term and long-run elasticities has indicated that investment in road infrastructure affects the structural competitiveness of Burkina Faso's economy more in the long term than in the short term. The long-run elasticity is 0.32 versus 0.06 for the short term. In any case, the results obtained by Charmeil (1967), Tefra (1996) and Nubukpo (2003), show that, in the short term, an improvement in road investments automatically leads to an improvement of the road infrastructure stock which in turn stimulates the demand for goods, the distribution of income thanks to the jobs created, the road traffic of merchandise. All of these effects contribute in the short term to improving the accessibility and commercial performance of the economy.

In the long term, on the other hand, all the effects observed in the short term combine to ensure a diffusion of externalities and to favor the emergence of the external economies which make it possible to maintain the productivity of the capital and labor factors over time. Therefore, the long term is marked by a greater impact of investment in road infrastructure on the structural competitiveness of Burkina Faso's economy. As Charmeil (1967) pointed out, it is in the long term that investments in road infrastructure act the most and most often on the competitiveness of economies.

Moreover, it appears generally that road investment positively impacts the structural competitiveness of the Burkina Faso economy over the period 1980-2016. This conclusion is similar to that of Nubukpo (2003). Indeed, the author who was interested in the effects of public spending on the economic growth of WAEMU showed that for public investment expenditure in transport infrastructure in general, the impact is positive.

## Conclusion

At the end of this work, the overall result obtained is plausible and highlights the positive impact of road infrastructure investments on the structural competitiveness of Burkina Faso's economy in WAEMU. Investment in road infrastructure contributes to improving the structural competitiveness of the

Burkina Faso economy, notably through the mobility of goods, external economies and increased accessibility to regions and the Union market.

Estimates of long-term and short-term relationships have shown that investing in road infrastructure improves competitiveness in the longer term rather than in the short term. Thus, it appears that structural competitiveness is more determined by the indirect effects of investment in road infrastructure.

The analysis carried out may give rise to what could be an economic policy implication for improving the structural competitiveness of the Burkina Faso economy in the WAEMU area. As has been established, road infrastructure is the most important transport infrastructure in Burkina Faso and its effects on the economy far exceed their mere ownership of public spending. In this context, what role can the public authorities play?

To strengthen the structural competitiveness of Burkina Faso's economy, the State must first and foremost reinforce the optimal allocation of investment in road infrastructure with a view to having sufficient and good quality linear routes, generating training in the sphere of production and marketing. Regarding the future, the country must focus its investment efforts on improving the quality of its road infrastructure, a guarantee of an improvement in its structural competitiveness. This is more of a necessity since 2012; the share of road investment in total investment has hardly reached 5% of the total public investment budget.



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### Annex 4. Estimation of the MCE

```
. reg ECR_RR Diff_Inves_IR Diff_TX_EXP Diff_tx_pe ECRR_1 Diff_Inves_IR_1 Tx_Export_1 Tx_Pe_1
```

Source	SS	df	MS	Number of obs = 34		
Model	.091589883	7	.013084269	F( 7, 26) = 51.68		
Residual	.006582969	26	.000253191	Prob > F = 0.0000		
				R-squared = 0.9329		
				Adj R-squared = 0.9149		
Total	.098172852	33	.002974935	Root MSE = .01591		

ECR_RR	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
Diff_Inves_IR	.0630134	.0185913	3.39	0.002	.0247984	.1012283
Diff_TX_EXP	.0242403	.0073125	3.31	0.003	.0092092	.0392713
Diff_tx_pe	.0639621	.1140897	0.56	0.580	-.1705527	.2984769
ECRR_1	-.1497372	.0257974	-5.80	0.000	-.2027646	-.0967098
Diff_Inves_IR_1	.0476044	.0135482	3.51	0.002	.0197558	.0754531
Tx_Export_1	.0853174	.0171359	4.98	0.000	.050094	.1205407
Tx_Pe_1	-.0144635	.12166	-0.12	0.906	-.2645392	.2356122
_cons	3.182374	.3492666	9.11	0.000	2.464446	3.900301

### Annex 5. Endogenous test

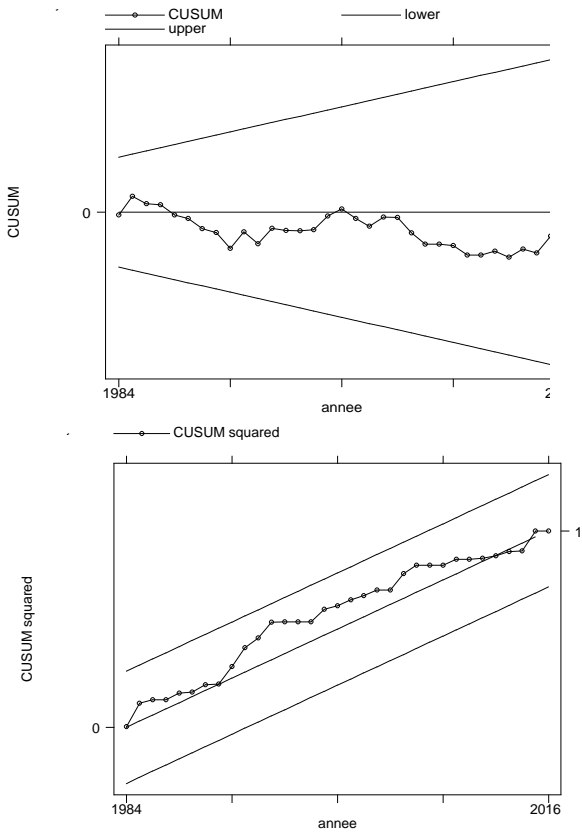
```
. reg ECR_RR Diff_Inves_IR Diff_TX_EXP Diff_tx_pe ECRR_1 Diff_Inves_IR_1 Tx_Export_1 Tx_Pe_1 resi
```

Source	SS	df	MS	Number of obs = 34		
Model	.091594297	8	.011449287	F( 8, 25) = 43.51		
Residual	.006578555	25	.000263142	Prob > F = 0.0000		
				R-squared = 0.9330		
				Adj R-squared = 0.9115		
Total	.098172852	33	.002974935	Root MSE = .01622		

ECR_RR	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
Diff_Inves_IR	.0639065	.0201687	3.17	0.004	.0223682	.1054448
Diff_TX_EXP	.0214018	.0231497	0.92	0.364	-.0262759	.0690794
Diff_tx_pe	.0621446	.1171537	0.53	0.600	-.1791379	.3034271
ECRR_1	-.1446558	.0472334	-3.06	0.005	-.2419348	-.0473768
Diff_Inves_IR_1	.4687793	.1490748	3.14	0.004	.1617541	.7758046
Tx_Export_1	.0852265	.0174835	4.87	0.000	.0492186	.1212344
Tx_Pe_1	-.0204542	.1323723	-0.15	0.878	-.29308	.2521716
resi	.0129776	.1002023	0.13	0.898	-.1933928	.219348
_cons	3.260393	.699766	4.66	0.000	1.819198	4.701589

**Annex 6. Stability Test of Cusum and Cusum Square**



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# 2

## Modeling the distributive effects of an agricultural shock on household income in South Africa: A SAM multiplier decomposition and structural path analysis

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### Introduction

The promotion of sustainable economic growth and reduction of poverty continues to be the main concern and focus of most developing countries. As a way of promoting inclusive growth, Sub Saharan countries embarked on the distribution of natural resources to improve ownership of productive resources for the benefit of mostly the rural and poor households. Most empirical findings analyzing the relationship between poverty, inequalities and land redistribution have applied a wide range of approaches and different results have led to huge debate on the nature and size of the relation. In South Africa, the

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economy continues to experience positive growth due to large infrastructure investment; however, the country continues to experience extreme poverty especially in rural areas and this have shown that the growth in the economy is not inclusive (Ncube *et al.*, 2012). To promote inclusive growth, the government through the national development plan 2030 targeted at improving access to productive agricultural land by redistributing 30 percent of productive land from large commercial farmers to smaller scale farmers. This is viewed as a way of promoting increased production by small scale farmers thereby reducing poverty and increasing access to income. Given the continued commitment by the government towards land redistribution and poverty reduction, it is pertinent to analyse the economy-wide impact of land redistribution taking into account growth in output, value added and income distribution between different income groups.

A number of studies analyzing the land inequality and redistribution have been done in developing countries (Thurlow, 2002; DFID, 2003; Lahiff, 2005; World Bank, 2006) and most of these studies have pointed to the fact that inclusive growth is an effective way of reducing poverty (DFID, 2003; World Bank, 2006). However, most analytical techniques employed in these studies made no attempt to investigate the effect of the proposed land redistribution on the welfare of interested stakeholders in the long run. The empirical techniques applied, generally did not provide a complete picture of the economy- wide effects attributable to agricultural land redistribution. For effective policy formulation and implementation, there is need to investigate the economy-wide effects and welfare consequences of the redistribution taking into account both the backwards and forward intersectoral linkages of the South African economy. Using a SAM multiplier decomposition framework, this study intends to analyse the economy-wide and redistributive effects of land redistribution on poor household income in South Africa. This SAM multiplier decomposition and structural path analysis model enables the tracking of the linkages among demand driven shocks and economic growth, income generation and distribution among different economic groups through linking household income to the productive sectors of the economy. The main contribution of

this study is to provide a microscopic analysis of the global multiplier by adopting the SAM multiplier decomposition as proposed by Pyatt & Round (2006). The multiplier decomposition can help show the transmission mechanism of household income from a shock into the agriculture sector and to show how income moves across sectors, factors of production and households by dividing the multiplier effects into the relevant components.

## Theoretical framework

To analyse the intersectoral impact of land redistribution on South African economy, this study adopted the IFPRI 2009 SAM which was built using official supply-use details, national accounts, state budgets and balance of payments accounts, therefore the SAM provides a detailed representation of the South African economy. The social accounting matrix records the transactions between different economic accounts; therefore it is an ideal data base for conducting economy wide impact assessments such as SAM based multiplier analysis and computable general equilibrium models. The IFPRI 2009 SAM consists of 49 activities, 85 commodities, 14 household types, a government sector, enterprise and the rest of the world. The SAM has 5 factors of production, namely capital, labor with primary education, labour with middle school education, labour with completed secondary school education and labour with tertiary education.

Given the nature of multiplier decomposition and structural path analysis, activity and commodities accounts are aggregated into single production accounts. For the purpose of this study, the SAM was aggregated into 41 production activities (and in this case production activities is a combination of 49 activities and 85 commodities), 4 factors of production and private institutions which combine 5 household categories and the enterprise accounts. The private institutions, activities and factor accounts form the endogenous account while the exogenous account will combine the government account, saving and investment as well as the rest of the world (Pyatt & Round, 2006). This SAM framework can be quite effective in capturing the linkages between these different production accounts and institutions in the economy and as such have been widely employed to explore the impact of different

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 exogenous shocks in the economy (Civardi *et al.*, 2006; Pansini, 2008).

A number of empirical studies have applied SAM multiplier framework to analyse growth and distributive impacts of different government policies (Nseera, 2014; Juana & Mabugu, 2005; Sadoulet & de Janvry, 1995). Though these input-output and social accounting matrix models have been extensively used in the early literature to analyze growth linkages between various economic sectors, especially to investigate the role of agriculture and industry as engines of economic growth (Olbrich & Hassan, 1999; Bautista *et al.*, 2002; Delgado, *et al.*, 1998), however, detailed and effective analysis of land redistribution requires SAM decomposition and structural path framework which captures intersectoral effects (Sadoulet & de Janvry, 1995). This study adopted this framework to analyse the impact of an exogenous shock in the agricultural sector on the income of poor households in South Africa.

An explanation of how the social accounting multiplier analysis can be applied to analyse the economy-wide impacts of land redistribution focusing mainly on the impacts on sectorial output, value added and household income distribution in South Africa as illustrated by the SAM structure in table 1.

**Table 1.***The basic structure of the SAM*

	Act1	Act2	Com1	Com2	factors	h/holds	total
Act1			S <sub>11</sub>	S <sub>11</sub>			X <sub>1</sub>
Act2			S <sub>21</sub>	S <sub>22</sub>			X <sub>2</sub>
Com1	Z <sub>11</sub>	Z <sub>11</sub>				C <sub>1</sub>	S <sub>1</sub>
Com2	Z <sub>21</sub>	Z <sub>22</sub>				C <sub>2</sub>	S <sub>2</sub>
factors	v <sub>1</sub>	v <sub>2</sub>					J
h/holds					D		Y-E
Total	X <sub>1</sub>	X <sub>2</sub>	S <sub>1</sub>	S <sub>2</sub>	J	E	

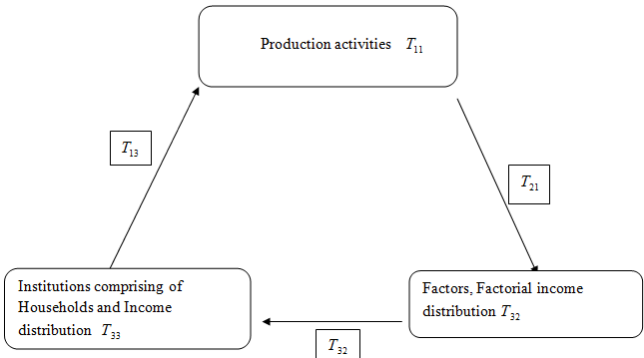
In order to analyse the effects of an exogenous shock in the agricultural sector on the endogenous variables, a SAM system is transformed into an economic model which can useful for simulation and for the purpose of the multiplier model the SAM are designated as endogenous and exogenous accounts as shown in the Table 2.

**Table 2.** SAM: Endogenous and Exogenous Accounts

	Activities	Factors	Households	Exogenous	Total
Activities	$T_{11}$		$T_{13}$	$X_1$	$Y_1$
Factors	$T_{21}$			$X_2$	$Y_2$
Households		$T_{32}$	$T_{33}$	$X_3$	$Y_3$
Exogenous	$I_1$	$I_2$	$I_3$		$\sum I$
Total	$Y_1$	$Y_2$	$Y_3$	$\sum X$	

**Source:** Civardi & Targetti (2006) and Pansini (2008).

The SAM is partitioned into endogenous accounts which include factors, institutions and productions accounts and exogenous accounts which include savings and investment, government and rest of the world. These partitions are represented in terms of matrix as shown in table 2 and these matrices are  $T_{11}$  which represent intermediate input requirements,  $T_{32}$  which captures factorial income distribution and  $T_{33}$  captures inter-household income distribution. The interactions among the different accounts in the SAM which are the production activities, factors and institutions can be represented in term of a triangle in Figure 1.



**Figure 1.** Multiplier process among endogenous accounts

**Source:** Civardi & Targetti, (2006).

Figure 1 represents the mechanisms through which the multiplier process operates as results of different exogenous injections into the economic system (Thorbecke, 2000). These mechanisms are represented as the relationship among the

production activities, institutions and factors which are the endogenous accounts in the model. The production activities generates value added which is allocated as factor income distributed to households and enterprises. These institutions will then spend their income on different commodities generated by the production activities.

The economic model which is representation by the SAM in Table 1 can be translated into a system of linear equations as shown below:

$$S_{11}S_1 + S_{12}S_2 = Z_1 \quad (1)$$

$$S_{21}S_1 + S_{22}S_2 = Z_2 \quad (2)$$

$$A_{11}Z_1 + a_{12}Z_2 + C_1E + JD_1 = S_1 \quad (3)$$

$$A_{12}Z_1 + a_{22}Z_2 + C_2E + JD_2 = S_2 \quad (4)$$

$$v_1Z_1 + v_2Z_2 = J \quad (5)$$

$$hJ = Y \quad (6)$$

Following the methodology by Pyatt (2004), the system of equations (equation 1-6) can be converted into a matrix. The resultant matrix is as follows;

$$\begin{bmatrix} 0 & 0 & s_{11} & s_{12} & 0 & 0 \\ 0 & 0 & s_{21} & s_{22} & 0 & 0 \\ a_{11} & a_{12} & 0 & 0 & 0 & c_1 \\ a_{21} & a_{22} & 0 & 0 & 0 & c_2 \\ v_1 & v_2 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & h & 0 \end{bmatrix} \times \begin{bmatrix} Z_1 \\ Z_2 \\ S_1 \\ S_2 \\ J \\ Y \end{bmatrix} + \begin{bmatrix} 0 \\ 0 \\ D_1 \\ D_2 \\ 0 \\ 0 \end{bmatrix} = \begin{bmatrix} Z_1 \\ Z_2 \\ S_1 \\ S_2 \\ J \\ Y \end{bmatrix}$$

The matrix shows that gross output from the economy can be represented by the product of technical coefficient matrix and output from different sectors of the economy. On the other hand the level of activity in the economy in real terms is determined by the vector of intermediate demand and the total final demand for inputs.

The SAM can be used as the basis for modeling by introducing the matrix of average propensities which will be defined within the framework of the social accounting matrix. If change in exogenous uses (J) can be accommodated by the change in total activity ( $Z^1$ ),

then total income of the endogenous account matrix will be represented the basic materials balance equation specified as:

$$Z^1 = AZ^1 + J \quad (7)$$

Where  $Z^1$  is an  $nx1$  column vector of total sectorial output,  $A$  is an  $n \times n$  matrix of direct technical coefficients for the endogenous factors and  $J$  is an  $nx1$  column vector of final demand. The dimension of the ' $A$ ' matrix coincides with the number of productive sectors. Solving for  $Z^1$  from material balance equation leads to equation 8 below

$$Z^1 = (I - A)^{-1} * J \quad (8)$$

Where ' $I$ ' is the identity matrix and  $(I - A)^{-1}$  represents the Leontief inverse.

The input-output model is concerned with solving for the sectorial output levels ( $Z$ ) that satisfy final demand for those outputs ( $J$ ) given the inter-industry structure of production ( $A$ ). The model is used to determine the production plan that is consistent with a desired final demand vector, given the inter-sectorial transactions matrix ( $A$ ). The equation  $(I-A)^{-1}J=Z^1$  shows the impact of exogenous shocks to the different entries in the social accounting matrix. The above equation can be used to derive various types of multipliers, the most common of which are the production and income multipliers.

The above equation can be reduced to:

$$Z^1 = N^1 J, \text{ where } N^1 = (I - A)^{-1} \quad (9)$$

Equation 9 solves for the equilibrium levels of the endogenous accounts due to an exogenous shock in the elements of the exogenous accounts and the same equation can be used to calculate the endogenous incomes associated with any changes of the total exogenous accounts, given the multiplier matrix. It can also be used to analyze the effects on output arising from

exogenous shocks, such as changes in investment or government expenditure or the rest of the world, that change final demand.

The change in output resulting from redistribution of land can be represented by the equation below:

$$(1 - A_1)^{-1} * J - (1 - A)^{-1} * J = [(1 - A_1) - (1 - A)] = \Delta Z^1 \quad (10)$$

Where  $\Delta Z^1$  represent the change in sectoral output resulting from redistribution and its impact of the technical coefficient matrix.

The SAM multiplier enables the quantification of the different ways in which the impact of the exogenous is distributed across the economy. This multiplier analysis also indicates the effects of an exogenous shock on the distribution of income and sectoral output (Round, 2003). However, to examine the nature of the linkages in the economic system, it is imperative to decompose the SAM multipliers. For a detailed analysis of the intersectoral linkages due to land redistribution in South Africa, the study adopted SAM multiplier decomposition as proposed by Pyatt & Round (2006).

This multiplier decomposition allows the assessment of the linkages between households and different components of the economic system affecting the distribution of income (Civardi, *et al*, 2008). The total multiplier can be decomposed into three components which are the transfer multiplier, the open-loop multiplier and the closed loop multiplier. The transfer multiplier captures the effects on the same set of account, the open-loop multiplier identifies the spill-over effects and the closed loop captures the full circular flow from the exogenous shock into the endogenous accounts. Thus using the multiplicative decomposition proposed by Pyatt & Round (2006), the total multiplier from equation 9 can be rewritten as:

$$(I - A)^{-1} = M_3 M_2 M_1 \quad (11)$$

Where  $(I-A)^{-1}$  represents the total multiplier and  $M_1$  is the transfer multiplier,  $M_2$  is the spill-over effects and  $M_3$  represents the full circular flow.

To derive the multiplier matrix, we first divide elements in each column of define the  $T$  matrix by its column total ( $y$ ) to get average propensities (Round, 2003). The matrix of average propensities which is obtained by dividing each element in the transaction matrix of endogenous account by the corresponding column sum vectors can be represented as:

$$A_n = \begin{vmatrix} A_{11} & 0 & A_{13} \\ A_{21} & 0 & 0 \\ 0 & A_{32} & A_{33} \end{vmatrix}$$

And the diagonal matrices of the average propensities can be represented as:

$$A_0 = \begin{vmatrix} A_{11} & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & A_{33} \end{vmatrix}$$

The multiplier that will capture the transfer elements  $M_1$  will be given by:

$$M_1 = \begin{vmatrix} {}_1M_{11} & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & {}_1M_{33} \end{vmatrix}$$

And the open loop multiplier will be given:

$$M_2 = I + (I - A_0)^{-1} (A_n - A_0) + [(I - A_0)^{-1} (A_n - A_0)]^2 + [(A_n - A_0)(I - A_0)^{-1}]^3$$

$$= \begin{vmatrix} I & {}_2M_{12} & {}_2M_{13} \\ {}_2M_{21} & I & {}_2M_{23} \\ {}_2M_{31} & {}_2M_{32} & I \end{vmatrix}$$

The closed loop multiplier which captures the full circular flow from exogenous shock to endogenous account will be represented by:

$$M_3 = \begin{vmatrix} {}_3M_{11} & 0 & 0 \\ 0 & {}_2M_{22} & 0 \\ 0 & 0 & {}_3M_{33} \end{vmatrix}$$

If we let  $A^*=(I-A_0)^{-1}(A_n-A_0)$ , then the multiplier will be given as  $M=(I-A^*)^{-1}(I+A^*+A^{*2}+A^{*3})(I-A_0)^{-1}$ . As in Pansini (2008), the focus of multiplier decomposition is on household income distribution. From the Table 2, the equation is given by:

$$Y_4 = (M_{33}M_{32}M_{31})x \quad (12)$$

$$Y_4 = M_{31}x_1M_{32}x_2M_{33}x_3 \quad (13)$$

Where  $M_{31} = {}_3M_{32}M_{311}M_{11}$

$$\begin{aligned} M_{32} &= {}_3M_{332}M_{32} \\ M_{33} &= {}_3M_{331}M_{33} \end{aligned}$$

To disentangle the three effects namely the transfer multiplier, open loop and closed loop, we consider the single element  $m_{ij}$  of matrix of the global multipliers. The single element  $m_{ij}$  can be expressed as:

$$m_{ij} = d_i' M_3 M_2 M_1 d_j = i' (r' A s') i \quad (14)$$

Where  $d_i'$  and  $d_j$  are vectors in the  $i$ th element and  $j$ th element which are equal to one and all others are equal to zero (Pyatt & Round, 2006; Pansini, 2008; Civardi & Targetti, 2008). The matrix  $A$  and vectors  $r'$  and  $s'$  are defined as:

$$r' = d_i' M_3 \quad A = M_2 \quad s' = M_1 d_j$$

This implies that each  $m_{ij}$  must be equal to the sum of all elements of an  $r'As'$  type transformation of the matrix  $M_2$  when the vector  $r'$  is formed from the  $i^{\text{th}}$  row of  $M_3$  and the vector  $s$  is formed from the  $j^{\text{th}}$  column of  $M_1$  (Pyatt & Round, 2006). This approach of multiplier approach allows the decomposition of direct-direct effect, indirect-direct effect, direct-indirect effect effects and indirect-indirect effects (Pansini, 2008). In this study,  $i$  represent the poor rural household in South Africa and  $j$  is the agriculture sector, it follows that the element  $m_{ij}$  becomes a sub-matrix  $M_{HA}$  of  $M$  and the element  $m_{ij}$  is given by  $m_{ij} = (d'3M_{HH})2M_{HA}(1M_{AA}d_i)$ .

This approach enables the assessment and identification of microeconomic detail about the nature of the linkages in the economy. In order to capture and assess both the direct and indirect effects of land redistribution on different sectors of the economy which is the main focus of this study, the social accounting multiplier decomposition and structural path analysis were adopted as in Round (2008).

This decomposition shows clearly the way the consequences of an exogenous of in the  $j^{\text{th}}$  activity on the  $i^{\text{th}}$  household. Using the block matrices  $2M_{HA}, 2M_{HF}$  which represent the cross effects and explain how the original injection into the activities/factor accounts effects in the household account (Civardi *et al.* 2008). An injection or a shock in an activity account of the production sector will be directly translated by the  $A$  part of the  $r'As'$  transformation into the income for the endogenous institutions. The main focus of this decomposition is the block matrix  $M_{HA}$ , where the column totals of this matrix indicate the effects of each sector of production on the household account of a shock on the agriculture sector where as the row totals indicate the total effect on each household group due to shock on the agricultural activity account. These column and row totals enable the identification of the four different effect in the single multiplier  $m_{ij}$  can be divided.

The four different effects can be defined mainly as:

- i) Direct-direct effects which represent the direct effect of agricultural land redistribution on the poor household without considering the other indirect effect on other household

categories and is equal to the  $j^{\text{th}}$  element of the column vector of the block matrix.

- ii) Indirect –direct effects. This measures the effect from other production accounts apart from agriculture on the  $i^{\text{th}}$  household group and is calculated as the difference between row totals of the block matrix and the direct-direct effect.
- iii) Direct- indirect effect is the effect from the shock in the agricultural sectors on other household groups. This effect is calculated as the difference between the column totals of the block matrix and the direct-direct effect.
- iv) Indirect-indirect effect. This is the effect from other accounts of the production accounts which are different from the agricultural sector on other household groups which are also different from the  $i^{\text{th}}$  category. The indirect-indirect effect is the difference between the total effects on  $i^{\text{th}}$  household and the direct-direct effect.

Though the multiplier decomposition enables the distribution of the global effects on the endogenous accounts of the SAM into three microscopic effects, the analysis alone do not highlight the paths/channels through which these influence are transmitted and show which path is better than other in transmitting the influences. Based on multiplier decomposition results, the structural path analysis is adopted so as to identify the transmission mechanism of the interactions among different accounts in the SAM.

If we consider every endogenous account in the SAM as the pole and the link between poles as arch( $i,j$ ), then element  $a_{ij}$  in the average expenditure matrix  $A_n$  is considered as the intensity of the arch ( $i,j$ ) which captures the magnitude of the influence transmitted from pole  $i$  to pole  $j$  and the sequence of the different arcs.

- i) Direct influence-this measures the change in income or production of  $j$  induced by a unitary change in  $i$  of all the other poles remaining constant and the direct influence can be measured as:  $P_{(i \rightarrow j)} = A_{ji}$  where  $a_{ij}$  is the  $(j,i)^{\text{th}}$  element of the matrix of average expenditure propensities  $A_n$ . The direct influence along more than one elementary path ( $i \dots j$ ) can be represented as a product of the intensities of the arcs constituting the arc, hence,  $P_{(i \rightarrow j)} = a_{jn} \dots a_{mi}$ . The number of arc

composition will then be identified as the length of path and the path which does not pass more one time through the same pole is called an elementary path while the one whose origin coincides with its pole of destination is the circuit.

- ii) Total influence-given an elementary path  $q=(i.....j)$  with origin  $i$  and destination  $j$ , the total influence will be the influence transmitted from  $i$  to  $j$  along the elementary path  $q$  plus all the indirect effects induced by the circuits adjacent to the same path. Algebraically, the total influence can be represented as:  

$$I_{(i \rightarrow D_p)}^T = I_{(i \rightarrow j)_p}^D M_p$$
Where,  $M_p$  is the path multiplier which measure the extent to which the direct influence along path  $q$  is amplified through the effects of adjacent feedback circuits. Thus, the total effects accumulate the direct effects from an elementary path and the indirect effects from an adjacent circuit.
- iii) Global influence- this influence measures the total influence on income or output of pole  $j$  consequent to an exogenous shock on income or output in pole  $i$  and this global influence captures the reduced form of the SAM model equation  $Z^I = (I-A)^{-1} * J$ . The global influence captures the direct influence transmitted by all the elementary paths linking the two poles which will be under consideration thus the global influence cumulates all the induced and feedback effects resulting from the existence of circuits (Lantner, 1974; Gabon, 1976). The global influence linking any two poles will thus be the sum of the total influences of all elementary paths spanning poles  $i$  and  $j$ , thus the global influence can be represented as:

$$I_{(i \rightarrow j)}^G = m_{a_{ji}} = \sum_{q=1}^n I_{(i \rightarrow j)_p}^T = \sum_{q=n}^n I_{(i \rightarrow j)_p}^D M_p$$

## Simulation technique

The main purpose of this study is to investigate whether redistribution of agricultural land from large commercial farmers to small scale farmers will promote land use social equity. Social equity in this context refers to job creation and income generation

and redistribution in favor of the low-income households. As the SAM entries are in millions on rands and the proposed land redistribution are in physical quantities, the land transfers are first converted into land income (revenue shares). This conversion is essential as transfer of land from commercial farmers to small scale farmers means transfer of land income. The land revenue share are then use to shock the social accounting matrix. This SAM multiplier approach enables the tracking of among demand – driven shocks, economic growth, income generation and distribution. Furthermore a multiplier decomposition analysis was applied to show the distributional mechanism across the economy with the focus on the household component of the global multiplier matrix which are  $M_{31}$ ,  $M_{32}$  and  $M_{33}$ . The multiplier decomposition shows the capacity of an activity to stimulate household income. The study seeks to analyse and assess the direct and indirect effects of land redistribution (which represent a shock in the agriculture sector) on poor household income in South Africa and for this study we assumed a progressive 30 percent land transfer from the large scale to small scale farmers.

## Results and discussion

In this study, the global matrix multiplier which reflects the total effects was decomposed to show how income is distributed across various household groups. The focus of the results from the decomposition was on the household section of the total effect which are  $M_{31}$ ,  $M_{32}$ ,  $M_{33}$ . as shown in Table 3 below.

**Table 3.** Summary of  $M_{31}$ ,  $M_{32}$ ,  $M_{33}$

Household type	$M_{31}$	$M_{32}$	$M_{33}$
hhd1	0.889	0.203	1.095
hhd2	1.839	0.414	1.201
hhd3	3.001	0.626	1.335
hhd4	5.551	1.05	1.63
hhd5	22.683	3.802	3.62
Total	33.963	6.095	8.883
Total average	0.828	1.52	1.7766

**Source:** Authors' computation from South African SAM, 2010.

From Table 3, the income effects on household income due to a shock into the production system as measured by matrix  $M_{31}$

indicates that household income increase by the size of the average multiplier. The results indicates that a shock in the agricultural sector of one unit, has a household income effect 0.828 and of this multiplier most occurs for the richer households (0.553). From these results it is important to note that the rural households benefitted more from most of the agricultural activities.

Matrix  $M_{32}$  measures the impact of an exogenous shock on the agricultural sector on household income which is directed to the factor account and on average an exogenous injection into the factors of production will increase the income especially of the poor household by a multiplier of 1.52 and by 2.3458 total income of the endogenous account. The redistribution of the factor income among different household group which is represented by the matrix  $M_{33}$ , the household income increase by a multiplier of 1.7766. From the redistributive matrix, it can be noted that because of the multiplicative effect due to the movement of income through the economic system, household income increase by a factor greater than one when there is a unit injection on the income of different groups of households as all the elements of the diagonal matrix are greater than one. This more than proportionate income can be explained by the diagonal elements of the  $M_{33}$  matrix which are all greater than one.

### Multiplier decomposition and household income

This section seeks to track the contribution of the direct and indirect effects of a shock in the agriculture sector on the income of rural households in South Africa. In addition the different directions in which the shocks into the agriculture sector operate will be traced and disentangled. The decomposition of the global multiplier matrix will be based on analyzing the elements of  $m_{ij}$  based on the  $r'As'$  type of transformation.

The corresponding element of the global multiplier for a shock in the agriculture sector on poor household income (represented by HHD1 in Table 4) is 0.002884 and this element is decomposed into four effects which are direct-direct effect, direct-indirect effect, indirect-direct effects and indirect- indirect effects as shown in Table 4 below. This decomposition enables the distinguishing of

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the link in an economic system that affects households in South Africa.

**Table 4.** *Decomposition of the global multiplier matrix*

Column j	Row i	Household group	Direct-direct effect	Indirect-direct effect	Total effect for A1	Direct-indirect effect	Indirect-indirect effect	Total effect	multiplier
agric	hhd1	hhd1	0.0087	-0.00587	0.002827	0.00089	-0.00083	0.00006	0.0028874
agric	hhd1	hhd2	0.0001	-0.00008	0.000022	0.00949	-0.00662	0.00287	0.0028874
agric	hhd1	hhd3	0.0001	-0.0006	0.000023	0.00950	-0.00664	0.00286	0.0028874
agric	hhd1	hhd4	-0.000	0.00007	0.000022	0.00964	-0.00677	0.00286	0.0028874
agric	hhd1	hhd5	-0.001	0.00110	-0.000001	0.0107	-0.00781	0.00289	0.0028874

**Source:** Authors' computation from South African SAM, 2010.

From the Table 4, it can be seen that the poor household benefits more compared to other household groups due to an exogenous shock as the direct effect from an exogenous injection or shock in the agriculture sector on the poor household income represents about 98% of the total effect on household. The direct effect of agriculture on the poor household are higher (0.0087) compared to other different categories of households indicating a strong link between agriculture and the rural poor. However, the indirect-direct effect which captures the effects from other sector on poor household welfare is the minimum for the poor household compared to other groups. The significant direct-direct effect on poor households reflects the poverty incidence of rural household who relies more on subsistence agriculture practices for survival.

For the rich households who are mostly urban household the direct effect from agriculture is minimum implying that these households benefit from agriculture through mainly the indirect channel (which is about 98% of the total effects). In the case of South Africa where agriculture contributes less than 4% of total GDP (Economic Research Division, SA, 2010), we expected a minimal direct effect on rich household income from an exogenous shock in the agriculture sector. The shock in the agriculture sector generates intermediates demand for agriculture products which in turn generates income for the rich households.

The decomposition has shown that an injection in agricultural sector in South Africa will have different results for different households groups. From the results poor households received higher direct effects from the agriculture compared to the richer

households however the indirect effects are much higher for the richer households. This indicates a strong link between poor households and agriculture but the link is much weak with the richer households. The results might be that poor households depends more on agriculture for the livelihoods compared to the richer households. These results implies that stimulus of the agricultural sector will benefit the poor households compared to the richer which might be a good policy for rural poverty reduction signifying the important role of agriculture for rural household welfare.

Structural path analysis

The structural path analysis helps us to identify the most important channels and paths within the economic system that will affect household income. In addition the analysis enables the identification of the sectors and activities that benefits from an exogenous shock in the agriculture sector. In this study, the origin is the agriculture sector where the shock occurs and in this case the shock is the land redistribution which will affect the land income of households and the destination is the unskilled households which mostly work in the agriculture sector and are viewed as the intended beneficiaries of the land redistribution exercise.

Table 5. Structural Path Analysis

Origin Destination		Global	Path	Direct	Path	Total	Proportion
		Influenc		Influenc	Multiplie	Influenc	
AGRI	HHD1	0.02582	AGRI, FLABLS, HHD1	0.00688	1.21498	0.00836	32.39
			AGRI, FCAP, ENT, HHD1	0.0007	1.46785	0.00103	3.98
			AGRI, FLABSK, HHD1	0.00062	1.24171	0.00077	3
			AGRI, FOOD, FLABLS, HDD1	0.00034	1.45392	0.00049	1.9
			AGRI, FOOD, TRAD, FLABLS	0.00017	1.76084	0.00031	1.19
			AGRI, TRAD, FLABSK, HHD1	0.00012	1.53034	0.00018	0.70
			AGRI, TRAN, FLABSK, HHD1	0.00012	1.40082	0.00016	0.64
			AGRI, TRAN, TRAD, FLABLS	0.0001	1.65305	0.00016	0.62
			AGRI, FOOD, FLABSK, HHD1	0.00008	1.4916	0.00012	0.15
			AGRI, FOOD, OSRV, FLABL	0.00004	1.64888	0.00007	0.28
			AGRI, OMIN, FLABLS, HHD	0.00005	1.26301	0.00007	0.25
			AGRI, FSRV, OSRV, FLABLS	0.00003	2.18007	0.00006	0.24
			AGRI, FLABHI, HHD1	0.00004	1.28871	0.00005	0.20
			AGRI, FOOD, TRAD, FLABLS	0.00003	1.80214	0.00005	0.18
			AGRI, FOOD, TRAN, FLABL	0.00003	1.63094	0.00004	0.12
			AGRI, FOOD, FCAP, ENT, HHD1	0.00002	1.7505	0.00003	0.12
			AGRI, OMIN, FCAP, ENT, HHD1	0.00001	1.51334	0.00001	0.03
			AGRI, OSRV, FLABSK, HHD	0.00001	1.42511	0.00001	0.03

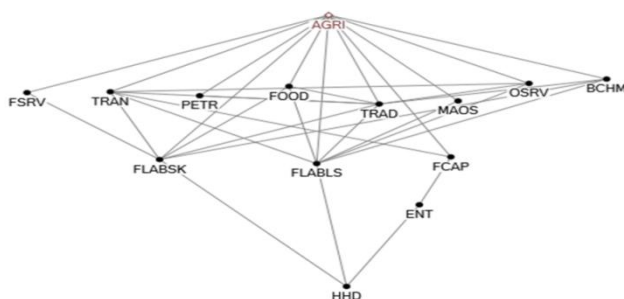
The study chose a few sectors and factors which are mostly and directly linked to the agricultural sector and rural household income. The results of the structural path analysis are shown in Table 5 below.

Table 5 shows the various channels through which the stimulation of the agriculture sector will impact on the income of poor households represented by *HHD1*. The results show that the global influence of a shock in the agricultural sector on household income is 0.02582 (which is column three from Table 5). This global influence implies that an injection in the production activity in this case agriculture yields a 2, 58 % increases in poor household income. However, there are no direct linkages between the income of poor households and agriculture hence the shock is transmitted via intermediate poles for example trade. A significant part of the global influence is transmitted through indirect channels especially the path of returns to factors of production. Of importance is that the food sector and trade sector plays a significant part in transmitting the influence of the shock in the agriculture sector to the poor household income.

The direct influence captures the change in poor household income induced by changes in the agricultural sector when all the other poles are assumed constant and from the results proved that the direct influence is minimal with the maximum influence being less than 1%. This implies that the agricultural influence on the income is necessarily transmitted via other poles/paths and not along the elementary direct path. The other paths are capturing the indirect influence imputed in the elementary path (Lantner, 1974). The amplifying actions of circuits which vary with the length of the path are powerful as indicated by path multipliers which are all greater than 1.2.

As indicated in the results, rural households received about 46.56% of their income from unskilled labour with a total of 13 paths passing through that arc of food sector and skilled labour contributing 5.71% of the income for the rural households with only 6 paths passing through that arc. Of importance to this study is the proportion of income for the rural households coming from the agriculture sector and the results showed that the proportion of income from unskilled labour from agriculture is 32.39% with only

a single arc. This implies that the unskilled labour receive their income directly from agriculture and not via other sectors. The global influence on rural households from a shock in agriculture is 0.2582 and with the path of agric-flabsl-hhd1 as the most important path of the rural household income multiplier. This implies that an exogenous shock into the agricultural sector will affect household income mainly through affecting the returns to factors of production. The returns to employment for the unskilled labour are the main factor affected by the shock in the agriculture sector as the majority of them are employed in the agricultural sector. Though the unskilled households get most of the income from agricultural sector, path analysis help establish the other sectorial sources of income and employment following the shock in the agricultural sector.



**Figure 2.** *Structural path to low income households*

Figure 2 shows the different and most important path that connects the agriculture sector and low income households which in this case are the intended beneficiaries of the land redistribution exercise in South Africa. As shown in Figure 2, the agriculture is connected to almost all the sectors even though the strength of the connections is almost the same. The existence of both forward and backward linkages among sectors in the economy may be the explanation of these connections. The existence of these connections implies that any exogenous movement in the agricultural sector will affect the whole economy through the different path that influences this arc.

As shown on Figure 2, skilled labor received their income from six of the sectors which include financial services, transport, trade

sector, petroleum products, manufacturing services and food processing. This might be because the bulk of skilled personal are employed in this sectors. The least connected factor of production is capital which only receives its income directly from agriculture and the transport sector. Low income households receive the income mostly from low skilled workers and less from capital. The low income households are mostly connected with low skilled labour.

## Conclusions

This study adopted a SAM multiplier decomposition and structural path analysis to analyse and track the channels through which an exogenous shock in agriculture will affect the income poor households. This approach enables the disentangling different effects (both direct and indirect effects) of an exogenous shock on the agricultural sector in South Africa. From the study different set of results emerged which have different policy implications for the government.

The results show that although the contribution of the agriculture sector to the overall economy which is only 4% of the GDP in South Africa, the sector influence household income through different paths and sectors. This can be explained by the existence of strong backwards and forwards linkages in the economy. Thus the proposed land redistribution will significantly alter the production structure of the agriculture sector which means that the income of the households will be altered.

The results also show that land income transfer increases the income of poor households and these results also identified the different path through which income is distributed from the origin (agriculture sector) to the destination( poor household income). These results can be very important in articulation of the impact of land redistribution policy of poverty and income distribution; however, more emphasis can be achieved through the relaxation of the assumption of linearity and fixed prices. This will allow for the analysis of long run and redistributive effects of land redistribution policy in South Africa. This analysis then requires the application of a dynamic computable general equilibrium micro simulation model.

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# 3

## Accounting variables and differentiation of stock exchange prices in Sub-Saharan Africa

Elie Ngongang <sup>†</sup>

### Introduction

Accounting variables constitute some of the elements which the great majority of firms must ensure. They are used in the balance sheet, the accounts of the results and the appendices. They respect the regulatory norms and do so at the pace of legal publication. The stock market share corresponds to the value of a security that is determined when supply meets demand in the stock exchange market at a given time  $t$ . It may be prone to more or less strong fluctuations, even in the course of the day, and particularly for financial assets (such as shares, CFD type products, etc.). Accounting models arouse an interest which deserves to revisit the literature. The shareholders' register goes from the referential theoretical model to practical models by passing by its empirical variants. According to Kobena Ahukari, Vijav Job and Bruce J. McConomy (KVB) (2003), models make it

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possible to show the pertinence of diverse accounting variables for the purpose of explaining the deviations observed between the price of a share and its accounting value.

Our objective in this paper is to evaluate the pertinence of various accounting variables, in addition to the book value of the share, for the purpose of explaining the range of share prices observed in the context of Sub-Saharan African countries. In other words, we would like to determine the explanatory power of models based on profits or residual results; to put the methods or models in order according to their pertinence or aptitude to explain the price of shares<sup>2</sup>; to compare the explanatory power of empirical models with the power of theoretical models; to estimate the importance of accounting variables in the different models under study; and to determine the robustness of these models using the data of Sub-Saharan African countries over the period 2011-2018.

One question emerges from these developments, namely, in the context of Sub-Saharan Africa, what are the share evaluation models based on accounting variables likely to prove (raise or show) the validity of diverse accounting variables for the purpose of explaining, in cross-section, the deviations observed between the price of a share and its accounting value? In other words, is the pertinence inherent in an accounting measure linked to the change in the market value of the firm in the Sub-Saharan African context?

One may consider several methods to answer these questions. One possible method would consist of carrying out tests concerning the pertinence of evaluation of value (in the sense of determining whether the value generated by the model can be compared with the “real” value of the firm such as it is approximated through its share price). However interesting it may be, this method has a limit. It restricts the steps to be taken for answering the question rather on the eventual significant link between the market value of the security and the level of an accounting measure. It is for this reason that one may retain a modelling that makes it possible to perform tests concerning the pertinence of the value of accounting variables (in the sense that

<sup>2</sup> Liu *et al.*, (2002) compare rival evaluation models in depth.

their cross-sectional levels are linked to the share price). The present study is in line with this perspective.

The interest of this study is double: firstly, this is about innovating our methods to study the importance (significance) of variables and to classify the models according to their performances, and to estimate the ability of models to predict the value of shares. Secondly, we need to check the explanatory superiority of rival models (Vuong, 1989) and the robustness of our results (see Brown *et al.*, 1999), and then to find out whether in the framework of Sub-Saharan Africa the accounting value of a share, the capital invested, and the residual result are the variables most linked to the share price (Ohlson, 1995). To show that the dividend and the capital invested matter more than profits to establish the stock market prices of low profits firms, and that the models admitted in the courts of Justice, where the variables specific to firms are put into perspective in their sector, also perform well.

The first part of our model characterizes the models at issue and the description of the methodology, and then the second part presents and analyzes our results.

## Characterization and methodology of the study

### Families of models

The models for promoting the rise in value of a share through accounting information (accounting variable) are of three types: (1) theoretical models of the EBO type (Edwards & Bell, 1961, and Ohlson, 1995); (2) their empirical variants, and (3) the models of practitioners (based on ratios) which the analysts use for the firms listed or accepted in the Courts of Justice to promote the rise in the share values of private firms. We retain 9 models, including all the definitions used.

#### *Theoretical models of the EBO type*

Ohlson (1995), and Ohlson & Feltham (1995) rely on Edwards & Bell (1961) to consider the current value of the dividends expected as a foundation for evaluating the share. They establish links with accounting variables. They find that the accounting value of a share, corrected by the current value of future residual results, is equal to the share price.

According to Ohlson (1995), the next residual result  $R_{t+1}$  which is conditional upon the extra-information  $V_t$  excluded from  $R_t$  and subjected to errors  $\varepsilon_1$  and  $\varepsilon_2$ , corresponds to the following autoregressive process:

$$R_{t+1} = wR_t + V_t + \varepsilon_{1,t+1} \quad (1)$$

$$V_{t+1} = \delta V_t + \varepsilon_{2,t+1} \quad (2)$$

Where  $w$  and  $\delta$  are non-negative fixed persistence parameters below 1 ( $w$  and  $\delta$  are higher than zero and lower than 1).

Dechow *et al.*, (1999) show several variants of Ohlson (1995), including the one where the share price  $P_t$  expresses as follows by correcting its accounting value  $C_t$  by the  $R_t$ ,  $V_t$  and  $\varepsilon_t$  as already defined:

$$P_t = C_t + a_1 R_t + a_2 V_t + \varepsilon_t \quad (3)$$

Through regressions reuniting cross sections and series, they feel that  $w = 0.62$  and  $\delta = 0.32$ , according to equations A1 and A2. With these persistence parameters we can estimate the  $a_i$ 's ( $i=1, \dots, t$ ) of Ohlson (1995), according to Equation A3. They consider that the model based on the residual result proves to be useful to fit with empirical research.

Next, they show that if one fails to take account of the extra-information  $V_t$  so that  $R_{t+1}$  does depend only on its current level  $R_t$  (normal evolution around the mean, according to the normal law =  $R_t$  is subjected to a central tendency at its average rhythm)<sup>3</sup>, then the future residual result equals to  $w$  times its current level ( $w$  being considered as the unconditional estimate of the persistence). Because of this, we get the reference model 1 of

<sup>3</sup> Technically speaking, we assume like Kobena *et al.*, (2003) that  $R_t$  follows a central tendency (its average rhythm).

Ohlson (1995) where the share price is explained by the accounting value and its current residual result, which is written as follows:

$$P_{it} = d_0 + d_1 R_{it} + d_2 C_{it} + \varepsilon_{it} \quad (4)$$

Similarly, we deduce model 5 where we carry out a linear combination of the accounting value, the current residual result and the extra information, where  $w$  and  $\delta$  measure the persistences concerned. This model is written as follows:

$$P_{it} = e_0 + e_1 R_{it} + e_2 C_{it} + e_3 I_{it} + \varepsilon_{it} \quad (5)$$

Dechow *et al.*, (1999) place the extra information in the forecasts of analysts. In the present study, we place it like Kobana *et al.*, (2003) in the invested capital, a move which enlarges the firms' analytical field in the context of the empirical models they create.

#### *Empirical models resulting from Ohlson (1995)*

Rees (1997) carries out a linear combination of the announced current profits ( $B_t$ ) and of the accounting value ( $C_t$ ) to express the price of a share in the following manner:

$$P_t = a_0 + a_1 B_t + a_2 C_t + \varepsilon_t \quad (6)$$

Schematically, he hypothesizes constant growth for the variables and a linear relationship between their respective multiples. In diverse variants, invested capital (I) is sometimes integrated, whereas one may substitute undistributed profits (UDPs) and the dividend (D) for Profits (Ps) insofar as UDPSs + D = Ps.

We may note it in the following equations of variances 2, 3 and 4:

$$P_{it} = a_1 + a_1 B_{it} + a_2 C_{it} + \varepsilon_{it} - (EBO.de.base^{**}) \quad 2$$

$$P_{it} = b_0 + b_1 BNR_{it} + b_2 D_{it} + b_3 C_{it} + \varepsilon_{it} \quad 3$$

$$P_{it} = c_0 + c_1 BNR_{it} + c_2 D_{it} + c_3 I_{it} + c_4 C_{it} + \varepsilon_{it} \quad 4$$

In other similar tests, Amir & Lev (1996), Collins *et al.*, (1997), Costijo *et al.*, (2009), Tiras & Brown (1998) add fundamental variables to the basic EBO expression. Maydew (1993) finds that by making the rate vary according to the firm, the basic model is not given more explanatory power insofar the authors omit conversion to current value.

The works of Dicitrich *et al.*, (1997), Lev & Schipper (1999), and Lev & Zarowin (1999) evaluate the pertinence of accounting variables in explaining stock market yields. According to the works of Dechow *et al.*, (1999), with a single rate of conversion into current of 12% and a persistence estimated at  $w = 0.52$ , the differentiable evaluation coefficients of the Ohlson model are 1.38 for profits and for the accounting value of the share, and 3.9 and 0.4 respectively by regression. Kobana *et al.*, (2003) find 2.7 for profits and 0.81 for the accounting value.

Do these empirical results effectively fit into the practitioners approach?

### *Models of practitioners*

In North America, some models accepted in the courts of justice, and or by practitioners who carry out analyses, rely on a practice with a less evident theoretical basis. According to Kobana *et al.*, (2003), private individuals and analysts estimate the share price ( $p$ ) through a ratio, or a multiple, sustainable in their eyes, the accounting measures per share: Profit ( $B$ ), Sales ( $V$ ), accounting price ( $C$ ), and etc., hence the well-known ratios, such as  $P/B$ ,  $P/V$  and  $P/C$ . The practitioner Leibowitz (1997) agrees that  $P/V$ , the profit margin, constitutes a significant evaluation factor (see Equation 6 following), for the ability to realize positive margins and to enlarge its markets is a guarantee of growth in sales and wealth. This is about a practitioner's explaining the ratio which is written in the form:

$$(P/V)_{it} = c_0 + \lambda_1 B_{it} + \lambda_2 G_{it} + \lambda_3 MB_{it} + \lambda_4 MB_{it} + \lambda_5 (D/B)_{it} + \varepsilon_{it} \quad (6)$$

Penman (1996) models an explanation of the ratio  $P/C$  by combining it with the evaluation framework of Ohlson (1995).

As to Bhojraj & Lee (2002), they use the ratios P/C and (VDF)/V (which is equal to (the value of the firm = debt + (equity capital)/sales) to determine the effectiveness for selecting comparable firms.

Analysis through P/C aims to establish the market bonus justifiable for the share relative to its accounting value. Damodaran (1994, 1996) estimates the expected P/C or P/V as a function of fundamental variables such as the profit margin, the growth rate, the yield per share, the beta, the dividend fraction of profits (see Equation 6 above and Equation 7 below) :

$$(P/C)_{it} = g_0 + g_1 B_{it} + g_2 G_{it} + g_3 RCP_{it}^+ + g_4 RCP_{it}^- + g_5 (D/B)_{it} + \varepsilon_{it} \quad (7)$$

For econometric reasons, it is difficult as already emphasized by Kobana (2003), Tiras *et al.*, (2008), Portier *et al.*, (2014), Ciftci *et al.*, (2014) and Beldi *et al.*, (2010) to obtain stable estimates of his model of the P/B (prices/Profits) ratio. His cross-sectional regression which explains the ratio P/V (prices/sales) of firms in the United States in 1995, reveals significant coefficients and an  $R^2 = 77\%$ . For the ratio P/C (price/Accounting value), he obtains coefficients of determination  $R^2$  ranging from 85% to 90 % with data for the period 1987-1991. Hence our adoption like Kobana *et al.*, (2003) (it approach), to test in Sub-Saharan Africa, models such as 6 and 7 which explain the ratios P/V and P/C.

The North American courts generally accept the so-called comparative method, or of comparables, through which the private firm to be evaluated is given the value of a comparable open firm of the same sector. Hickman & Petry (1990), Beatty *et al.*, (1999), evaluate models which have served in the courts of justice during the affairs of public notaries, as well as models based on dividends converted into current value.

In the Bader affair for instance, the share is accepted or given priority at the end of the financial year (P) as a function of the product of its corresponding profit (B) times the average sectoral P/B, of its dividend (D) converted into the yield in sectoral dividend (RDS) and its accounting value (C). Hence model 8 below:

$$P_{it} = \mu_0 + \mu_1(B_{it})(P/B)_s + \mu_2(D_{it}/RDS) + \mu_3(C_{it}) + \varepsilon_{it} \quad (8)$$

According to Beatty *et al.*, (1999), the judge points out that the profit and dividend potential is more important than the accounting value C. In the Central Trust affair and according to model 9 below:

$$P_{it} = q_0 + q_1(B_{it}^*)^*(P/B)_s + q_2(D_{it}/RDS) + q_3(C_{it})(P/C)_s + \varepsilon_{it} \quad (9)$$

The same values apply (or intervene), except that the accounting value C makes room for product  $c(P/C)_s$  and finds itself corrected according to the membership sector s.

The judge felt that in the evaluation of private firms, one should consider the accounting value, the profit, the yield in dividends and the price/ sales ratio, all this relative to the norms of the sector. According to Hickman & Petry (1990), the formulas accepted in the courts perform better than the models based on a dividend converted into current value. In these models we weight three price estimates apart from a constant, to explain the “true” value of the share, such as in model 8 above: (1) its accounting value; (2) the price justified according to the average return on dividends in the sector; and (3) the price adjusted for sectoral profits. In these cases, we should have high  $R^2$  (greater than 60% of the cases), between other good indices.

Comparison with models with a unique base of dividends converted to current value is bound to be unjust. As to Beatty *et al.*, (1999) feel that the values attributed by the judges are unbiased on the average.

## Methodology

We present the approach adopted on the one hand and the application of statistical data on the other.

## The approach adopted

From this abundant literature on the modelling of share prices based on accounting variables, we retain 9 models of 3 rival types: theoretical, empirical and practical. Our choice is justified by the urgency of incorporating: the theoretical reference of the EBO type (a basis of comparisons coming from Ohlson (1995) in a version with 2 explanatory variables); empirical (models 2 to 5) through which one may measure the explanatory contribution of complementary accounting variables (for example : dividend and invested capital); and the models of practitioners (models 6 to 9, in order to discover the empirical advantages which permit the explanation, the durable adoption among the analysts and in rights in North America and in Europe, and to estimate if they may be transposed with success into Sub-Saharan Africa. Finally, using 9 rival models with the same data makes the results more comparable, and not more convincing.

The models used comprise, the norm according to Green *et al.*, (1996); Rees, (1997); Kobana *et al.*, (2003), etc., a constant in order to compensate for specification errors if need be, including the omission of variables (let us note, for instance, the possible distortion of the coefficients of models 1 to 3, given the omission of the invested capital variable (I). Similarly, since some of the Ohlson variants (1995) contain the variable extra-information, the list of omitted variables can only be very long.

Our tests here concern the pertinence of the value of accounting variables insofar as their cross-sectional levels are linked to the share price and the evaluation of the pertinence.

The evaluation of the pertinence tests requires more than identifying the generative factors of value, but also their attentive combinations. For instance, Liu *et al.*, (2002) perform tests with 17 models which they evaluate in terms of error terms.

As far as robustness tests are concerned, we have resorted to Vuong (1989) and Kobana *et al.*, (2003) who have shown how one can compare models by pair, even if one of them, the other or both are badly specified.

All of our statistics are adjusted for possible heterovariance following White (1980). Next, we assess the explanatory contribution (EC) of a given variable according to its share of the

total variance it explains Pratt (1987), Thomas & Zumbo (1996) and Thomas *et al.*, (1988).

The measure proportional to the coefficient of determination  $R^2$  is expressed by  $AE = \frac{\beta \rho}{R^2}$ , where  $\beta$  is the standardized coefficient of the variable, and  $\rho$  the coefficient of correlation with the dependent variable.

To check or judge whether the equations we use for estimation “predict” efficiently well outside the sample of the same population, we adopt the transversal validity measure of Stein (justified by Stevens, 1992), which is written as follows:

$$s = \hat{\rho}^2 = 1 - \left[ \frac{(N-1)}{(N-k-1)} \right] \left[ \frac{(N-2)}{(N-k-2)} \right] \left[ \frac{(N+1/N)(1-R^2)}{1} \right] \quad (10)$$

And yet since N is high relative to k;  $S \approx R^2$ , and for this reason, S becomes superfluous. N= sample size, and k the number of explanatory variables.

## Our statistical data

We used the synthesized data of several Sub-Saharan African countries (notably, of central Africa, of the West and of Nigeria etc.) which provide us with five annual regressions from 2011 to 2018 for each model. The number of firms quoted in Nigeria, Ghana, West Africa, and Central Africa goes from 57 in 2011 to 128 in 2018, for a total of 588 firms-years (see Table 1). However these firms do not take into account: (1) the mines whose value stands more for their ore reserves (more important in Sub-Saharan Africa) than for accounting variables; (2) public services and financial institutions, due to their quite special relationships with accounting values (Rees, 1997; Kobana *et al.*, 2003; Fama & French, 1993; 2012; 2017; Sean *et al.*, 2014); (3) the small firms with stock exchange prices lower than 500 CFAF at the end of financial years, with incomes lower than 10 millions CFAF and with total assets inferior to 25 millions CFAF (in constant CFAF of 2010); and (4) firms with missing levels of the end of the year in stock guide (1998) under diverse reasons (monetary flows, profit, dividend, debt, investment, accounting value and stock exchange prices).

**Table 1.** *Synthetic Distribution of the Sample of all the Stock Exchanges Considered in Su-Saharan Africa (2011 - 2018)*

Years	2011	2012	2013	2014	2015	2016	2017	2018	Total
Sectors									
Oil and gas	4	7	8	12	17	20	26	29	123
Forestry products	24	2	3	3	4	5	7	9	35
Consumption goods	4	5	6	7	9	12	16	18	77
Industrial products	8	11	13	18	23	28	31	34	166
Transports	1	1	2	2	3	4	6	7	26
Telecommunications	3	3	4	5	7	9	11	14	56
Trade	5	7	7	8	10	12	17	21	87
Conglomerates	1	1	1	1	2	3	4	5	18
Total	28	37	44	56	75	93	118	137	588

**Sources:** Syntheses of data from the BEAC, BCEAO, Eurostat (2010-2018).

# Presentation and analysis of the results

## Results

The regressions of our models 1 to 9 are analyzed by insisting on the explanatory contribution (EC) of each variable and of their set through the coefficients of determination (  $R^2_{aj}$  ) observed. Comparisons are easier insofar as 7 models over 9 have the stock exchange price of the firm as a dependent variable. Our main results are given in Tables 2 and 3 below.

**Table 2.** *Tests of Regressions (1) and (2)*

PART A-Referential model of Ohlson (2012)								
(1) $P_{it} = a_0 + a_1R_{it} + a_2C_{it} + \varepsilon_{it}$								
	$a_0$	t	$a_1$	t	$a_2$	t	$R^2$ adjusted	n
Global Sample	3.25	(15.1)	3.03	(10.66)	1.12	(30.11)	0.63	411
2011	2.69	(7.09)	1.98	(4.65)	1.13	(13.21)	0.64	20
2012	4.79	(7.05)	2.55	(5.45)	1.02	(16.1)	0.56	26
2013	2.70	(7.27)	2.24	(5.70)	1.06	(15.57)	0.69	31
2014	3.19	(12.00)	2.26	(9.57)	1.09	(29.11)	0.62	39
2015	4.57	(6.23)	3.12	(4.35)	1.18	(14.40)	0.67	53
2016	2.64	(8.00)	3.16	(4.40)	1.08	(9.62)	0.54	65
2017	3.10	(9.72)	1.61	(3.38)	1.019	(18.03)	0.59	87
2018	2.94	(8.66)	4.08	(5.92)	1.3	(19.13)	0.65	96
PART B- Basic EBO model								
(2) $P_{it} = b_0 + b_1B_{it} + b_2C_{it} + \varepsilon_{it}$								
	$b_0$	t	$b_1$	t	$b_2$	t	$R^2$ adjusted	n
Global Sample	3.52	(24.05)	2.78	(13.60)	0.83	(26.30)	0.58	588
2011	2.99	(10.00)	2.22	(5.30)	0.76	(11.78)	0.59	28

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2012	3.04	(12.50)	2.88	(6.00)	0.89	(11.80)	0.60	37
2013	3.07	(8.75)	2.59	(7.86)	0.73	(10.13)	0.65	45
2014	3.71	(11.37)	1.90	(4.46)	0.75	(10.69)	0.51	56
2015	2.78	(12.40)	4.11	(9.26)	0.86	(13.39)	0.61	75
2016	3.06	(8.76)	2.79	(7.11)	0.73	(10.41)	0.64	93
2017	3.74	(11.36)	1.89	(4.44)	0.77	(10.70)	0.53	118
2018	3.61	(11.50)	3.99	(8.25)	0.84	(12.31)	0.61	137

**Sources:** Results obtained from estimated equations.

### *Models 1 to 2*

Model 1 of Ohlson (1995) requires the expensive calculation of the residual result (R), insofar as the latter must capture the future surperformance of the security. The basic EBO model (2) substitutes from it an available variable, net profit B, hence the greatest frequency of the tests of (2). If we compare the PARTs A and B of Table 3, we note that at each year (or globally):

- The  $R^2_s$  of Equation 1 in general exceed the  $R^2$  of (2);
- The coefficients Equation 1 are significant everywhere, even with 30 % less cases (n = 411 versus 588) in the regressions, in spite of the missing data (unavailable with precision) to calculate some Rs.

Model (1) proves to be logically superior to (2), which implies that the residual result (R) matters more in the explanation of the share price. In addition, as predicted In addition, as predicted all the coefficients are positive and relatively stable from one annual section to another. In terms of explanatory contribution, we can establish that about 3/4<sup>th</sup> of them come from the accounting value C and the rest from profits B.

Let us also note that the coefficients of Equation (2) may be compared to those of studies carried out in the Canadian and American contexts. For example, we obtain  $a_1 = 2.78$  and  $a_2 = 0.83$  against 2.70 and 0.81 for the study of Kobana *et al.*, (2003) (Canada), and 3.44 and 0.92 of Collins *et al.*, (1997) (United States), respectively for the periods 1983-93 and 1992-1996. However, the results for Great Britain of Rees *et al.*, (1997), differ from the results ( $a_1 = 4.05$  et  $a_2 = 0.57$ ), Which may show that in Great Britain, there is a tendency to focus more on B than on C, and this all the more because we use the overvalue in charge, whereas in Sub-Saharan Africa by going up to 2016, it is redeemed over almost 30 years. By

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and large, model (2) which is the basic EBO model, explains 58% ( $R_{aj}^2 = 0.58$ ) of the variance in the stock market prices  $P$ , the field of the annual  $R_{aj}^2$ , going from 51% to 65%, against 56% to 69% for model (1).

For the rest of our analysis, given the stability of annual results, we examine global results only.

**Table 3. Results of Global Regressions (Sub-Saharan Africa) 2011-2018.**

PART A : Model (1) to (5) (variance and EBO type)										
Model	constant	Residual result $R_{it}$	Profit share $B_{it}$	Not distributed profit $BNR_{it}$	Dividend $D_{it}$	Invested capital $I_{it}$	Accountin g value $C_{it}$	N cases (Firms)	$R_{aj}^2$	Rang
	(stat-t)	(stat-t) AE	(stat-t) AE	(stat-t) AE	(stat-t) AE	(stat-t) AE	(stat-t) AE			
$P_{it} =$	3.36 (15.07)	+2.48 ( $R$ ) (12.87) 3.7%					+ 1.44 ( $C$ ) (37.24) 98.7%	411	0.63	3
$P_{it} = P_{it} =$	4.19 (27.41)		+2.91 ( $B$ ) (13.88) 31.2%				+ 0.9 ( $C$ ) (27.11) 72.62%	588	0.585	7
$P_{it} = P_{it} =$	4.37 (26.78)			+2.5 ( $BNR$ ) (14.33) 19.7%	+6.01 ( $D$ ) (9.47) 14.2%		+ 0.81 ( $C$ ) (24.52) 69.4%	588	0.601	5
$P_{it} =$	4.33 (23.67)			+2.4 4 ( $BNR$ ) (13.32) 18.1%	+4.7 ( $D$ ) (9.77) 12.2 %	+ 0.41 ( $I$ ) (24.16) 63.8%	0.75 ( $C$ ) (25.20) 63.8%	399	0.627	2
$P_{it} =$	4.04 (14.07)	+3.2 ( $R$ ) (10.47) 3.5%				0.5 ( $I$ ) (7.18) 12.6%	11.04 ( $C$ ) (35.3) 87%	411	0.642	1

**PART B : Models admitted in court (with  $P$  as a dependent variable)**

(8) $P_{it} =$ Bader affair	3.78 (26.54)	+ 0.21 ( $B_{it} (P / B_{it})$ ) (12.36) 21.3%	+ 0.03 ( $D_{it} / RDS$ ) (3.02) 4.01%	+ 0.92 $C_{it}$ (28.88) 78.6%	576	0.591	6
(9) $P_{it} =$ Central- trust- Affair	3.62 (26.61)	+ 0.11 ( $B_{it} (P / B_{it})$ ) (12.15) 19.4%	+033 ( $D_{it} / RDS$ ) (3.27) 4.2%	+ 0.522 ( $C_{it} (P / C_{it})$ ) (27.83) 80%	576	0.64	4

**PART C : Models with Ratios**

(6) $(P/V)_{it} =$	0.70 (4.21)	- 0.435 $B_{it}$ (- 2.17) 0.1%	+ 0.07 $C_{it}$ (0.78) 0.3%	+ 16.16 $MB_{it}^+$ (99.98) 29.3 %	- 8.14 $MB_{it}^-$ (-7.6) 72.6%	- 0.009 ( $D/B_{it}$ ) (- 2.41) 0.01%	77.1	0.539
(7) $(P/C)_{it} =$	2.23 (7.51)	-0.031 $B_{it}$ (-0.14) 9.1%	+0.081 $C_{it}$ (0.89) 3.1%	+6.18 $RCP_{it}^+$ (9.98) 86.2%	-0.98 $RCP_{it}^-$ (-4.24) 13.12%	+0.004 ( $D/B_{it}$ ) (2.01) 0.1%	79.3	0.191

**Sources:** Results obtained from estimated equations.

*The variants of the Ohlson and EBO types*

Two aspects are considered here:

- First, if we add invested capital (I) to the residual result (R) and to the accounting value (C) of the classical model (1) of Ohlson, we compose its variant "CRI" as in model (5) above. We know that the Ohlson model constitutes the residual variant of the standard EBO model where profits find themselves replaced by R.

- Then, from this standard model, or "CB" model (with its explanatory variables C and B), we can substitute BNR (=N) and the dividend (D) for B and express model 3) also called "CDN", or enlarged EBO, whereas by adding I to the latter, we establish model (4), also called "CDNI" or over-enlarged EBO.

To sum up, we obtain the following equivalent applications which are based both on the relationships between models and on the symbols of their explanatory variables, notably:

- 1- Classical model (CR) of Ohlson, or residual EBO variant
- 2- Standard EBO model or CB model
- 3- Enlarged EBO variant or CDN model
- 4- Over-enlarged EBO variant or CDNI model
- 5- Enlarged CRI variant of Ohlson or enlarged EBO residual variant.

From these definitions, let us see if with the models 3, 4 and 5 of the basic CR and CB models, we can obtain better results from the explanatory point of view of the stock exchange prices in Sub-Saharan Africa. The results obtained figure on the PART A of Table 4.

It emerges from this Table 4 that: the results are all fully significant and stable. Actually, if we target the most related models (CB, CDN and CDNI or (2) to (4)) their coefficients of C lie between 0.75 and 0.90, whereas for B or BNR the field becomes restricted between 2.49 and 2.91; the  $R_{ij}^2$  increase by going from (2) to (4), and from 58.2% to 62.7%=63%. As concerns the Ohlson model (1), the residual EBO variant supports the comparison well, with 63% for  $R_{ij}^2$  and 1.44 as a coefficient of C, as well as 2.48 for R. We note the distribution of the explanatory contribution (EC) of variables R (41.4%) and C (58.5%) of the Ohlson model against B (31.2%) and C (72.69%) for the basic EBO model, the only model

with 2 variables. This shows that refining the measure of movements (flows) that R represents relative to B, we add to its explanatory weight at the expense of the stock variable which C is, while also adding to the coefficient of determination ( $R_{aj}^2$ ) which increases from 58.9% to 63%).

In addition, by considering the enlarged models (3) and (4) where D and BNR replace B, we can establish the pertinence of the dividend in the rise of the value of the share (its value pertinence). Thus, for D to be a signal of value, its coefficient should be significant, and at the same time, greater than that of BNR. And yet, regressions (3) and (4) show that the coefficients of (D) are significant (6.01 and 4.7 in that order), thus expressing the fact that each CFA Franc of the dividend weighs about 6 CFA Francs on the stock exchange price against about  $(1/2 (2.91 + 2.49) = 2.7)$  CFA Francs per CFA Franc of BNR. D could therefore be a signal of value in Sub-Saharan Africa. A result already acquired in Canada (Kobana *et al.*, 2003), in the United States (Hand & Landsman, 1999) and in Great Britain (Rees, 1997). Moreover, the absence of D in the CB standard model (2) indicates that an  $R_{aj}^2$  of 58.2% against almost 63% for its over-enlarged variance (4) (CDNI) or between D. This result is not the only one. Other results make it possible to check the descriptive force of the dividend D. Thus, we have segmented our cases like Kobana *et al.*, (2003) as follows: once they were put in turn in increasing order of the net profits margin of market capitalization and of growth rates: 1<sup>st</sup> lower quartile Q1, both quartiles of the centre Q2,3 and the upper quartile Q4.

The segmented results of the growth rate are very interesting. Actually, for Q1, the coefficient of D differentiates itself (at the threshold of 0.001) from that of BNR by becoming 8.11 larger than the latter against 3.09 times for Q2.3 (threshold of 0.01). However, for quartile Q4 with superior growth, the difference with BNR disappears (like that with zero). This means that D does not signal the high growth, but rather the returns to shareholders of liquid assets. As to the results linked to net margin quantiles, tests reject the hypothesis (at the 0.01 threshold) that D and BNR are equal in their coefficients for Q1 and Q4 (the threshold being 0.10 for Q2.3). These univariate comparisons do not contradict the hypotheses

known and underlined by Hand & Landsman (1999), Landsman & Maydew (2012) and Distinguin *et al.*, (2013) who suggest that the dividend D would be informative for the firms with reduced growth and it lessens the abusive use of the liquid assets that it releases. In addition, the D effect proves to be stronger and significant for the Q1 of smaller capitalizations (characteristic of the Sub-Saharan African context), which are considered as being less transparent, hence more asymmetrical or miserly from the informative point of view. For this purpose, the recognized hypothesis (mentioned by Rees, 1997) that the signal D grows with more asymmetry of information finds strong support in this context.

The estimation of Equation (5) of the enlarged Ohlson variant or the residual enlarged EBO variant (in invested capital) provide us with the results that are shown in PART A of Table 4. These results show that the variables C, R and I are fully significant insofar as they yield our best  $R_{aj}^2$  (64.2%) among the 9 equations; the addition of I reduces the coefficient of C, almost to unity (1.04) which happens to be a good result in itself; similarly, I means 12.6% of the explanatory contribution (EC) taken from C, which goes from 98.7% to 87 %, that is, a level which exceeds the (72.62%) of explanatory contribution in the standard EBO. Let us note that by passing to the EBOs (models, 2, 3, 4, 5), there is an increase in the  $R_{aj}^2$  s everywhere, and that the EC always remain clearly dominant. These results corroborate with the American results of Collins *et al.*, (1997), and of the Canadians Kobana *et al.*, (2003) in spite of the lack of enough data, but they are acceptable due to several compilations. It can also be noted that the residual result (or abnormal profit) R, which is nevertheless significant, does not provide more than about 3.5% of explanation in models (1) and (5), which represent nearly 35% of the total brought by the two variables which are substituted for B in the variants (3) and (4). It might be that the link between the stock market prices P and R is weakened by the abnormal frequency of the negative Rs in the first years of the period 2011– 2018.

### *The models of practitioners*

Here, we give priority to 2 groups of results. The results of the models admitted in terms of stock exchange prices ((8) and (9)), and in terms of ratios ((6) (7)). These results are shown in that order in PART B and C of Table 4.

#### *Models (8) and (9) admitted in terms of Stock Exchange Prices*

This is about moving finance closer to justice where everything is a comparable matter. The models considered have variables all of which are almost related to the membership sector of the firm under contested evaluation. Linked to the Bade affair, model (8) shows coefficients that are all significant at the 0.01 threshold or better, and one obtains an  $R_{aj}^2$  that is as much honourable as that of the standard EBO model: 59.1% against 58.5%, but which is however lower than the  $R^2$ s of the 4 EBO variants. As to the accounting value C, it provides 78.6% of the explanatory power of the model. Moved closer to the Central Trust affair, model (9) is superior to model (8) in explanatory terms ( $R_{aj}^2 = 64$ ) and the accounting value relativized to sector contributes to it to the tune of 80 %. We note that in both models, their common variable (profits adjusted to the sector) is very significant and provides not far from 22% of the explanation found for the variations of P in section, whereas the adjusted dividend is not important. All in all, the models admitted in the courts also transpose themselves in the Sub-Saharan context.

#### *Models with ratios (6) and (7)*

Model (6) is meant to be explanatory of the variations of the ratio P/V, and therefore of the price P brought back to the sales per share (V) probably succeeds, judging by its  $R_{aj}^2$  of 53.9%. To explain the variations of the ratio P/V, and hence of the price P of the share brought back to its accounting value, model (7) proves to be less performing with an  $R_{aj}^2$  of 19.1 %. In both cases, we observe the expected signs, but only 2 significant variables per model. In model (6), this has to do with the positive profit margin ( $MB^+$ ) which co-varies 16.16/8.14 times more than ( $MB^-$ ) with P/V, in view of its coefficient of 16.16 against - 8.14. In model (7), it is observed that the yield of positive equity capital ( $RCP^+$ ) co-

varies 6.18 times stronger than ( $RCP^-$ ) with a P/C (in view of coefficients of 6.18 against  $-0.98$ ), and that it justifies 89% of the explanation of the P/C concerned. As a result, the Sub-Saharan market attributes a lesser value to firms that are less performing. Furthermore, one has the impression that this market potentially leans on current performance to create its expectations of future performance.

## Organization of the models into a hierarchy and test of robustness

We deal here with two important aspects: the first consists of classifying the aptitudes to predict the models according to the equations, and the second is concerned with the explanatory powers of the models.

### *Organization of the models into a hierarchy*

The results of the models that have the stock market price  $P$  as a dependent value in Table 4 come in first place. Models with ratios come next. Their aptitude to predict outside the sample is measured with prudence, according to Stevens (1992) and Kobana *et al.*, (2003), by a correction of the  $R^2$  in the manner of Stein, as previously presented, is symbolized by  $\hat{\rho}c^2$ . For our regressions with their large number  $N$  of cases relative to a small number  $k$  of variables, the measure corrected is finely less than  $R_{aj}^2$ . For example, for model 5 with a maximal  $R^2$ , we have  $\hat{\rho}c^2 = 64.201$  against  $R_{aj}^2 = 64.206$ . Thus, it would suffice for us to put in order the aptitude to predict models according to the  $R_{aj}^2$  obtained. The latter and the ranks of the aptitudes which correspond to them occupy the 2 columns on the right in Table 4. If we provide the results in a decreasing order of the aptitudes to be predicted (as measured by the  $R_{aj}^2$ ), we obtain the classification in Table 4 below.

**Table 4.** *Classification of Models*

Model $R_{aj}^2$	5	4	1	9	3	8	2
Rang	1	2	3	4	5	6	7
Variant	EBO or enlarged Ohlson	Over enlarged EBO	Residual EBO or Ohlson	Of the court: Central Trust	Enlarged EBO	Of the court: Bader	Pure EBO
Variables	C.R.I	C.D.I.N	C.R	Cs,Bs and Ds	C.D.N	C, Bs and Ds	C.B

N: BNR: adjusted  
to the sector

This Table 4 shows that the EBO variants overtake the pure EBO model as concerns the prediction, and the court model of the Central Trust affair appear very well there. The Ohlson model is very attractive with both of its variables and its third rank. However, since R needs more calculations than D, I, and N reunited, the second rank model deserves its place, or even 1<sup>st</sup> place.

All in all, we have been able to check that by carrying out our regressions of the 7 models above with the stock market prices brought back to previous accounting values, their performances did not decrease relative to models with ratios (6) and (7). Thus, the inferiority of the aptitude to predict using these models comes closer to the results arrived at for the United States by Beatty *et al.*, (1999) and for Canada by Kobana *et al.*, (2003). The more performing models are recommended to improve the present results with an undeniable capacity of explanatory power.

### *Tests of robustness*

We take inspiration from the Vuong (1999) test, by practicing a test based on the likelihood ratio in order to distinguish between ours models as to their explanatory potential of the value of shares in section. This test is justified here, insofar as the  $R_{aj}^2$  are moved closer (a problem encountered by Courteau *et al.*, 2001). The test proceeds by pairs. We retain as null hypothesis that 2 models are at the same distance, or equally close, to explain the generating process of the data at issue, against the alternative that one of them is closer to it (or near it). However, as to our Vuong test, we do not discriminate between any pair of models taken likewise by 4 of our

models. The hypothesis of their «explanatory equivalence» is not rejected.

Three results appear: first, the Vuong test attributes explanatory superiority (at the threshold of 0.001) to the 1<sup>st</sup> rank model over that of the 6<sup>th</sup> rank (the Bader court model)). Logically, the court should make due with a model of the EBO type. Then, one may also support the Central Trust model (4<sup>th</sup> rank) which is better than the Bader model (6<sup>th</sup> rank). Finally, we may through Vuong accept the fact that the residual model of Ohlson (3<sup>rd</sup> rank is superior to the standard EBO standard (7<sup>th</sup> rank).

After all is said and done, of our regressions with the stock market prices brought back to the previous accounting value, we obtain similar  $R_{aj}^2$  of the same organization into hierarchy. Our results are very robust.

## Conclusion

We have attempted in this paper to study the influence of accounting variables in Sub-Saharan Africa on the distribution of the market values of shares. Using the synthesis of the data of firms quoted in the stock exchanges of Sub-Saharan African countries over the period 2011-2018, we have evaluated by estimating with cross-section regressions for 9 models based on accounting variables, their explanatory potential of the distribution of stock exchange prices. From one annual cross section to another, from one methodological precaution to another, our quite robust results show, first, that the explanatory contribution of the accounting value of a share is dominant in the 9 models, and at the same time there appears the net pertinence of the derivatives of profit, as the residual result, the dividend and the BNR (UDPSs). Among the models of the EBO type, the residual variant of Ohlson (model 1) and its extension (model 5) are particularly explanatory of the stock market prices, which is contrary to the results of Maydew (1993), while the classical EBO model (2) is the last of all of them. Moreover, by substituting (dividend) D and BNR for profits (in the variants of models (3) and (4), we note an increase in the explanatory power at the same time, as one perceives the descriptive superiority of D on BNR. The greater explanatory

power (model 5) of the models (with  $R_{aj}^2 = 64.2\%$ ) integrates invested capital, and hence the investment accumulated in the firm, as a very pertinent variable. Furthermore, the Sub-Saharan stock exchange market appreciates the winning firms as long as it depreciates the losing firms. This behaviour is justified by the large gap between the coefficients linked to the positive and negative of model (6), and to positive and negative yields on the invested capital of model (7). It seems to hold their current performance as an indicator of future performance.

As concerns the models (8) and (9) which are accepted in the courts in Canada and in the United States, they transpose themselves with success in Sub-Saharan Africa, and show themselves to be more explanatory than models (6 and 7) with ratios serving financial analysts. All in all, despite the first four ranks (in terms of  $R^2$ ) attributed, in order, to models 5, 4, 1 and 9, our Vuong tests (1989) do not reject the hypothesis of their "explanatory equivalence". But they rather make it possible to validate their explanatory superiority in view of the five other rival models. A more enlarged temporal field could make it possible to establish the pertinence of the models for the firms of the new economy.

## Notes

1. Liu *et al.*, (2002, 2007) compare rival evaluation models in depth.
2. Technically, we assume like Kobena *et al.*, (2003) that  $R_t$  follows a central tendency (its average rhythm).
  - \* We apply the CAPM in the following manner: (rate k) = (reliable or real rate) + (bonus by risky unit) (level of  $\beta$  risk). Or  $k = z + \lambda\beta$  or  $z$  and the reliable or real rate issued by the treasury bond at three months,  $\lambda$  is assumed to be known and  $\beta$  is obtained by regression through a monofactorial market model with the Vasicek correction.
  - \*\* In the models we substitute the net profit per share for the residual result and the extra-information variable is omitted.

### Definition of Variables

$P_{it}$  = Share price at the end of the financial year t.

$R_{it}$  = Residual result = surplus profit per share =  $[BN - (k\%) (OAS)]/n$   
 where BN= net profit; k= required rate on the accounting value ordinary capital-shares (OAS) and n, the number of shares concerned.  
 The rate k is established according to the CAPM.

$C_{it}$  = Accounting value of the share =  $(OAS/n = (CA - AP)/n$  where  $CA = OAS + AP$  and  $AP$  = Privileged capital-shares.

$B_{it} = BN/n = BPA_{it}$  = profits regularized per share. The regulation is carried out by excluding the unusual elements (according to Collins *et al.*, (1997) and Hand & Landsman (1999).

$BNR_{it}$  = undistributed Profits =  $BPA - D$ .

$D_{it}$  = dividend per share.

$I_{it}$  = Invested capital per share =  $(\text{immobilization} + \text{investment and purchases})/n$ .

$\beta_{it}$  = Bêta of the share.

$(P/V)_{it}$  = Price/sales ratio.

$G_{it}$  = average geometric growth rate, over the last five years.

$MB_{it}^+$  = Profit margin (B/V ratio) if positive, if not zero.

$MB_{it}^-$  = MB if negative, if not zero.

$(D/B)_{it}$  = Dividend /profits ratio= Dividend fraction of ordinary profits.

$(P/C)_{it}$  = Price/accounting value ratio.

$RCP_{it}^+$  = Yield on equity capital if positive, if not zero.

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$(P/B)_s$  = Price ratio/Most recent average sectoral profits.

$RDS$  = Yield in average sectoral dividend.

$(P/C)_s$  = Price Ratio/average sectoral accounting Value.

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# 4

## Before Entering the East African Currency Board: The Case of Zanzibar (1908 – 1935)

Marissa Licursi <sup>†</sup>

### Introduction

Prior to joining the East African Currency Board in 1936<sup>2</sup>, Zanzibar had established a local Board of Commissioners of Currency to issue government notes beginning in May of 1908. A few prior accounts on the subject and period exist, such as Ferguson (1989), yet none present the note issuance statistics of the period in a machine-readable, high-frequency form necessary for further quantitative analysis.

We provide annual and monthly statistical data of the balance sheet of the Board of Commissioners of Currency. An analysis of the balance sheet data and of legislative history of the period suggests that the Board worked like an orthodox currency board in many respects but not in all.

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<sup>2</sup> The currency board existed between 1908 and 1935. However, because of a lag in publication data, the relevant dates for the *Zanzibar Gazettes* and colonial reports stretch into the year 1936.

We mainly focus on determining the extent to which Zanzibar's Board of Commissioners of Currency operated like an orthodox currency board. We do not address broader issues such as whether a different monetary arrangement might have resulted in greater economic prosperity. The statistics and legislative history that we provide in the companion spreadsheet workbook should, however, be useful to any further analysis of the Zanzibar monetary system of the period.

## Origins and workings of the government note issue

Economic and political relations between Great Britain and Zanzibar extended as far back as the early nineteenth century. During the period that followed, British involvement in Zanzibar escalated, finally culminating into formalized British protection over Zanzibar in 1890. A combination of the loss of the Sultan of Zanzibar's possessions on the East African mainland to the Imperial British East Africa Company and pressures to end the export of slaves and slave markets resulted in the rapid deterioration of the Sultan's sovereignty in Zanzibar ([Shelswell-White, 1949: 2-3](#)). This paved the way for the official establishment of the Zanzibar Protectorate by Great Britain on November 1, 1890 ([Crofton, 1921: 3](#); [Morris, 1979: 1](#)).

The following year, in 1891, a regular government was constituted with a British Representative as First Minister ([Colonial Report, 1928: 3](#)). While the Sultan retained his title, presided over the Executive Council in important decision-making, and issued legislation in his name, the British Resident "in actual fact, exercised on the Crown's behalf an extensive and all-pervading authority in [Zanzibar]" ([Morris, 1979: 2](#)). Now in control of the administration of the Zanzibar Protectorate, Great Britain had command over the country, including its currency.

The British Indian rupee had been in use and had been for a long time in Zanzibar before Great Britain's establishment of the Protectorate ([Mwangi, 2011: 767](#)). The currency had been "used irregularly by merchants during the slave era to facilitate commodity circulation" ([Ferguson, 1989: 27](#)). In fact, the Indian rupee was used throughout British East Africa (now Kenya), Uganda, German East Africa (Tanganyika, now the mainland of

Tanzania), and Zanzibar. German East Africa was under German rule at the time, and its currency was the German rupee, made of silver, and the subsidiary coin was the Heller (1/100 of the Rupee). In Zanzibar, the local rupee would take the form of notes, while the Indian silver rupee and its subsidiary coins would continue to form the coinage ([Bank of Tanzania, 2015](#)).

On March 11, 1908, the Zanzibar Currency Decree (No.3 of 1908) established a government currency note issue and provided that currency notes were to be issued by the Board of Commissioners of Currency “in exchange either for current coin or notes previously issued under this Decree” ([Government Gazette, March 11, 1908](#): 1). The currency board arrangement ensured that the local currency was fully backed by sound Indian rupee securities. Additionally, the issue of currency notes provided a means for the government to earn additional revenue. In fact, C.E. Akers<sup>3</sup>, Financial Member of the Council of Zanzibar, in a report on the financial, commercial, and economic situation in Zanzibar, advocated an investment in Indian government securities bearing 3.5 percent interest and recommended the issue of Treasury notes to replace “the existing clumsy currency of silver rupee coins,” since “profit would accrue to the Government from such a financial operation” ([Throup et al., 1995](#): 176). The report stated that he made these currency control recommendations on December 23, 1906. Akers made similar recommendations once again on February 8, 1907 – just one year before the official establishment of the local currency board in Zanzibar.

The 1908 decree also established the silver rupee<sup>4</sup> of British India as the standard coin of the Zanzibar Protectorate ([Government Gazette, March 11, 1908](#): 4; [Colonial Report, 1919](#): 6). The rationale was the “close commercial ties with that mighty British colony and the powerful role of its merchants in the Zanzibar economy” ([Ferguson, 1989](#): 27).

<sup>3</sup>We credit C.E. Akers for the idea of establishing a currency board in Zanzibar. The Financial Member apparently had powers like those of a minister of finance.

<sup>4</sup>The Currency Decree, 1908 states, “The silver rupee of British India of the standard weight and fineness enacted in the Indian Coinage Act, 1906 is made the standard coin of Zanzibar.”

The decree authorized the issue of notes in 5, 10, 20, and 100 rupee denominations and in any multiple of 100 rupees. The number of notes of each denomination was to be fixed by the Currency Board, with the approval of the Financial Member of Council ([Government Gazette, March 11, 1908](#): 2). The silver rupee of British India became exchangeable with the local Zanzibar rupee on demand ([Crofton, 1921](#): 3; [Government Gazette, March 11, 1908](#): 3; [Colonial Report, 1919](#): 6). The British sovereign was made legal tender at 15 rupees to the pound sterling. Legislation specifies no commission fee or minimum transaction size.

The decree also provided that the Board of Commissioners of Currency (also known as the Currency Board) should consist of the Financial Member of Council, the Treasurer, an officer in British public service, and a member of the commercial community to be nominated by the Financial Member of Council. The Board of Commissioners of Currency became the body responsible for the issue of currency notes. The Currency Board did not issue coins, which were issued by the government ([Krus & Schuler, 2014](#): 257). The particular denominations of the currency notes from among those specified by the law, and the designs of notes, were to be decided by the Currency Board and approved by the Financial Member of Council ([Currency Decree, 1908, Government Gazette, March 11, 1908](#): 2). The Zanzibar rupee was divided into 100 cents, like the rupees of the British Indian Ocean colonies of Mauritius and Seychelles, but unlike the Indian rupee, which was divided into 16 annas, 64 pice (paise), and 192 pies. The government of Zanzibar only issued coins of 1, 10, and 20 cents. In 1911, old local Seyyidieh copper pice became legal tender at 64 pice per rupee for payment of amounts not exceeding one rupee ([Currency Decree, 1911; Government Gazette, April 11, 1911](#): 1).

On April 5, 1911, the Currency Decree, 1911 (No. 2 of 1911) was passed, repealing and replacing the 1908 decree. The 1911 decree contained a provision that removed certain doubts with regard to legal tender of coin within Zanzibar. Gold coins, whether coined at the Royal Mint in England or at any mint in the British Empire established as a branch of the Royal Mint, were made legal tender at the rate of 15 rupees for one sovereign (the British £1 gold coin) ([Currency Decree, 1911; Government Gazette, April 11, 1911](#): 1).

We infer that, as with similar Indian legislation of the time, this measure was intended to promote the use of gold coins as a step toward an eventual full-fledged gold standard. Zanzibar had an Indian rupee exchange standard, and India in turn had a sterling exchange standard, and sterling was itself pegged to gold, so the Zanzibar rupee was *indirectly* linked to gold. Zanzibar did not, however, define the local rupee in terms of gold or hold a gold reserve. Silver coins of British India other than the rupee were legal tender for the payment of amounts not exceeding five rupees; the Indian rupee remained unlimited legal tender.

The Commissioners of Currency had control over the invested securities of the Note Guarantee Fund, which was invested wholly in Indian rupee and sterling securities. The invested portion of the Note Guarantee Fund was to be invested in government securities of any part of the British Empire or in other securities such as the British Secretary of State for the Colonies might approve ([Currency Decree, 1916](#)).

On July 1, 1913, control of Zanzibar was transferred from the British Foreign Office to the Colonial Office, legally taking effect the following year ([Colonial Report, 1919](#): 6). The transfer involved a number of changes within the administration. Chief among them was the newly created post of a British Resident in Zanzibar, which replaced the offices of the prior consul general and first minister. An advisory body, formally known as the Protectorate Council, was led by the British Resident and included a chief secretary and an assistant chief secretary ([Bissell, 2011](#): 106; [Colonial Report, 1928](#): 5).

Due to this administrative change, the Currency Decree, 1916 provided a new arrangement for the Board of Commissioners of Currency. The decree provided that the Board should now consist of the Chief Financial Secretary, the Treasurer, and a member of the commercial community to be nominated by the British Resident ([Currency Decree, 1916](#); [Red Book, 1922](#)). It continued to require that currency notes of each denomination be fixed by the Currency Board, but now with the approval of the British Resident rather than, as formerly, the Financial Member of Council. Currency notes were also now to be printed, kept, issued, and cancelled under the regulations of the British Resident.

The official exchange rate was set at 15 rupees to the pound sterling; this rate held from the time of the currency board's establishment in 1908 until August 1917. From August 28, 1917 to March 31, 1927, however, the Indian rupee officially had a fluctuating exchange rate against the pound sterling, initially because of financial pressures related to World War I and later because of a postwar boom and slump in the price of silver. The Zanzibar rupee followed the Indian rupee, preserving its one-to-one exchange rate with that currency. In practice, the Indian rupee stabilized at about 13<sup>1</sup>/<sub>3</sub> rupees to the pound sterling starting in September 1924, and on April 1, 1927 the rate became official. The Zanzibar rupee likewise maintained the same exchange rate to the end of Zanzibar's currency board in 1935.

The year 1935 marked a turning point for the monetary arrangement in Zanzibar, as there were murmurings of an intention to change from rupee currency to East African (shilling) currency, and join the East African Currency Board (EACB) (Bartlett, 1936: 4). The EACB, already consisting of Uganda, Kenya and Tanzania, was originally established in 1919. The EACB's original establishment came from the British desire to issue a currency *specific* to East Africa and to exclude other currencies from that area—namely, the Indian rupee (Mwangi, 2011: 767-768).

On May 29, 1935, J.P. Jones, the Chief Secretary to the Government of Zanzibar, by direction of the British Resident, approved the substitution of the East African currency for the Indian rupee currency (Government Gazette, June 1, 1935: 216). Passed on December 12, 1935, the Currency Decree of 1935 provided that Zanzibar abandon its local currency board and join the East African Currency Board on January 1, 1936 (Currency Decree, 1935: 112).

East African shilling notes and coin became legal tender, replacing Zanzibar Currency Board rupee notes, Indian rupee silver coins, and Seyyidieh copper pice, which ceased to be legal tender on and from April 6, 1936 (Colonial Report, 1936: 28). The exchange value of the currency was controlled and maintained at par with sterling by the operations of the East African Currency Board, London, which was represented in the Protectorate by a Currency Officer (Colonial Report, 1936: 28). The exchange rate for

conversion to the new currency was 1.50 East African shillings per Zanzibar rupee ([EACB Annual Report, 1936](#): 4). This rate reflected that the exchange rate of the Indian rupee with the pound sterling, and therefore the cross rate of the Zanzibar rupee, was 13.33 per pound, while the East African shilling was worth one British shilling, or 20 per pound.

The rationale for why Zanzibar ultimately joined the EACB is not explicit in official publications. We assume that because of Zanzibar's proximity to the African mainland, the British government wished to incorporate Zanzibar into the regional economic grouping it was developing in East Africa. Nevertheless, we *do* know that little objection was encountered in exchanging the East African shilling note issues or silver coins, once introduced in the Protectorate. However, subsidiary copper coins were *not* readily accepted at first, and an "unknown but not inconsiderable number of pice were still in use at the end of the year," – that is, the end of 1936 ([Colonial Report, 1936](#): 39).

Prior to Zanzibar joining the EACB, local Zanzibar currency notes were fully covered by external reserves and yielded a small annual surplus from the interest earned on investments. The EACB, on the other hand, had far less than 100 percent reserve cover as a consequence of decisions it had made at its founding about the exchange rate for converting Indian rupees and German rupees into East African shillings. (British forces had conquered much of German East Africa during World War I, and after the war the territory had become the British mandate of Tanganyika.) Because Zanzibar was receiving profits from its note issue while the EACB was retaining all net earnings until its external reserves reached 100 percent of currency in circulation, the EACB agreed to pay Zanzibar £2,700 "apart from any contribution to the member Governments out of the Board's surplus income" ([Blumenthal, 1963](#): 3; [Lomoro, 1964](#): 3).

Zanzibar and Tanganyika united in 1964 as the Republic of Tanzania. The East African Currency Board arrangement lasted until 1966, when the establishment of central banks in Kenya, Uganda, and Tanzania came to fruition. On June 13 of that year, the government of Zanzibar founded the People's Bank of Zanzibar, a commercial bank in Tanzania that is licensed by the

Ch.4. Before entering the East African currency board: The case of Zanzibar Bank of Tanzania. The Bank of Tanzania issued the Tanzanian shilling in place of the former East African shilling ([Bank of Tanzania, 2015](#)).

## To what extent was the board of commissioners of currency a currency board?

A currency board's key characteristics are a fixed exchange rate with an anchor currency; unlimited convertibility between its notes and coins and the currency to which it is pegged; and at least 100 percent net foreign reserves against the whole monetary base ([Hanke, 2002](#); [Imam, 2010](#)). To what extent did the Board of Commissioners of Currency of Zanzibar actually operate with these characteristics in the years 1908 to 1935, prior to Zanzibar joining the East African Currency Board?

Zanzibar currency notes issued under the Zanzibar Currency Decree of 1908 were fully backed by British Indian rupee securities. These funds were held in the Note Guarantee Fund, kept in the custody of the Currency Board or the National Bank of India (Zanzibar branch), as the Currency Board directed ([Currency Decree, 1908, Government Gazette, March 11, 1908](#): 2).

The Currency Decree, 1908 specified that the Note Guarantee Fund "[should] *not* be invested in any securities of the Government of Zanzibar, but may be invested in such securities of the Government of any part of the dominions of His Britannic Majesty, or in such other securities as the Currency Board may select, subject to the approval of the Financial Member of Council" ([Currency Decree, 1908, Government Gazette, March 11, 1908](#): 3; emphasis added). This provision implies that there could be no domestic assets and only foreign assets. A fixed proportion for foreign reserves is not explicit in the Decree, nor is it in subsequent legislation ([East Africa Further Correspondence, 1908](#): 3). However, our data and analysis show that the Note Guarantee Fund held assets consisting of at least 100 percent foreign reserves against notes in circulation. Such findings are consistent with the implications of the 1908 decree.

The 1908 decree also provided for full conversion of Zanzibar currency notes into Indian rupees on demand. The Board maintained unlimited convertibility between its notes and coins

Ch.4. Before entering the East African currency board: The case of Zanzibar and the Indian rupee against which they were pegged at a fixed exchange of 15 rupees to 1 pound sterling. This provision of convertibility was critical to build the public's confidence in the local currency.

## The data and our tests

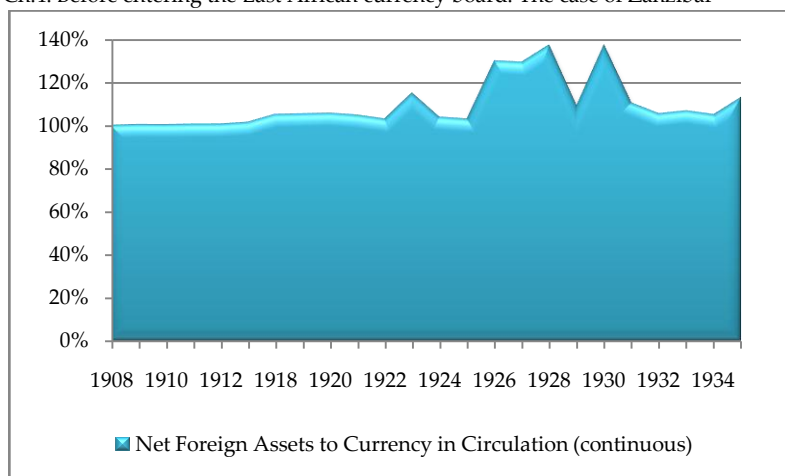
We have digitized annual and monthly balance sheet data on the Currency Board from 1908 to 1935, the years in which Zanzibar's local currency board was in operation. The main source was the *Zanzibar Government Gazette*, including a few of the gazette supplements. The balance sheet monthly data are not reported for September 1914 to March 1919, nor for some other scattered individual months, and we could not find balance sheet annual data for some years, since the currency board did not publish statements for certain years for unexplained reasons<sup>5</sup>. We performed tests on the balance sheet items of the Board of Commissioners of Currency.

### Test One: Domestic assets, foreign assets, and the monetary base

We first measured net foreign assets as a share of the monetary base, in Figure 1. Figure 1 is a "continuous" version showing only the available data and omitting gaps. We provide a "discrete" version showing gaps in annual data for the years 1914, 1915, 1916, and 1917 in the accompanying spreadsheet workbook (see Figure 1a in the workbook). From 1908 to 1935, net foreign assets hovered in the range of approximately 100 to 137 percent of currency notes in circulation. Total assets ranged from approximately 100 to nearly 138 percent, a practically identical range to net foreign assets. This makes clear that the currency board's Note Guarantee Fund exclusively consisted of foreign assets, and suggests that the Board operated in a highly disciplined, rule-like manner. It is unclear why the reserve ratio was so far above 100 percent in 1926-1928 and 1930. Prices of British securities do not seem to have rallied sharply in 1926.

<sup>5</sup> See Appendix B for a detailed discussion of balance sheet monthly and annual missing data.

#### Ch.4. Before entering the East African currency board: The case of Zanzibar



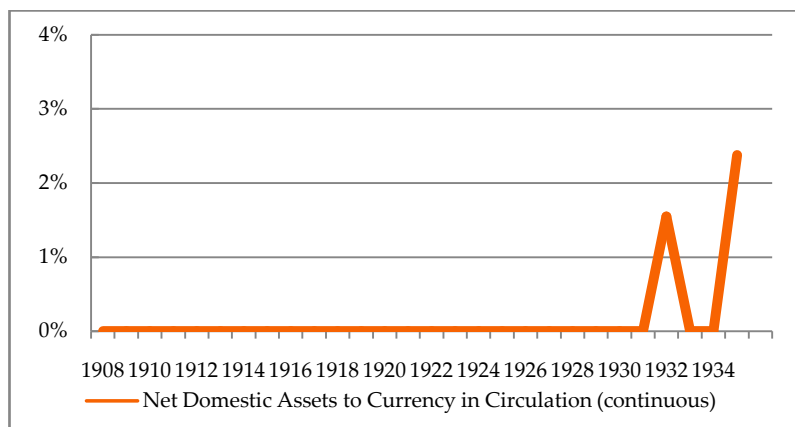
**Figure 1.** *Net Foreign Assets (% of Monetary Base; Currency Board Orthodoxy = 100% or a bit more)*

**Sources:** Zanzibar Government Gazette; calculations.

Although not pictured, it is worth mentioning the composition of net foreign assets held in the Note Guarantee Fund. During the period 1908 to 1935, net foreign assets consisted of both Indian rupee assets and sterling assets. The percentage of the investment portion that was Indian rupees versus the percentage that was sterling varied throughout the period, but never did one dominate the other (refer to the accompanying spreadsheet to see calculations). Especially in the early years, Indian rupee securities represented the majority of the investment portion (about 65 percent Indian rupee versus 35 percent sterling), while later sterling securities became the larger portion (about 70 percent sterling versus 30 percent Indian rupee). These fluctuations in the respective proportions of the securities reflect Zanzibar's politico-economic situation during the period in which the currency board operated. Zanzibar had strong trade relations with India, but was itself a British colony, with other links to England. Its asset holding pattern is evidence of both Indian and British influence on Zanzibar.

Figure 2 lends some insight into how net domestic assets (namely, Zanzibar government securities as well as a deposit at the National Bank of India, Ltd. in Zanzibar) were 0 percent, if not very close to 0 percent, of the whole monetary base (equal to

Ch.4. Before entering the East African currency board: The case of Zanzibar currency notes in circulation, in this case). This metric shows the drastic contrast between net foreign assets and net domestic assets as respective components of the monetary composition. Figure 2 is a continuous version, showing all available data. This again highlights the highly disciplined policy practiced by the Board of Commissioners of Currency.



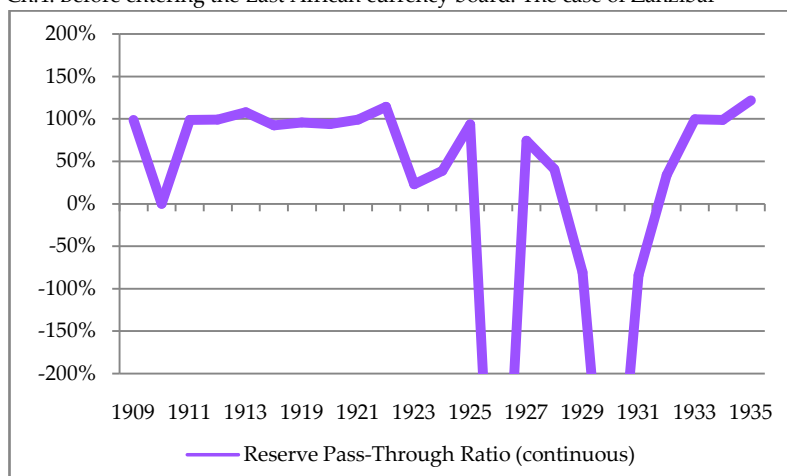
**Figure 2.** *Net domestic assets of monetary composition (%)*

**Sources:** Zanzibar Government Gazette; calculations.

## Test Two: Reserve pass-through

So far, the legislative history and our data indicate that the Board of Commissioners of Currency may have followed currency board orthodoxy during the period 1908 to 1935. Now, we conduct a second crucial test: the “reserve-pass through”, which measures year-over-year change in the monetary base divided by year-over-year change in net foreign reserves. Measuring on a year-over-year basis tends to eliminate any seasonal effects and diminish the importance of one-time events (such as extraordinary distributions or retentions of profit). An orthodox currency board normally has a reserve pass-through rate that is “close to 100 percent” but in practice, “within a range of 80 to 120 percent” (Hanke, 2008: 280). A reserve pass-through of 100 percent means that if net foreign reserves rise (or fall) by a certain amount, then the Zanzibar monetary base should also rise (or fall) by that same amount (Hanke, 2008).

We have measured reserve pass-through, in Figure 3. Figure 3 is a continuous version, showing only the available data. We provide a discrete version showing missing annual data in the years 1914, 1915, 1916, and 1917 in an accompanying spreadsheet workbook (see Figure 3a in the workbook). The year 1908 is also not shown since it was the first year of the currency board's operation; hence, the year-over-year calculation required by the reserve pass-through test is not applicable to 1908. The reserve pass-through was moderately volatile between 1908 and 1935, indicating that the currency board of Zanzibar is in some way unorthodox. The data ranges from a ratio as low as approximately -555 percent to a ratio as high as approximately 121 percent, in 1926 and 1935 respectively. Despite the rather erratic jumps as displayed by the figure, there are some periods in which the reserve pass-through is steady at or near the 100 percent currency board orthodoxy level. In the early years, between 1909 and 1912 and between 1918 and 1921, the ratio hovered just below this threshold at roughly 99.5 percent. The years 1913, 1922, and 1935 have corresponding reserve pass-through ratios that are higher than the orthodoxy mark, averaging at about 114 percent. However, there are definitely volatile jumps in between these seemingly orthodox couplets of years, especially in the middle years of the currency board's operation. For instance, the ratio of -555 percent in 1926, -81 percent in 1929, -462 percent in 1930, and -84 percent in 1931 bring about wild fluctuation, which does indicate unorthodoxy. Even so, Figure 3 suggests that the reserve pass-through ratio loosely held at around 100 percent, despite the volatility in the years of the late 1920s and early 1930s.



**Figure 3.** Year-Over-Year Reserve Pass-Through (%). (100% = currency board orthodoxy) (Continuous)

Sources: Zanzibar Government Gazette; calculations

## Test Three: Changes in monetary base and net foreign assets

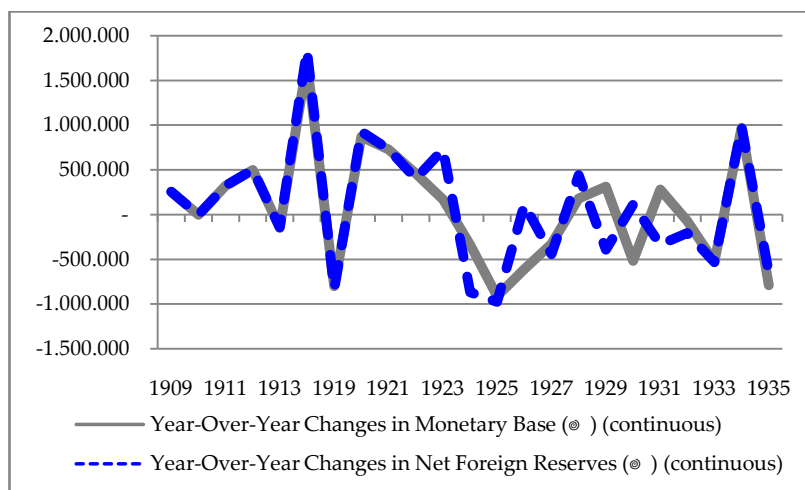
We also measured annual changes in the monetary base and changes in net foreign assets, in Figure 4. Figure 4 is a continuous version, showing only the available data. We provide a discrete version showing missing annual data in the years 1914, 1915, 1916, and 1917 in the accompanying spreadsheet workbook (see Figure 4a in the workbook). The year 1908 is again not shown since this was the first year of the currency board's operation; hence, the year-over-year calculation required by the changes in the monetary base and changes in net foreign assets is not applicable to 1908. A tight linkage between the two metrics means that when net foreign reserves rise (or fall) by a certain amount, the monetary base should also rise (or fall) by that same amount (Hanke, 2008). In Figure 4, we observe a fairly close correlation between changes in notes in circulation and changes in foreign reserves. From 1909 to 1913 as well as from 1918 to 1922, the relationship holds, as changes in the monetary base produced identical, if not, nearly identical changes in net foreign assets. The correlation finds itself again in 1933, where changes in the monetary base directly correspond to changes in net foreign reserves; this relationship

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holds from 1933 to the end of the currency board's operation in December of 1935.

However, the marked deviations in a few years between 1923 and 1933 do indicate some degree of unorthodoxy. For instance, in 1923 there was a great rise in net foreign reserves (of approximately 730,000 rupees) while only a slight expansion in notes in circulation (of approximately 170,000 rupees). Similarly, in 1924, net foreign reserves significantly dropped (to approximately 866,000 rupees) whereas the monetary base witnessed only a relatively minor contraction (of approximately 337,000 rupees). In 1926, we observe the currency board's first dramatic deviation where a contraction of the monetary base was matched with an expansion of net foreign assets. While net foreign reserves rose by approximately 110,000 rupees, currency notes in circulation contracted by nearly 611,000 rupees. This dramatic deviation explains the significantly low and deviant reserve pass-through ratio of -555%. In 1929, the currency board showed yet another deviation. Net foreign reserves dropped by 389,000 rupees while the monetary base expanded by 314,000 rupees. The year 1930 witnessed an even more dramatic deviation: notes in circulation plummeted by 518,000 rupees while foreign reserves rose by 112,000 rupees. This deviation explains the reserve pass-through ratio of -462%. In 1931, we see another divergence, where the monetary base expanded by 282,000 rupees while foreign reserves fell by approximately 335,000 rupees. Finally, in 1932, we see that both the monetary base and net foreign reserves contracted; however, the small change in notes in circulation (of approximately 70,000 rupees) and the large change in foreign reserves (of approximately 206,000 rupees) generated the anomalous reserve pass-through ratio of 33%.

Despite the tight correlation between changes in the monetary base and changes in net foreign reserves in the first decade and in the final few years of the currency board, the dramatic deviations between 1923 and 1933 suggest that Zanzibar's currency board was unorthodox to some extent. From the bare statistics, the source of the deviations is unclear. The Indian rupee, which fluctuated against the pound sterling starting in August 1917, returned to a rigid exchange rate with sterling de facto in September 1924 and

Ch.4. Before entering the East African currency board: The case of Zanzibar officially in April 1927, so the cause of divergences between the monetary base and net foreign reserves after 1924 cannot be the effect of changes in the rupee-sterling exchange rate on the currency board's sterling securities. It is possible that there was some difference in accounting practices between the middle period and the beginning and end, such as valuing securities at market value rather than at cost. There may also be some connection with the jump in the currency board's reserve ratio in 1926, noted above. We leave it as a puzzle to be resolved by future research.



**Figure 4.** *Changes in Monetary Base and Net Foreign Assets (₹)  
(Continuous)*

Sources: Zanzibar Government Gazette; calculations. “₹” is the symbol for rupees.

## Fiscal discipline, trade statistics, and broad money supply

Beyond the three tests that measure currency board orthodoxy, we also analyze Zanzibar's level of fiscal discipline, trade statistics in relation to changes in the monetary base, and currency board share in the overall money supply.

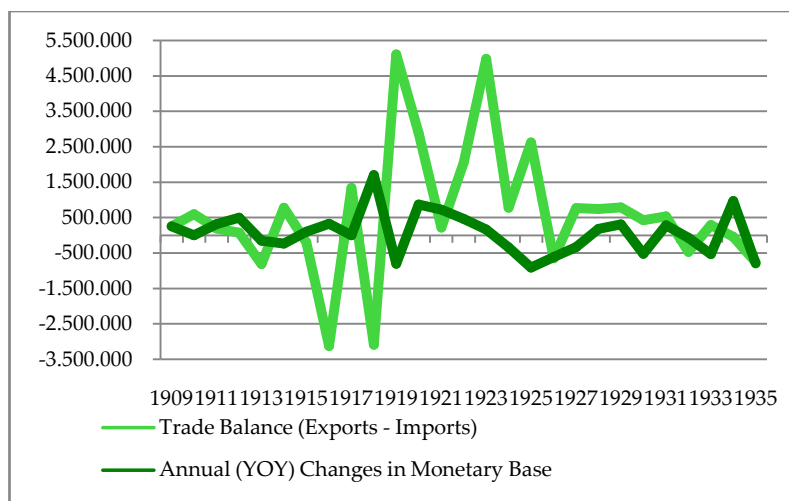
Countries that have adopted currency boards tend to have respectable growth rates, price stability, and, above all, fiscal discipline (Hanke, 2002: 92). Zanzibar's government budget was largely in balance from 1908 to 1926, with a few years in deficit.

However, from 1926 to 1931, the budget was in a clear deficit, year 1926 marking the period's largest deficit. The 1926 Colonial Report and other sources we consulted do not provide an explanation for the deviation in this year; hence, the happenings in 1926 remain a subject for future researchers to investigate<sup>6</sup>. From 1931 to 1935, the government budget seems to balance out once again, as it had in the early years of the currency board. Because the government budget was predominantly in balance during its twenty-eight year period, we infer that Zanzibar's currency board enforced high fiscal discipline.

Some scholars have contended that currency boards require a trade surplus to generate funds to expand the monetary base. In other words, changes in the monetary base often connect to the trade balance—notes in circulation increase when there is a trade surplus and decrease when there is a trade deficit. We performed a test to examine Zanzibar's trade statistics in relation to changes in its monetary base. We measured the trade balance (exports minus imports) against changes in the monetary base, in Figure 5. Here, we see that only the early years of the currency board show a correlation between the two metrics, and a loose correlation at best. By contrast, the bulk of the period shows no apparent relationship between the annual trade balance and changes in the monetary base. Between 1909 and 1913, a trade surplus where exports exceeded imports produced an increase in currency notes in circulation. However, from 1914 onward, a trade surplus or trade deficit in any given year did not imply a respectively corresponding expansion or contraction in the monetary base. For instance, in 1916 and 1918, there were trade deficits of 3,120,000 and 3,089,700 rupees, respectively, contrarily matched with expansions in the monetary base of 323,495 and 1,698,570 rupees, respectively. Similarly, in 1919, exports exceeded imports by approximately 5,105,300 rupees while the year-over-year change in the monetary base rapidly dropped by nearly 801,500 rupees. In 1923, there was a trade surplus that was, in fact, matched with an increase in notes in circulation; however, the monetary base

<sup>6</sup> The source of the unusual deviations for 1926 requires further investigation, but may be related to the effects of poor revenue from the clove harvest during that year ([Colonial Report, 1926: 7](#)).

Ch.4. Before entering the East African currency board: The case of Zanzibar expanded by merely 169,550 rupees whereas exports greatly exceeded imports by 4,974,260 rupees. In Figure 5, the wide gaps in the years 1916, 1918, 1919, and 1923 reveal these stark deviations. This lack of a correlation suggests that currency boards may not require a trade surplus to generate funds to expand the monetary base.

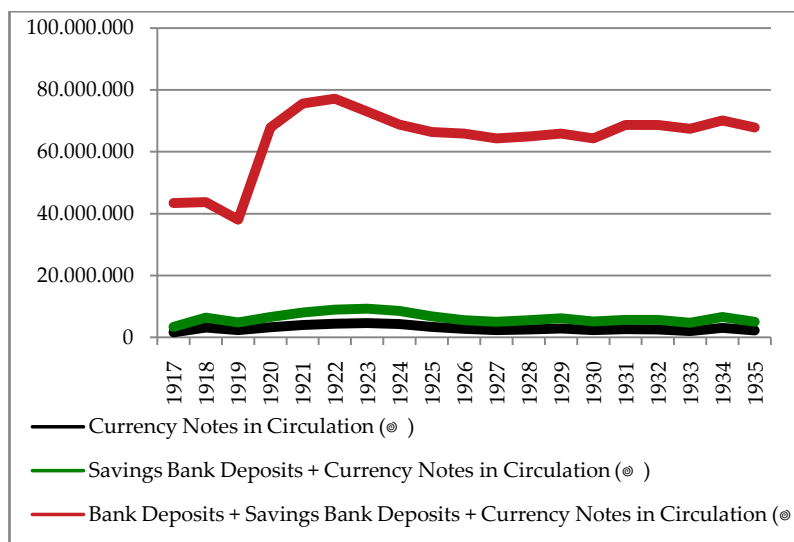


**Figure 5.** *Trade Balance and Changes in Monetary Base (▼)*  
**Sources:** Zanzibar Government Gazette; calculations.

We performed a final test that looks at the currency board's share in the overall money supply, shown in Figure 6. Figure 6 is a continuous version, showing only the available data. We provide a discrete version showing missing annual data in the years 1908, 1909, 1910, 1911, 1912, 1913, 1914, 1915, and 1916 in the accompanying spreadsheet (See Figure 6a in the spreadsheet). The figure is a stacked representation of the money supply, where the bottom layer represents the monetary base and the layers stacked above represent broader measures of the money supply. The second layer includes both savings bank deposits and currency notes in circulation. The third layer includes savings bank deposits, bank deposits, and currency notes in circulation. Indian coins circulated extensively and some other foreign coins likely circulated as well; however, no statistics for Indian and other foreign coins exist. Thus, we characterize the overall money supply

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as the sum of the monetary base, savings bank deposits, and bank deposits. In Figure 6, we observe a close relationship between currency notes in circulation and broader measures of the money supply. Specifically, there was a tight correlation between the monetary base (labeled in black) and savings bank deposits (labeled in green), and bank deposits (labeled in red), respectively. Although not apparent at first, there is indeed a correlation between the monetary base and bank deposits. By disregarding that bank deposits significantly increased the overall money supply, and solely observing the trajectories of the two metrics, we do see a close correspondence between the amount of bank deposits in any given year and the amount of currency notes in circulation in that year. In other words, the trajectories of these two metrics did tend to align with one another. The figure therefore elucidates the tight relation between the monetary base and other broad measures of the money supply (namely, savings bank deposits and bank deposits). The correlation between currency notes in circulation and bank deposits plus savings bank deposits is 0.3326 (see accompanying spreadsheet).



**Figure 6.** Monetary Base as a Share of the Money Supply (↗) (Continuous)

**Sources:** Zanzibar Government Gazette; calculations.

## Conclusion

The data tests and the overall legal framework suggest that Zanzibar's currency board was definitely orthodox in its early and late years, and quite possibly though not indubitably so in its middle years. The data tests and the overall legal framework suggest that Zanzibar's currency board was definitely orthodox in its early and late years, and quite possibly though not indubitably so in its middle years. The Currency Decree, 1908 provided that the local Zanzibar currency was fully backed by sound foreign assets, those being Indian rupee securities, and established the Board of Commissioners of Currency as the small overseeing body in control of issuing the currency notes ([Government Gazette, March 11, 1908](#): 2). Additionally, the invested securities were to consist of strictly Indian rupee and sterling securities, and government securities that had to be approved by the British Secretary of State ([Currency Decree, 1916](#)). Such provisions imply that the currency board distanced itself from the Zanzibar local government and was thus able to efficiently perform its primary function: to supply a stable, convertible currency that facilitates market exchange ([Hanke, 2002](#): 88). These legislations embody the features of and are consistent with currency board orthodoxy.

Some of the statistical tests also suggest orthodoxy. Net foreign assets ranged from approximately 100 to 137 percent of currency in circulation, and total assets ranged from approximately 100 to nearly 138 percent of currency in circulation between 1908 and 1935, remaining at or above 100 percent, suggesting that during the period the Board of Commissioners of Currency acted in a highly rule-like manner. Moreover, the rather flat index showing net domestic assets as a percent of the monetary composition also suggests orthodoxy.

However, the volatile reserve-pass through ratio seems to indicate a degree of unorthodoxy during the currency board's middle years. Because of these conflicting results, whether Zanzibar's currency board operated with orthodoxy is a question that remains to be more fully answered by further study of currency board balance sheet data and the development of other statistical tests to measure currency board orthodoxy. The slightly volatile reserve pass-through metric does suggest the Board of

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Commissioners of Currency were rather unorthodox. Yet, there may be circumstances in which reserve pass-through is not as good an indicator.

Although this study gathered and digitized mass data from 1908 to 1935, it is prudent to note that there are several months when data are incomplete. This might not affect the significance of the statistical tests, but possible future studies might want to gather the missing data and hence confirm the reliability of the current study. (See Appendix B, Missing Data)

*Postscript: Companion Spreadsheet Workbook and Source Documents*

The companion spreadsheet workbook to this paper contains the underlying data, calculations, and original versions of the graphs. The workbook also contains some data not used in the paper, notably annual data of revenue and expenditures, trade statistics, banking and savings deposits, and some miscellaneous data such as population.

## Appendix

### Appendix A. Legislative History of the Zanzibar Currency, 1908-1935

Here, we provide a brief discussion of the legal framework of the Zanzibar currency and legislation that relate to the Board of Commissioners of Currency.

- Legislation consisted of the Decrees of the Sultan, and certain Imperial Statutes of general application (Colonial Report, 1931, page 4).

- The British Resident and his staff controlled legislation enacted in Zanzibar, but this legislation took the form of decrees put into effect in the name of the Sultan and countersigned by the British Resident (Morris, 1979: 21). Until 1908, these decrees were only enforced in Her Britannic Majesty's Court for Zanzibar set up by the Zanzibar Order in Council of 1897; in the Sultan's courts the only law enforced was Islamic law (Morris, 1979: 21). After the currency board's establishment in 1908, however, while Islamic law remained the fundamental law in civil matters, the Sultan's decrees were also applicable in all courts.

- Note also that the entire legal system in respect of Her Britannic Majesty's Court was based on that of India.

- *The Currency Decree, 1908.*No. 3 of 1908, Assented March 11, 1908.

Currency Notes: Government currency note issue established. Currency notes issued were set with the British Indian rupee on demand.

Board of Commissioners of Currency: Board arrangement and organization specified.

Denomination: Currency notes may be for any of the following denominations, 5, 10, 20, 100 rupees, and the number of notes of each denomination respectively shall be such as may from time to time be fixed by the Currency Board with the approval of the Financial Member of Council.

Legal tender: Currency notes made legal tender under the Zanzibar Government for the amount named therein.

Coin: Silver rupee of British India, of the standard weight and fineness enacted in the Indian Coinage Act, 1906, is made the standard coin of the Protectorate and British sovereign made legal tender at Rs. 15 to the pound.

Note Guarantee Fund: Comprised of two components: Coin portion and Investment Portion. The coin portion could not be less than a fixed proportion of the notes in circulation (at a given time); the proportion was set at two-thirds (66 2/3%). Included a provision stating that the invested portion should be invested in securities of Government of any part of dominions of his Britannic majesty and *not* invested in any Zanzibar Government securities.

Depreciation Fund: Fund established as part of the portion of the Note Guarantee Fund.

- *Assented Currency Amendment Decree: The Currency Decree, 1909.* No. 21 of 1909. Assented December 2, 1909.

In section 5, subsection (1), after the figures and word "20 rupees," the following figures and word shall be inserted: "50 rupees," and after the figures and word "100 rupees," the following words and figures shall be inserted, "and any multiple of 100 rupees as from time to time shall be determined by the currency board."

- *Assented Currency Amendment Decree: The Currency Decree, 1911.* No. 2 of 1911. Assented April 5, 1911.

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Gold: Gold coins whether coined at the Royal Mint in England or at any mint established as a branch of the Royal Mint were made legal tender in payment or on account at the rate of 15 rupees for one sovereign (Currency Decree, 1911: 1)

Coin: All other silver coins of British India (apart from the British Indian silver rupee) were legal tender for the payment of an amount not exceeding five rupees, but for no greater amount

- *The Zanzibar Currency Decree, 1916.* Cap. 51, No. 3 of 1916. Assented February 14, 1916

Control of Zanzibar transferred from Foreign Office to Colonial Office in 1914

Newly Created post of British Resident, which removed the offices of the prior consul general and first minister. With the newly created post of British Resident, the Currency Decree of 1916 includes changes to the Decree of 1908 with respect to the British Resident. Affected areas of the decree include, Acting Member, Regulation as to preparation, Coin portion of the Note Guarantee Fund, Application of Income of Depreciation Fund, Deficiency in Note Guarantee Fund

Office: The Currency Board shall have an office at Zanzibar, and may employ such officers and persons as may from time to time be required (replacing the prior 1908 provision that that such persons were subject to the approval of the Financial Member of Council)

Denomination: The number of currency notes of each denomination shall be as such as may from time to time be fixed by the Currency Board with the approval of the British Resident.

Note Guarantee Fund: The coin portion could not be less than a fixed proportion of the notes in circulation (at a given time); the proportion was changed to one-half, 50% (formerly, in 1908, the proportion was fixed at two-thirds,  $66\frac{2}{3}\%$ )

Prohibition regarding dealings in Legal Tender: No person shall sell or purchase or take or receive in exchange, or offer to sell or purchase or take or receive in exchange, any coin or currency note which is for the time being legal tender in the Protectorate for an amount other than its face value, or accept or offer to accept any such coin or currency note in payment of a debt or otherwise for an amount other than its face value.

*The remainder of the 1916 Currency Decree was a comprehensive restatement of the basis of the government note issue (established in the Currency Decree, 1908)*

- *Government Notice No. 20 In re: The Zanzibar Currency Decree, 1916.* Assented February 26, 1916

In pursuance of the provisions of the Decree above-named, the members of the Currency Board give notice that the fixed proportion of the coin portion of the Note Guarantee Fund shall be 50% of the notes for the time being in circulation.

- *The Zanzibar Currency Amendment Decree, 1920.* No. 7 of 1920. Assented July 5, 1920

Made revisions to the 1916 Decree

- *The Zanzibar Currency Amendment Decree, 1922*(should be read and construed as one with "The Zanzibar Currency Decree, 1916."). No. 1 of 1922. Assented January 2, 1922.

Made revisions to the 1916 Decree Prohibition regarding dealings in legal tender: "No person shall sell or purchase or take or receive in exchange or offer to sell or purchase or take or receive in exchange any coin or currency note which is for the time being legal tender in the Zanzibar Protectorate for an amount other

Ch.4. Before entering the East African currency board: The case of Zanzibar than its face value, or accept or offer to accept any such coin or currency note in payment of a debt or otherwise for an amount other than its face value

- *The Zanzibar Currency Decree, 1935.* No. 21 of 1935. Assented December 16, 1935

British East Africa shilling to be standard coin: The British East Africa shilling coined under the provisions of the Order-in-Council shall be the standard coin of the Protectorate.

Ratio of shillings and cents of a shilling to pounds, rupees, and annas, pice, and cents of a rupee: Where any sum due to be paid after the coming into operation of this Decree is payable in pounds or pounds sterling, whether the obligation to make the payment was incurred before or after the coming into operation of this Decree, the payment may be made in shillings at the rate of twenty shillings to the pound or pound sterling.

Legal tender: (i) Currency notes issued by the East African Currency Board shall be legal tender in the Protectorate of the amounts respectively expressed therein. (ii) It shall be lawful for the East African Currency Board to pay the bearer of a currency note the amount named therein, and the amount required for such payment shall be a charge on the monies and securities in the hands of the Board and falling them on the general revenue of the Protectorate. Note and Coinage Redemption Fund: (1) There shall be established a Fund to be called the Note and Coinage Redemption Fund and there shall be transferred to or paid into the said Fund - (a) all monies, securities, and investments standing to the credit of the Note Guarantee Fund and the Depreciation Fund established under the provisions of the Currency Decree hereby repealed; (b) all monies held by the Currency Board established under the provisions of the said Decree; and (c) the proceeds of the sale of all coins declared to be legal tender under the provisions of the said Decree. (2) There shall be charged against the said Fund: (1) the cost of all currency notes and coins of the East African Currency Board paid by the Treasurer in exchange for the notes and coins declared to be legal tender under the provisions of the Currency Decree hereby repealed until 6 months after all such notes and coin shall have ceased to be legal tender; and (b) all costs and expenses incurred by the Treasurer in connexion with the exchange for the currency of the East African Currency Board of the currency declared to be legal tender under the Currency Decree hereby repealed. Repeal of Cap. 94: The Currency Decree is hereby repealed.

## Appendix B. Missing Data

To repeat, we performed tests on the balance sheet items of the Board of Commissioners of Currency. However, some balance sheet monthly data as well as annual data are not reported for some years.

The balance sheet annual data are apparently not reported for these years: 1908, 1910, 1912, 1914, 1915, 1916, 1917, 1923, 1928, 1929, 1931, and 1933. Annual data for any given year can be found in the Statement of Assets and Liabilities, reported for December 31 year end, often found in the last December issue of the subsequent year's government gazette. For example, annual data for the year 1921 appear in the Statement of Assets and Liabilities in the last December issue of the 1922 Gazette. For the years listed above, though, the corresponding government gazettes in the following year contained no annual data in a Statement of Assets and Liabilities. For some years in which annual data were missing, we used the corresponding

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December 10 monthly data in place of the missing December 31 annual data for calculations and statistical analysis. Those years were 1908, 1928, 1929, 1931, and 1933. For 1910, we substituted October 10 data, and for 1912 and 1923 we substituted November 10 data for missing December 31 data. No monthly data for any calendar month was provided for the years 1914, 1915, 1916, and 1917 in the Official Gazettes, Colonial Reports, or Blue Books that we consulted; therefore, we were not able to use any substitute annual data for these years. It is unknown as to whether this data is truly missing.

The Commissioners of Currency apparently did not publish monthly balance sheet data for January-April 1908; February, April, May, November, and December 1910; April, June, September, October, and December 1912; January, May, and July 1913; June and July 1914; the long period September 1914-March 1919; November, and December 1919; December 1921; December 1923; October 1925; and December 1926. Our main source for monthly balance sheet data was the *Zanzibar Government Gazette*, which published abstracts of notes in circulation on the tenth of each calendar month. Although we were able to obtain the gazettes published for each of the years mentioned above, the libraries (namely, the Library of Congress and the Center for Research Libraries) we consulted were missing some gazette issues. We presume these issues contain the monthly balance sheet data we are missing here. For the years 1914 through 1918, we were able to obtain the gazettes for each respective year; however, the *Gazettes* (including the supplements) during this period contained no currency board data for any calendar month during the year. We examined every issue of the *Zanzibar Government Gazette* from 1908 to 1935; however, the currency board did not seem to have published monthly statements for the following dates: 1914, 1915, 1916, 1917, and 1918.

The Zanzibar Government published brief summaries of the note issue in only several of its annual reports on the financial state of the country. The Board of Commissioners of Currency did not publish an annual report, but did publish monthly abstracts of notes in circulation on the tenth of each calendar month in the *Zanzibar Government Gazette*. Even in these publications, official narrative detail about the currency note issue is extremely scarce.

### Appendix C. Zanzibar Principal Events of Economic Importance (1890-1935). (Bartlett 1936: 7-9)

- 1890: Assumption by Great Britain of Protectorate over Zanzibar
- 1895: Assumption by Great Britain of Protectorate over mainland between

Uganda Protectorate and coast, and between River Juba and northern frontier of German sphere

- 1908: Silver rupee of British India, of the standard weight and fineness enacted in the

Indian Coinage Act, 1906, is made the standard coin of the Protectorate and British sovereign made legal tender at Rs. 15 to the pound

Government currency notes issue

- 1913: Control of Protectorate informally transferred from Foreign Office to Colonial Office.

- 1914: Control of Protectorate formally transferred to Colonial Office. Protectorate

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Council and Offices of High Commissioner, British Resident, and Chief Secretary constituted

- 1917: Owing to rise in price of silver rate of exchange raised by Government of India to 1s 5d.

- 1918: Rise in sterling value of rupee. Rate of exchange raised to 1s. 6d.

- 1919: Rate of exchange raised by successive steps to 2s. 4d.

- 1920: Exchange value of rupee fixed by Government of India at 2s. gold Exchange after rising to 2s. 10d. In February fell to 1s. 4 3/4d. in December. British sovereign demonetized in the Protectorate.

- 1921: Exchange rose to 1s. 6 1/4d. In January, fell to 1s. 2 7/8d. In March and closed at 1s. 3 7/8d.

- 1922: Exchange ruled fairly steady in neighborhood of 1s. 4d.

- 1923: Exchange opened at 1s. 4d. And rose to 1s. 5 1/4d. In December

- 1924: Exchange opened at 1s. 5 1/8d. And after many fluctuations closed at 1s. 6 1/8d.

- 1925: Office of High Commissioner abolished.

Exchange ruled steady around 1s. 6d.

- 1926: Executive and Legislative Councils constituted

Exchange kept in neighborhood of 1s. 6d.

- 1927: Exchange value of rupee fixed by Government of India at 1s. 6d. gold

- 1930: Gold bullion standard suspended by Government of India

- 1935: Intimation of intention to change from rupee currency to East African (shilling) currency as from January, 1936

(Note: Recall that under the old British monetary system, £1= 20 shillings (s.) = 240 pence (d.).)

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# 5

## Zimbabwe's unorthodox Dollarization

Erik Bostrom <sup>†</sup>

### Introduction

The Zimbabwean economy over the last two decades has suffered tremendous hardship, starting in 2000 with the Fast Tract Land Reform Program (FTLRP), which legalized government seizures of land from farmers. This land was primarily redistributed to government officials and supporters who, in many cases, knew nothing about farming and let the land go fallow. Inflationary problems emerged at the end of the FTLRP in 2004 in conjuncture with unaccounted-for expenditures from Zimbabwe's participation in the Second Congo War and inflationary remedies pursued by the Reserve Bank of Zimbabwe (RBZ). These policies culminated in hyperinflation between February 2007 until November 2008. As inflation rose, foreign currencies increasingly displaced the use of the Zimbabwe dollar, despite being illegal. Eventually, the government finally ceased issuing Zimbabwe dollars in April 2009 and adopted the U.S. dollar.

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The process of dollarization, however, was not a straightforward attempt to adopt one specific currency, like Ecuador's dollarization in 2000. Despite allowing foreign currencies to be legal tender in January 2009, the government also attempted to replace the third Zimbabwe dollar with the fourth Zimbabwean dollar on February 2, 2009. (Successive Zimbabwe dollars had a number of zeros chopped off compared to their predecessors to make calculation easier, at least until they, too, succumbed to high inflation.) Quickly this new dollar was devalued, like its predecessors, and was officially suspended on April 12, 2009 as legal tender. The government subsequently built upon the legal and growing multicurrency regime introduced in January 2009 that allowed foreign currencies as legal tender in Zimbabwe. These included, most noticeably, the euro, South African rand, Botswana pula, British pound, U.S. dollar, Japanese yen, and Chinese yuan. Other currencies were also used unofficially, such as the Zambian kwacha. The two most popular were the South African rand, due to Zimbabwe's proximity to rand-using countries, and the U.S. dollar, due to its internationally accepted stability.<sup>2</sup>

Contrary to popular opinion at the time, which favored the rand, the Zimbabwean government decided to adopt the U.S. dollar (USD) for conducting official business. The decision had a noticeable effect on currency prevalence, as fiscal spending plays a large role in the Zimbabwean economy. In 2009, government spending equaled 14 percent of total GDP and by 2016, it had increased to 30 percent. This move was the major factor supporting the rise of the USD as a *de facto* currency. In consequence, there was a dollarization of Zimbabwe, rather than a "randization" as some had speculated.

The adoption of the USD created an interesting scenario for Zimbabwe, due to the limited number of dollars available in the country. Although the USD was presumably chosen for its reputation as a stable unit of account, liquidity challenges have hindered Zimbabwean's ability to gain access to dollars for everyday transactions.

<sup>2</sup> The next few paragraphs draw heavily from Noko (2011).

This paper will explain how certain government policies have impeded the formalization of a successful dollarized economy. Each section will cover a different unorthodox policy choice of the Zimbabwean government and analyze the observed or potential effects. An appendix at the end of the paper lists the relevant legislation enacted by the government of Zimbabwe up to July 2017.

**Table 1.** *Zimbabwe's Hyperinflationary Problems 2007-2008*

## HYPERINFLATION IN ZIMBABWE, 2007–2008

Date	Monthly Inflation Rate (%)	Annual Inflation Rate (%)
March 2007	50.54	2,200.20
April 2007	100.70	3,713.90
May 2007	55.40	4,530.00
June 2007	86.20	7,251.10
July 2007	31.60	7,634.80
August 2007	11.80	6,592.80
September 2007	38.70	7,982.10
October 2007	135.62	14,840.65
November 2007	131.42	26,470.78
December 2007	240.06	66,212.30
January 2008	120.83	100,580.16
February 2008	125.86	164,900.29
March 2008	281.29	417,823.13
April 2008	212.54	650,599.00
May 2008	433.40	2,233,713.43
June 2008	839.30	11,268,758.90
July 2008	2,600.24	231,150,888.87
August 2008	3,190.00	9,690,000,000.00
September 2008	12,400.00	471,000,000,000.00
October 2008	690,000,000.00	3,840,000,000,000,000.00
14 November 2008	79,600,000,000.00	89,700,000,000,000,000,000.00

SOURCE: Hanke and Kwok (2009: 355).

## Definition of an orthodox Dollarized economy

Zimbabwe can be classified as a dollarized economy due to the prevalence and priority given to the U.S. dollar by the Zimbabwean government. Although Zimbabwe has followed many of the steps required for complete dollarization, three broad areas still stand out as problematic, resulting in Zimbabwe's unorthodox dollarization status. In order to achieve the solid economic growth and stable inflation that accompany dollarization, the three following requirements must be fulfilled:

Full financial integration into the world market, Reform and reorganization of government agencies to comply with new monetary arrangements, and responsible curbing of government deficits.

Full financial integration on the world market is a broad term, yet crucial for effective dollarization. For Zimbabwe, this will “occur when the law allows financial institutions extensive freedom of action to compete and does not discriminate against foreign institutions.” More specifically, it requires Zimbabwe to allow foreign financial institutions to “establish branches, accept deposits and make loans, obtain full ownership of domestic institutions, and move funds freely into and out of the country” (Hanke, 2008, 10).

Adhering to these principles could allow Zimbabwe to access a large amount of liquid international funds. For example, with an internationally integrated financial system in place, banks would be able to easily give loans in Zimbabwe while deposits could be held in another country entirely. Zimbabwe would become part of an expansive dollar zone where funds could be exchanged without risk between Zimbabwe and the United States. This would reduce the risk of volatile business cycles, while stabilizing real exchange rates. In short, financial integration increases reliability and liquidity for domestic interbank markets due to an easy influx of foreign capital (Hanke, 2008, 10; see also Moreno-Villalaz, 1999, 2005 on Panama's highly satisfactory experience with financial integration under dollarization).

The second major area where Zimbabwe has fallen short of complete dollarization is in reforming government organizations that manage fiscal and monetary policy. Following any case of dollarization, the first thing that should be reformed or eliminated is the central bank. In the case of Zimbabwe, the components of the Reserve Bank of Zimbabwe (RBZ) should have been reorganized into separate organizations focusing on statistics, economic analysis, and financial institutions. Although alternatives exist, the most important point to doing this is that the RBZ would cease to exist as an entity that could enact monetary policy for Zimbabwe. This ensures dollarization is adhered to and that back-door

currency attempts cannot be made by the RBZ, let alone at the request of the government.

The last aspect that needs to be addressed for Zimbabwe's dollarization is the curbing of government deficits. For dollarization to be effective, the government must operate on a sustainable budget, as once its dollar reserves have dwindled, liquidity will start to become an issue in repaying government debts. If debts cannot be repaid in U.S. dollars, people will begin to doubt the government's ability to support the large wage network government spending sustains. Therefore, if the government does not adhere to a "hard budget constraint," dollarization will last only until the government runs out of foreign reserves, at which point Zimbabwe might turn to the creation of faux or worthless local currency again to increase liquidity.

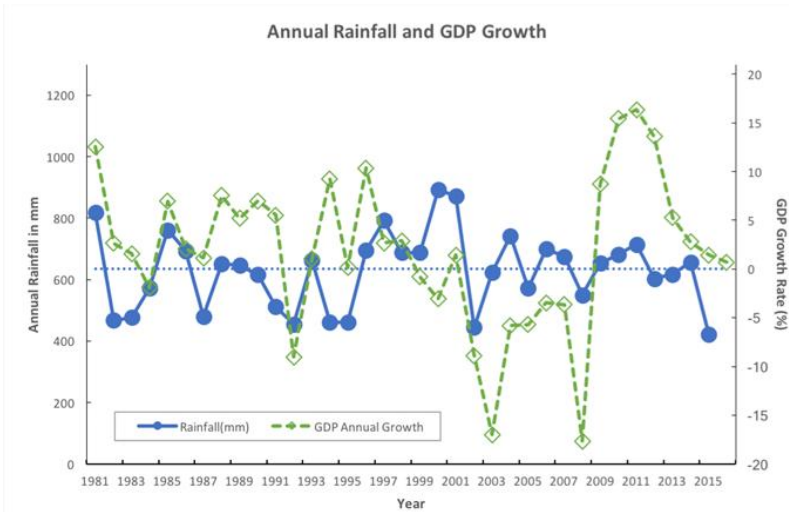
Once these areas are addressed, dollarization can achieve its full potential to benefit Zimbabwe's economy. Until then, Zimbabwe will feel the effects of an unorthodoxly dollarized economy that is constrained by policies posing risks to economic development.

## Financial integration

The two most influential policies preventing the government of Zimbabwe from achieving full financial integration for the country's dollarized economy are the Indigenization and Empowerment Act of 2007 (IEEA) and the Fast Track Land Reform Program of 2000 (FTLRP). Although they were enacted before the economy went into free-fall in 2007, they have both proved to be daunting hurdles for Zimbabwe's economy to overcome.

The FTLRP between 2000 and 2003 established an unstable economic environment that has hindered the country's ability to develop for over a decade. What set Zimbabwe's Land Reform Program apart from other countries' land reform programs was the lack of compensation for seized land and the use of seized land as a tool of political patronage. The voiding of Zimbabweans' property rights set a dangerous precedent and was the major driver of economic downturn in the early 2000s ([Richardson, 2005](#)). The Program changed the structure of the economy, of which, in 2000, 60 percent was based on or dependent upon agriculture.

(Richardson, 2005) Unsurprisingly, economic growth fell post-land reform, and GDP was longer was correlated with rainfall as had been the case pre-2002 (see Figure 1). Furthermore, even though the FTLRP was ruled unconstitutional by the High Court of Zimbabwe, the policies of the Fast Track Land Reform Program have not been reversed. As a result, land reform has drastically hurt GDP growth both because of its direct effects on agriculture and because of its indirect effect as a signal that the government might not respect future property rights (Richardson, 2005).



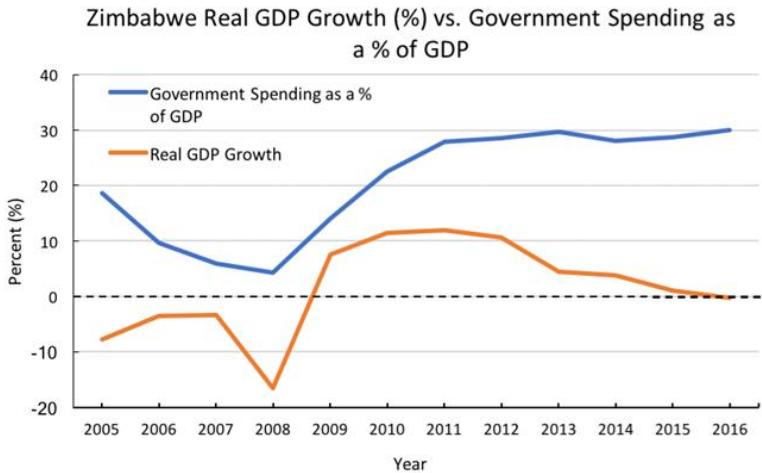
**Figure 1.** Rainfall vs. Annual GDP growth

**Source:** World Bank and Meterological Services Department of Zimbabwe

Secondly, the Indigenization and Economic Empowerment Act (IEEA) in 2007 created problems of its own for financial integration. The act states that “at least fifty-one *per centum* of the shares of every public company and any other business shall be owned by indigenous Zimbabweans” (Part 2, Section 3: 1a). The term “indigenous Zimbabwean” is legally defined as “any person who, before the 18th April, 1980, was disadvantaged by unfair discrimination on the grounds of his or her race, and any descendant of such person, and includes any company, association, syndicate or partnership of which indigenous Zimbabweans form the majority of the members or hold the

controlling interest” (Part 1, Section 2). In practice, the act prevents foreigners, as well as Zimbabweans who benefitted under British colonization and the quasi- state of Rhodesia, from owning a majority stake in business.

This Act has effectively isolated Zimbabwe by hindering direct foreign investment. However, since 2009 Zimbabwe’s economy seems to have rebounded, despite the Indigenization and Economic Empowerment Act. The reason why, however, is more nuanced as the economy had hit rock bottom in late 2008, and GDP growth was goosed by a large and unsustainable increase in government spending (Figure 2).



**Figure 2.** *Government Spending as a Percentage of Real GDP*

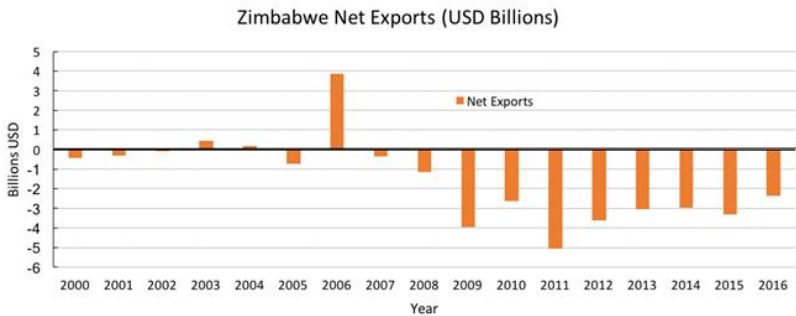
**Source:** Federal Reserve Bank of St. Louis, Federal Reserve Economic Data (FRED).

The most important aspect of the Indigenization and Economic Empowerment Act is its effect on foreign investment. A key principle of dollarization is to allow inflows of foreign capital to ensure that there is liquidity to fuel consumption and investment. However, Zimbabwe has problems in securing steady inflows of U.S. dollars. Most capital inflows have been through loans, which have seen a two-thirds decline between 2014 and 2016.

Furthermore, looking at net imports and exports indicate that Zimbabwe has begun to feel the shortage of U.S. dollars. Exports to the United States have remained constant, while there has been a

huge decline in imports from the United States over the past five-year period. Although this would suggest an increase in net exports, Zimbabwe's trade deficit has remained large, indicating that Zimbabwe's exports are struggling, a potential downside to restrictions on foreign capital (see Figure 3).

These two issues have proved to be limiting factors in securing a steady stream of U.S. dollars, as they hinder foreign investment and full financial integration with the international economy.



**Figure 3.** *Net Exports of Zimbabwe*  
Source: ZIMSTAT External Trade Section

## Government wage spending and the public debt

The second area of reform necessary for full orthodox dollarization is the reform of government institutions and practices, most notably fiscal spending. Despite multiple attempts to decrease government spending since 2009, spending has significantly increased, with domestic debt in October 2016 equaling nearly 30 percent of total GDP (Figure 4).

Even as Zimbabwe has faced a liquidity crunch due to an annual trade deficit of over 2 billion USD since 2009, it has managed to increase government spending. This spending, however, has not managed to keep up GDP growth, which has stalled over the last two years (See Figure 2). Government spending itself presents an interesting trend concerning the allocation of funds. Between 2012 and 2015, the Administrative, Finance and Management sector rose from 21 percent to 26 percent of total government expenditure. Conversely, the Roads and

Works sector dropped from 24 percent to 16 percent and Health and Education fell from 13 percent to 11 percent (see Table 2).

The fact that most government spending is being directed to bureaucratic and financial ends is troubling for successful dollarization. A government needs an administrative and management staff, but large increases in those roles' share of the budget on top of growing government

spending set a dangerous precedent, considering the quickly rising domestic debt. As of 2016, government wages accounted for 91 percent of total government revenue, up from 65 percent in 2015 ([Government of Zimbabwe Annual Budget Review 2017](#), 40). Although the government has made plans in the Public Service Wage Bill to reduce government wage spending to 65 percent by 2019, proper implementation of the bill remains questionable given the record of the ruling ZANU-PF political party.

The more worrying aspect for successful dollarization is how the government goes about financing spending increases. When the local currency was abolished in 2009, the role of the central bank, the Reserve Bank of Zimbabwe, should have become much smaller, becoming limited to data collection with no role in monetary policy. However, the RBZ still remains a key player in economic policy, working at the behest of the government to support large debts and spending.

**Table 2.** *Expenditures by category, Selected local authorities, 2012-14 (%)*

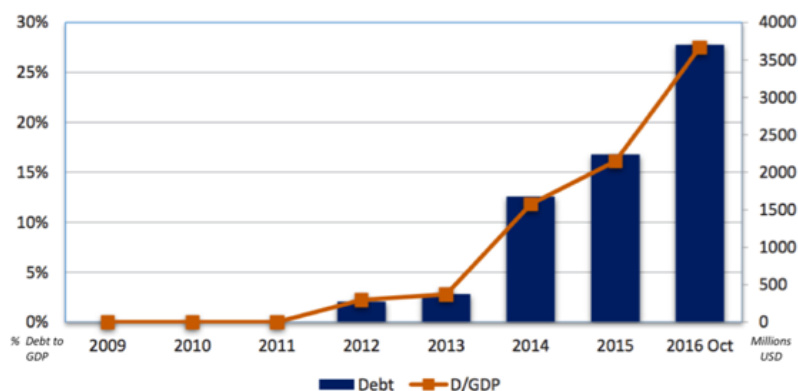
	Actual				
	2012	2013	2014	2015	Ave.
Administrative, finance and management	21%	18%	29%	26%	23%
Health and education	13%	10%	12%	11%	11%
Water supply	12%	15%	19%	16%	15%
Water sanitation	4%	7%	3%	5%	5%
Solid waste and environ. Management	5%	6%	4%	4%	5%
Roads and works	24%	18%	11%	16%	17%
Welfare, community infra and parks	5%	3%	4%	3%	4%
Housing and public building	4%	13%	6%	6%	8%
Income generating activities	3%	2%	2%	3%	3%
Police and emergency services	9%	7%	10%	9%	8%
Total	100%	100%	100%	100%	100%

From 2011 to October 2016, Zimbabwe's domestic debt has risen from zero to 30 percent of GDP and equaled 3.6 billion USD

by October 2016. In a report by the Ministry of Government in March 2017, this number had risen to 4 billion USD, with the pace of accumulation showing no signs of slowing. Without more reform to government spending, the country will begin to face further liquidity problems as loans dry up and domestic debt rises. As a result, to fund the debt, the government has turn to the issuance of Treasury Bills (T-bills), creating a slew of liquidity problems.

As of March 2017, the number of Treasury bills issued by the Zimbabwean Government amounted to over \$2 billion. The government has issued four different categories of T-bills. The first category is long-dated bills of 549 million USD issued to banks for the acquisition of nonperforming loans by the Zimbabwe Asset Management Corporation (ZAMCO). The second category is long-dated bills amounting to 300 million USD issued for the capitalization of institutions that include the Reserve Bank, the Agricultural Development Bank of Zimbabwe, the Infrastructure Development Bank of Zimbabwe, ZB Bank, the Cotton Company of Zimbabwe, and CAPS Pharmaceuticals. The third category is medium- to long-dated bills amounting to 780 million USD issued under the Reserve Bank Debt Assumption Act for the central bank debt taken over by government. The fourth category is short-to-medium-dated bills in an amount of 450 million USD issued to finance the gap between expenditure and revenue collection by government. Only the last two categories of T-bills can be traded on the market; the first two types must be held to maturity.

In September 2016, tradable T-bills maturing in 2017 were being discounted 11-14 percent, those maturing in 2018 were being discounted 29-30 percent, and T-bills maturing from 2019 to 2020 were being discounted at rates of 39-40 percent. Some financial analysts have even discussed trading T-bills at discounts of up to 65 percent. In addition, according to the latest IMF Article IV report on Zimbabwe, the banking industry "could lose up to 15 percent of its capital base (about 1 percent of GDP) for every 10 percent discounting of T-bills, with domestically owned banks at higher risk" (IMF, 2017, 41).



**Figure 4.** *Zimbabwe's Domestic Debt*  
**Source:** Public Debt Management Office.

Although highly discounted now, these T-bills are likely to face even further discounts as accounting procedures are updated. On January 1, 2018, Zimbabwe will adopt a new accounting policy, International Financial Reporting Standards 9, which replaces the old method, International Accounting Standards 39.9. The new policy will require financial institutions to recognize T-bills as Fair Value Other Comprehensive Income (FVOCI) on the balance sheet rather than on the income statement. The implication is that if there is an

accounting mismatch, the entity's own credit risk must be recognized on the consolidated income statement. Furthermore, the impairment rules in the new standards will require credit losses in FVOCI to be anticipated in a forward-looking, "expected-credit loss" model, whereas currently they are not recognized until after the fact when a "trigger" event occurs (FinX, 2017).

The change is expected to create a more conservative banking sector, as long-term risk emerging on balance sheets will increase FVOCI and catalyze a subsequent increase in loan loss provisions (Old Mutual Zimbabwe Limited, 2016). The increase will have to be large, considering that the RBZ has "issued" large sums of T-bills onto institutions and that T-bills now comprise a significant portion of bank assets. However, to raise provisions for losses in a cash-strapped economy, banks are likely to recall or no longer issue loans and limit withdrawals, effectively taking more money out of circulation.

Reserve Bank of Zimbabwe

The government policies that predominately prevent Zimbabwe from enjoying the full benefits of a dollarized economy are those regarding the RBZ and the financial sector in general. As mentioned previously, the RBZ should have been effectively sidelined after the disastrous hyperinflation in 2009. However, as of 2017 the institution still remains largely unreformed, and has even grown in influence.

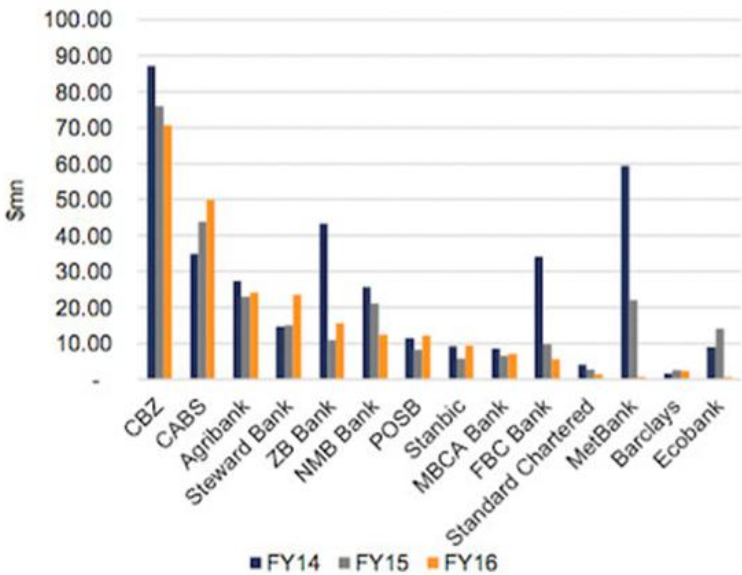


Figure 5. Distribution of Nonperforming Loans by Bank  
Source: RZB

In 2015, the government enacted the Reserve Bank Debt Assumption Act. It took onto the government’s books a total of 1.4 billion USD of pre-2008 debt from the RBZ, with a general set annual interest rate of 5 percent. The act significantly contributed to enlarging domestic debt,

from 2.3 billion USD as of November 2010 to 3.9 billion USD by the end of 2016. The debt included arrears dedicated to the government-run Zimbabwe Asset Management Corporation (ZAMCO), which was supposed to “acquire, manage, restructure, and dispose” of nonperforming loans (NPLs) from Zimbabwean

banks. ZAMCO was helpful to the private nonfinancial sector and to commercial banks: nonperforming private sector loans by banks fell from 20 percent of the total in 2014 to only 8 percent by 2017. However, in doing so, ZAMCO has endangered government accounts through the assumption of over 800 million USD as of 2016 ([Government of Zimbabwe Annual Budget Review 2016](#); see also Figure 5).

ZAMCO also assumed pre-2008 arrears as a result of the Reserve Bank of Zimbabwe Debt Assumption Act in 2015. Its large portfolio of risky loans poses a threat to the Zimbabwean government. The Public Debt Management Act, which authorizes the RBZ to act as an agent of the state and issue securities in repayment of the public debt, is an exercise in trying to postpone the problem rather than addressing it.

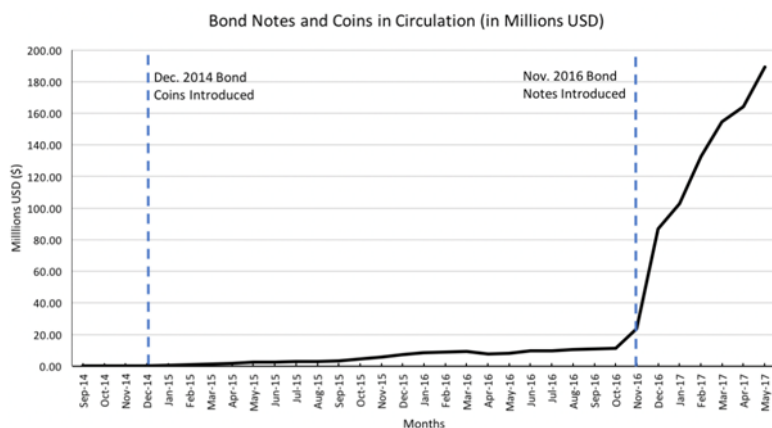
None of these actions would be particularly alarming under orthodox dollarization, as the government would be forced to reduce the deficit due to liquidity shortages. However, the adoption of Statutory Instrument 70 (S.I. 70) in 2015, which demonetized Zimbabwe dollar coins and notes, and S.I. 133 in October 2016, hint at future monetary troubles. S.I. 133 of 2016 allows for the issue of “a tender of payment of bond notes and coins issued by the Bank [RBZ] that are exchangeable at par value with any specified currency other than Zimbabwean currency” (S.I.133, 44B). The act goes on to declare that all bond notes are legal tender for “all transactions as if each unit of a bond note is exchangeable for one United States dollar.” In March 2017, S.I. 133 became an official act, giving it more entrenched legal status, as the Reserve Bank of Zimbabwe Amendment Act ([Phiri, 2017](#)).

On November 28, 2016, the country began circulating 10 million USD worth of so-called bondnotes of \$2 and \$5, as well as a \$1 Bond Coin.<sup>3</sup> On February 3, 2017, the RBZ began circulating 15 million USD worth of \$5 bond notes. Later in February the government started issuing \$10 and \$20 bond notes. The bond notes are backed by 200 million USD of support from the Africa Export-Import Bank (Afreximbank), a Cairo-based international

<sup>3</sup>Note that in 2014, bond coins were in circulation as 1, 5, 10, and 25-cent coins and in 2015 a 50-cent coin was introduced. These bonds were also reportedly backed by 50 million USD of support from Afreximbank.

financial institution. It has been questioned though by financial analysts how legitimate the \$200 million backing is, as Afreximbank has had credibility issues in the past and is seen to have an unusually close relation with the Zimbabwean government. Some South African news sources have disputed the backing and Afreximbank has not published anything related to the \$200 million on their website as of August 2017. As of May 2017, there were \$186 million worth of bond notes and coins in circulation, according to the RBZ, up from the \$87 million in circulation in December 2016, and the \$11 million in October 2016 before notes were released (see Figure 6). As of June 2017, roughly \$175 million is solely in notes ([See Reserve Bank of Zimbabwe, Monthly Economic Review, 2017](#)).

Bond notes are facing particular scrutiny on the black market (Makochehanwa; see also Mabeza). Officially, they are to be traded on par with the U.S. dollar. On the black market, premiums for converting bonds into U.S. dollars range widely, and as of early 2017, bond notes traded at a 5-15 percent discount for USD, while corporations and large-sum conversions by bank officials faced higher discounts of around 20 percent (Zwinoira). Black markets for bond notes are also reported to exist in Mozambique, Botswana, Zambia, and South Africa, highlighting the uncertainty of the fair value of bond notes (Saigal).



**Figure 6.** Bond Notes and Coins in Circulation

Source: Reserve Bank of Zimbabwe, Monthly Economic Review.

The bond notes are treated as a surrogate currency on the black market, but the RBZ and the Zimbabwean government have imposed an official exchange rate, limiting the freedom of large corporations and financial institutions operating in Zimbabwe, which are legally not allowed to discriminate against accepting bond notes. The Bank Use and Promotion Act, which was updated in 2004, makes it illegal to trade the bond notes at less than par. Smaller businesses are officially not allowed to discriminate against bond notes either, but their violations are harder to detect, so many small business owners have been reported to offer discounts of up to 50 percent to people paying USD. Furthermore, other countries do not view the Zimbabwean bond notes as legal tender, making trade harder for the import-heavy country. As of August 2017, an additional \$300 million-dollar facility from Afeximbank is currently in progress to back the issuance of more bond notes.

Alternatively, Zimbabweans have turned to the real time gross settlement (RTGS) payments system set up by the government of Zimbabwe in the early 2000s. The system accounted for approximately 78 percent of the total value of electronic and plastic transfers in 2016. The RBZ is supposed to facilitate transfers by backstopping them with its foreign reserves held in offshore accounts. These accounts are increasingly viewed to no longer possess enough foreign assets to support the RTGS system. This is indicated by the long transfer times of many payments, with some transfers, which are supposed to be instantaneous, taking up to two weeks, alongside premiums for USD in transactions involving RTGS.

T-bills are also currently being redeemed through the RTGS system. This is the most worrying aspect of the entire monetary system. If the RBZ lacks sufficient foreign assets in offshore accounts to support the RTGS system (as some sources claim) the whole repayment system would become a Ponzi scheme. In this increasingly-likely scenario, T-bills are issued to banks to fund government debt, while the government receives hard USD in return. Banks, in turn, receive principal and interest, but in RTGS form, that contains some USD. Since the RTGS system would not contain enough USD to back the transfers entirely, the government

must issue more T-bills in order to not default on its previous loans. The cycle continues until the government either is able to control its finances or, more likely, defaults when it runs out of foreign assets in its offshore accounts.

The continuing issuance of what is, in effect, a new local currency, allows the government of Zimbabwe to undertake further discretionary monetary measures that should have been eliminated under dollarization.

## Conclusion

Dollarization in Zimbabwe ended hyperinflation and prompted a modest real return to economic growth by drastic, but necessary measures. However, the methods implemented by ZANU-PF, the ruling political party, show a reluctance to accept a nondiscretionary monetary system. By not adhering to orthodox dollarization, Zimbabwe has left open, and used, a back door to monetary policy. The dollarized system will falter under a noncompliant government with large debt and increasing discounts for bond checks and Treasury bills. In the worst-case scenario of Zimbabwe defaulting — which is increasingly likely — bonds are only expected to fetch between 5-18 cents on the dollar, further reducing investment and credibility for the financial system ([Hanke, 2017](#), see also [Muronzi, 2017](#)).

With a back door to monetary policy open, Zimbabwe is likely to and has even announced plans to reintroduce a local currency (backed by gold and diamond reserves) and break free from the remaining monetary constraints of dollarization. This undertaking will result in further inflation, perhaps even another hyperinflationary deathblow, as the government has not developed an internationally integrated financial system, fiscal responsibility, and independent government institutions. (Moreover, diamond and gold production over the past years has reportedly slowed, calling into question the potential liquidity of the proposed system). Zimbabwe's current liquidity problems are made worse through government programs, leading to more people unwilling to spend the USD they have currently, fearing that they will have difficulty reacquiring USD. The government policies described above have choked the flow of foreign

investment, and have also limited local investment, as people worry that assets issued by the government will soon be worthless once again.

Government reform will be a requirement for successful dollarization, especially since the government still faces credibility problems stemming back from the early 2000s. Since then, it has time and again proven untrustworthy to international investors, making strong economic growth extremely difficult. Under President Mugabe's ruling ZANU-PF party, confidence is unlikely to improve anytime soon. Recent power struggles to see who will succeed Mugabe, who is 93 years old and in ill health, exacerbate problems with national stability. Unless the government unconditionally accepts the constraints that orthodox dollarization imposes, Zimbabwe will follow in the footsteps of its past, producing economic crises and hardship for a nation that possesses huge potential for economic growth.

## Appendix

### Appendix: Laws and Regulations on Dollarization in Zimbabwe

Bank Use Promotion and Suppression of Money Laundering Act – Prevents bond notes from being legally traded at less than par in Zimbabwe.

Indigenisation & Economic Empowerment Act – Requires at least 51 percent business ownership by Zimbabweans who are “native” to Africa.

Public Debt Management Act - Reserve Bank of Zimbabwe is required to act as an agent of the central government.

Reserve Bank of Zimbabwe Amendment Act 2017 – Formalized SI 2016-133 introducing bond notes as legal tender to be valued at par with USD.

Reserve Bank of Zimbabwe (Debt Assumption) Act – Assumes Zimbabwe's debt in terms of USD from before the scrapping of the Zimbabwe dollar in 2009.

SI 2015-70 - Reserve Bank of Zimbabwe (Demonetisation of Notes and Coins) – Removes all value from notes and coins from the Zimbabwe dollar which hyper-inflated and was scrapped.

SI 2016-064 - Control of Goods (Open General Import Licence) – Restricted the importation of certain goods to boost local production.

SI = Statutory Instrument

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# 6

## Was the cassa per la circolazione monetaria della Somalia an orthodox currency board?

Noah Naparst <sup>†</sup>

### Introduction

The southern part of what is now Somalia became an Italian colony in the late 19<sup>th</sup> century. Following the partition of the area by France and Britain in the latter half of the 1880s, the Italian government took interest in the southern portion of the territory as part of its larger colonial project. The process of colonization was gradual and involved “[proceeding] step by step, area by area,” given that there existed no “ready formed authority” in the Horn of Africa (Strangio, 2012). The Italian ambassador in the British protectorate of Zanzibar, a trader named Vincenzo Filonardi, orchestrated the creation of an Italian protectorate in the Sultanate of Obbia and the Sultanate of Majeerten in February and April of 1889, respectively. The protectorate was then enlarged with the Italian government’s leasing of the ports of Barawa, Merca, Mogadishu, and Warsheikh. The area was administered by

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Filonardi's company and came to be known in English as Italian Somaliland or Italian Somalia and in Italian simply as Somalia. To the north, in what is now the northern part of Somalia, was the colony of British Somaliland. Following lackluster economic results and a period of violence, the initial hands-off approach by the Italian government was replaced with direct administration of the colony (Strangio, 2012).

From the outset the colonial authorities (and later the Italian government) issued distinct currencies, bearing markings which distinguished them from Italian note issues. They began as informal promissory notes, and gradually increased in officiality and aesthetic similarity to other currencies of the time. In the earlier period, when there was no officially legislated currency, coins like the Indian rupee and the Maria Theresa thaler were used in Italian Somalia (Linzmeier, 2017). Prior to the establishment of the Cassa per la Circolazione Monetaria della Somalia, the Banca d'Italia, Italy's central bank, had exercised monetary authority over Italian Somalia, first opening a branch in Mogadishu in 1920 (Strangio, 2012). The first currency issued in the colony was a promissory rupie (rupee) note circulated by Filonardi's company beginning in 1893 (Linzmeier, 2017). The rupee notes were equal to the Indian rupee, the predominant currency around the Indian Ocean. Under Decree No. 600 of May 1920, the Banca d'Italia began issuing *buoni di cassa*, cash certificates which were denominated in rupie (Linzmeier, 2017). The Italian government passed Decree No. 1143 on June 18, 1925, authorizing the introduction of the Italian lira into Italian Somalia, replacing the rupee at an exchange rate of 8 lire per rupee (Linzmeier, 2017). In 1936, following the Italian invasion of Ethiopia from its colony of Eritrea, the Italian government joined Italian Somaliland, Eritrea, and Ethiopia into Africa Orientale Italiana (Italian East Africa). In 1938 it began issuing Italian East African lire, which were "similar to the notes then circulating in Italy, but with different colors and red overprints in the margins indicating the notes were for use only in Italian East Africa" (Linzmeier, 2017). During World War II, British forces conquered Italian Somalia, Ethiopia, and Eritrea. They replaced Italian-issued currency with the notes and coins of the East African Currency Board, which served the British colonies

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of Kenya, Uganda, Tanganyika, and Zanzibar (the last two of which now constitute Tanzania). The East African Currency Board issued the East African shilling, equal to the British shilling and worth 1/20 of a British pound (Schuler, 1992). While the East African shilling was the dominant currency issued during the British occupation, other currencies including the Italian lira, Indian rupee, Egyptian pound, and Maria Theresa thaler continued to circulate.

After the war, the United Nations, in effect representing Britain and the other World War II Allies, agreed with Italy that Italy would resume control of Italian Somalia, but not as a colony without a presumed right of independence (Italy, 1966). With the establishment in 1950 of the United Nations trusteeship of Somalia under the Republic of Italy came the need for a monetary system for the territory, which was set to become independent in 1960. The Cassa per la Circolazione Monetaria della Somalia (CCMS—a loose English translation would be Somalia Currency Office) would fulfill this role, acting as an independent monetary authority, and possessing the ability to issue a Somalian currency, the somalo.

There are already some surveys of the history and economic context of the CCMS, notably the overviews included in two books by the Italian historian Donatella Strangio, *Decolonizzazione e sviluppo economico: dalla Cassa per la circolazione monetaria della Somalia alla Banca nazionale somala: il ruolo della Banca d'Italia* (2010) and *Reasons For Underdevelopment: The Case of Decolonization in Somaliland* (2012). However, none present a fully digitized and translated balance sheet, currency issuance statistics, and robust balance sheet analysis regarding the extent to which it functioned like an orthodox currency board. We provide annual and monthly statistical data of the balance sheet of the Cassa per la Circolazione Monetaria della Somalia for the duration of its existence, from July 1950 to June 1960. An analysis of this balance sheet and of the legislative history of the Cassa suggests that it functioned somewhat, but not entirely, like an orthodox currency board.

## **Origins and history of the Cassa per la Circolazione Monetaria della Somalia**

Donatella Strangio describes the underdeveloped state the British found Somalia in after the defeat of Italian forces in 1941: “there was not even one Somali university graduate and 94.4% of the population were illiterate; there was one doctor for every 60,000 inhabitants and one hospital bed for every 990; only 20,000 Somalis had a brick house” (Strangio, 2012). To many, this lack of development, combined with the ghastly photographs of Somali partisans interned in Italian concentration camps, evidenced the failure of Italy’s “civilizing mission” in Somalia. Consequently, there was a push to decolonize the territory and build up a Somali nation state in its place. The failure of the 1956 Anglo-French expedition to reclaim the Suez Canal for the British bolstered a movement to “return Africa to the Africans” and intensified calls to decolonize Africa and Asia (Strangio, 2012: 6). But how would this nation-building occur? One solution lay in the United Nations trusteeship system, which had its precedent in the League of Nations mandates for the former colonies of the defeated Central Powers. It aimed at balancing the desire for self-determination of former Axis colonies with the continuation of the colonial system which benefitted the Allied Powers, who still possessed overseas territories (Strangio, 2012: 6-7). A Western power would assume temporary administrative responsibility over the territory, with the aim of creating governing and social institutions that would persist after the fiduciary relationship ended. The end goal was the establishment of stable, successful governments ruled by the local population that could oversee economic growth in the former colonies; the trusteeship in Italian Somalia followed this pattern.

On November 21, 1949, the United Nations General Assembly voted to allow Italy to assume administrative control over its former colony of Italian Somalia (CCMS, 1° Esercizio: 5). This was confirmed on January 27, 1950, through an agreement by the Council for the Administrative Trusteeship of the United Nations and the Italian Republic in Geneva. This form of UN trusteeship, ratified in the General Assembly on December 2, 1950 and by the Italian Parliament on November 4, 1951, charged Italy with

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political administration and economic development of the territory. Named the Amministrazione Fiduciaria Italiana della Somalia (AFIS), it was the only trusteeship granted to any of the former Axis powers. When the proposal was being debated, Italy had not yet joined the United Nations (and would not do so until 1955), which resulted in a more stringent mandate for the AFIS and a duration of ten years being specified.

With political independence would come the need for a Somali monetary system, and thus the administrators of the AFIS set out to establish one. There were three main proposals debated by the Italian authorities with regards to the establishment of this system: the reinstitution of the Italian monetary system in Somalia; the introduction of a mixed Italo-Somalian system with a currency that was distinct but linked to the Italian lira; and the creation of an independent system. The Cassa per la Circolazione Monetaria della Somali are presented the third option, as it was hoped that its independence would allow for a move towards self-governance in Somalia. The CCMS was founded on April 18, 1950 as a joint-stock company, with its headquarters in Rome (Strangio, 2010: 51). Its initial capital was 87.5 million lire, subdivided into 1,000 shares (Strangio, 2010: 51). It was 99.5 percent underwritten by a government department, the Ministero dell'Africa Italiana, with the small remainder financed by foreigners (Strangio, 2010: 51). The CCMS took this form due to the impossibility of establishing a public institution in such a short time frame. It would be transformed into a public body on June 30, 1954 (Strangio, 2010: 18). The CCMS began operating prior to the start of the AFIS, having been granted legislative approval on May 16, 1950, with its charter signed and published in Mogadishu on May 18 (Strangio, 2010: 51).

The first task at hand was to create a currency for Somalia, which was done under AFIS ordinance 14 on July 16, 1950, and was given the name "somalo" (CCMS, 1° Esercizio: 9). The CCMS had sole control over the issuance and maintenance of the somalo, (Strangio, 2010: 52). which was to be backed by a mix of gold, silver, and foreign currency reserves (Strangio, 2010: 16; CCMS, 1° Esercizio: 9). It was subdivided into 100 centesimi, and banknotes in denominations of 1, 5, 10, 20, and 100 somali were issued

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(Strangio, 2010: 17). All other currencies, including British Commonwealth currencies that had circulated in the territory due to the British occupation, ceased to be legal tender on July 23, 1950 (Strangio, 2010: 17-18). The exchange rate for East African shillings into the somalo was fixed at 1 somalo for 1 East African shilling, and the exchange rate for the Italian lira was based on somalo gold parity and the U.S. dollar-lira cross rate, with 1.143 somali equal to 100 Italian lire (Strangio, 2010: 51). The somalo-lira exchange rate would remain fixed for the duration of the CCMS's existence. (CCMS, Bilancio 1960: 91). This system was quite like the British currency board model, a fact repeatedly acknowledged in the first annual report of the CCMS (CCMS, 1° Esercizio: 6-7, 10-11). This is due to the fixed parity with the lira and the requirement that all currency in circulation be backed by foreign reserves. The CCMS was not required to fully back the coins in circulation; specifically, 1-somalo coins only needed to be backed by reserves equal to the value of the silver they contained less their face value (nominal value), and smaller-denomination coins did not need to be backed at all (Strangio, 2010: 19). The report notes that the CCMS functioned differently than the British currency boards in that the currency it issued was backed by a basket of foreign assets, including gold and silver, instead of one reserve currency, like the British pound. (Strangio, 1991: 96; CCMS, 1° Esercizio: 10). This did not preclude it from being an orthodox currency board, since a backing by a basket of foreign currencies is also feasible, (Schuler, 1991: 3) and its status with regards to currency board orthodoxy will be discussed later. Note, however, a currency being backed by a basket of foreign reserves and having an exchange rate calculated from a basket of foreign currencies are two different concepts, with the somalo exhibiting only the former characteristic. While it was backed by a mixture of currencies, the somalo was fixed to the lira.

All the members of the CCMS's Board of Directors were Italian. This would prove to be a concern in the waning years of the trusteeship period, given the Somali government's goal of filling administrative, technical, and managerial roles with native Somalis. While the Somali government was successful in lobbying for the relocation of the CCMS's headquarters to Mogadishu, which occurred in 1959, it was but one step towards full

independence. Communications between the Banca d'Italia's governor and the Ministry of Economic Affairs of Somalia show the Somali government's push to create an independent financial and banking institution for the new state. It was in this context that the Banca Nazionale della Somalia (BNS; in English, Somali National Bank) was created to replace the CCMS when Somalia became independent. Still, many of the technical roles in the CCMS and later BNS continued to be filled by Italians. The Somali government thus made efforts to "Somalize" the newly-created Banca Nazionale della Somalia (into which the CCMS had been dissolved), and equip young Somali with the knowledge they would need to run the organs of state (Strangio, 2012: 26). Using scholarships to Italian universities, apprenticeships at the Banca d'Italia and other Italian banks, and maintaining certain Italian experts in their roles after independence to facilitate the training of new management succeeded in reducing the foreign staff of the BNS to nine by 1966.

By the conclusion of the trusteeship period, the CCMS had merged with the local "Banking Department" of the Banca d'Italia to form the Banca Nazionale della Somalia (Strangio, 2012: 22-23). During this time the buildings, equipment, reserves, and legal rights, obligations, and claims of the CCMS were legally transferred to the BNS, as indicated in the new central bank's charter. On July 4, 1960, the offices of the new Somali state opened, and all the duties of the rebranded Somalian National Bank were transferred to the new government (Strangio, 2012: 24-26). Independent Somalia comprised both the former Italian Somalia and the former British Somaliland, with British Somaliland having used the East African shilling as its currency. The somalo was renamed the Somali shilling, with the same extant subdivision into centesimi and exchange rate with other currencies (Strangio, 2012: 25). The Italian staff of the Banca d'Italia, who had occupied all but one of the CCMS's administrative posts during the AFIS period, (Strangio, 2012: 25) were gradually replaced by Somalis trained in banking through a "process of Somalization." (Strangio, 2012: 26-27).

## The workings of the CCMS

The Cassa per la Circolazione Monetaria della Somalia was founded on April 18, 1950, in a document signed by the Director General of the Ministry for Italian Africa, Tomaso Columbano, Italian Treasury official Alfredo Di Cristina, and foreign finance advisor Amedeo Gambino. From May 18, 1950, when the CCMS became operative, to January of 1959, when the Somali government's request to move the CCMS's headquarters to Mogadishu was accepted by the Italian President, the bank was headquartered at 107 via Torino, in Rome. The CCMS's founding process took place while under debate in the United Nations General Assembly and later the Italian parliament, both of which ratified it later that year. It was initially founded as a joint-stock company, with its 87.5 million lire share capital subdivided into 100 registered shares 99.5 percent underwritten by the Ministry for Italian Africa and 0.5 percent underwritten by foreign financial firms. The legal relationship between the CCMS and the AFIS was delineated by Article 6 of AFIS Ordinance No. 14, passed on May 16, 1950. The article established the CCMS's right to produce and issue coins and notes for circulation in Somalia, and fixed the somalo parity, the composition of the coinage, and the standards for the composition of the foreign reserves backing the somalo (Strangio, 2012: 20). Article 6 of Ordinance No. 14 also stipulated that in the absence of a specific law, the CCMS would follow practices followed in Italy.

The CCMS was managed by a Board of Directors whose size fluctuated between seven and nine members. Members of the Board were elected to three-year terms, with re-election permitted, in a General Meeting of shareholders. While the President was appointed by the government, members of the Board of Directors could come from any of the following bodies: the Treasury, the Ministry for Italian Africa and Foreign Trade, the Banca d'Italia, the Foreign Exchange Office, or the AFIS. The Board was overwhelmingly made up of administrators with advanced degrees: in its first year, seven of the eight members held doctorates, with the other being an accountant. The Board was empowered under article 24 of Titolo IV with "the faculty to sign any convention with the Trusteeship of Somalia, the Italian State, and any Authority,

Body, or person", and "the power to create, issue, circulate, and withdraw money for Somalia ... and over the composition of the reserves and uses of the part of the reserves made up of currencies." (Strangio, 2012: 20). The CCMS was charged with issuing banknotes against the receipt of gold, silver, and foreign currency, and was allowed to hold "a quantity of currency no greater than one third of the money in circulation as a reserve." The CCMS's governing statute gave it the exclusive right to produce and issue legal-tender currency with debt-paying power in Somalia under the trusteeship.

Although it had its own headquarters and upper management, the CCMS was dependent on Banca d'Italia staff for its day-to-day functions. The relationship between the CCMS and the Banca d'Italia was stipulated in an agreement signed by both parties on August 17, 1950. The CCMS was to delegate to the Banca d'Italia "its accounting and administrative management in Italy and Somalia as well as its relations with public administrations, third parties, authorities, and foreign countries." The Banca d'Italia was therefore to carry out the decisions of the CCMS, and conduct most of its daily operations, including the production and delivery of banknotes and coins; the storage of monetary reserves; exchange of coins and notes with gold, silver, and foreign currency in reserve; retirement and destruction of worn-out notes and coins; managing the CCMS's accounts; and providing the data used in the CCMS's financial statements. Two "banks" were created within the CCMS, called the Special Bank and the Central Bank. Each had a headquarters in Rome and a branch in Mogadishu and worked for both the CCMS and the Banca d'Italia, while maintaining separate books. The Special and Central Banks became two discrete parts of the Banca d'Italia, and while the management and book-keeping remained separate, they worked for both the CCMS and the Banca d'Italia. The somali notes (along with the annual reports of the CCMS) were printed by the Istituto Poligrafico dello Stato, the Italian state printing office, and coins were manufactured by the Italian mint. These were delivered to the Special Bank, as was its legal responsibility, and were transferred to the Central Bank by decree of the CCMS's

administrators, as per the laws on the circulation of the somalo (Strangio, 2012: 20).

To allow for exchange between the lira and the somalo, the CCMS set up three permanent offices in Mogadishu and five mobile offices in other parts of the country. By May 22, 1950, all the offices were operational, and a two-month period for the exchange operations, concluding on July 22, was decided. Due to the Somali population's curiosity about the somalo, there was an overwhelming demand for somalifrom the first day of operations. The CCMS's founders had envisioned such a scenario; in cases where an immediate need or unexpectedly high demand for money arose, a local bank acted as a custodian dispensing payments in accordance with currency board rules while more notes and coins were shipped from Rome (Strangio, 2012: 21). The CCMS apparently did not charge a fee for conversion into and out of the somalo.

The CCMS underwent two major structural changes during the trusteeship period. In June 1954, under article 4 of Italian Law No. 677, the CCMS was refounded as a public institution, under the supervision of the Italian Ministry of the Treasury and the Foreign Ministry (Italy, 1966: 25). The following year, on March 5, 1955, the Italian President issued a decree mandating that the share capital of 87.5 million lire be transformed into an endowment fund to be given to the CCMS, a change reflected in the balance sheet for that year. The bank was reorganized again by an Italian presidential decree on December 2, 1958. The CCMS's mandate was enlarged, as the AFIS authorities prepared its transition into a central bank (although the term central bank is absent in the decree) (Strangio, 2012: 22). Its new powers included rediscounting for credit firms, issuance of checks and bank drafts, cash services, investment in public securities and publicly guaranteed currency operations, deposits, and cash services (Strangio, 2012: 22). It also performed other functions for the AFIS and Somali government, such as Treasury services (Strangio, 2012: 22). The CCMScontinued functioning this way until its transfer to the Somali government on July 1, 1960.

The decision to establish a central bank rather than continue with the more limited powers of the CCMS was rather typical of

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newly independent countries at the time. Steve Hanke cites three reasons for the abandonment of currency boards in favor of central banks in former colonies after World War II (Hanke, 2002: 98). First, “a choir of influential economists was singing the praises of central banking’s flexibility and fine-tuning capacities.” At the time, economists and policymakers had greater confidence than they do today in the ability of activist monetary policy to promote economic development by channeling credit to the sectors most needing it. Second, the International Monetary Fund and World Bank, seeking new clients and projects for their employees, encouraged the establishment of these new central banks. But, according to Kurt Schuler, it was mainly “the desire for a central bank as an expression of national sovereignty” which most strongly led to the demise of currency boards (Schuler, 1991: 132). Looking to the first annual report of the Somali National Bank, it is evident its creators believed it would “achieve still greater success in the service of Somalia’s economy and finances,” (Somali National Bank, First Annual Report: xix) by acting “as impeller and guide of the country’s economic development.” (Somali National Bank, First Annual Report: 171). The language in the report eschews nationalist rhetoric, but it does describe the CCMS as “an Italian public corporation,” (Somali National Bank, First Annual Report: 171) implying its undesirability compared to the introduction of a new, independent monetary and credit system. For these reasons, Somalia echoed other newly-independent countries of the time and established its own central bank.

## To what extent was the CCMS a currency board?

Our summary of the history of the Cassa per la Circolazione Monetaria della Somalia now complete, we will discuss the extent to which it operated as an orthodox currency board. Orthodox currency boards possess the three following characteristics: a fixed exchange rate with an anchor currency (or basket of currencies, though this has not been done before), unlimited convertibility into and out of the anchor currency, and at least 100 percent net foreign reserves against the monetary base (Hanke, 2002: 88-90). To determine whether the CCMS functioned as an orthodox currency board during its ten-year existence, we must first examine the laws

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governing the institution and its annual balance sheets to inform the analysis.

The CCMS's governing structures did mandate a fixed exchange rate whereby 1 somalo was nominally equal to 0.124414 grams gold. (Gold was a unit of account only, not a medium of redemption; the CCMS did not pay out gold to holders of somali who wished to exchange them.) Since the Italian lira was also tied to gold, the exchange rate between Italian lire and the somalo remained constant at 1.143 somali per 100 Italian lire. Orthodox currency boards are not permitted to hold domestic assets, though in practice many currency boards have deviated from orthodoxy in this respect. Some currency boards have had bylaws prohibiting the purchase of domestic assets, as was for instance the case with the Board of Commissioners of Currency in Zanzibar ([Licursi, 2016](#): 6). While Article 3 of the CCMS's bylaws required it to hold foreign reserves equal to 100 percent of the monetary base, ([Strangio, 2010](#): 59) it did not meet this threshold for the first four years of its existence. Additionally, there seems to have been no prohibition on the CCMS's ownership of domestic assets, and indeed it owned a substantial amount of domestic assets for the first four years of its existence. All told, the CCMS's bylaws provided for some of the qualities of orthodox currency boards but lacked some crucial requirements.

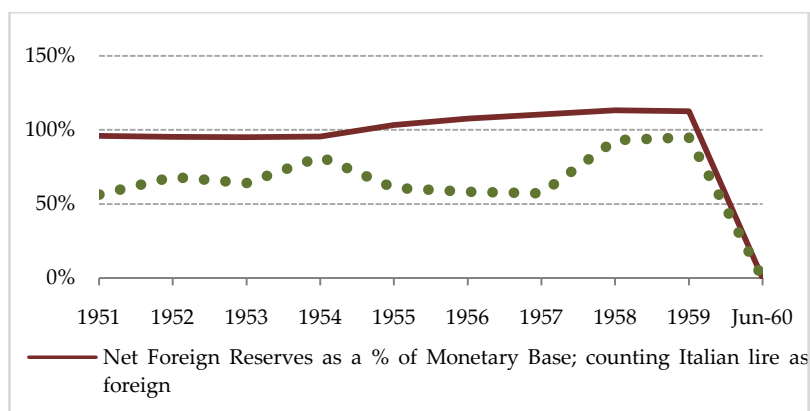
## The data and our tests

We have digitized annual and monthly balance sheet data on the Cassa per la Circolazione Monetaria della Somalia for the whole period of its existence, 1950-1960. The balance sheets are published in the annual reports of the CCMS and have been digitized in an accompanying spreadsheet workbook. We have performed tests on the items in the balance sheets, to aid in the determination of the CCMS's status as an orthodox currency board.

### Test One: Foreign assets, domestic assets, and monetary base

First, we measured foreign assets as a percentage of the total monetary base, which includes coins and notes and is given both monthly (in the Statistical Tables section) and yearly (in the

balance sheet) in the annual reports of the Cassa per la Circolazione Monetaria della Somalia. The value of foreign assets can be measured two ways: counting Italian lire as either foreign or domestic assets. There is some ambiguity as to the status of the lira, given that the Banca d'Italia had a branch operating in Somalia on the one hand, and that the CCMS was intended to be independent from Italian institutions on the other. Overall the more convincing answer is that Italian lire should be counted as foreign reserves. There are two reasons for this judgement. First, as previously mentioned, the CCMS's creators intended on creating an independent central monetary authority for the soon-to-be independent Somalia, which, along with the legislation establishing the CCMS and the somalo, specified the somalo as the sole legitimate domestic currency. Second, if one counts lire as domestic assets, there is much more volatility in the value of the CCMS's foreign reserves than is apparent if lire are treated as foreign. The logical explanation is that if Italian lire are treated as foreign assets, the volatility can be interpreted as changes in the composition of foreign reserves, whose level was more stable in this analysis. Still, we have performed two analyses: one counting Italian lire as foreign reserves and another counting the currency as a domestic asset.



**Figure 1.** *Net Foreign Reserves (% of Monetary Base)*

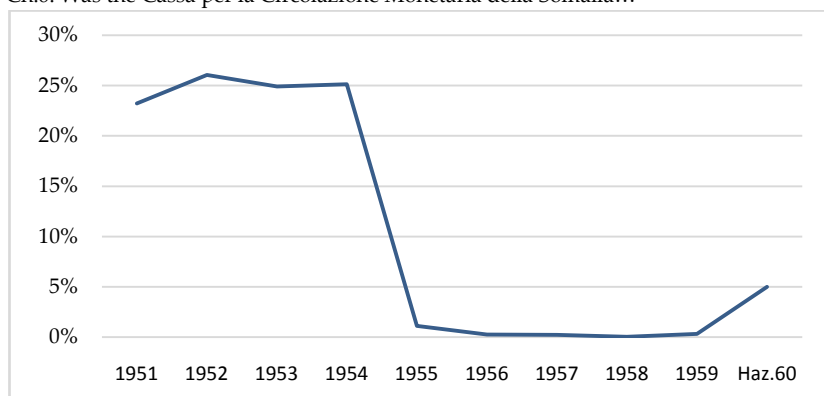
Counting Italian lire as a domestic asset, the figure for net foreign reserves as a percentage of the monetary base stays

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persistently below 100 percent, which breaks one of the crucial definitions of an orthodox currency board. However, the alternative analysis, counting Italian lire as a foreign asset, produces more orthodox results. From 1951 to 1954, net foreign assets as a percentage of the monetary base hover around 95 percent, modestly below the 100 percent figure expected of an orthodox currency board. Then, from 1955 to 1959, the figure rises above 100 percent, to an average of 109.4 percent for the period. While the simplest orthodox currency board would be expected to have a figure of 100 percent, in practice many currency boards have kept additional assets of up to 10 percent on hand to guard against a depreciation in their assets. In 1960 there is no reserve ratio, as the CCMS merged with the Mogadishu branch of the Banca d'Italia to form the Somali National Bank, and the value of the monetary base as maintained by the now-defunct CCMS fell to zero. Overall the CCMS fully meets the first statistical test for orthodox currency boards from 1955 to 1959, during the latter period of its existence, and nearly meets it during earlier years. This is consistent with the results of the second test, which suggests a move toward orthodoxy during the period, after its reorganization as a public institution.

## **Test Two: Domestic assets as a percentage of total assets**

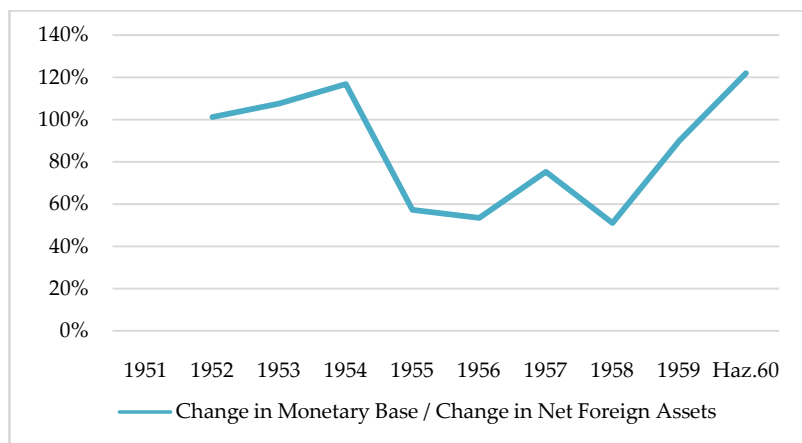
The second test we performed measures domestic assets as a percentage of total assets. For an orthodox currency board, this should be zero percent, although currency boards often keep a small amount of cash on hand to pay the salaries of their employees, rent, and other local expenses. A quarter of the Cassa per la Circolazione Monetaria della Somalia's assets were domestic assets for the period 1951-1954, before dropping to close to zero percent in the period 1955-1959. As in the previous section the changes in the numerical aspects of the CCMS's balance sheets bely a qualitative shift between 1954 and 1955, the year the CCMS was refounded as a public institution. It is unclear exactly what might have motivated the drop in domestic assets, and the sources we consulted do not shed light on the issue.



**Figure 2.** *Domestic Assets as a % of Total Assets*

### **Test Three: Reserve pass-through, and changes in the monetary base and foreign assets**

The third test involves reserve pass-through, which is the change in the monetary base divided by the change in net foreign assets. For an orthodox currency board, we expect a value of 100 percent, but most currency boards usually exhibit values between 80 percent and 120 percent, which may be considered “close” (Hanke, 2008: 80). A reserve pass-through rate of 100 percent means that if the monetary base rises or falls by a certain amount, then the foreign reserves change by the same amount (Hanke, 2008). Given that this test involves a rate of change, the figure begins in 1952 (the second full year of operation—the first balance sheet covered a “long financial year” comprising part of 1950 and all of 1951) and concludes in 1960. The data for the period of 1952-1954 suggest orthodoxy, whereas the data for 1955-1960 suggest a departure from orthodoxy. This stands in contrast to the results of the first two tests, which suggested heterodoxy during the period of 1951-1954 and orthodoxy during the period of 1955-1960. In 1960, the figure rises once more to 122 percent, which suggests orthodoxy but reflects the CCMS’s discontinuation of the somalo and the large-scale selling-off of the CCMS’s assets. In that year, the value of foreign assets owned by the CCMS decreased from 72.5 million lire to 19.7 million lire. Because the 1960 figure is complicated by the cessation of the CCMS’s functions, it can be considered an outlier.



**Figure 3.** *Reserve Passthrough as a % of Change in Monetary Base*

### Further Tests

We also measured annual changes in the monetary base and net foreign assets, as shown in Figure 4. If the changes in monetary base and net foreign assets are insignificant compared to the size of the monetary base, then a large reserve pass-through as a percentage of the monetary base can be ignored. This is the case for the CCMS. While there is a gap between the changes in the monetary base and net foreign assets, it is quite small and movements in both statistics mirror each other closely. This analysis is also true in Figure 5, which shows the change in the monetary base and net foreign assets as a percentage of the previous period's monetary base. Again, we see a slight discrepancy between the two figures, but the changes are similar and almost one-to-one. For the period of 1955-1959, in which the CCMS fails the reserve pass-through test, the largest discrepancy occurred in 1957. In this year, the percent change in monetary base rose to 12.9 percent and the change in net foreign assets increased to 17.2 percent. With the largest gap equaling just 4.3 percent, it does not make sense to discount the CCMS's potential as a currency board on the 1957 figure alone.

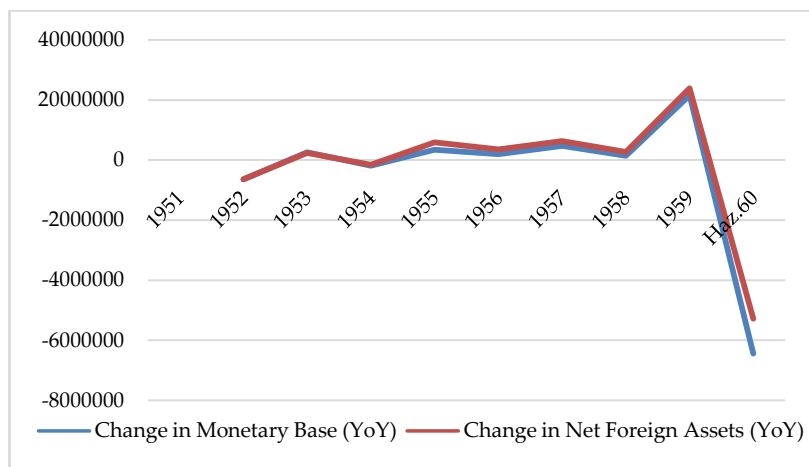
Additionally, we analyzed the composition of the CCMS's legal reserves, what are shown in Figure 6. The composition of the foreign reserves did change over time, with the pound sterling

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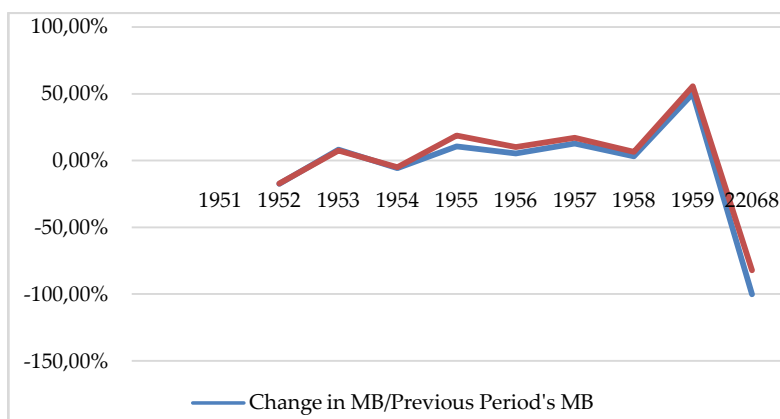
making up the majority from 1950-1954, the lira representing the plurality in 1955 and majority from 1956-1957, and the dollar forming the majority from 1958-1960. Little explanation is given in the annual reports for the changes in the composition of the foreign reserves, other than a vague desire on the part of the CCMS to safeguard against an "imbalance" in the balance of payments. (Cassa per la Circolazione Monetaria della Somalia: Bilancio 1960. 18). The first annual report of the Somali National Bank does offer some explanations, however (Somali National Bank, First Annual Report: 159-160). Initially, the reserves were dominated by sterling area currencies, including East African Currency Board shillings, which were withdrawn in 1950 and returned to British authorities in 1955. This withdrawal, combined with the fact that the Italian government made contributions to the CCMS's reserves in Italian lire, led to the proportion of lire rising to a peak in 1956. According to the report, "In 1957 the CCMS received from the Exchange Management Account a request to convert sterling into dollars," (Somali National Bank, First Annual Report: 160) which was followed in 1958 by a similar request to convert lire into dollars. The result was that the proportion of dollar assets rose in the final years of the CCMS's existence. A possible explanation for the conversion requests could have been local demand for each of the currencies. With the gradual British withdrawal from the region, and the increased American presence and interest in Somalia, Somalis may have demanded more U.S. dollars and fewer pounds sterling as the AFIS period progressed. Given the Italian role in administering the AFIS, the lira would have been a salient currency throughout the period, and thus to accommodate demand, the CCMS may have decided to hold substantial amounts of lire throughout its existence. Still, while Italy was the primary destination for Somali exports, the Italian government "remained firm in its intention to keep the somalo independent." (Somali National Bank, First Annual Report: 160). A final item of interest is the abrupt rise in gold and silver reserves in 1960. This rise is partially explained by the CCMS's acquisition of 140,000 somali worth of gold in the second half of 1959. Another reason for the abrupt rise is that when the CCMS took over the Banca d'Italia's

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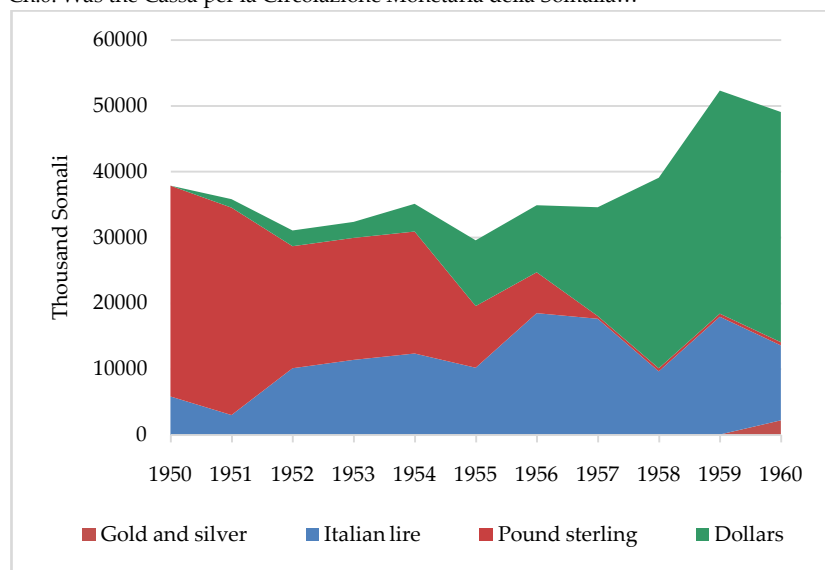
assets in Somalia, the value of the silver in 1-somalo coins not in circulation was added to the reserve.



**Figure 4.** *Changes in Monetary Base and Net Foreign Assets*



**Figure 5.** *Change in Net Foreign Assets and Monetary Base as a % of the Previous Period's Monetary Base*



**Figure 6.** *Foreign Reserves of the CCMS, 1950-1960*

## Conclusion

The Cassa per la Circolazione Monetaria della Somalia did possess many of the qualities of an orthodox currency board, particularly during the latter part of its existence, but fails to meet all the necessary criteria. Although in principle the CCMS's bylaws could have caused it to operate as an orthodox currency board, the absence of restrictions on purchases of foreign assets, and the data from its annual balance sheets suggest that it was not an orthodox currency board. Two of the three statistical tests suggest orthodoxy for the latter half of the CCMS's existence, but the final test suggests that the reverse is true. Furthermore, the existence of the Somali branch of the Banca d'Italia complicates the claim that the CCMS was a currency board, since the Banca took on many responsibilities typically held by central banks and the two types of institutions are considered mutually exclusive. Overall, while the CCMS did have many of the attributes of a currency board and might be placed in the general canon of these institutions, it was not an orthodox currency board, a fact acknowledged even by its framers.

*Postscript*

The companion spreadsheet workbook to this paper contains the underlying data, calculations, and original versions of the graphs. The spreadsheets in the workbook also contain data not used in the paper, notably, full income statements and balance sheets for each year the Cassa per la Circolazione Monetaria della Somalia was active.

## Appendix

### Appendix A: Legislative History of the CCMS (Strangio, 2012)

- April 18, 1950: the Cassa per la Circolazione Monetaria della Somalia (CCMS) is founded as a joint-stock company, in a document signed by the Director General of the Ministry for Italian Africa, a Treasury official, and a foreign finance advisor.
- May 16, 1950: Under the Amministrazione Fiduciaria Italiana della Somalia (AFIS) Ordinance no. 14 in the Italian *Bollettino Ufficiale*, the somalo is introduced and made the official currency of Somalia.
- May 16-17, 1950: The exchange for the East African shilling, Italian lire, and U.S. dollar is fixed by articles 6 and 10 of AFIS Ordinance no. 14. Article 6 also grants the right to produce and issue coins and notes for circulation in the AFIS to the CCMS.
- May 18, 1950: Article IV of AFIS Ordinance no. 14 establishes the technical characteristics of the somalo notes and coins. After being signed by the AFIS authorities and published in the *Bollettino Ufficiale* on this date, the CCMS becomes operational.
- May 22, 1950: The initial official exchange between the somalo and shillings and lire begins.
- July 22, 1950: The initial official exchange between the somalo and other currencies ends.
- August 17, 1950: The Banca d'Italia and the CCMS sign a Convention in Rome which delineates their relationship and the responsibilities of each party.
- June 30, 1954: Under Article 4 of Law no. 677, ratified by the Italian Republic and the United Kingdom, the CCMS is transformed from a joint stock company into a public body.
- December 2, 1958: Under Presidential Decree no. 1131, published in the Italian *Gazzetta Ufficiale*, the CCMS's statute is altered to give it powers akin to those of a central bank.
- July 8, 1959: At the Somali government's request, and by Italian Presidential Decree, the CCMS's main headquarters are moved to Mogadishu from Rome.
- July 1, 1960: With Somalia's independence, and the end of the AFIS, responsibility for the Somali currency is transferred to the Somali National Bank.
- July 4, 1960: The offices of the new state open for the first time, as July 2 and July 3 were weekend days.
- December 2, 1960: Full autonomy and sovereignty over the Somali National Bank is transferred to the Somali government.
- November 23, 1960: A full Monetary Agreement between Italy and Somalia, entailing the transfer of currency and activities from the CCMS to the Somali National Bank, is signed.
- March 19, 1963: The transfer of ownership of the CCMS's buildings and equipment in Mogadishu to the Somali National Bank, for a total value of 200 million lire, takes place between the chairmen of the two institutions.

## **Appendix B: Timeline of Events in Italian Somalia (Strangio, 2012)**

- Late 1880s: The partition of what is now Somalia by France, Italy, and Britain occurs.
- 1889: Vincenzo Filonardi, owner of the Filonardi Company and ambassador in British Zanzibar, orchestrates the creation of an Italian protectorate in the Sultanates of Obbia and Majeerteen.
- 1893: The Italian government obtains a lease on the ports of Barawa, Merca, Mogadishu, and Warsheikh, and grants the administration of the ports to the Filonardi Company for 3 years.
- 1896: After modest economic results and following the end of a period of official uninterest, the Italian government briefly administers the ports directly, before granting them to explorer and geographer Antonio Cecchi.
- November 26, 1896: An attack near Mogadishu kills Cecchi, some government officials, and a group of men. Another company takes over the administration of the ports.
- 1905: Italy takes on direct administration of the colony. Its rule is characterized by "fascism, when tribes were disarmed, chiefs were reduced to collaborators, and expropriations became more systematic." (Calchi Novati, 1994: 57, Cited in Strangio, 2012: 3) Once the local leadership is subdued, the workforce follows. Farmers in the south are the hardest hit, being forced to "work like slaves." (Strangio, 2012: 3)
- 1908: The border between Italian Somalia and Ethiopia is settled on paper, but the disputes following will be used as justification for Italy's invasion of Ethiopia in 1935 following the Wal-Wal incident.
- 1900-1921: Sayiid Mohamed Abdille Hassan, known as Mad Mullah, wages a war of liberation against the occupying British, Italian, and Ethiopian forces. Efforts to develop and pacify Italian Somalia, along with an intensification of rebellions, ensue.
- July 25, 1924: An agreement between Italy and Britain establishes the boundaries between Italian Somalia and British Somaliland.
- October 3, 1935: The Italian invasion of Ethiopia begins. With the fall of the Ethiopian capital came the linking of Italy's colony in Eritrea with Italian Somalia.
- 1940: Italy enters World War II on the side of the Axis and conquers British Somaliland.
- 1941: British forces counterattack, forcing Italy out of Somaliland. The first organized political movements aimed at Somali independence appear.
- 1943: The Somali Youth League is formed with Britain's support. The League pushes for the unification of the Somali populations first and autonomy and independence later. It has the support of progressive segments of the population but is challenged by clan-oriented parties. Italian officials, colonists, and other pro-Italian elements group together under the Conference of Somalia.
- 1945: World War II ends in Europe; Italy is one of the defeated Axis powers.
- 1947: The Somali National League is formed under the Somali Youth League's influence and boycotts the elections held in that year. Italy signs a peace treaty with the Allied powers.

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- January 1948: An international investigatory commission visits Italian Somalia, seeking to investigate the economic conditions and needs of the people. It is disrupted by riots that kill 58 Italians.
- December 21, 1949: United Nations General Assembly grants trusteeship of Somalia to Italy for a ten-year period, to begin in 1950, at the end of which Somalia is to become independent.
- April 18, 1950: Cassa per la Circolazione Monetaria della Somalia created.
- July 16, 1950: Somalo created via Amministrazione Fiduciaria Italiana della Somalia (AFIS) ordinance.
- 1954: The AFIS holds its first administrative elections.
- 1956: The AFIS holds its first political elections.
- July 1, 1960: The trusteeship period officially ends, and the Somali Republic is born. The Somali National Bank officially replaces the Cassa per la Circolazione Monetaria della Somalia as the monetary authority.
- July 4, 1960: The Italian government transfers all control over the trusteeship territory to the Somali government.

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