



Shaking Out or Shaking In: The Impact of Zimbabwe's Economic Crisis on the Country's Manufacturing Sector Allocative Efficiency

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Shaking Out or Shaking In: The Impact of Zimbabwe's Economic Crisis on the Country's Manufacturing Sector Allocative Efficiency*

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Abstract

Zimbabwe had one of the world's worst economic crises from the late 1990s to 2009. The crisis encompassed a financial sector crisis, severe adverse investment and demand shocks and idiosyncratic firm and industry interventions by government. On the basis of the resource misallocation hypothesis, the study investigates the effects of the shocks on within industry resource allocation efficiency for the country. Using the country's manufacturing firm data before and after the crisis and comparable data for two comparator countries, Ghana and Kenya to estimate the potential productivity effects of the crisis, there is evidence suggesting a deterioration in the country's within industry resource allocation efficiencies, with the country estimated to have lost at least 20 and 32.8 log points in potential firm productivity, respectively, against its pre crisis and its comparator countries productivity, with the allocative inefficiency persisting into the post crisis period.

Keywords: Crisis, Selective Policy, Firm, Productivity, Size, Allocation, Zimbabwe

JEL classification: O33, L60

1 Introduction

The productivity effects of past economic crises have been widely studied, with notable studies being on the Asian Financial crisis (Claessens et al. 2012, Riley et al. 2014)

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and the Global Financial and European crisis (Dias et al. 2016, Claessens et al. 2012). Both the Asian and Global Financial Crises had international contagion effects on productivity that spread across many countries, which increased with the degree of an individual country's openness. The most commonly identified effects of the crises on productivity and growth have been through crises induced real and financial shocks and hostile expectations and actions of economic agents (Claessens et al. 2012).

However, there is little attention on episodes and effects of economic crises which have occurred in small developing countries or on how the small countries have been affected by the major international crises. This is possibly due to the wider welfare effects of the international crises on large economies and the world economy and on assumptions that the crises in small countries have insignificant contagion effects externally. In addition, most studies in the literature have emphasized the within firm productivity effects of the crises as opposed to their allocative efficiency implications, yet the resource allocation efficiency implications of the crises may be large (Riley et al. 2014). This study contributes in filling these gaps by considering Zimbabwe's case; a small open economy which had a major economic crisis from the late 1990s to 2009¹.

The representative firm theories with constant returns to scale suggest that productivity differences over time and across countries chiefly emanate from within firm technical efficiency differences caused by low investments in firm specific capital or lack of firm exposure to foreign sources of technology (Klenow and Rodriguez-Clare 2005, Aghion et al. 2009). In this respect, therefore, a crisis can be envisaged as causing productivity losses by discouraging new investments, encouraging capital flight or by choking international technology diffusion channels like trade and FDI. However, views by theories on firm heterogeneities suggest that differences in productivity may be a result of sub-optimal factor allocations among firms caused by idiosyncratic policies and shocks on firms (Baily et al. 1992). Thus, on the basis of this view, a crisis may result in efficiency losses or gains depending on whether it shakes out or it accommodates inefficiencies through the crisis induced policy interventions (Riley et al. 2014).

The views that selective government interventions can lead to manufacturing inefficiency and productivity slowdown are not uncontested. A number of studies have also suggested that when well structured, the same interventions can be pro-productivity growth as in cases of South Korea and China (Pack 2000, Zheng 2005, Noland 2011). According to the resource misallocation hypothesis, however, it can still be argued that despite the observed productivity growth in these countries, the growth may be negated

¹There are views that Zimbabwe's economic crisis goes beyond 2009. We, however, argue that post 2009 a number of policy reforms that were instituted were anti-selective. For example, the adoption of the multi-currency system eliminated the selective allocation of foreign currency the same way the abandonment of ASPEF eliminated selective credit allocation. The period after 2009 is, therefore, defined in this study as post crisis or a period with minimal selective industry policies.

by the adverse effects of misallocation. This view is suggested by (Hsieh and Klenow 2007) with respect to China's productivity growth falling behind its potential.

The suggestion that a crisis has resource allocation implications is premised on the fact that crises are usually associated with idiosyncratic supply and demand shocks or lead to firm or sector specific interventionist policies that distort optimal resource employment by firms. In addition a crisis usually heighten corruption, lawlessness and crime related losses for business, which are firm specific and selectively affecting productivity (Restuccia and Rogerson 2008). During the Zimbabwean crisis, for example, government embarked on selective distortionary interventions through credit and foreign currency allocation and directed marketing (RBZ 2006). The interventions inevitably implicitly taxed some firms and subsidized others with allocative effects.

Over and above the domestic policy interventions, the country's manufacturing sector also suffered from the international economic and political sanctions that emanated from the Zimbabwe Democracy and Economic Recovery Act (ZIDERA) (S. 494) passed by the United States Congress in 2001. This saw some companies, especially those which are partly or wholly owned by the government or those that transact with the government to a significant extent facing adverse cost shocks. Consequently, Ndikumana and Boyce (2008) estimate that Zimbabwe had severe capital flight during the crisis period, while the CZI (2009) reports a reduction in the country's industry capacity to below 10% at the peak of the crisis in 2008/9.

Zimbabwe's 1997-2009 economic crisis differs in marked ways from most of the crises in the literature. First, it involved a small developing country and its origin was mainly internal imbalances and economic mismanagement (IMF 2001). In addition, given the small size of the country, it is unlikely that its crisis had much external contagion effects. More notably, the crisis was longer, entrenched and encompassing, characterized by severe political, economic and financial shocks that interacted to produce one of the worst crises in the world history. Given the idiosyncratic nature of the crisis induced shocks on a country's producing entities, the productivity effects of Zimbabwe's crisis should be complex involving both within firm efficiency losses as well as misallocations of resources (Melitz 2003, Melitz and Polanec 2012). Whether these industrial shocks led to improved industrial efficiency and productivity or not is an empirical question which this study investigates.

In this study, therefore, we provide an evidence based analysis of the productivity effects of the idiosyncratic firm shocks during the country's deep crisis, emphasizing on the crisis induced resource reallocations. To the best of our knowledge, no study in the case of Zimbabwe has exclusively considered productivity loss from this perspective. The effects of the crisis on de-industrialization, capital flight and capacity utilization have been well documented (CZI 2009, Ndikumana and Boyce 2008).

To assess the allocative efficiency implications of Zimbabwe's crisis, firm allocative efficiency and productivity in 1995 just before the onset of the crisis and firm productivity in 2011 after the crisis are compared. Firm productivity and allocative efficiency levels in two comparator countries; Ghana and Kenya over closely matched time periods are also estimated and compared to the Zimbabwean case to infer on the potential efficiency effects of the crisis.

Compared to its pre-crisis allocative efficiency and efficiency gains in Ghana and Kenya over the closely matched periods, Zimbabwe is estimated to have lost at least 20 and 32.8 percentage points, respectively in potential firm productivity between the pre and post crisis periods, with firm inefficiency hangover persisting in the post crisis period characterized by a number of production frictions and constraints

The study is organized as follows: section 2 gives the historical background on Zimbabwe's crisis while section 3 outlines industrial policies in Ghana and Kenya. In section 4, related literature on crisis and firm productivity is reviewed and section 5 presents the theoretical model framework while sections 6 and 7 are on the estimation and discussion of the study's findings, respectively. Section 8 concludes the study.

2 Zimbabwe's Manufacturing Sector and the Crisis

Until the 1997-2009 crisis, Zimbabwe was one of the most advanced economies in Sub-Saharan Africa, with a large and diversified manufacturing sector producing metal alloys, cotton lint, steel, food manufactures, textile and leather, wood and furniture, metals and machinery and equipment industries. A greater part of the country's industry advancements dates back to the Federal Boom Period (1953-1963) when a strong industrial base was set up to supply the Central African Federation (Gunning and Oostendorp 1999)² ³. The UDI period between 1965 and 1980 also resulted in further sector advancements as the then Rhodesian Government adopted inward looking industrialization strategies to counter the international economic and political sanctions that were imposed on the country⁴.

However, since the country's attainment of political independence in 1980 a number of quantitative and price controls in the labour, products, foreign exchange and capital

²A detailed outline of the historical evolution of Zimbabwe's manufacturing sector is covered in Wield (1981) and Gunning and Oostendorp (1999).

³The Federation was made up of three countries that were British colonies-namely, Zimbabwe (then Southern Rhodesia), Malawi (then Nyasaland) and Zambia (then Northern Rhodesia). Zimbabwe, which had the highest proportion of white was commonly understood to be the dominant territory, economically, electorally, and militarily, hence it became the industrial power house of the federation.

⁴The Southern Rhodesian government declared the unilateral declaration of independence in November 1965, resulting in Britain and other countries putting the country under political and economic sanctions which hindered the country's trade with the rest of the world.

markets were instituted, resulting in the deterioration of the sector's competitiveness until the adoption of the Economic Structural Adjustment Programme (ESAP) in 1991 (Botchwey et al. 1998).

During the ESAP period (1991-1995), a number of reforms were instituted to boost competitiveness in the waning manufacturing sector. These included goods market de-regulations and price decontrols, tax and tariff rationalization, deregulation of the labour market, financial sector and foreign exchange market reforms and public sector reforms, including privatization and commercialization of non-strategic public enterprises (GoZ 1991). Consequently, the country's manufacturing sector made gains in industrial diversification and competitiveness, with Gunning and Oostendorp (1999) indicating that by the mid 1990s, the sector accounted for 24% of the country's gross domestic product, 15% of formal employment, and 42% of total exports earnings. In addition, the share of manufactured exports in GDP increased from 24% in 1991 to about 36% in 1996.

The gain in the country's manufacturing sector competitiveness was, however, quickly eroded by a number of factors, which included two major drought shocks in 1992 and 1995. Gunning and Oostendorp (1999) attribute the weak performance of ESAP to poor fiscal performance, policy incompatibility and policy reversals as well as high interest rates which negated investment, while Botchwey et al. (1998) attributed it to poor policy sequencing, involving quicker external and credit sector reforms than warranted by developments in the real sector. More importantly, policy reversals and a slow public sector reform program meant that public sector expenditure and deficits remained high and destabilizing (Gunning and Oostendorp 1999). This resulted in high inflation, high lending rates and an overvalued exchange rate by the mid 1990s.

The country's crisis strated around 1997 when government embarked on huge unplanned fiscal outlays in payment of gratuities to war veterans and in financing its involvement in the Democratic Republic of Congo (DRC) conflict (Tarisayi 2009). Consequently, there were greater inflationary pressures, hostile speculations and heightened capital flight after 1997. In addition, adverse expectations and specualtions surrounding uncertainties regarding the implementation of the land reform program, which started in the late 1990 worsened the country's situation (IMF 2001).

The government adopted a successor program to ESAP, the Zimbabwe Programme for Economic and Social Transformation (ZIMPREST) in 1998 with support from the IMF. The program, however, did not perform any better due to continued weaknesses in macroeconomic policies, especially with regard to fiscal imbalances, exchange rate misalignment and fast waning investor confidence (IMF 2001). Aannual inflation went up to a peak of 70% in 1999 while the country's usable reserves had fallen to almost zero by 2000 (IMF 2001). Unsustainable domestic borrowing by government signifi-

cantly increased domestic interest rates, with the annualized 90-day Treasury bill rate increasing to more than 35% in 1999.

The deterioration in the Zimbabwean economy perpetually increased into the 2000s, with multiple shocks inflicted on the manufacturing sector. The sector's competitiveness was fast eroded by accelerating inflation, an overvalued exchange rate and excessively high interest rates over and above the high cost of utilities. By July 2008, inflation had reached a peak of 230 million percent, creating an acute cash shortage in banks and massive capital flight. The domestic currency was re-based twice between 2006 and 2008 before the payments system literally became dysfunctional and became de facto dollarized. As a result, depositors lost their wealth in bank deposits. Inevitably, deposit holders including firms were subjected to varying losses depending on how much they had in banks. There were massive firm closures and downsizing.

Other than the shocks directly induced by the crisis on the country's manufacturing sector, the government embarked on other multiple firm and sector specific interventions to rescue the falling manufacturing sector. The interventions were also necessitated and worsened by the adverse effects of the ZIDERA induced sanctions on the manufacturing sector. The crawling exchange rate peg system which had been introduced in 1999 was abandoned for a managed auction foreign currency market system in 2004, under which exchange rates were highly fixed, with foreign exchange being directly rationed to importing firms, with firms perceived to be strategic e.g, large corporates, parastatals or those with connections in government more easily accessing foreign currency from the auction at low official exchange rates.

Besides the distortionary effects of direct allocations in the foreign currency auction market, a multiple of other official exchange rates co-existed alongside the auction rates for different sectors which created further selective price and cost shocks to firms⁵. A vibrant parallel market for foreign currency at exorbitant premiums emerged for the disadvantaged firms, usually the small and new firms. The system, which was eventually abandoned in 2008⁶, also induced idiosyncratic corruption and rent seeking under the auction system. There were also sector specific surrender requirements for corporate

⁵Examples of the multiple official exchange rates that were put in place as 'support' rates for various sectors since 1997 include the government rate for government procurement, the auction rate for firms that could access foreign currency from the auction, the export support rate meant for exporter viability, the blend rate which was an average of various exchange rates, the gold support rate for gold producers, the tobacco support rate for tobacco merchants, the tourism support rate for tourist charges, and the diaspora rate for income remittances of Zimbabweans living abroad. The government rate was highly overvalued and meant additional implicit tax exporting firms.

⁶The auction system started as a managed auction system in 2004, before it was replaced by the Tradable Foreign Currency Balances System (TFCBS) allowing for greater market interplay in 2005. In 2006, the system was replaced by a Volume Based System (VBS) allowing rates to adjust by up to +/-1.5% depending on the volume of the US dollar traded. Demand pressure led to the abandonment of the VBS in 2008 for the Interbank Market based system.

foreign currency accounts (FCAs), ranging between 25% and 75% at the government exchange rate and forced liquidation of corporate FCAs to finance strategic imports for the country such as fuel, energy and grain.

In addition, a number of controls in the credit and goods markets were instituted. The central bank embarked on a number of quasi fiscal activities by way of directly extending credit to the private sector through the Productive Sector Finance Facility at concessionary lending rates to restore manufacturing sector productivity and competitiveness. The facility, which was also sector and firm specific providing cheap loans to firms perceived to be 'productive' and disadvantaging the less known small and new firms, later became a major outlet of significant liquidity injection into the economy which put more pressure on inflation and an already overheated foreign currency market.

Despite the differences in the implicit credit market taxes and subsidies, the manufacturing was also selectively disadvantaged by a government directed procurement of basic commodities at controlled prices under the the BACOSI⁷ scheme for onward distribution to consumers. This became yet another landmark marketing distortion for firms that already faced a confluence of other distortions. The severity of the distortions on Zimbabwe's manufacturing sector during the crisis is summarized by table 2, which presents a summary of selected economic indicators for the Zimbabwean economy.

Table 1: Selected Economic Indicators

	1999	2000	2003	2004	2006	2007	2008
GDP Growth	-2.1	-6.1	-0.8	-4	-4	-6.9	-14.8
Manufacturing Sector GDP	-4.5	-11.5	-13.8	-9.5	-15	-16.3	-24.6
Annual Inflation (%)	57	55	599	149	1205	66212	231m
Official Exchange Rate (Z\$:US\$)	38	55	824	5729	3000	250	126
Parallel Exchange Rate (Z\$:US\$)	38	55	6400	8400	2500	1.5m	6tr
Bank Lending Rates (%)	55	82	610	270	700	1100	10500
ASPEF Lending Rates (%)	30	30	30	50	50	25	25

Source: Reserve Bank of Zimbabwe & CSO

The Zimbabwe dollar was re-based for the first time in August 2006, resulting in all monetary figures scaled down by a factor of 1000. The currency was re-based two more times by Z\$10bn and Z\$1trillion in 2008 and 2009, respectively.

The disparities between the official exchange rate and the parallel foreign exchange rate illustrate the degree to which firms that had privileged access to foreign currency in the formal markets were selectively advantaged compared to those that sourced

⁷BACCOSI, which stands for the government's Basic Commodity Supply Side Intervention involved government's procurement of firms' produce at directed prices for free distribution to the final consumers. Companies producing for BACCOSI also enjoyed concessionary credit from government. The term BACCOSI has become part of Zimbabwe's vernacular to mean free or cheapest to suggest the extent of income taxes firms that were selling their products through the scheme were subjected to.

foreign currency from the parallel market. The same is also true with regard to the huge disparities between the maximum bank lending rates applicable to the rest of the firms and the ASPEF lending rates applicable to firms that were classified as productive.

3 Manufacturing Sectors in Kenya and Ghana

In order to assess the impact of Zimbabwe's economic crisis on manufacturing sector resource allocation efficiency, we benchmark its performance to that of Ghana and Kenya given that the two countries had economic structures and policies that closely matched those of Zimbabwe during the 1990s⁸. The two countries, however, differed from Zimbabwe in that during the crisis period for Zimbabwe when the country experienced multiple adverse industry shocks and induced policy reversals, the other two countries did not experience similar shocks. The two countries, therefore, can be sound comparators to assess the likely impact of Zimbabwe's crisis on production efficiency.

Kenya's industrial policy has gone through at least three phases of reforms since independence, starting with import substitution industrialization in the 1960s, through the Structural Adjustment and Liberalization spanning from early 1980s to early 1990s; to the current export-led growth (Chege et al. 2014). The country's manufacturing sector, which is largely dominated by the food-processing, consumer goods fabrication and petroleum processing subsectors, contributes between 10-13% towards its GDP and about 51.3% of exports. Like the Zimbabwean case, the Kenyan manufacturing sector is characterized by the coexistence of the modern sector and a fast growing informal sector with a firm size distribution made up of micro, small, medium and large enterprises and multinationals.

By 1994, when the RPED firm survey was carried out, Kenya had embarked on a number of structural and macroeconomic reforms to strengthen competitiveness, reduce industry excess capacity and addressing the distortions associated with the previous policies and strategies under the import substitution industrialization strategy. Instituted reforms included the elimination price controls and import licensing, removal of foreign exchange controls, tariff rationalization and a number of public sector reforms including privatizing, leading to the full liberalization of the economy by 1994 (Chege et al. 2014). Like Zimbabwe, by the mid 1990s firms in Kenya were operating under a competitive environment with minimal distortions.

Kenya, however, escalated its reforms into the 2000s while Zimbabwe had policy reversals during the 1997-2009 crisis. Since the mid 1990s, Kenya has also put in place a number of institutional reforms earmarked for enhancing competitiveness among its

⁸See Hsieh and Klenow (2007) who utilized the same approach using the USA productivity growth as a benchmark to infer the resource allocation effects of idiosyncratic interventions in other countries.

firms, especially to deepen its export-led industrialization. These include joining the Common Market for Eastern and Southern Africa (COMESA) and AGOA, and establishment of export promoting institutions, including the Export Promotion Council, the Export Compensation Scheme, Manufacturing Under Bond (MUB) and export processing zones (EPZ) (Bigsten et al. 2010). As potential sources for improved resource allocation efficiency among the country's firms, Kenya's reforms remained market driven seeking to promote competitiveness.

Since 2000, the country's industrial policy thrust as spelt out in its Poverty Reduction Strategy Paper, the Economic Recovery for Wealth Creation, and Kenya Vision 2030 continues to target reforms to enhance productivity and general performance of Kenyan industry (Bigsten et al. 2010).

Similarly, Ghana's post-independence industrial development policy qualitatively mirrors that of Kenya, starting with an import substitution industrialization (ISI) strategy soon after independence and progressing through a series of structural adjustments and reforms to the current programme of private sector-led industrialization (Ackah et al. 2014). The country, however, inherited a less developed manufacturing sector from the colonial government in 1957, which emphasized on the extractive sectors (Jedwab and Osei 2012). The administrative measures and controls associated with the ISI system resulted in industrial excess capacity and weak sector linkages in the economy, hence the sluggish performance of the sector by mid-1970s (World Bank, 1985). This prompted a shift away from central planning to a more market based economy by the beginning of the 1970s.

Ghana introduced the Economic Recovery Programme (ERP) as part of the structural adjustment programme (SAP) in 1983. The programme, which lasted until 1989, constituted a number of stabilization and reform measures, which included the introduction of a market-determined exchange rate with minimal intervention, removal of price and distribution controls, liberalization of the financial sector and interest rates, abolition of the import licensing system and rationalization of import tariffs and the taxation system. It also involved a number of institutional reforms, including the establishment of the Ghana Investment Centre (GIC) and privatization of state-owned enterprises (Nyanteng 1993).

The country's post-ERP new industrialization strategy emphasized the development of a more internationally competitive industrial sector based on highly efficient import substitution and increased export approach. However, unlike the Kenyan case, Ghana pursued a middle of the road approach falling between Kenya and Zimbabwe. Its reforms were characterized by instances of policy reversals. After its sluggish growth between 1989 and 1994, for example, the country introduced a number of industry specific measures such as the Business Assistance Fund (BAF), the Private Enterprise and

Export Development Fund (PEED), and the Fund for Small and Medium Enterprises Development, which in a way amounted to some form of selective interventions.

Since early 2000s, the country has also been facing some challenges endangering its growth prospects. The challenges include a high public debt for the country, high lending rates, erratic power supplies, and rising fuel prices and increasing industrial excess capacity, which potentially negated the country's private sector-led accelerated industrial development strategy under implementation since 2005 (GoG 2011).

4 Literature Review

Crises have been associated with the weakening of the public sector fiscal space; and with adverse shocks on terms of trade, domestic expenditure and production. Reinhart and Rogoff (2013), for example, note that a financial crisis raises fiscal expenditures and public deficits through induced bailouts of troubled institutions by government and through the contraction in the fiscal revenue base. The destabilizing effects of the crises are envisaged as being intertemporal, prevailing during and after the crisis. In their empirical findings, the effects of crises in developed and developing countries are similar, while Bordo et al. (2001) suggest that the effects of a crisis depend on a country's external and internal balances, its exchange rate system, and the structure of its financial system.

According to Bordo et al. (2001), the shocks that precipitate into depressed GDP growth include loss of demand and market shares for firms, loss of jobs and incomes, de-investment, capital flights, terms of trade and exchange rate losses and adverse speculation and expectations. Rose and Spiegel (2011) and Lane and Milesi-Ferretti (2011), among others, have attempted to disentangle these factors. However, given the high correlation among the factors in a crisis, other scholars have suggested that a clearer picture can only be obtained from firm-level micro data where linkages are identified with the micro decision units (Claessens et al. 2012).

Different agents and firms are likely to be differently affected by a crisis depending on selective firm or sector specific demand and cost shocks they are exposed to and the exposures of balance sheets before and during the crisis. For example, some firms face favourable demand and cost shocks while others face adverse shocks, depending on the sectors they are domiciled in or the resultant crisis induced interventions by the authorities. Similarly, firms that are heavily borrowed just before the crisis may experience worse firm specific effects than otherwise.

Micro models on the effects of economic crisis on firm productivity have largely analyzed the within firm productivity effects of the crises caused by the credit squeezing effects of crises (Riley et al. 2014, Claessens et al. 2012, Griffin and Odaki 2009)

or through negative demand shocks and lack of new investment (Hayashi and Prescott 2002). These views, however, fall short of the wider effects of the crisis, which include its resource reallocation effects. The fact that firms face non-uniform idiosyncratic demand shocks during a crisis suggests that crises lead to reallocation of market shares and resources. Similarly, crisis induced selective credit shocks inevitably lead to production reallocation. The aftermath results of a crisis may, therefore, be a more efficient or inefficient industry depending on whether the crisis prevented or delayed the restructuring or exit of inefficient firms or it fast tracked it (Riley et al. 2014, Peek and Rosengren 2003).

The potential for resource misallocation during the crisis is rooted in models of heterogeneous firms which predict that the existence of crisis induced firm or sector idiosyncratic shocks lead to sub-optimal factor employment, firm size distribution and exit and entry of firms (Melitz 2003, Melitz and Polanec 2012). In addition, Bartelsman et al. (2013) implies that even in the absence of the shocks, the existence of asymmetric production frictions across firms in a crisis may still cause allocative inefficiencies in narrowly defined industries. It is likely that the net shaking-in-shaking-out effect of a crisis is dependent on the degree to which inefficiency is protected by the system, with greater protection likely to lead to net deterioration in aggregate productivity.

There is evidence, for example, suggesting that poor corporate governance involving interlocking ownership systems between banks and firms that allowed banks to lend to or keep bad loans of their troubled sister firms that were unproductive during the Asian crisis to protect their balance sheets, worsened the adverse aggregate productivity shocks of the crisis (Claessens 2004). Outside private sector corporate governance problems, governments also have a tendency of directly providing incentives to persuade banks to lend to selective sectors or firms or in extreme cases directly lending (RBZ 2006). In this respect, Peek and Rosengren (2003) has evidence suggesting that the slow recovery of Japan's productivity after the 1990s crisis was a result of credit misallocation caused by incentives to Japanese banks to provide credit to financially troubled, "zombie" firms which could easily die without the selective protection. Similarly, Griffin and Odaki (2009) decompose the loss in Japan's productivity between within firm productivity loss and the loss attributable to resource reallocation and find evidence suggesting the existence of adverse resource misallocation productivity effects.

Thus, directed credit allocation and other selective interventionist practices during and after crisis are counter productivity growth. It propagates inefficiency through slowing the churning of firms and protection zombie firms against small and new firms that are usually more productive (Melitz and Polanec 2012). A reallocation of resources from favoured firms that face favourable selective policies such as concessionary credit or foreign currency at overvalued official exchange rates to unfavoured firms facing higher

marginal production costs should boost aggregate productivity and growth (Hsieh and Klenow 2007, Baily et al. 1992).

Outside the findings of Griffin and Odaki (2009) and Peek and Rosengren (2003) who find results supporting the adverse resource allocation effects of the crisis, Riley et al. (2014) also finds that resource misallocation reflected by changes in firm market shares, entry and exit patterns for the British firms during the 2007-2009 Global Financial crisis had an adverse effect on labor productivity dynamics for the country and widespread within firm productivity shocks resulting from the effects of other shocks that discourage firm investments in firm-specific capital and innovations.

For a multifaceted crisis involving multiple shocks over and above financial shocks such as that of Zimbabwe, zeroing in exclusively on the impact of the financial crisis falls short of an objective assessment of the productivity consequences of the crisis. The need to consider the multi-dimension of a crisis is also supported by Claessens et al. (2012) who undertook a study on the wider effects of the 2007-2009 global crisis by estimating how firms' productivity in 42 countries responded to the crisis shocks, including changes in demand, business cycle, trade, foreign exchange and external financing and find that firms with greater sensitivity to business cycle and trade shocks were worse affected than otherwise. Thus the productivity impact of a crisis should be appropriately addressed wholesomely not partially.

The model framework utilized in this study is inspired by this view and assumes that a crisis is an intricate interaction of multiple shocks that are not easily separable. The model summarizes the effects of the crisis into implicit taxes and subsidies on the operation of firms⁹ that influence firm sizes and how they allocate production factors.

5 Modelling Selective Distortions and Productivity

In order to inform our analysis about how the Zimbabwean crisis impacted on firm and the country's aggregate productivity, we develop a model that closely follow models utilized by Restuccia and Rogerson (2008), Hsieh and Klenow (2007) and Bartelsman et al. (2013). While the situations considered by these models are defined by selective policies such as non-uniform taxes, selective credit and corruption, we use the same models in circumstances where firms are exposed to composite shocks resulting from multiple crisis induced firm and sector specific distortions.

The shocks are realized either as part; or cause; or a result of the crisis and they include credit constraints, adverse demand shocks, asymmetric terms of trade shocks and selective credit and foreign currency allocation at concessionary rate through gov-

⁹We assume that the distinction of each individual shock is unimportant. The bottom line is the net effect of the totality of the distortions on firm behaviour.

ernment's deliberate fire fighting interventionist policies and directives to rescue the economy from collapsing. Because, the net effect of the crisis induced shocks is emphasized, the net tax on revenue is assumed to lead to sub-optimal firm sizes and resource allocation, which lead to less than potential aggregate productivity for the country.

Further to ensure that no single firm can take all the market in an industry, we assume a production function characterized with decreasing returns to scale and a downward demand curve associated with product differentiation. Each firm is assumed to produce an intermediate product Y_{it} under imperfect conditions with selective shocks. The outputs are intermediate inputs in the production of the final good Y_t produced under perfect competition. Thus assuming there are S , ($S = 1, 2, \dots, S$) intermediate goods produced in S industries, the final good is assumed to be produced according to a Cobb Douglas production as follows:

$$Y_t = \prod_{s=1}^S Y_{st}^{\phi_s}, \text{ where } \sum_{s=1}^S \phi_s = 1 \quad (1)$$

Where Y_s is each industry's output. The final good is assumed to be a numeraire with a price equal to one. Each industry's output is a CES aggregator of i differentiated goods produced by i , ($i = 1, 2, \dots, N$) firms in each of the S industries as follows:

$$Y_{st} = N_t^{\frac{\rho-1}{\rho}} \left(\sum_{i=1}^N Y_{it}^{\rho} \right)^{\frac{1}{\rho}} \quad (2)$$

With $\rho < 1$ defining the elasticity of substitution between firms' output values. The adjustment factor on the CES aggregator is meant to ensure that the elasticity of substitution is scale free as in Bartelsman et al. (2013).

Before the crisis induced idiosyncratic shocks each of i firms in each industry are assumed to produce according to a Cobb-Douglas production function given by:

$$Y_{it} = A_i \varepsilon_{it} L_{it}^{\gamma - \alpha_s} K_{it}^{\alpha_s}, 0 < \gamma < 1; 0 < \alpha < 1 \quad (3)$$

Where Y_{it} is output for firm i in period t , A_i is the time invariant productivity which is specific to firm i , L_{it} and K_{it} are the firm's labour and capital employment, respectively. ε_{it} is an i.i.d shock drawn from a time-invariant distribution and observed by producing firms. The price faced by each firm is defined a downward sloping demand curve as follows:

$$P_{it} = P_{st} \left(\frac{\bar{Y}_{st}}{Y_{it}} \right)^{1-\rho} \quad (4)$$

Where P_{st} is the aggregate price for all the differentiated goods in industry S and \bar{Y}_{st} is

the average output in the industry measured as final output divided by the number of firms in the industry (N). Within the existence of the crisis induced idiosyncratic shocks that selectively affect each of the firms in the various industries, we assume that each surviving firm seeks to maximize its profit defined by:

$$\Omega_{it} = (1 - \nu_i - \varphi_{it})P_{st}\bar{Y}_{st}^{1-\rho} [A_i\varepsilon_{it}L_{it}^{\gamma-\alpha_s}K_{it}^{\alpha_s}]^\rho - w_tL_{it} - (1 + \tau_{it})R_tK_{it} \quad (5)$$

With w_t defining the wage rate paid to homogenous workers and $R_t = r_t + \delta_t$ defining the user cost of capital which is equal to the the depreciation rate plus the real interest rate. The parameter τ_{it} gives the firm-specific time varying shock on its cost of capital. This is meant to align the model with the literature which assumes that the major transmission mechanism through which a crisis affects firm productivity is through its impact of credit markets and also on the basis that in the case of Zimbabwe, credit market interventions were rampant. The specified model abstracts from other firm specific selective shocks such as those relating to foreign exchange market interventions or directed marketing of goods. Instead, the positive and negative shocks faced by the firms from all other interventions are assumed to sumed up as either a net implit tax or subsidy on the firm's revenue and captured by ν_i and φ_{it} as net idiosyncratic firm-specific time-invariant and time-varying shocks, respectively.

For firms that survived during the crisis, their profit maximization requires that each equates its marginal revenue product from each factor input to the marginal cost associated with the factor net of any implied tax or subsidy on the factor and output. Thus

$$\rho(\gamma - \alpha_s)(1 - \nu_i - \varphi_{it})P_{st}\bar{Y}_{st}^{1-\rho} [A_i\varepsilon_{it}K_{it}^{\alpha_s}]^\rho L_{it}^{\rho(\gamma-\alpha_s)-1} = w_t \quad (6)$$

$$\rho\alpha_s(1 - \nu_i - \varphi_{it})P_{st}\bar{Y}_{st}^{1-\rho} [A_i\varepsilon_{it}L_{it}^{\gamma-\alpha_s}]^\rho K_{it}^{\rho\alpha_s-1} = (1 + \tau_{it})R_t \quad (7)$$

Which can be summarized the following optimum factor demand functions and output:

$$\frac{K_{it}}{L_{it}} = \frac{w_{it}}{(1 + \tau_{it})R_t} \frac{\alpha_s}{\gamma - \alpha_s} \quad (8)$$

$$K_{it} \propto \frac{A_i^{\frac{\rho}{1-\rho(\gamma-\alpha_s)}} (1 - \nu_i - \varphi_{it})^{\frac{1}{1-\rho(\gamma-\alpha_s)}}}{1 + \tau_{it}}, 1 - \rho(\gamma - \alpha_s) > 0 \quad (9)$$

$$L_{it} \propto A_i^{\frac{\rho}{1-\rho\gamma}} (1 + \tau_{it})^{\frac{\rho\alpha_s}{1-\rho\gamma}} (1 - \nu_i - \varphi_{it})^{\frac{1}{1-\rho\gamma}}, 1 - \rho\gamma > 0 \quad (10)$$

The effects of the crisis induced idiosyncratic shocks on firm productivity and firm

size are summarized by equations 8-10. Without shocks firms in similar industries face the same product price and factor prices, hence they equate factor marginal revenue products to their respective marginal costs, which are the wage rate and user cost of capital. In this case, firms within similar industries are not expected to have heterogeneous productivity except that which is caused by quasi-fixed factors as suggested by Bartelsman et al. (2013).

However, once there are crisis induced idiosyncratic implicit firm specific taxes, ν_i and φ_{it} , firms that have adverse shocks employ less capital and labour than those that receive implicit subsidies. The same also applies to credit shocks, with firms that receive subsidized credit employing more capital than otherwise. Equations 8 and 10 also suggest that firms with high credit taxes, e.g those that are screened out of the imperfect credit market, sub-optimally employ more labour than capital.

Given that subsidized firms get cheaper credit or relatively high output prices than those with negative shocks, they tend to over-employ factors and over-grow at the margin while producing at lower marginal productivity. These sub-optimal choices imply that a reallocation of resources or market share from the subsidized firms to the taxed firms should improve the country's aggregate productivity.

Thus the model predictions follow Bartelsman et al. (2013), who used a dynamic model to show that the existence of idiosyncratic taxes and subsidies lead to sub-optimal firm entry and exit patterns with delayed or non-exit of inefficient firms and forced exit for more productive firms. The important result for a country in a crisis is that the crisis induced distortions lead to sub-optimal factor employment by firms and size choices, with the implicitly subsidized firms over-employing factors and over-growing their optimal sizes and the taxed firms, under-employing factors and under-growing their sub-optimal sizes, resulting in reduced aggregate productivity for the country.

6 Empirical Model Framework

To cast the productivity effects of Zimbabwe's 1997/2009 crisis into the above theoretical framework and determine the extent to which the country's multiple firm and sector specific crisis induced shocks could have impacted on inter-firm and sector resource allocation and productivity, we estimate covariance indices between firm size and firm productivity before the crisis in 1995 and after the crisis in 2011; and also in Ghana and Kenya over close to similar time periods.

The indices exploit the cross-sectional decomposition of industry-level productivity developed by Olley and Pakes (1992) (OP). Using the approach, an index of productivity for an industry, which is the weighted average of firm-level productivity in the industry is decomposed as follows:

$$\Theta_t = \sum_{i=1}^N \omega_{it} a_{it} = \bar{a}_t + \sum_{i=1}^N (a_{it} - \bar{a}_t)(\omega_{it} - \bar{\omega}_t) \quad (11)$$

Where Θ_t is the overall industry productivity index, a_{it} is firm-level productivity, ω_{it} is the share of activity for the firm. A “bar” over a variable represents the unweighted industry average of the firm-level measure. Following Bartelsman et al. (2013), productivity is measured by the logarithm of revenue labour productivity defined as the log of firm’s value addition divided by the number of workers it employs. We also follow Bartelsman et al. (2013) and use the firm’s employment level to represent its industry share of activity. The two terms constituting the industry index of productivity are the unweighted average of firm-level productivity and a covariance term reflecting the extent to bigger firms are more productive in relation to industry average productivity.

Because this study is more interested in the allocative efficiency impact of the crisis on firm productivity, we emphasis productivity comparisons on the second term of equation 11, which is the OP covariance measure of the allocative efficiency implications. Equation 11 enables us to address this study’s research question in the sense that the incidence of the crisis induced idiosyncratic shocks is expected to reduce the size of the OP covariance term if such shocks or the crisis induced interventions implicitly subsidized the inefficient firms; or to increase the size of the OP covariance term if the shocks had the effects of shaking out inefficiency.

The core hypothesis of the study, therefore, is that idiosyncratic crisis shocks and policy induced distortions on firms may be the source of differences in firm size productivity distributions for Zimbabwe before and after the 1997/2009 economic crisis. The dynamic version of equation 11 as modeled and utilized by Melitz and Polanec (2012) and Riley et al. (2014) includes terms for productivity change from firm entry and exit, which are not estimable given the data that we employ, which is cross sectional.

7 Data

To estimate the resource allocation efficiency implications of Zimbabwe’s crisis from 11, harmonized industry and firm indicators are drawn from two comparable firm level data sets, which are the Regional Program on Enterprise Development (RPED) and the World Bank Enterprise Surveys (WBES) data sets. The RPED surveys were done in 1995 for Zimbabwe and Ghana and in 1994 for Kenya. The data covered manufacturing firms in four sectors, namely: food processing; textile, garments, leather and footwear; woodworking and furniture; and metalworking (Gunning and Oostendorp, 1999). These are respectively denoted as industries 1, 2, 3 and 4 in this study.

The WBES were conducted in 2013 for Ghana and Kenya; and in 2011 for Zimbabwe

and cover all the manufacturing sectors. To make comparisons on the basis of the two surveys, the four sectors corresponding to those in the RPED surveys only were extracted from the WBES. All monetary figures in the two data sets were converted to their 2010 US dollar equivalence using the US CPI after conversion to the US dollar at the average exchange rates prevailing in each country when the surveys were done.

In total there are about 213 firms in Zimbabwe's RPED survey and 300 firms in its WBES survey, while Ghana has about 270 firms both in its 1995 RPED and 2013 WBES surveys. For Kenya, the 1994 RPED survey has about 220 firms while the 2013 WBES has 785 firms. Both the RPED and WBES survey data cover firm indicators of interest to compute firm productivity, which include firms real sales, employment, asset net book values and replacement cost, the wage bill and a number of indicators of firm frictions.

Common methods and variable definitions are used in all computations, e.g labour employment, asset values and firm output. The measure of output is based on firm sales data, while labour input is measured using number of production employees and that of capital stock is based on the replacement cost values of equipment. The measure of labour productivity utilized is revenue based given that price deflations are done using the GDP deflators instead of firm or product specific deflators (Bartelsman, et al, 2009).

Three measures of productivity and implied allocative efficiency are used. These are labour productivity, capital productivity and a measure of within-industry covariance between firm size and productivity (OP) suggested by Olley and Pakes (1996). Capital productivity is estimated on account of the drastic reduction in capacity utilization between Zimbabwe's pre and post crisis periods, which could distort the measure of labour productivity (CZI 2009).

To compute firm labour productivity, firm value addition over firms' 12 month trading period are divided by production workers (Bartelsman et al. 2013). Production workers combine both full time and casual workers. Non-production managerial workers are excluded on the basis that in some firms, especially those that are tied to family business backgrounds, the distinction between employees and non-employees for business owners and their relatives who are involved in the affairs of the business is not clear. Capital productivity is computed as firm value addition divided by the total replacement cost of the firm's equipment.

Following our presentation of the OP covariance index in equation 11, firm size is defined on the basis of the number of workers the firm employs. The use of asset values could have been distorted given the differences in asset valuations as well as the fact that some firm types or ownership types, especially MNCs, usually tend to be capital intensive and this would misleadingly show firm sizes that are not necessarily reflective

of firm activity levels.

A summary of the major variables for the countries is given by table 7below:

Table 2: Firm Characteristics Summary Statistics

	1995			2011		
	Mean	Std. Dev.	n	Mean	Std. Dev.	n
Firm Size ¹	2.18	0.85	213	2.13	0.78	292
Firm Age (Years)	22.77	17.16	213	37	22.61	284
VAD Per Worker	7222.25	9743.30	165	60374.18	273328	292
VAD Per Capital	16.32	170.60	159	7.84	27.63	287
Firm Capacity	61.63	31.12	165	44.95	21	292
Labour ²	274.32	593.81	213	116.55	272.41	292

Source: RPED and WBES Surveys

1/Firm sizes is coded as: 1=small (<20 employees); 2=medium (<19 employees<100) & 3=large (>99 employees)

2// Number of Production workers

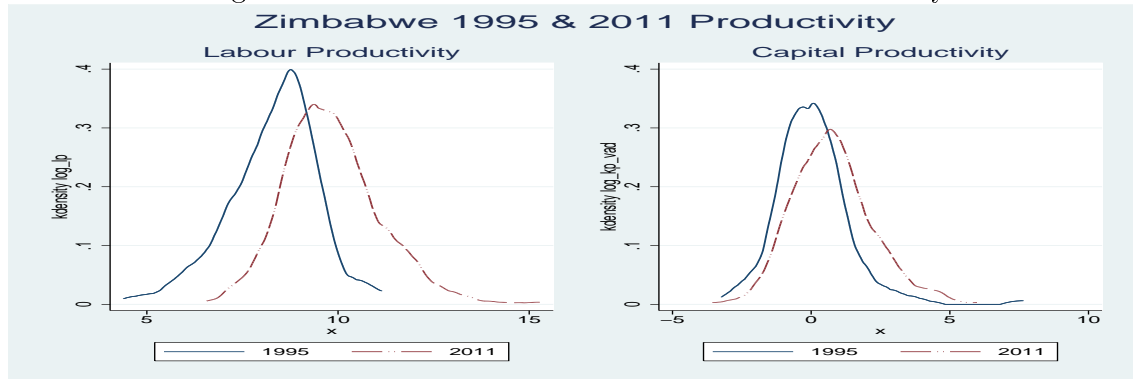
8 Results Estimation and Analysis

Before the analysis of the differences in production allocative efficiency before and after Zimbabwe's crisis, the country's firm productivity characteristics are first discussed. Firm productivity distributions for Ghana and Kenya are also discussed to cast a picture of productivity characteristics in Zimbabwe and the comparator countries. This assists in informing the analysis of estimated resource allocation efficiency indices later on.

8.1 Descriptive Analysis of Productivity

Figure 8.1 below plots firm labour and capital productivity distributions for Zimbabwe using the 1995 RPED and the 2011 WBES surveys. Usually, labour productivity is the popular measure of firm productivity. However, because of the significant fall in the country's industry capacity utilization, which fell from over 60% during the post ESAP period based on the 1995 firm data to less than 40% in the post crisis period based on the 2011 survey, the measure of labour productivity alone may not be adequately informative. Therefore, labour productivity is meant to show the efficiency with which firms employ labour, while capital productivity shows the productivity of capital employed.

Figure 1: Zimbabwe's Pre and Post crisis Productivity



Data Source: RPED & WBE Surveys

From Figure 8.1, there was an improvement in Zimbabwe's average firm labour productivity between the 1995 and 2011 firm surveys, while average capital productivity remained more or less the same between the two periods. In fact from the summary of statistics table 2 above, the unlogged labour productivity improved from US\$7222 per year in 1995 to US\$60374 in 2011; while capital productivity fell by about 50% from US\$16 per US dollar of capital to US\$8 over the same period. While a higher average capital/labour ratio caused by the relatively high excess industry capacity advantages labour in terms of its productivity, it tends to penalize capital productivity.

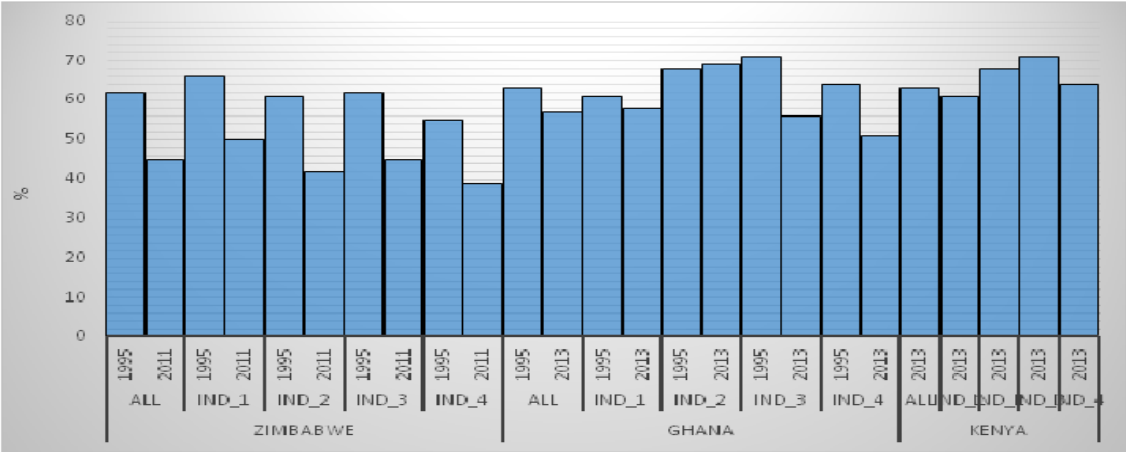
Figure 8.1 illustrates that the dispersions of firm cross-sectional labour and capital productivity distributions across all the four manufacturing sectors did not change much before and after Zimbabwe's economic crisis. The dispersions of the plotted cross sectional productivity distributions show the possibilities and efficiency implications of inter industry factor mobility and resource allocation. This is not necessarily the same as the within industry resource allocation efficiency implications, which is at the centre of this study. Given that firms tend to be more mobile within similar industries than across different industries, what is more informative is the within industry firm productivity dispersion, which is appropriately estimated using the OP index of firm size productivity covariance.

Notwithstanding the above argument, the estimated dispersion ratios, however, suggest unchanging frictions and rigidities hindering firm and resource mobility; and or restructuring across sectors in Zimbabwe before and after the crisis. One such rigidity, for example, pertains to labour laws which are more restrictive in Zimbabwe in terms of engaging and dis-engaging workers than in Kenya and Ghana (Basu et al. 1996, ILO 2004). The legal and cost implications of firm downsizing in Zimbabwe may, therefore, force firms to operate sub-optimally with regard to labour and capital employment even if better returns could be obtained by closing down or moving across to other sectors.

A firm survey, jointly done by the University of Cape Town's Southern African

Labour Development Research Unit (SALDRU) and the Zimbabwe Economic Policy Analysis and Research Unit (ZEPARU) in 2015, for example, had incidences of firms existing under 'maintanace' operations with workers doing minimal production just to 'maintain' plant and equipment. This view is supported by the existence of excessive unutilized capacity in excess of 60% across all the manufacturing sectors in Zimbabwe after crisis, where firms are forced to remain in operation at low capital utilization for purposes of keeping workers engaged.

Figure 2: Comparison of Country Capacity Utilization



Data Source: WBE Surveys

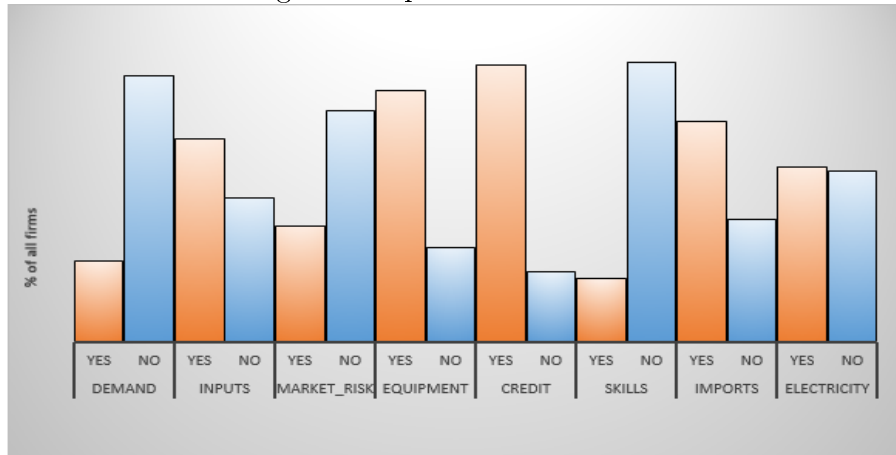
//NB Industry 1 is food processing; Industry 2 is textile, garments, leather and footwear; Industry 3 is woodworking and furniture; and Industry 4 is metalworking

Other major factors affecting capacity utilization for Zimbabwe’s firms in the post crisis period include lack of adequate demand, shortage of important factor inputs, market risk, obsolete equipment, credit constraints, unfair competition from imports of similar products as well as infrastructure deficiencies such as poor electricity, water, transport and communication networks.

Most of the operational challenges faced by firms in Zimbabwe’s post crisis period are a result of the country liquidity constraints imposed by the country’s full dollarization, which with the country’s limited export earnings and international transfers restrict the leverage with which the country can improve on the factors. Lack of credit, equipment and inputs, for example, are a result of the country liquidity problems post dollarization.

In terms of the rating of the country’s business impediments, credit constraint is the major impediment to firm capacity utilization with firms both failing to access adequate credit for business due to inadequate domestic and foreign lines of credit; and or accessing credit at exorbitant interest rates in the dollarized economy. It is most common in Zimbabwe for the majority of firms to access US dollar loans at rates between 15% and 18%, in light of high prevailing lending rates due to high perceived country

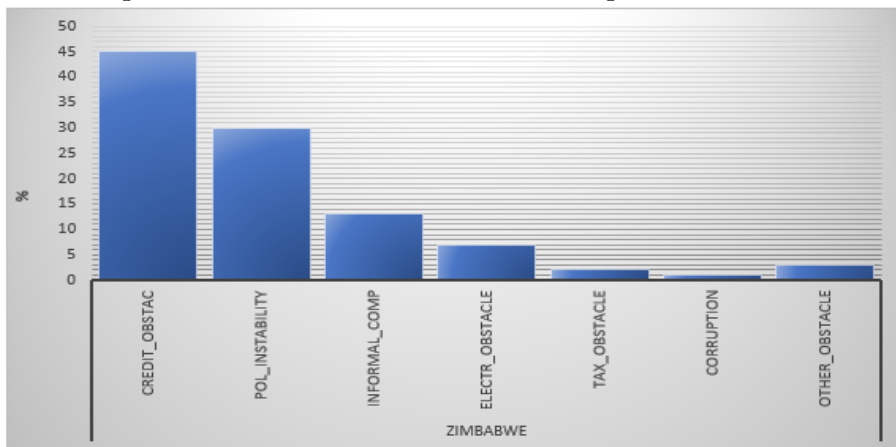
Figure 3: Factors Affecting Firm Operations in Zimbabwe's Post Crisis Period



Data Source: WBE Surveys

risk and inadequate availability of loanable funds. To the extent that environments of market shortages such as the credit constraints easily lead to rationing tendencies or selective credit support by the government and possible corruption, resource allocation efficiencies are more likely to have persisted into period after crisis.

Figure 4: Capacity Constraints Rating by Firms-2011



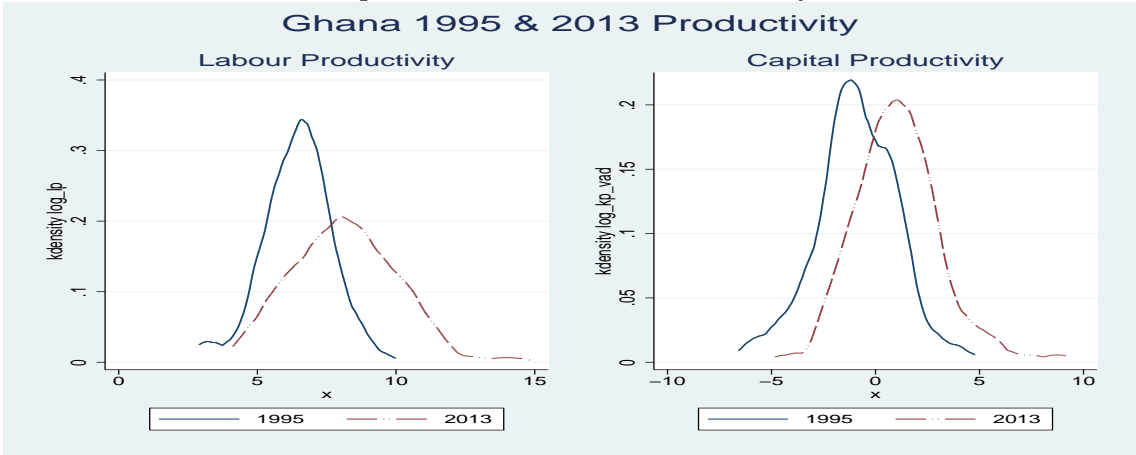
Data Source: WBE Surveys

Perceived political instability and informal sector competition are also rated as second and third most constraining factors on firm capacity utilization. The 2011 World Bank Enterprises Survey for Zimbabwe was done during the Government of National Unity (GNU) and there was high uncertainty among the business community about its sustainability. Henceforth, most firms took a 'middle of the road' or a 'wait and see' attitude with regard to firm restructuring and optimal production decision.

Figures 8.1 and 8.1 present firm productivity distributions for Ghana, between 1995 and 2013; and Kenya, between 1994 and 2013, respectively. Firm labour productiv-

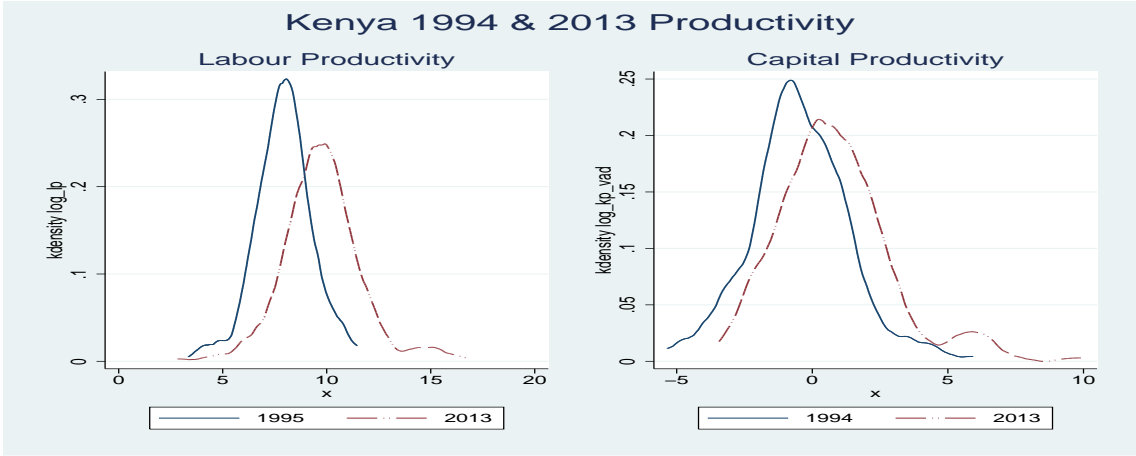
ity heterogeneity across all the four manufacturing sectors increased in Ghana while it remained more or less unchanged for Kenya between their respective survey periods, with average labour productivity improving over the two survey periods in both countries. However, despite the increase in productivity dispersion in Ghana compared to the Zimbabwean case, there was an improvement in capital productivity in the two countries, suggesting higher technical efficiency with regard to both labour and capital employment.

Figure 5: Ghana Firm Productivity



Data Source: RPED & WBE Surveys

Figure 6: Kenya Firm Productivity



Data Source: RPED & WBE Surveys

8.2 Estimating Zimbabwe’s Within Industry Allocative Efficiency

8.2.1 Within Industry Productivity Dispersion

To estimate the changes in the dispersions of labour productivity before and after Zimbabwe’s crisis in Zimbabwe within the four industries under study, the ratios of

firm labour productivity figures at the 90th quantile to the 10th quantile (Q90/Q10) are computed and presented in 8.2.1. Because labour productivity measured in log terms has lesser dispersion than the actual labour productivity, the ratios presented are in respect of the index of actual labour productivity measured as value addition per worker. The table also reports the ratios of the labour productivity figures for 75th quantile to the 25th quantile firms (Q75/Q25), which is less sensitive to outliers than Q90/Q10.

The measurement of the within industry productivity dispersion using quantile ratios, which follows from Hsieh and Klenow (2007) and Bellone et al. (2013) shows the number of times the productivity of the firm at the Nth quantiles surpasses the productivity of the firm at the (100-N)th quantile. The larger the ratio, the greater is the within industry productivity dispersion. Table 8.2.1 presents the productivity quantile ratios for Zimbabwe in the pre and post crisis periods. Comparable statistics for Ghana and Kenya are presented in the Annexure.

Table 3: Zimbabwe's Within Industry Labour Productivity Heterogeneity

Industry	Pre Zim crisis		Post Zim crisis	
	Q75/Q25	Q90/Q10	Q75/Q25	Q90/Q10
Industry 1	2.38	5.14	3.83	11.48
Industry 2	1.46	2.05	2.15	5.23
Industry 3	1.68	2.48	3.20	9.10
Industry 4	2.02	2.61	2.80	7.44

Data Source: RPED & WBE Surveys

//NB Industry 1 is food processing; Industry 2 is textile, garments, leather and footwear; Industry 3 is woodworking and furniture; and Industry 4 is metalworking

Table 3 shows that during the pre-crisis period, the ratio of industry 1's 90th to 10th productivity quantiles was 5.14 while that of the 75th to 25th quantiles was 2.38, which compares with respective dispersion ratios of 11.48 and 3.83 in the post crisis period. This suggests that in the 75th percentile firm was about 3.8 times as productive as the 25th percentile firm in the post crisis period compared to being about 2.4 times more productive in the pre-crisis period. There was even wider productivity dispersion between the 90th and 10th percentile firms after the crisis than before it.

Qualitatively similar dispersion changes are observed in respect of industries 2, 3 and 4. To the extent that resources are more mobile within the narrowly defined industries, it is anticipated that in a freer business environment with less firm specific constraints, incentives and taxes; the profit maximizing behaviours of firms would tend to close down the productivity dispersions over time. The picture portrayed in table 3 is, therefore, reminiscent of the prevalence of escalated idiosyncratic firm specific interventions that are known to derail productivity growth over time. Zimbabwe's post crisis situation is at variance with those of Ghana and Kenya, where within industry productivity

heterogeneity tends between Zimbabwe's pre and post crisis periods (see respective tables in Annexure).

8.2.2 Firm Size-Productivity Covariance

To quantify the extent of potential productivity loss for Zimbabwe between the pre and post crisis periods, estimated results from the Olley-Pakes measure of the covariance between firm size and productivity (equation 11) in Zimbabwe, Ghana and Kenya are presented in 8.2.2. The table gives the OP covariance indicators for logs of labour productivity for each of the four industries to show the (in)efficiencies with which resources were allocated among firms within similar industries.

To the extent that firms should be as mobile as possible and be able to re-structure their factor employment and combinations as much as possible under competitive environments and less so in the presence of controls, distortions and shocks; positive and larger OP covariance terms suggest better resource allocation efficiency and vice versa. The column for overall productivity size covariance is a weighted aggregate for all the four industries, with weights defined as industry employment to total employment. The O-P covariance terms indicate the degree to which individual countries lost or gained in respect of each industry and for all the four industries aggregated together (Bartelsman et al. 2013).

Consistent with core models of the size distribution of firms which predict a positive relationship between firm size and productivity (Melitz 2003), there is wider evidence in the firm-level data for the three countries suggesting that firm productivity and size are positively correlated in Zimbabwe's pre-crisis period for all the three countries, suggesting that larger firms tended to be more productive. This general finding is, however, violated for Zimbabwe's post crisis aggregate firm productivity as well as for its industries 3 and 4.

The estimated overall OP covariance terms for the three countries in 8.2.2, which fall within the range of -4.7 and 23.7 log points are not unanticipated, given that Bartelsman et al. (2013) got 51 log points for the USA and between -3 and 30 log points for the United Kingdom, Germany, France, Netherlands, Hungary, Romania and Slovenia.

Table 4: Within Industry Productivity Dispersion and Country O-P Covariance Term

		Overall	Industry 1	Industry 2	Industry 3	Industry 4
Zimbabwe	1995	0.155	0.283	0.150	0.104	0.054
	2011	-0.047	0.013	0.108	-0.568	-0.181
Ghana	1995	0.049	0.045	0.018	0.037	0.084
	2013	0.222	0.159	0.219	0.377	0.291
Kenya	1994	0.033	-0.404	0.185	0.277	0.096
	2013	0.237	0.233	0.4230	0.076	0.517

Data Source: RPED & WBE Surveys

After the industry reforms of the Structural Adjustment Programmes (SAPs) in the three countries in the mid 1990s, the more competitive manufacturing sector environments meant higher resource allocation efficiency as illustrated by the estimated positive overall and individual industries' OP size productivity covariance measures, except for Kenya's food industry. Ghana and Kenya's aggregate allocative efficiencies are fairly comparable during the mid 1990s when the RPED surveys were conducted. Zimbabwe, however, had greater allocative efficiency, which was at least 10 log points higher. This suggests that the country had a more competitive manufacturing sector in the mid 1990s than Ghana and Kenya.

Following Zimbabwe's Economic Structural Adjustment Programme (ESAP), which included a number of de-controls and deregulation measures, the country overall manufacturing sector's resource allocation efficiency indicator was 15.5 log points, with greatest efficiencies in the food processing; textile, garments, leather and footwear; and woodworking and furniture industries. This implies that, before the crisis, labour productivity for the country's manufacturing sector was about 15.5 percentage points higher than it would be if labour employment had been randomly allocated within its industries (see Bartelsman et al. (2013)).

However, in 2011 after the crisis, the aggregate OP measure for the country had fallen to -4.7 log points, which implies lost firm productivity of at least 20 percentage points between 1995 and 2011. Contrary to the case of Zimbabwe, resource allocation efficiency improved from 4.9 to 22.2 log points for Ghana; and from 3.3 to 23.7 log points for Kenya between the pre and post crisis periods for Zimbabwe, resulting in Ghana and Kenya becoming more competitively efficient than Zimbabwe. For countries, which were less competitive and productivity than Zimbabwe before Zimbabwe's crisis, the deterioration in Zimbabwe's within industry resource allocation efficiency is likely to be a result of shocks of the 1997/2009 crisis

The gravity of the potential loss in Zimbabwe's aggregate productivity due to resource misallocation in the post crisis period becomes clearer, when the country's situation is compared to that of Ghana and Kenya. Relative to the two countries' gains

in resource allocation efficiency, Zimbabwe lost at least 37.5 log points of potential aggregate productivity growth through resource misallocation over the period 1995 to 2011 compared to what it could have achieved if it had pursued manufacturing sector policies and reforms similar to those of Ghana; and at least 40.6 log points if it had followed Kenya's manufacturing sector policies and reforms. When the lost resource allocation efficiency for Zimbabwe is analysed by industry, table 8.2.2 shows that greatest efficiency losses were in respect of the metalworking and woodworking and furniture industries (industries 4 and 3), respectively.

For the Zimbabwean case, the persistence of within industry resource misallocations suggested by the descriptive results analysis and the estimated allocative inefficiency in the 2011 firm survey, more than two years after the crisis, suggests the existence of policy hang-over and lack of aggressiveness by the authorities to address the policy reversals of the crisis period and to initiate new market based corrective reforms to improve industry's competitiveness and allocative efficiency.

9 Conclusion

Following Zimbabwe's economic crisis between 1997 and 2009, a number severe policy reversals from the achievement of reforms and a more competitive manufacturing sector attained through the 1991 to 1995 IMF/World Bank supported Economic Structural Adjustment Programme, were instituted by the country's authorities in their quest to rescue the crisis. These included selective credit, selective foreign exchange allocation and at worst directed marketing of basic commodities at the height of the crisis. These firm and industry specific interventions complemented the already existing crisis induced idiosyncratic shocks on industry and firms.

On the basis of the resource misallocation hypothesis, we asked the question on whether such idiosyncratic shocks and interventions had a bearing on the country's within industry resource allocation efficiency and potentially on its aggregate manufacturing sector productivity. The study finds that there were significant losses on the country's aggregate productivity due to worsening resource allocation inefficiencies during and after the crisis. The results of the study have suggested the existence of a positive correlation between the escalation of these selective interventions and shocks and inefficiencies in the country's within industry resource allocation. Lessons have been drawn from the cases of Ghana and Kenya, whose manufacturing sectors were less competitive than that of Zimbabwe in the mid 1990s but which remained steady fast with industry policy reforms and managed to grow their aggregate productivity through improved manufacturing sector resource allocation efficiencies between Zimbabwe's pre and post crisis periods.

The study is novel in considering the resource allocation inefficiency implication in Zimbabwe following its crisis, which is one of the worst economic crisis in history. The study has also illustrated how economic crisis in a small country, as opposed to crisis in large economies, can be costly, with the costs persisting into the post crisis period due to policy inertia and weak willingness to embark on market reforms by the affected country authorities.

The study suggests relevant policy handles for the government of Zimbabwe and other developing countries which experience crisis similar to Zimbabwe's to consider urgent implementation of policy reforms that are pro resource allocation efficiency as well as to desist from use of selective firm and industry policies and interventions.

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