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ENHANCING FOREIGN CURRENCY ALLOCATION FOR PRIVATE SECTOR DEVELOPMENT - CASE OF THE RESERVE BANK OF ZIMBABWE FOREX AUCTION SYSTEM

Michael Takudzwa Pasara 

North-West University, South Africa
Email: michaelpasara@gmail.com

Nigel Nyajeka 

George Washington University, USA
Email: nyajekanigel@gmail.com

Steven Henry Dunga 

North-West University, South Africa
Email: Steve.Dunga@nwu.ac.za

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Abstract

Foreign currency shortages remain a perennial challenge in Zimbabwe leading to several spillover effects such as shortages in electricity, raw materials, fuel, inflation among other market distortions. The central bank introduced the Dutch Auction system in an attempt to address forex shortages but the effectiveness of this approach has been questioned. This study employed the Vector Autoregressive (VAR) and error corrected (VECM) models in order to empirically determine how the Reserve Bank of Zimbabwe can efficiently allocate foreign currency in a manner which supports private sector development. In the short run, the auction is an effective tool to promote private sector development. However, long run analysis presents a deleterious effect. This is due to a rise in round-tripping from market participants to leverage and perform arbitrage on different rates (auction and parallel), increased backlog reflecting shortages in allotments and high incidences of corruption. All this leads to a significant decrease in the confidence levels of the economy among private stakeholders. The study recommends monitoring of authorized auction dealers, improve public confidence by minimizing rent-seeking behavior, re-model exporters participation in the auction system or abandoning the auction system altogether.

Keywords: Foreign Currency Auction, Private Sector Development, Monetary Policy, Zimbabwe

JEL Classifications: E3, E43, E58

1. Introduction

Zimbabwe's biggest challenge over the past two decades has been to understand how best to allocate foreign currency in a way that supports the nation's economic growth agenda. The nation has been plagued by consistent foreign currency shortages coupled with constraints in developing an appropriate currency allocation regime and exacerbated by widespread exchange rate instability (Ndlela, 2011). The Reserve Bank of Zimbabwe (RBZ) launched a foreign currency auction on 23 June 2020 to improve the transparency in the country's foreign exchange transactions. According to Dordunoo (2020), the Dutch auction system is an auction system where the foreign currency's price is established after all bids have been received and the winning bid is then allocated the maximum amount that the seller can sell. In this type of auction, the bidders are expected to submit a bid for the desired amount (Klemperer, 2002).¹

Initially, when the system was introduced in Zimbabwe, it was supposed to be backed by a real-time electronic trading platform operated by Reuters, but the central bank decided to leave it before fully adopting it. RBZ (2020) poses the idea that the auction platform has started to evolve into a more transparent and competitive platform that allows the reserve bank to manage and allocate of foreign currency in the nation.² However, Watambwa (2021) notes that it has also deviated from the principles of the Dutch auction, which was designed to instil confidence in the bank's operations. These principles allowed the central bank to provide a more accurate and timely view of the country's foreign exchange transactions. Apparent concern among policymakers and economists is whether the auction is an effective means of allocating foreign currency in Zimbabwe in a way that supports private sector development.

The shortage of foreign currency has been identified as one of the main challenges that businesses and industries in Zimbabwe face (RBZ, 2021). The shortages of fuel, electricity and raw materials are mainly caused by the lack of foreign currency which in turn negatively affects the country's balance of payment and capacity utilization (CZI, 2023). Forex shortages have also raised primary concerns about the country's increasing inflation and market distortions. This is coupled with dwindling international financial support, lack of financial integration with the regional and international market which in turn impedes the feasibility of an auction system as an allocation tool especially given a thriving parallel foreign currency market. On the other hand, economists and policymakers have raised questions about the effectiveness of the foreign exchange auction system in supporting the country's economic development. Although the literature has not been able to provide conclusive evidence on the effectiveness of the auction system, several studies have supported its use as a means of improving the country's economic performance and transparency with regards to allocation (Pétursson *et al.* 2014; Krumm, 1986). However, contradictory studies have also raised questions about its failure. For instance, Makochekanwa (2007) claims that the system is inefficient and that it supports the black market as a more stable and efficient method of allocating foreign currency.

The study aims to empirically determine how RBZ can efficiently allocate foreign currency in a way that supports sustainable private sector development. More specifically, the study seeks to understand the overall impact of auction foreign currency allocation on Zimbabwe's private sector development; develop a framework on how best to allocate foreign currency in Zimbabwe and proffer recommendations and policy advice to the central bank on foreign currency allocation in Zimbabwe. The growth of base money in Zimbabwe has been faster than that of the economy, which could cause inflation to rise faster or the exchange rate to weaken. The government has not met its fiscal targets, and rising fuel prices and wages are the key drivers of this. These expenditures will likely put a strain on the price stability of the economy, as revenues lag behind the cost of doing business. Consequently, the Dutch auction system is under threat due to the increasing volatility in the exchange rates.

¹ A Dutch auction is a type of market structure that involves taking in all the bids that are submitted. The highest bid that the market can offer is then determined. This type of auction is usually conducted for the amount that the investors are willing to pay.

² Foreign currency being one, a variety of financial assets and commodities are often auctioned off to raise funds for various purposes, such as the purchase of livestock, art or construction contracts.

This paper considers the efficacy of the auction system introduced in 2020 to support private sector development in the unique case of Zimbabwe. This is on the backdrop of a failed auction system in 2004. Furthermore, the paper briefly discusses Zimbabwe's forex allocation policy options, exchange rates, and imperatives toward foreign currency distribution stability. It does this in the context of the auction system since its inception in 2020, the performance of the nation's stock market as a proxy of private sector development and determines the role of the central bank in ensuring sustainable private sector development by leveraging on strategic foreign currency allocation.

1.2. Post-Independence Period: 1980-2000

Kavila and Le Roux (2017b) observes that between 1980 and 1990, Zimbabwe's inflation rate was relatively low, at around 13 percent with a fairly stable exchange rate regime³. RBZ (1996) postulates that during the initial stages of the country's Economic Structural Adjustment Program (ESAP), the rate peaked at around 20 percent. Some of the factors that led to this were the removal of price controls and the government's decision to monetize its fiscal deficits. Kavila and Le Roux (2017) further explains that the exchange rate and currency problems in Zimbabwe grew when the government agreed to the demands of the country's war veterans for pay-outs in 1997-1998. It then decided to raise taxes to fund the payments but the plan was immediately abandoned after the country's main labor union, Zimbabwe Congress of Trade Union (ZCTU) opposed it (IMF, 1999). According to Kairiza (2012), the central bank then injected seigniorage revenue amounting to \$180 million leading to a loss of currency value. The currency depreciated to a value of Z\$18.6 per US dollar by December 1997. It then depreciated to a value of Z\$10.8 at the beginning of 1997 (IMF, 1999). Coomer and Gstraunthaler (2011) add that there was also rationing of foreign currency at official rates against the parallel market that created a heavily-devalued exchange rate. In 1999, the value of the Zimbabwe dollar had decreased to about Z\$0.0373692. Following this, the country's monetary authorities started implementing a static exchange rate system (Kavila and Le Roux, 2017b).

1.1. Hyper-inflationary era: 2000-2008

In December 2003, a new central bank governor introduced new measures which include increasing the reserve requirements from 20% to 30% for banks and reducing the liquidity support provided by the central bank which took effect in early 2004 (RBZ, 2003). According to IMF (2004), corrective mechanisms led to an increase in the interbank rates with a subsequent deterioration in stock market performance. However, a tighter monetary policy was not able to sustain its impact on inflation. In December 2004, the RBZ provided liquidity to the financial system through its PSF facility at a rate of 30 percent. The introduction of a new fund known as the Troubled Bank Fund (TBF) was also carried out to help struggling banks. According to Ndlela (2011), it was established to provide liquidity and support the financial system during difficult times. Munoz (2007) notes that the TBF was regarded as a significant contributor to the growth of reserve money in 2004.

The country's monetary authorities were able to control the exchange rate by restricting the amount of foreign currency that could be traded in the market. On 12 January 2004, the government of Zimbabwe introduced an auction process to manage the allocation of foreign currency. The consequential effect was that the exchange rate was to be adjusted according to the forces of demand and supply (Ndlela, 2011). According to Kavila and Le Roux (2017a), the lack of liquidity in the foreign exchange market was a major issue that prevented the central bank from effectively managing the currency. On October 21, 2005, the system was replaced with a new system that allowed the central bank to manage the foreign exchange market. Mandeya (2017) further observes that after it was introduced, the value of the Zimbabwe dollar depreciated from about Z\$36.6469 to about ZW\$99.16 in the first quarter of 2006. Due to the persistent decline in the value of the local currency, the government decided to introduce a volumes-based

³ This was largely due to the country's administrative controls, which were mainly focused on the foreign exchange and product markets (RBZ, 1996).

adjustment method in the inter-bank market to set the exchange rate (Madesha *et al.* 2013). In May 2006, the exchange rate was at about \$101.1955 against the US dollar. It then depreciated to about Z\$250 in July 2006. Later on, the exchange rate was fixed at US\$1 by the Reserve Bank of Zimbabwe from January 2004 to December 2006 and remained at this level until the end of 2006 (Kavila and Le Roux, 2017b).

Mandeya (2017) indicated that the gap between the parallel foreign exchange rates and the official exchange rates widened and this resulted in the over-flow of foreign currency into the underworld. Additionally, it resulted in a shortage of foreign exchange in the country which was worsened by fixing the exchange rates which caused severe shortages of foreign currency in the country's formal banking systems (Ndlela, 2011). Watambwa (2021) observes that due to the existence of the parallel market, most economic agencies were compelled to use foreign currency to hedge against hyperinflation. Coomer and Gstraunthaler (2011) add that due to the shortage of foreign currency, many organizations and corporations were unable to access their foreign currency accounts. In 2008, the International Rescue Committee reported that many humanitarian organizations and non-governmental organizations in the country were threatened with collapse due to the lack of foreign currency and declining economic indicators⁴. In response to the situation, the Reserve Bank of Zimbabwe (RBZ) in April 2008 started implementing a new exchange rate determination process. According to Kavila and Le Roux (2017b), the new framework provided authorized dealers with a set of tools to help them meet the needs of their customers. These included a priority list that was established by the RBZ and a list of buyers and sellers that was regularly updated. The exchange rate is determined by the market forces that determine the prices that each agent is willing to offer its customers.

1.2. Post-hyperinflation era: 2009-2022

Following the 2008 elections, a multi-currency regime was established by the GNU, which included multiple legal tender units. The Zimbabwe dollar was to be abandoned completely. After a period of exchange rate stability, the multi-currency regime ended in mid-2019 when the Zimbabwe dollar was reintroduced as the country's sole legal tender (Mandeya, 2017). According to Ndlela (2011), this affected both the parallel and official markets and foreign exchange allocation primarily became managed by the parallel market. The authorities introduced a new foreign exchange auction system on June 23, 2020. The objective of the system was to provide transparency in the allocation of foreign exchange resources (RBZ, 2020). The average rate that was used during the week to which the auction was determined using the allotments method. A new rate was then to be determined at a subsequent auction the following week. According to RBZ (2020), compared to a dealer market, an auction market is more difficult to manipulate. Also, it allows the dealer to set the prices without having to transact a single dollar. The introduction of the foreign exchange auction system in Zimbabwe was praised by the monetary authorities as a good initiative. However, its strategic implementation was also imperative to guarantee its successful implementation and efficiency. Various factors that affected the implementation of the auction system, such as the lack of supply and the public's preference for the parallel market, raised questions about its role in the allocation of foreign exchange in the country.

⁴ Before reaching a peak of 431 quintillion percent in December 2008, annual money supply growth increased from 1 416 percent in December 2006 to 64 113 percent in December 2007. In addition, inflation increased from 1 281.1% in December 2006 to 66 212.3% in December 2007 and 231,000,000% at the end of July 2008. IMF (2009) estimates that in December 2008, inflation reached a peak of 500 billion percent.

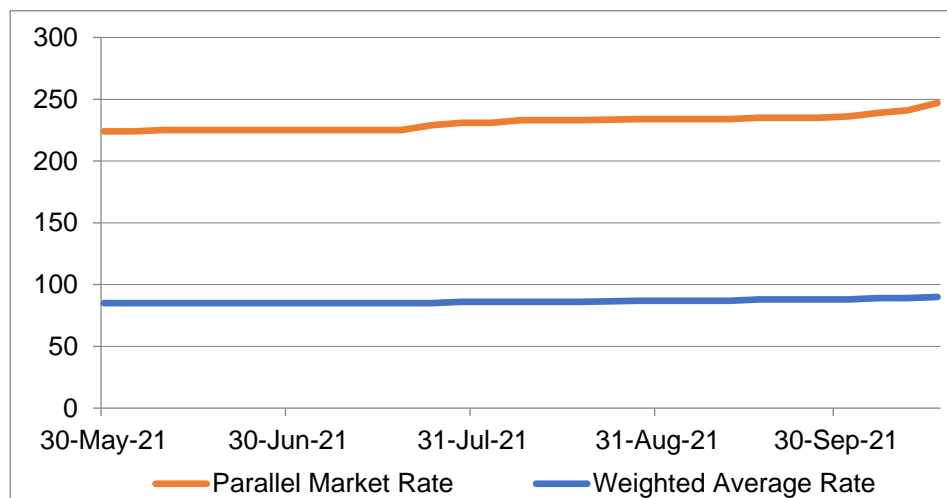


Figure 1. Parallel market rate vs. interbank market rate 2021

Source: International Monetary Fund (2022)

As shown in Figure 1, the gap between the interbank rate and the parallel market continued to rise due to increasing market dependence on the black market operations. The massive gap between the two rates has created an environment wherein rent-seeking and arbitrage flourish, which severely undermines the supposed economic recovery (RBZ, 2021). The RBZ in its 2020 mid-term monetary policy statement notes that the introduction of the auction system in Zimbabwe was able to provide an opportunity for the country to stabilize its currency and remove some of its macroeconomic distortions. Additionally, RBZ (2020) observed that the foreign exchange auction system has resulted in the reduction of the volatility in the exchange rates and this has allowed the market to continue to operate at a lower exchange rate than before.

As of June 2022, Zimbabwe faces a critical monetary stability problem with rising inflation and plummeting exchange rate stability that needs swift correction. This is on the backdrop of a recovering global economic shock initiated by the Covid 19 pandemic and further worsened by the Ukraine-Russia war that has resulted in spikes in fuel prices. The auction system has been heavily questioned due to massive delays in forex issuance and a huge backlog. The failure of the central bank to effectively manage the exchange rate and the indiscipline within its monetary policy framework led to the total collapse of the previous auction system (Coorey, 2020). It becomes imperative for the RBZ to invoke turnaround measures to pave way for recovery and stability despite the apparent economic challenges. This paper aims to provide a comprehensive analysis of the system and its various inefficiencies. It also offers recommendations to the central bank on how it can implement its foreign exchange strategy (The Independent, 2022).

2. Theoretical and empirical literature review

According to Dordunoo (2020), the demand for foreign currency is mainly caused by the buying and selling of goods and services by non-resident nationals. Alternatively, Johnson (2018) notes that foreign currency is generated when the non-resident uses the currency to pay for the country's imports. In Zimbabwe, demand for foreign currency largely emanates from the argument that the country is a net importer of several consumer and capital goods especially given its low industry capacity utilization (CZI, 2023). Factors such as interest rate movements and the country's economic growth are also taken into account to determine the supply of foreign currency. Aron and Elbadawi (1994a, 1994b) additionally state that two currencies exchange at a rate that is determined by the various foreign exchange arrangements. Dordunoo (2020) further explains that the two main methods that are used to determine the exchange rate are the Direct Auction System (DAS) as well as the Marginal Pricing System (MPAS). In the DAS, the successful bid is paid for the foreign exchange, while the market-clearing price determines the latter.

The auction theory focuses on the interactions between buyers and sellers in real-world auctions. Klemperer (2004) notes that auction theory studies how these markets are designed to incentivize predictable outcomes. Basically, the system helps sellers raise more money while allowing buyers to get a lower price. In order to prevent market failure, auction theorists develop rules that encourage optimal bidding strategies. These rules can be used in various informational settings. According to Krishna (2009), these games are economic games that have two components: the format and the information. Klemperer (2004) asserts that the format of an auction sets the framework for multiple aspects of auction processes, such as price setting, the placing of bids, and awarding of winners. The way auctions differ from other types of games is in how they deal with the various types of information that are collected by multiple buyers. In most cases, the bidders do not disclose their private information to the other buyers. For instance, they may know the value of the item, but they do not share it with the other bidders. This could affect the personal valuations of the other buyers.

The benchmark model was pioneered by McAfee and McMillan (1987) to provide a comprehensive view of the auction process. The theory is based on the assumptions that all potential buyers are risk-neutral, every bid is independently computed and priced using a probability distribution, the buyers have the necessary information to make an informed decision and the payment is then calculated as a function of the bids. This model and the Revelation Principle are often adopted by market participants in order to establish an optimal auction structure. The principle is based on the notion that each auction format has its own structure that allows the potential buyers to report their valuations honestly. Klemperer (2004) states that the optimal auction format allows the potential buyers to bid on the item with the highest valuation. However, if the seller believes that the other bidders' valuations are lower than their own, they will not sell the item.

The four main assumptions of the model are being replaced to create unique auction formats that are designed to meet the varying needs of different groups. For instance, risk-averse individuals are more likely to bid higher in sealed-bid auctions as they are more likely to win. This is because the higher the expected revenue, the more likely the other bidders are to believe that the item's value is high. In other words, if the bidders' values are correlated with the actual values of the item, then the other bidders are more likely to perceive their own values as high (Botelho and Pinto, 2002). The concept of the winner's curse is a notable example of this type of auction. Krishna (2009) notes that the linkage principle allows for comparisons between the various auction types. The concept of the asymmetric model suggests that the buyers are divided into two groups: the dealers and collectors, and the sellers. In auctions with incentives or royalties, the seller adds various factors to the price function to determine the true value of the item. These factors include the cost of production, supply, and royalty payments.

A game-theory-based auction model is a type of economic game that involves a group of participants or players and a set of strategies that they can use to win. The payoff vector for each strategy is related to the number of actions that the players have available to them. The auction set of the players is also known as the bid functions or reservation prices. Botelho and Pinto (2002) posited that the bid functions determine the value of the player and the cost of the transaction. The expected profit or utility of the player is calculated by taking into account the combination of strategies that the player uses. Game-theoretic auction models are categorized into two: private values and common values. In the former, the participants assume that each of them gets a random private value from the other players and do not know the precise value of the product in question as they can insinuate that other participants acquire a discreet signal. This method allows them to estimate the true value of the item based on the probability distribution. Dordunoo (2020) states that this method ensures that the probability distribution of the players is identical across all of them. In the private values model, symmetry is also ensured as the values are independently distributed. The latter, that is, common values says that participants have equal information about the item's value (Klemperer, 2004; Botelho and Pinto, 2002).

Fibich *et al.* (2004) state that the revenue equivalence theorem is premised on the idea that mechanisms that allocate items to the same bidder achieves the same revenue outcomes, then the same outcome will also happen in the auction system. The importance of the theorem is that if a single-item auction provides the item to the highest bidder unconditionally, then the

expected revenue will be the same. This means that if the auctioneer wants to increase the revenue, he or she must change the outcome function. One way to do this is by setting the reservation price. This method ensures that the item is always given to the highest bidder (Tenorio, 1993). The revenue equivalence theory postulates that an auction that conforms to the fundamental assumptions presented in the benchmark model results in identical returns for both sellers and buyers.

According to the balance of payments theory, the market's supply and demand for foreign currency determines the exchange rate. Johnson (2018) indicates that this is done by considering the country's balance of payments, and if a country's currency's demand declines at a rate of exchange, then its balance of payments will be in deficit. The balance of payments of a nation will be in excess if the demand for its currency rises at a rate of exchange. In Zimbabwe, claims of positive balance of payments by the Ministry of Finance and Economic Development (MoFED) have not been supported by the stable (or more precisely, the increasing) value of the domestic currency. Krueger (1969) states that a surplus position allows the country to increase its external value and conversely, a deficit position causes the country's currency to lose value. On the other hand, a surplus position allows the country to maintain its current external value. According to Krueger (1969), market forces can work unimpeded and establish a rate of exchange that can clear the market and prevent a surplus or a deficit from emerging. Kovanen (1994) also claimed that if the country's balance of payments is permitted to decide its currency's value, the exchange rate will be fully responsive to changes in the supply and demand situations.

The country's balance of payments can be in a surplus or a deficit, and this can cause the exchange rate to change (Dordunoo, 2020). This phenomenon can also affect the country's foreign exchange reserves. When the country has a deficit in its balance of payments, the debits from the foreign exchange transactions will surpass the credits. If the country's balance of payments is in a surplus, then the foreign exchange reserves will be able to cover the credit and debits issued by the country. On the other hand, a surplus will cause the exchange rate to fall. This is because the demand for foreign exchange will exceed the supply (Johnson, 2018).

According to the balance of payments theory, the market's supply and demand for foreign currency can influence the exchange rate (Krueger, 1969). This is in line with the general theory of value. It also regards the issue of the determination of the rate of exchange as a central part of the general equilibrium theory. This is particularly true in Zimbabwe given how high demand of foreign currency and low supply tends to lead to a depreciation of the Zimbabwean dollar. The balance of payments theory does not assume that the rate of exchange can be solely determined by the goods and services that are imported and exported, which may be a true case in Zimbabwe given how import and export trends in the country may be a key determinant of the exchange rate influence allocated forex in the market. The concept of the balance of payments theory states that the rate of exchange can be determined by the supply and demand of foreign currency in the market.

The concept of the balance of payments theory states that the rate of exchange can be adjusted to address the disequilibrium in the country's balance of payments (Johnson, 2018). This can be done through the devaluation of the home currency. This may not be particularly feasible in the Zimbabwean case given how the government is keen on letting the auction determine the rate of the currency against the United States dollar. The idea that the government cannot intervene in the foreign currency market and that there is perfect competition underlies the BOP notion of exchange rate determination. Since the Reserve Bank of Zimbabwe often enacts policies and mechanisms to influence and regulate the markets, the theory may not hold.

Multiple studies have been conducted on how foreign exchange auctions operate in underdeveloped nations. An overview of the experiences of the auction marketplaces in the Western Hemisphere and Africa is provided by a study by Krumm (1986). The paper also states that the auctions have improved the allocation of foreign exchange relative to administrative allocations. Dominguez *et al.* (2012) analyzed Bolivia's experience with the foreign exchange auction market and found that the auction system improved the country's exchange rate stability. Despite the multiple difficulties that the auctions have caused, the research claims that the exchange rate remained stable. According to Kovanen (1994), the development of auction markets in developing countries has not been sustainable for a long time. Following the initial

implementation of these markets in the 1980s, many of them have been terminated. Some of these include Jamaica (1983), Ghana (1986), Nigeria (1986), Sierra Leone (1982), Zambia (1985), and Uganda (1982). Kovanen (1994) further posits that the failure to maintain a stable exchange rate has caused the authorities to change the format of the auction market to influence its exchange rate. This has also undermined the public's confidence in the market's structure. Additionally, to provide more clarity on how the auctioning process may be an issue of concern, Tenorio (1993) analyzed the auction arrangement of Zambia. The research found that the country's auction system was affected due to the introduction of a new bidding technique that involved discriminative bidding. As a result, it may mean that Zimbabwe to get the most return out of the auction.

A comprehensive approach was also taken by Kimaro (1988) and Kyung-Mo *et al.* (1987) in their studies on the operations of interbank and auction markets in developing countries found that although the arrangements have not been ideal, they have been beneficial for the public sector. In this research, the decrease in the amount of foreign exchange allocated through the auction market highlighted the system's shortcomings and the need for more efficient methods of allocating foreign exchange. This issue is important to consider as Zimbabwe has been unable to meet the demand for foreign exchange which led to large backlogs. Another critical question that needs to be resolved is how the country can find an alternative means of funding its foreign exchange needs.

A study by Watambwa (2021) builds on this assertion and states that one of the main advantages of auction-based foreign exchange rates was their ability to encourage the surrender of foreign currency to the official market. In poor nations, such as Zimbabwe, where few market participants have reimbursed earned foreign cash back in the formal market, this activity still poses a concern. The majority of agents in Zimbabwe have a propensity to send foreign money into the black market, hence escalating the shortages in the official markets.

Aron and Elbadawi (1994b) observe in a study that the introduction of multi-unit auction systems for foreign currency within several nations was seen as a step toward establishing a more credible and sustainable regime. However, there is still a lot of doubt regarding the functioning of these markets in Sub-Saharan Africa. Umar (2010) studied the data points collected during the weekly sessions of the Retail Dutch Auction System in Nigeria from July 22, 2002 to March 27, 2006. The study found that the auction system did not improve the stability of the exchange rate in the long run. According to a study by Nkurunziza (2020) and Rouget *et al.* (2004), the design and management of auctions are some of the mechanisms that contributed to the demise of the foreign exchange market in Sub-Saharan Africa.

A study conducted by Ogiogio (1996) revealed that the level of depreciation experienced by the Nigerian currency against the dollar was influenced by the country's auction system. It also found that the frequency of bidding and the impact of both the system and the bidding on the exchange rate were significant. To further understand the feasibility of the auction system in non-African economies, Pétursson *et al.* (2014) conducted a study on auction systems and observed that the foreign currency auctions have been beneficial for Iceland's economy and private sector. Auctions led to more investment in the country, as well as a significant increase in the prices of stocks and real estate. These contrasting observations from different studies tend to point out that foreign currency auctions in developing economies tend to present a deleterious effect on the economy as compared to developed nations. From these research papers, it is clear that Zimbabwe can get a positive outcome from the auction system if it strategically redesigns the auction as put forward by Pétursson *et al.* (2014).

To get a broader perspective on the effectiveness of the auction system in different economies from that of Zimbabwe, a review of studies from Iraq by Mahmoud (2017), notes that the Iraqi Ministry of Finance was able to raise the value of the dinar by paying a large amount of foreign currency through the auction system. Supporting studies by Walid (2009) noted that the same process can help raise the value of the currency. Other research conducted by Akkawi and Salman (2014) revealed that the auction played a critical role in stabilizing the Iraqi exchange rate which consequently acted as a useful tool to keep prices at manageable thresholds.

Taking from this analysis a critical question is why then is Zimbabwe and other African economies failing to attain the results observed in Iceland and Iraq? To answer this question, a

study by Ndlela (2011) directs the failure of the 2004 auction in Zimbabwe to the over-supply of foreign exchange. This was caused by the country's two-tier exchange rate system, which severely affected the flow of funds into the economy. The primary source of export proceeds was also severely affected by the system. The problem is that currently, the same predicament seems to be prevailing in Zimbabwe with the auction failing to meet all the bids requested by auction participants. Makochekanwa (2007) further observes that the failure of the past auction system was also a consequence of foreign currency shortages to meet the requirements of the demand side.

The literature analyzed above seems to present mixed findings in determining a unified conclusion on the effectiveness of the forex auction as a means of allocating foreign currency in an economy. Generally, studies like Kimaro (1988), Walid (2009), Mahmoud (2017), Pétursson *et al.* (2014, and Kyung-Mo *et al.* (1987 support the notion that the auction is an effective means of foreign currency allocation. Contrastingly, scholars like Rouget *et al.* (2004) and Aron and Elbadawi (1994a) skew toward discrediting the auction system's efficacy as a sustainable solution for effective allocation that can present positive economic outcomes. As a result, a pertinent issue will be to determine what the government of Zimbabwe needs to do either to reform the past mistakes of the previous auction systems or find alternative means to increase foreign currency allocative efficiency to meet economic objectives while simultaneously supporting private sector development.

3. Methodology

Following the study by Aron and Elbadawi (1994a), a cointegration modeling in the sequential weekly auction was employed. The weekly data covers the period 18 August 2020 up to 31 May 2022. As highlighted by (ibid), the analysis of foreign exchange auctions frequently consists of variables like the auction exchange rate (level and variation of the selling price), the demand and supply of foreign currency, and black-market premium that are non-stationary and are associated with structural breaks and regime shifts. This means that the shock to the foreign exchange system tends to have high persistence. Dealing with variables that pose unit root affects econometric modelling and estimation as this causes spurious regressions.

According to Granger and Newbold (1974), the causality among multiple non-stationary variables can be indicated within a stationary model. A clear linear combination of the components can be identified as stationary in a co-integrated vector. In econometrics, if a series is co-integrated, then an error correction model can be leveraged in indicating the changes in the long-run equilibria. Since the Zimbabwean foreign currency exchange auction system is done weekly, the econometrics modeling will analyze these weekly dynamics and trace the adjustment to unified markets in the longer term. As a way of ascribing behavioral interpretation in the foreign exchange auction system, it is important to test for co-integration in addition to preliminary tests of stationarity among individual variables (Aron and Elbadawi, 1994a, 1994b).

3.1. Model specification

This study modified the weekly auction model of Aron and Elbadawi (1994a, 1994b) marginal adjustments. After the stationarity tests, the study opted between the Vector Auto regression and the Vector Error Correction Model. The ADF test revealed that the variables were non-stationary at some levels before becoming stationary at the first difference. The Trace test component was then used to perform the Johansen co-integration test to look for co-integration. Given these two significant findings, the Vector Error Correction Model (VECM) is advised (Taylor and Peel, 2000). A co-integrated vector autoregression model is the vector error correction model (VECM). This consists of an error-correction term derived from the known relationship and a VAR model of order $p-1$ on the differences between the variables. As a result, the VECM model corrects the deviation from the long-term co-movement and changing trend of the percentage allocations, establishing a short-term relationship between the allocation of foreign currency to the private sector and the development of the private sector. The empirical model used in the study is specified as:

$$PSD_t = \alpha_t + \sum_{i=1}^p PSD_{t-1} + \sum_{i=1}^p PSA_{t-1} + \mu_t \quad (1)$$

where PSD_t is private sector development; PSA_t is the allocation of foreign currency to the private sector and μ_t represents the disturbance or the error term.

Private Sector Development (PSD) is the dependent variable in this study which was measured using the all-share indices obtained from the Zimbabwe Stock Exchange (ZSE). Private sector development (PSD) is a strategy that aims to establish markets that are vibrant and fairly competitive. It can provide economic opportunities to the poor and other marginalized individuals.

Foreign Currency Allocation to Private Sector (PSA) is the amount attained when the central bank (Reserve Bank of Zimbabwe) sells a specific quantity of foreign currency through a bidding or atonement process, the total foreign exchange auction allocation occurs. The Dutch auction system, also known as the open-bid descending-price auction or clock auction, is used by the RBZ. It involves setting the price of the offering (foreign currency) at a very high amount at first and then gradually lowering it until a median rate is determined. The study calculated the percentage allocation to the private sector by mainly focusing on the small to medium enterprises' allocation of the foreign currency by the central bank. This was important as it will help to assess how the allocations have been changing over the study period. Due to the continued perfection of the auction system by the RBZ and that the central bank initially did not disclose the total value of foreign currency required by the private sector, the study, therefore, used the percentage share to the SMEs. As a priori expectation, a rise in the allocation of foreign currency within the private sector is expected to lead to a surge in the development prospects of that sector.

3.2. Pre- and post-estimation tests

The Augmented Dickey-Fuller test was applied to test to stationary. This method takes a look at the first difference between the two series and then performs a series regression. It also takes into account the lagged difference terms and the time trend. The test seeks to assess and validate the null hypothesis that $\phi = 1$ in

$$y_t = \phi y_{t-1} + \mu_t \quad (2)$$

against alternative $\phi < 1$. The null hypothesis (H_0) will therefore be: series contains the unit root, against an alternate hypothesis (H_1): series is stationary. If the ADF statistic's value surpasses the critical levels, the null hypothesis can be considered. The null hypothesis can be disproved if the series do not interact with non-stationary or order zero. When the initial difference is stationary and the time series is not stationary, I (1) can be thought of as including the time series as a whole.

The cointegration tests were also performed to determine the nexus between variables in a given unit root to avoid the risk of false positives and ensure meaningful results. It is generally not possible to make a linear regression of a process that has been integrated with another. However, if the two processes are co-integrated, then it can be possible to perform the same procedure. Cointegration is a property that allows one to perform a meaningful regression on another process. Cointegration analysis is very important when two non-stationary variables are combined. This method can prevent a VAR model from miscalculating the first difference due to the effects of the common trend. If the relationship between the two variables is confirmed, then the model should include residuals taken from the two vectors. The Johansen method is used in this stage to identify the relationship between two non-stationary variables. It takes into account the likelihood that the two vectors will be co-integrated. The testing hypothesis is that the relationship between the two variables is not non-coexistent. The method is then used to confirm the existence of co-integration. The maximal eigen value test and the trace test are the two test statistics on which the Johansen technique is based. The purpose of the trace test is to determine if there are multiple r co-integrating relationships in a given set of statistics. If the value of these statistics exceeds its critical value, the test rejects the null hypothesis. On the flip side, the eigenvalue test is used to discard the null hypothesis if the value of these statistics exceeds its critical value.

3.3. Vector error correction model

A cointegrated Vector Autoregression model is the Vector Error Correction Model (VECM) and it consists of an error-correction term derived from the known relationship and a VAR model of order $p - 1$ on the differences between the variables. As a result, the VECM model corrects the deviation from the long-term co-movement and changing trend of the percentage allocations, establishing a short-term relationship between the allocation of foreign currency to the private sector and the development of the private sector. This is done to show how the long-run equilibrium and the short-run equilibrium differ from one another. For cointegrated non-stationary series, a vector error correction model is frequently utilized. It demonstrates the model's response to the long-run equilibrium state's conditions. The VECM illustrates how modifications to the variable distributions impact the long-term equilibrium of the model. The models will be compelled to move in the direction of equilibrium in the short term by movements away from the long-run equilibrium. It is demonstrated that the error correction terms obtained from the VECM are independent of the equilibrium's long-run location. The data used in the research were sourced from the Reserve Bank of Zimbabwe's weekly release on the auction system whilst all-share indices data will be obtained from the ZSE. The data spans from the week starting 18 August 2020 up to the week ending 31 May 2022. This is because the Dutch Auction system was officially launched in June 2020 and the one month lag period was to allow for operational adjustments. In analyzing the data, the study used the Eviews-12 statistical software package.

4. Results

4.1. Pre-estimation analysis

These results are pivotal in research as they provide the basic features of data. They provide a summary of measures of central tendency, measures of variability, skewness, and kurtosis of the data. Table 1 provides a summary of descriptive statistics on the core variables that were adopted in this research.

Table 1. Descriptive statistics

	PSD	PSA
Mean	7911.897	13.9740
Median	6032.194	14.8500
Maximum	28919.04	29.3200
Minimum	1301.208	3.6500
Std. Deviation	6479.134	6.4100
Skewness	1.2833	0.1881
Kurtosis	4.1979	1.9919

Table 1 shows that the Private Sector Development (*PSD*) data has a standard deviation of 6479.13. This shows that the data is widely spread around the mean. In terms of skewness of the data, the tail of the distribution for the *PSD* variable is skewed to the right since the value of skewness is positive which indicates the there is a probability that the data may not be normally distributed. The kurtosis value shows that in terms of the peakedness, *PSD* data has a high peak than the normal distribution as shown by the value of 4.20 is greater than 3. Thus, the distribution is leptokurtic with tails fatter than the normal distribution. The value of the mean and the median are almost close to each other showing that outliers might be expected in the data. The data for foreign currency allocation to the private sector (*PSA*) has a standard deviation of 6.41 which is lower than that of private sector development. The *PSA* variable data is positively skewed and thus the tail points to the right. In terms of peakedness, the data is lowly peaked as the kurtosis value is 1.99 which is less than the normal value of 3 that is to say it is peaked. The test result is shown in Table 2 for the Augmented Dickey-Fuller Test (ADF), which was used in the study to check for stationarity.

Table 2. Stationarity test results

Variable	ADF p-value	ADF p-value 1 st Difference	Order of Integration
PSD	1.0000	0.0000***	I (1)
PSA	0.2543	0.0000***	I (1)

Note: *, **, *** denote significance at 10%, 5%, and 1% respectively.

The null hypothesis when checking for stationarity is that the data is not stationary. For the decision criteria, when the absolute ADF value is greater than the absolute critical values, we may refute the null hypothesis, which would indicate that the data will be stationary. Also, the decision criteria can be done using the probability value of the ADF. When the value is below 1% or the 5% significant level, the null hypothesis will be disregarded thus meaning to say the data will be stationary. From Table 2, the two variables became stationary after first differencing and the decision was made based on the 1% significant level. This means that the variables are integrated in order one.

The results revealed that multicollinearity did not pose serious problems to the regression as all the absolute pair-wise correlation coefficients were below 0.8. The number of lag sets to be utilized in the model was decided after stationarity tests were completed. According to Liew (2004), when it comes to determining the true lag length, the Akaike's Information Criterion (AIC) and Final Prediction Error (FPE) are superior to the other criteria. These two criteria are claimed to maximize the recovery of the lag duration and decrease the possibility of underestimation. When the number of observations is big, greater than 120, the Hannan-Quinn Criterion is used to find the ideal lag length. The AIC was used to calculate the ideal lag time because the study's data set, at 87, was small. The criterion was also validated by performing autocorrelation in the residuals. When autocorrelation is detected in the residuals, the appropriate lag length had to be modified to take into account the changes in its properties. The values of the lag length and the AIC were then used to determine the optimal lag length which is 3 lags.⁵ Table 3 shows the results.

Table 3. Lag length

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-1091.981	N/A	1.3333	26.6825	26.7412	26.7060
1	-896.6835	428.3289	6468438	21.3581	21.5342	21.4288
2	-856.4782	24.8022	5168862	21.1336	21.4271*	21.2515
3	-850.1645	11.5493	4887848	21.0772*	21.4881	21.2515
4	-843.8715	11.2046*	4626351	21.0213	21.5496	21.2334*
5	-839.7051	7.2150	4614428*	21.0172	21.6629	21.2764

Note: *, **, *** denote significance at 10%, 5%, and 1% respectively.

The ADF test findings showed that the two initially distinct variables are integrated in the same order I (1). This indicates that the two have a long-term cointegration relationship. The cointegration hypothesis is tested using the Johansen test, a two-step procedure. The trace test is used in the process' first phase, and the maximum eigenvalue test is used in its second phase. Therefore, the Johansen test for cointegration was used, and the outcomes are shown in Table 4.

Table 4. Johansen test for cointegration (Trace Test)

Hypothesized N.o of CE(s)	Eigenvalues	Trace Statistic	0.05 Critical Value	Prob**
None*	0.1700	9.1779	15.4947	0.0000
At most 1*	0.0144	6.6106	3.8415	0.0101

Note: When the p-value is greater than 0.05, the null hypothesis is rejected of no co-integration at 5% significance level.

⁵ Full detailed results in the appendix

The null hypothesis for maximum Eigen value and the Trace test is that there are no cointegrating equations. Given that the Trace test's probability value is less than 5%, the null hypothesis is rejected at 5% and claim that the model contains cointegration.

4.2. Diagnostic tests

Diagnostic tests done after the estimation of the VECM are shown in Table 5 and these include autocorrelation, heteroskedasticity, model specification, and normality after estimating the VECM.

Table 5. Diagnostic test results

	Test used for detection	P-value	Decision at 5%
Autocorrelation	Breusch-Godfrey	0.6312	No serial autocorrelation
Heteroskedasticity	Breusch-Pagan Godfrey	0.1321	Errors are homoscedastic
Model specification	Ramsey RESET	0.5891	Model is correctly specified
Normality	Jarque-Bera	0.2153	Normally distributed

Results indicated in Table 5 show that the adopted VECM model passes the different model diagnostics and thus the model does not suffer from econometric anomalies. This means that the error term in the model is homoscedastic, free from serial autocorrelation and that it is normally distributed. In order to test for autocorrelation in the model, the Breusch-Godfrey serial correlation test was performed. The results reveal that there is no second-order serial autocorrelation on any of the lags. The probability value of 0.6312, which is larger than 5% and indicates that the null hypothesis may not be rejected, and this suggests that there is no serial autocorrelation.

Heteroskedasticity testing was the additional diagnostic procedure used. The findings indicate that the error term's variance is constant. This is supported by a joint probability value of 0.1321, which is higher than the threshold of significance of 5% and indicates that the errors are homoscedastic. The Jarque-Bera probability value of 0.2153, which is greater than the 5% level of significance, indicates that the test findings also demonstrate that the errors are normally distributed.

4.3. Vector Error Correction Model (VECM)

The variables are seen to be non-stationary by the ADF test at levels only at the first difference, and the Johansen cointegration test utilizing the Trace test component also revealed that the variables share a common trend (cointegration). Given these two significant findings, the Vector Error Correction Model (VECM) is advised (Taylor and Peel, 2000). The VECM's long-run and short-run components are discussed in the sections that follow:

4.4. Long-run analysis

The results of the Johansen test indicated that the variables are related over the long term. Three lags were used in the VECM estimation of private sector development and allocation of foreign currency to the private sector. From the error correction model, the long-run co-integration equation between private sector development and foreign currency allocation to the private sector was derived, and specified as follows:

$$psd_t = 62236.28 - 4959.34aps_t \quad (3)$$

From the equation specified above, it can be deduced that a dollar increase in the allocation of foreign currency to the private sector will lead to a 4959.34 decrease in private sector development in the long run.

4.5. Short run analysis

The short-run analysis was done to determine if the parameters were appropriately signed and significant. Table 6 shows the short-run regression coefficients from the short-run model.

Table 6. Short run model

Variable	Coefficient	Standard Error	t-ratio	p-value
Const	175.6661	30.4459	5.7698	0.0000***
DPSD(-1)	0.6327	0.1105	5.7238	0.0000***
DPSD(-2)	-0.3000	0.1152	-2.6040	0.0512**
DAPS(-1)	6.6489	2.1061	3.1570	0.0034**
DAPS(-2)	-50.6459	7.0219	-7.2126	0.0000*
Error Correction Term	-0.0029	0.0005	-4.9220	0.0001***

Note: *, **, *** denote significance at 10%, 5%, and 1% respectively.

The short-run outcomes from the VECM are shown in Table 6. The results indicate that, in the short run, the parameter is negative and statistically significant at the 1% level of significance, indicating that there is a long-run causal relationship connecting the performance of the private sector and the auction rate. For the private sector development, the previous period deviation from the long-term equilibrium is rectified in the long-run present period as an adjustment speed of 0.1% after a shock in the foreign exchange auction rate. The short-run results show that a dollar increase in the allocation of foreign exchange to the private sector is associated with a 6.65 increase in private sector development. According to the findings, in the long term, there is a negative correlation between the distribution of foreign currency and the growth of the private sector in Zimbabwe. This can be a result of the premiums on the black market, corruption, and the backlog in RBZ forex allocations. The results of the regressions show a short-term positive association between the two variables.

5. Conclusion and policy recommendations

The regressions observed that in the long-run, an increase in foreign currency allocation on the auction will lead to a decline in the value of private sector development. The outcome is somewhat contrary to popular wisdom because it is widely believed that increasing the amount of foreign currency allocated to the private sector should boost the sector's development because businesses will now be able to acquire productive machinery that will encourage growth. However, in Zimbabwe, this may not be the case as several justifications can be aligned with the contrary results.

Firstly, as noted by Lengwiler and Wolfstetter (2000), corruption exists in many auctions because the auctioneer is an agent of the seller. They assert that corruption in the auction market exists when the auctioneer tempers with the auction rules in favor of the market participant. During the initial stages of the auction, the central bank was not showing the total value of the bids submitted as well as the participants in the auction system. This consequently puts the auction at risk of corruptive practices. Zimbabwe has seen a rise in round-tripping from market participants to leverage and advantage and perform arbitrage on the differences in the auction rate, and the parallel market rate. The round tripping trade known as burning currencies in street language works as follows: a company in need of foreign currency participates in the auction system and receives its allocation of foreign currency at a lower weighted foreign exchange auction rate.⁶ This round-tripping behavior means that the allocated foreign currency is not being used to productively enhance the private sector but is cyclically used to gain profits from the parallel

⁶ Round tripping is a type of financial transaction that involves the buying and selling of a specific asset. It can be done in the foreign exchange market, where it involves the continuous purchase and sale of a certain currency. This process can be used to boost the volume statistics of a market. In other words, businesses or market participants can also use this type of trading to buy and sell assets at a lower price.

market. Thus, leading to more and more deterioration of the development of the private sector. Because RBZ in its auction system fails to make it a true price discovery mechanism, rather than an allocation system, the premium between the auction forex rate and the parallel market will remain in place and affect industries in need of foreign currency.

A second important factor is that there has been a backlog in foreign currency allotment by RBZ. Companies are failing to access the foreign currency allocated through the auction system and this has created a backlog in allotments which according to CZI (2023) reached close to US\$200 million. Given that the private sector needs foreign currency in time to survive, and import equipment and raw materials, the backlog might be contributing to the negative effect of foreign currency allocation on the private sector for development.

Overall, results from the study indicate that in the short-run, the auction is an effective tool to promote private sector development. However, the long-run analysis shows that it presents a deleterious effect on the performance of the nation's private sector. This outcome is likely due to several factors which, among others, include but not limited to proliferation of the parallel market, increased arbitrage opportunities, persistent foreign currency shortages and corruption. All of this led to significant decreases in the confidence levels of the economy by private stakeholders.

One of the critical research questions presented in chapter one was what structures and policies should be put in place to improve the auction's efficacy to support private sector development in Zimbabwe? To answer this question, below is an outline of the proposed courses of action or recommendations that the central bank can undertake to support efficiency.

Firstly, monitoring of authorized dealers on the auction to prevent abuse of the auction, the government should regularly monitor and audit the conduct and activities of its authorized dealers. Additionally, it should also conduct due diligence and make use of the Know Your Customer (KYC) system to better understand the dynamics of usage and bidding.

Secondly, improving public confidence and minimizing rent-seeking behavior. The Zimbabwean government should put in place measures to incentivize usage and transacting in Zimbabwean dollars to increase public confidence in its value. Despite various factors that contribute to a stable exchange rate such as the country's balance of payments position and real sector capacity utilization, the negative sentiment and rent-seeking behavior have been weighing on the exchange rate. Furthermore, the Reserve Bank of Zimbabwe should also develop market-focused measures to boost confidence in the financial markets. These include not only developing policies which wipe out any potential arbitrage opportunities (which lead to speculative behavior) by adjusting interest rates accordingly to reflect market sentiment but also convincing banks to follow this approach. This could help prevent the parallel exchange rate from moving.

Thirdly, there is a need to rethink exporters' participation in the auction system. The RBZ should consider introducing an independent, and efficient mechanism to enable exporters to access their foreign exchange on the auction. This primarily acts as a strategy to subsidize and incentivize exporters to conveniently acquire the means to procure raw materials and operational tools. The result will be an inflow of foreign currency that would increase currency circulation in the economy thus easing demand and pressure on the auction. Additionally, the government should increase the local production of minerals, agricultural products, and raw materials to help reduce the pressure on the auction while simultaneously improving export earnings.

Another alternative is to abandon the auction system. The RBZ is the single supplier of forex on the nation's auction allocation platform, having allocated over US\$2,930 billion since June 23, 2020. This year, it has allocated over US\$370 million for the importation of various types of commodities and the payment of offshore services. In 2021, Zimbabwe made a formal foreign exchange payment of US\$7 billion, which is more than double the amount it made in 2020. This means that the country now has to make at least US\$660 million in monthly payments for various services and imports. The current foreign exchange auction is failing to follow the principles of an auction market based on the tenets of the conventional Dutch auction process. Some foreign market participants argue that it does not provide adequate details about the amount to be auctioned, and it delays the settlement process. Also, the allotments are only partially done, and the selected winners jump the queue ahead of the other candidates. This said, given the vast inefficiencies and high backlogs, the RBZ may have to abandon the auction system altogether and move towards a fully market-driven foreign currency market determined by market forces as

evidenced in other nations. This may act as an effective way of finally removing the power out of the parallel market and back to the formal sector as evidenced in the post-2008 era. However, for this to be successful, critical measures need to be put in place to ensure that there is enough foreign currency in circulation within the economy coupled with institutional reforms that can support market efficiency.

This research only used two variables, that is, private sector development proxied by the ZSE weekly all share index and auction foreign currency allocation. Other variables such as inflation and GDP could also be integrated to provide a comprehensive picture in understanding economic phenomena. They were left out in this study due to lack of availability of weekly data and also the possibility that, inflation is somewhat reflected in the ZSE weekly share index, and the inclusion of inflation could have possibly led to multicollinearity issues.

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