Authors:
STRIKE MBULAWA
Graduate Studies, Faculty of Business & Accounting, Botho University, Gaborone, Botswana
SAMUEL CHINGOIRO
Graduate Studies, Faculty of Business & Accounting, Botho University, Gaborone, Botswana

EXPORTS DIVERSIFICATION IN BOTSWANA: KEY DRIVERS AND POLICY IMPLICATIONS

ABSTRACT

Export diversification appears to be a well sought trade goal for developing countries, with a lot of studies now focusing on the drivers. However, there are no universal diversification determinants that fit for all countries and this study specifically investigated the key drivers in Botswana. The study applies a vector autoregressive estimation, using annual data that spans from 1960 to 2020. The study shows that economic growth, remittances, and exchange rate volatility matter for a successful diversification policy on exports. Enhanced GDP growth and inflow of remittances promote diversification, while exchange rate depreciation dampens it. Both domestic investment and foreign direct investment were also found to be essential drivers. Therefore, policies targeted at attracting investment in public infrastructure projects and private business initiatives should be encouraged. Whilst Botswana is on growth trajectory, policies that attract of foreign oriented financial flows and stabilize the exchange rate management system are ideal for reducing the current concentration of exports in merchandise and commercial services sectors.

Keywords: Botswana; Export Diversification; Growth; Remittances; Investment
JEL Classification: F21; F43; O11

RIASSUNTO

La diversificazione dell'export in Botswana: fattori chiave e implicazioni di policy

La diversificazione dell'export sembra essere un obiettivo commerciale molto ambito per i paesi in via di sviluppo, tanto che molti studi attualmente sono focalizzati sui fattori chiave del suo raggiungimento. Non essendoci però determinanti universali di diversificazione che si adattano a tutti i paesi, lo scopo di questo articolo è analizzare i fattori chiave per il Botswana. Lo studio applica una stima vettoriale autoregressiva usando dati annuali dal 1960 al 2020. Secondo questo

studio la crescita economica, le rimesse e la volatilità del tasso di cambio sono determinanti per una diversificazione efficace dell'export. La crescita del PIL e il flusso delle rimesse aiutano la diversificazione, mentre la diminuzione del tasso di cambio la ostacola. Sia gli investimenti interni che esteri risultano essere dei fattori essenziali per la diversificazione. Pertanto, sono incoraggiate le politiche il cui obiettivo è attrarre investimenti in infrastrutture pubbliche e iniziative imprenditoriali private. Nonostante il Botswana sia in una fase di crescita, le politiche che attraggono flussi finanziari diversamente orientati all'estero e stabilizzano la gestione del tasso di interesse sono ideali per ridurre l'attuale concentrazione di export di beni e servizi commerciali.

1. Introduction and background

Export diversification is vital for all economies. The economic benefits are more pronounced to developing countries as it helps them reduce export instability and adverse effects of terms of trade in primary products (Hesse, 2008; Balavac and Pugh, 2020). The ripple effect of these economic benefits is felt in many sectors of the economy through employment creation, improved resource allocation and productivity (Hesse, 2008).

Like other developing countries, Botswana has taken a deliberate policy to diversify its exports. This was drafted in its revised National Export Strategy 2019-2024 (CEDA, 2020). The country is an Upper Middle-Income, whose *per capita* income in current United States Dollars of US$6,640 (2020) ranked among the best in Africa and is now targeting to achieve the High-Income status by year 2036 (AfDB, 2022). However, the main concern by policymakers is that significant economic development of the country has predominantly originated from the diamond mining export sector. The drawbacks of undiversified export sector on the economy, have been felt each time there has been an external shock. For example, the global financial crisis of 2008-2009 and the COVID-19 pandemic, both contracted Botswana's GDP by 6% in 2008 and by 8.5% in 2020 due to external shocks. Furthermore, the capital-intensive nature of the diamond industry has meant that it has a far-fetched limited capacity of value chain development and employment creation on the economy, which by 2020 managed to employ only 1.1% of total labour force (AfDB, 2022). These shortcomings, among others, have persuaded policymakers and academics to focus on the need for Botswana to diversify its exports. This paper explores into the key drivers of export diversification in Botswana.

There are many studies that have attempted to research into the determinants of export diversification (Hesse, 2008; Arawomo *et al.*, 2014; Balavac and Pugh, 2020). Although scholars generally agree that export diversification is crucial for developing economies, there seem to be no one-fit-for all determinants for policy prescriptions by all countries. Depending on economic circumstances facing different countries at any stage of their development, appropriate policy orientation is dependent on correct identification and appreciation of the determinants of export diversification. This paper contributes onto the ever-evolving literature on export diversification, with specific focus on Botswana. Following econometric analysis, this study argues that the country's level of economic welfare, the type of recipients of remittances, outward generated financial flows, and exchange rate policy matter in explaining export diversification. Results confirm that there is an asymmetric relationship between export diversification and exchange rate volatility. Path dependence is also confirmed, in this context, which has implications for setting the country's initial conditions for boosting the export sector. The rest of the paper is organised as follows: the next section reviews the theoretical and empirical literature, followed by the discussions of the employed research methodology. Authors' analysis of the research findings then supersedes the conclusions and recommendations of the study.

2. LITERATURE REVIEW

Discussions in this section focuses on the theoretical and empirical literature that identify drivers of export diversification with an orientation towards the economy of Botswana. The main goal is to develop a conceptual framework that demonstrates the interrelationship of key variables that have the potential to drive export diversification in our context. The conceptualised framework is developed from the findings identified in literature.

2.1 Theoretical Literature Review

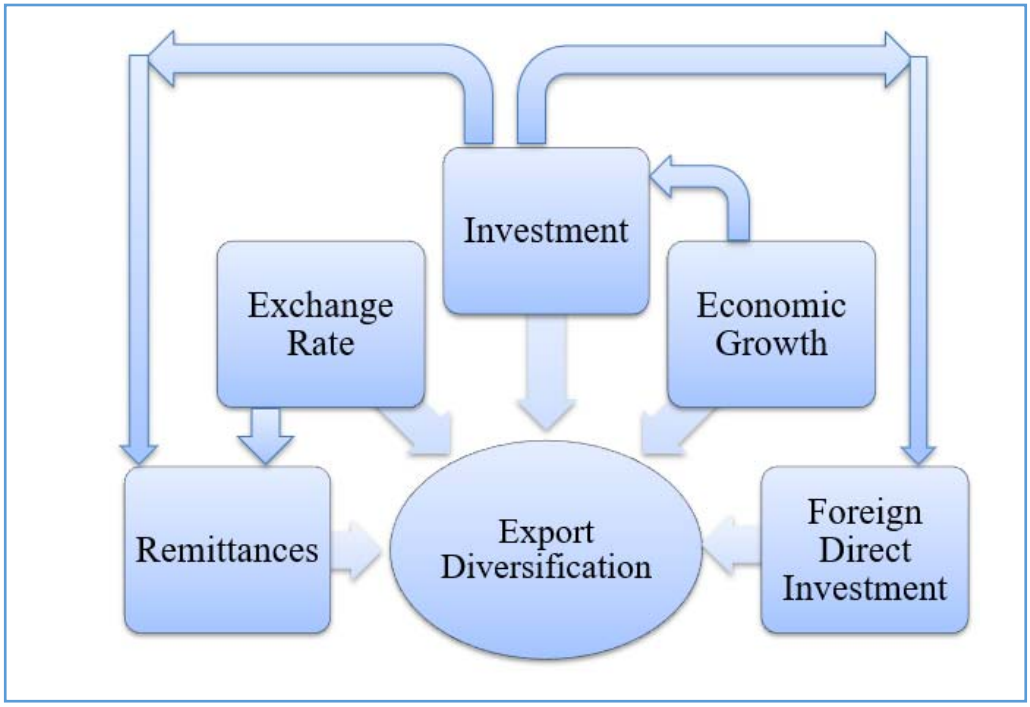
2.1.1 Interpretation of Export Diversification

There is no universally accepted definition of export diversification found in literature. Nonetheless, different researchers have developed their conceptual understanding of this term from how they attempted to measure it (Balavac and Pugh, 2020). There are several measurement methods, with the most used approach being the concentration indices of export shares. A highly concentrated index spread on a few products shows undiversified exports. The widely used measurement for this is the Herfindahl Export Concentration Index (Arawomo *et al.*, 2014). Other definitions have considered the horizontal export diversification, which measures growth in the number of export sectors. Balavac and Pugh (2020) provides that the Herfindahl Concentration Index can be analysed either from the extensive or intensive margin point of view. The former measures changes in the magnitude of a country's export mix brought about by newly introduced categories to a country's exports. The latter quantifies some changes in the shares of products in the export mix from which equality of the shares signify diversification. As a developing country that is dependent on production and export of raw materials that are non-labour intensive, an extensive diversification effort is more likely to improve Botswana's labour market and economic outcomes. Accordingly, this study adopts the extensive margin definition of diversification as measured by the Herfindahl-Hirshmann index (HHI) and the Theil concentration index. The Theil index is generally used as the main indicator for identifying diversification trends because of its decomposability property across different lines of exports (UNCTAD, 2022). It takes account of the fact that a growing export volume might still be concentrated in a few lines of goods and services.

2.1.2 Conceptual Background

The interrelationship of variables that drive export diversification is presented in Figure 1, which also represents the conceptual framework developed for the current study. This has been developed by authors based on their understanding of literature and context.

FIGURE 1 - *Key Drivers of Export Diversification – Botswana*



Based on some econometric modelling ran on data obtained from the World Bank (2021), Figure 1 conceptualises the key drivers for export diversification in Botswana. These variables, which includes remittances, exchange rate, investment, economic growth, and foreign direct investment, have also been identified in economic literature as significant determinants of export diversification[1]. For instance, recent trade literature has suggested that as economies grow, they tend to diversify their exports, which is a departure from the theory of specialisation depicted by Adam Smith and the Heckscher-Ohlin-Samuelson model (Cadot *et al.,* 2011a). On the other hand, remittances are likely to lead to an appreciation of local currency and result in suppression of exports in general. Although some goods are affected more than others, remittances are thus likely to cause a reduction in the overall export diversification (Vardanyan, 2019). The real exchange rate tends to appreciate where remittances are used to increase demand in the non-tradable sector. However, if they are used to ease supply constraints or raise productivity in the same sector, then the real exchange rate will depreciate. In support of this

[1] See the following, among many others: Cadot *et al.,* 2011a and 2011b; Sannassee *et al.,* 2014; Elhiraika and Mbate, 2014; Ajmi *et al.,* 2015; Giri *et al.,* 2019; Khan *et al.,* 2021; Jolo *et al.,* 2022.

view, Berg *et al.* (2007) find no evidence of the Dutch disease and instead exchange rates remain stable or depreciate as remittances increase; similarly, Mongardini and Rayner (2009) show that remittances and grants are not associated with an appreciation of the exchange rate and are not likely to give rise to the Dutch disease, and Singh *et al.*, (2011) opine that exchange rates depreciate. Hence the link between remittances and equilibrium exchange rates remains inconclusive. Thus, remittances positively affect export diversification (Brahim *et al.*, 2017; Bahadir *et al.,* 2018). The current study seek to clear these conflicting hypotheses between remittances and export diversification, at least in the case of Botswana. Further to these variables, investment and foreign direct investment have also been linked with significant influence on improving the capacity of economic activity and consequently export diversification (Hausmann *et al.,* 2020). Moreover, there are some interrelationships among the key drivers themselves, with exchange rates impacting on remittances, and economic growth on investment, while investment influences both remittances and foreign direct investment (Hamdar and Nouayhid, 2017; Giri *et al.,* 2019; Fosu, 2021; and Gamariel *et al.,* 2022).

2.2 Empirical Literature Review and Derivation of Hypotheses

This paper is premised on the contemporary strand introduced by development economists that export diversification is more progressive than specialisation, at least for developing countries. New extant literature has emerged to investigate the key drivers of export diversification and different conclusions have been arrived at. Some of these studies are reviewed in this section to extract the determinants and hypotheses of diversification.

Economic growth appears to be one of the widely researched variables with a general conclusion that it positively impacts on diversification. Although, Imbs and Wacziarg (2003) used domestic sectorial output and labour data from different countries to investigate the effects of economic diversification on output performance, their research drew a lot of interest from many trade scholars seeking to challenge the position of classical and neoclassical theories of specialisation. They found a nonmonotonic connection between sectorial output diversification and income levels. The findings suggested that it is not until when low- and middle-income countries attain higher levels of income that they may specialise to yield meaningful performance. A U-shaped pattern, which they found implied that developing countries are better off diversifying their

economic activity and may only begin to specialise at higher levels of income to sustain higher output.

A growing number of comparable studies that used different data and methodologies have since followed with a view to establish the nature of the relationship between economic growth and export diversification. For example, Parteka and Tamberi (2011) applied some two-stage econometric modelling in which they investigated whether export diversification is depended on development levels of a country. They employed data that spanned over 20 years on 60 sampled countries and concluded that developing countries with faster economic growth rates were able to introduce more sophisticated products into their export mix. Later when countries become developed, they can afford the comfort to introduce some trade specialisation and move away from diversification. Recent studies, however, have emphasized on the positive association between export diversification and economic growth, with most writers focusing more on possible channels through which diversification sustains long term economic prosperity (Hesse, 2008; UNIDO, 2009; Aditya and Acharyya, 2013; Ajmi, 2015; and Giri *et al.*, 2019). However, Elhiraika and Mbate (2014) find a negative effect of economic growth on export diversification.

Moreover, the theory of economic complexity provides that diversification of production requires substantial investment in almost all sectors of the economy because of the intersectoral operations of economic activity (Hausmann *et al.,* 2014 and 2020). Investment is a huge necessity to breaking the vicious cycle of overdependence on a thin basket of exports, which are usually commodity products in the case of developing countries. It helps to create the much-needed competitiveness of the export sector. This assertion has been supported by the empirical evidence. For example, Phiri (2022) carried out an empirical investigation on the effects of public investment on export diversification, by specifically looking at low skilled labour force economies in Sub Saharan Africa. The study found that public investment encourages export diversification in such economies. Vogel (2022) applying a Bayesian Model Averaging technique on 47 African countries to control for uncertainty of export diversification determinants, found that investment was amongst the key drivers of diversification. The positive influence of investment on export diversification has also been empirically confirmed in many other studies including those by Giri *et al.* (2019); Khan *et al.* (2021) and Jolo *et al.* (2022).

Given the challenges faced by developing countries in mobilising considerable domestic investment, some studies have focused on the effect of foreign direct investment (FDI) on diversifying exports. Empirical evidence of the influence of FDI has been so far inconclusive, with some studies producing mixed results (Banga, 2006; Fosu, 2021), and others confirming positive impact (Giri *et al.*, 2019; Khan *et al.*, 2021; Jolo *et al.*, 2022). Researchers have attributed different reasons that may result in FDI having a negative or neutral effect. For instance, availability of infrastructure in a country may determine whether FDI drives diversification (Fosu, 2021). The outcome may also be dependent upon the existence of positive or negative externalities of the investing counterpart and absorptive capacity of the host country (Görg and Greenaway, 2003). FDI has positive spillover effects on export diversification. The positive impact of FDI is possible through the acceleration of technology transfer and enhancement in the production possibilities of the country (Iwamoto and Nabeshima, 2012). On the other hand, Arawomo *et al.* (2014) find a negative effect of public investment and FDI, respectively, on export diversification. If FDI has no impact, this could be explained by the concentration of export diversification in sectors that are not linked to the greater economy (Ofa *et al.*, 2012). Another dimension is that the type of FDI matters if the policy interest is focusing on boosting exports (Hosein *et al.,* 2019). If FDI is channeled towards different export sectors, then it is likely to have a diversifying impact. All other things held constant, under normal circumstances, FDI is expected to drive diversification of exports in developing countries.

Some studies have explored into the influence of remittances on export diversification. For example, Vardanyan (2019), based on the Dutch disease phenomenon, tested the hypothesis that extensive inflows of remittances strengthen a country's exchange rate and thus restrain diversity of its exports as supported by Paudel and Bhusal (2021). Employing the system GMM estimation on a panel data, assembled from 135 countries and for a period spanning from year 2000 to 2016, found that significant remittances hurt export diversification. Similarly, Ahmadov (2022) examined the effect of remittances on the competitiveness of exports from Armenia and Georgia, using quarterly data stretching from 2000 to 2019. Applying a vector autoregressive model, the study concluded that remittances cause an appreciation of the exchange rate on both countries and have a weak negative impact on exports. Equally, Uddin and Murshed (2017) reverberate the existence of the Dutch disease effect in the case of South Asian countries, as the remittances induced appreciation of the real exchange rate shrinks the base for their tradable goods. There are many more other studies that have used different econometric approaches but

still confirmed the negative impact of remittances on diversification (see, for example, Basnet *et al.*, 2019; Ito, 2017; Roy and Dixon, 2016). Some authors have attributed the negative income effect of the remittances to the Dutch Disease, arguing that more remittance inflows afford the labour force more leisure time and in turn reduce their productivity (Bayangos and Jansen, 2011; Okello *et al.*, 2021).

Nevertheless, some researchers found that remittances depreciate the real exchange rates for developing countries. For example, Ito (2019) performed a GMM estimation on 18 developing countries, whose share of remittances on GDP exceeded 5 percent, and discovered that remittances depreciated the real exchange rate. Others have claimed that policymakers can institute measures that mitigate the Dutch Disease phenomenon, to harness on the inflows of remittances in pursuit of the goal to diversify their exports (Brahim *et al.*, 2017; Bahadir *et al.,* 2018; Urama *et al.*, 2019; and Polat and Andrés*,* 2019). They cited measures that improve trade openness and capital movement as alleviating because they can overturn the impact of remittances into a positive effect on increasing the share of a variety of tradable goods (Cadot *et al.*, 2011b).

Finally, scholars generally agree that an appreciation of real exchange rate is likely to depress the diversification effort of an exporting country. Nonetheless, studies have looked at different issues surrounding the nature of the effect of exchange rate volatility on export diversification. Policies affecting exchange rate are key in this context. For example, devaluation of exchange rate enhances export diversification by deflating prices and improving competitiveness of exports (Agosin *et al.*, 2012) and exchange rate appreciation has adverse effects on export diversification as producers focus on the domestic market (Goya, 2014; Kwasi Obeng, 2018). In contrast, Elhiraika and Mbate (2014) find no effect of exchange rate policy on export diversification. Kwasi Obeng (2018) investigated whether exchange rate volatility posed a symmetric or asymmetric effect on diversification of tradeable goods in the case of Ghanian economy. The study employed the linear and nonlinear autoregressive distributed lag models that were processed using annual data spanning from 1983 to 2015. It was concluded that exchange rate volatility had an asymmetric effect and stabilisation policies on exchange rate value were recommended to drive export diversification. A key implication from that study is that appreciation and depreciation of a country's currency might not necessarily affect export diversification. This is reinforced by Upadhyaya *et al.* (2020) who confirmed that exchange rate

volatility of the Chinese yuan negatively affected both exports and imports of China to and from the United States of America. Symmetrically or asymmetrically, most researchers concluded that depreciation promote the competitiveness of a country's exports and their diversification. The converse is true (Bahmani *et al.,* 2016).

Generally, findings are dependent on the level of concentration of exports and on the sample and country setting. Studies on causality provide mixed findings. Altıner *et al.* (2018) find unidirectional causality from economic growth to export diversification. Using a different sample, they find that unidirectional causality also flows from export diversification to growth, which is confirmed by Shahzad *et al.* (2014). In addition, Shahzad *et al.* (2014) also find that FDI Granger causes export diversification. A bidirectional causal relationship between the two variables, FDI and export diversification, is confirmed by Khan *et al.* (2021). As per the econometric approach applied by Cismaş *et al.* (2020), remittances Granger cause export diversification depending on conditions and specificity of a country.

3. Methodology

3.1 Econometric Estimation

This study identifies the determinants of export diversification (EXD) and its causal linkages with selected covariates. A vector autoregression (VAR) analysis is applied with the following form:

$$Y_t = \alpha + \beta Y_{t-1} + \mu_t \quad (1)$$

where, Y_t is a six-variable vector (EXD, GDPPC, REM, FDI, EXV, GFCF), β represents a vector of parameters, α is a vector of the intercept and μ_t is vector of error terms. Variables are represented as follows: Gross domestic product *per capita* (GDPPC) in current United States dollars, Personal remittances received as % of GDP (REM), Foreign Direct Investment (FDI), net inflows as a % of GDP, Gross Fixed Capital Formation as a % of GDP (GFCF), and Exchange rate volatility (EXV). Export diversification (EXD) is measured using two indicators, the Herfindahl-Hirshmann index (HHI) and the Theil concentration index. The system of VAR (2) model(s) are represented as follows:

$$EXD_t = \alpha_1 + \sum_{i=1}^{2} \beta_{1i} EXD_{t-i} + \sum_{i=1}^{2} \delta_{1i} GDPPC_{t-i} + \sum_{i=1}^{2} \theta_{1i} REM_{t-i} + \sum_{i=1}^{2} \varphi_{1i} FDI_{t-i} + \sum_{i=1}^{2} \omega_{1i} EXV_{t-i} + \sum_{i=1}^{2} \gamma_{1i} GFCF_{t-i} + \mu_{1t} \quad (2)$$

$$GDPPC_t = \alpha_2 + \sum_{i=1}^{2} \beta_{2i} EXD_{t-i} + \sum_{i=1}^{2} \delta_{2i} GDPPC_{t-i} + \sum_{i=1}^{2} \theta_{2i} REM_{t-i} + \sum_{i=1}^{2} \varphi_{2i} FDI_{t-i} + \sum_{i=1}^{2} \omega_{2i} EXV_{t-i} + \sum_{i=1}^{2} \gamma_{2i} GFCF_{t-i} + \mu_{2t} \quad (3)$$

$$REM_t = \alpha_3 + \sum_{i=1}^{2} \beta_{3i} EXD_{t-i} + \sum_{i=1}^{2} \delta_{3i} GDPPC_{t-i} + \sum_{i=1}^{2} \theta_{3i} REM_{t-i} + \sum_{i=1}^{2} \varphi_{3i} FDI_{t-i} + \sum_{i=1}^{2} \omega_{3i} EXV_{t-i} + \sum_{i=1}^{2} \gamma_{3i} GFCF_{t-i} + \mu_{3t} \quad (4)$$

$$FDI_t = \alpha_4 + \sum_{i=1}^{2} \beta_{4i} EXD_{t-i} + \sum_{i=1}^{2} \delta_{4i} GDPPC_{t-i} + \sum_{i=1}^{2} \theta_{4i} REM_{t-i} + \sum_{i=1}^{2} \varphi_{4i} FDI_{t-i} + \sum_{i=1}^{2} \omega_{4i} EXV_{t-i} + \sum_{i=1}^{2} \gamma_{4i} GFCF_{t-i} + \mu_{4t} \quad (5)$$

$$EXV_t = \alpha_5 + \sum_{i=1}^{2} \beta_{5i} EXD_{t-i} + \sum_{i=1}^{2} \delta_{5i} GDPPC_{t-i} + \sum_{i=1}^{2} \theta_{5i} REM_{t-i} + \sum_{i=1}^{2} \varphi_{5i} FDI_{t-i} + \sum_{i=1}^{2} \omega_{5i} EXV_{t-i} + \sum_{i=1}^{2} \gamma_{5i} GFCF_{t-i} + \mu_{5t} \quad (6)$$

$$GFCF_t = \alpha_6 + \sum_{i=1}^{2} \beta_{6i} EXD_{t-i} + \sum_{i=1}^{2} \delta_{6i} GDPPC_{t-i} + \sum_{i=1}^{2} \theta_{6i} REM_{t-i} + \sum_{i=1}^{2} \varphi_{6i} FDI_{t-i} + \sum_{i=1}^{2} \omega_{6i} EXV_{t-i} + \sum_{i=1}^{2} \gamma_{6i} GFCF_{t-i} + \mu_{6t} \quad (7)$$

In the system of equations above, parameters are represented by $\beta, \delta, \theta, \varphi, \omega,$ and γ.

3.2 Granger Causality Tests

The VARs provide a framework for testing for Granger Causality between each set of variables. Considering equation (2), the dependent variables (GDPPC, REM, FDI, GCFC, EXV) are said to Granger cause EXD if their past values have predictive power for the current value of EXD, conditional on the lagged values of EXD. In this case, the study tests if any lags of the dependent variables are statistically significant using Wald test. The assists in comparing performance a restricted model for EXD which excludes dependent variables against an unrestricted model for EXD which includes them. The study tests for causality in both directions by making each of the independent variables a dependent variable.

The study tests the null hypothesis for non-causality as follows:

$$H_0: \beta_{11} = \beta_{12} = \delta_{11} = \delta_{12} = \theta_{11} = \theta_{12} = \varphi_{11} = \varphi_{12} = \omega_{11} = \omega_{12} = \gamma_{11} = \gamma_{11} = 0$$

The alternative is such that:

At least one of $\beta'_{11}, \beta_{12}, \delta_{11}, \delta_{12}, \theta_{11}, \theta_{12}, \varphi_{11}, \varphi_{12}, \omega_{11}, \omega_{12}, \gamma_{11}, \gamma_{11} \neq 0$

The Wald test follows a Chi-square distribution and we are more likely to reject the null hypothesis as the test statistic gets large.

3.3 Data and Measurement of Variables

The study employs annual data from World Bank (2021) for the period 1960 to 2020. Expected signs are influenced by past studies. Definitions for all variables are adopted from World Bank except EXV which is calculated as the proportional change in the exchange rate (Table 1).

TABLE 1- *Variables and Expected Signs*

Variable	Measurement Source	Expected Signs
GDPPC	World Bank	Positive
FDI	World Bank	Positive/ Negative
REM	World Bank	Positive/ Negative
EXV	Author's Compilation	Positive
GFCF	World Bank	Positive/ Negative

Source: Authors' compilation.

The HHI is a formal measure of export concentration or the degree to which the export basket for an economy depends on specific markets or products. Consistent with Ugarte (2014) it is calculated by taking the square of shares of each sector or product group in the total exports of the economy and taking the sum of squares as follows:

$$HHI = \sum_{n=1}^{N} (S_i^r)^2$$

and the HHI can be normalized as follows:

$$HHI = \frac{\sum_{n=1}^{N}(S_i^r)^2 - \frac{1}{N}}{1-\frac{1}{N}}$$

where $(S_i^r)^2$ is the share of exports of sector *i* in the economy *r*. *N* is the number of sectors in the economy *r*. The value of the index lies between zero and one. It takes the value of 1 where an economy is extremely concentrated in one sector or is not diversified and takes the value of 0 where the economy is homogeneously diversified or less concentrated, and all sectors have an equal share of the national output.

The Theil index gives a weighted average of exported goods in total exports and is determined as follows:

$$Theil = \sum_{i=1}^{N} P_i \log\left({}^{1}/_{P_i}\right)$$

Where, P_i is the share of product $i\,(x_i)$ in total exports (X) and *N* is the total number of products exported. Lower values of the index show more product diversification while high values show high concentration or a low diversified export sector.

In determining the above indices, the study employs both merchandises, with six (6) products[2], and commercial services exports, with four (4) products[3].

The study performs stability tests (AR roots) and residual tests (white heteroscedasticity test) on the VAR model. Robust standard errors are employed to deal with problem of heteroscedasticity.

4. Presentation and discussion of findings

4.1 Descriptive Analysis

Findings on descriptive statistics are presented in Table 2. The average gross domestic product *per capita* stands at US$2936.88, remittances are 2.52% of GDP on average, FDI also stands at 2% of GDP, and the GFCF is 28.75% of GDP on average. Considering the two measures of export diversification, results show mean values which stands at 0.69 and 0.77 based on the THEIL

[2] Exports for Agricultural; Food; Fuel, manufactured; Ores and metals.
[3] Computer, communications, and others; Insurance & Financial services, Transport services, ICT goods.

index and HHI respectively. They show that there is high export concentration in Botswana as values are both closer to one. The Study, therefore, proceeds to determine the factors affecting export concentration.

TABLE 2 - *Descriptive Statistics*

Stats	THEILa	HHI	GDPPC	REM	FDI	EXV	GFCF
Mean	0.69	0.77	2936.88	2.52	2.03	0.05	28.75
Max	0.78	0.99	8279.82	16.51	15.59	0.47	46.22
Min	0.02	0.46	60.49	0.13	-10.77	-0.22	18.28
Sd	0.11	0.13	2675.30	3.49	3.58	0.10	5.74
Skew	-0.42	-0.32	0.59	2.42	0.33	0.94	0.83
Kurt	2.34	2.24	2.00	8.89	7.90	7.23	4.30
N	61	61	61	61	61	61	61

In building an appropriate model, it was necessary to check for unit root. The study applied Augmented Dickey Fuller (ADF), Phillips-Perron test (PPER), Dickey Fuller-Generalized Least Square test (DF-GLS). Findings (Table 3) are presented in levels using each of the three approaches and in first difference using the DF-GLS test. The conclusion reached is that two variables (EXRD, GFCF) are stationary at levels while the remainder (THEILa, HHI, GDPPC, REM, FDI) are stationary after first difference. This detects the way the variable was employed in the analysis.

TABLE 3 - *Unit Root*

	Levels			**First Difference**	**Order of Integration**
Variable	ADF	PPER	DFGLS	DFGLS	
THEILa	-1.126	-0.952	-1.256	-6.267***	I(1)
HHI	-3.026**	-3.020**	-2.287	-5.797***	I(1)
GDPPC	-0.225	-1.976	-0.156	-5.077***	I(1)
REM	-1.620	-2.669	-2.232	-6.311***	I(1)
FDI	-4.074***	-4.151***	-3.026**	-5.826***	I(1)
EXV	-6.040***	-5.967***	-5.441***		I(0)
GFCF	-2.628*	-3.070**	-4.188***		I(0)

Findings based on pairwise correlation (Table 4) show both positive and negative relationships between variables. The measure of economic welfare (GDPPC) has a weak and negative relationship with both measures of export diversification. The same relationship is confirmed with all other variables except for remittances which have a positive relationship with export diversification. Weak positive and negative relationships are confirmed between other covariates. Hence there is no problem of multicollinearity in the variables.

TABLE 4 - *Correlation Matrix*

	THEILa	HHI	GDPPC	REM	FDI	EXV	GFCF
THEILa	1.0000						
HHI	-0.1233	1.0000					
GDPPC	-0.0492	-0.1068	1.0000				
REM	0.0499	0.0181	-0.0099	1.0000			
FDI	-0.0016	0.0861	0.0021	-0.1862	1.0000		
EXV	-0.0667	0.0301	-0.4417	0.0123	-0.0041	1.0000	
GFCF	-0.0732	0.0451	-0.0191	-0.0496	-0.1172	-0.1198	1.0000

4.2 Lag Length and Tests for Cointegration

The study used VARSOC command in STATA to check for lag length for each dependent variable with the same set of explanatory variables. The choice was done by selecting the minimum between AIC and SBIC. In this case the AIC was preferred and indicated lag length of 2 considering the dependent variable applied (results withheld). Furthermore, the tests for cointegration were done using the VECRANK command in STATA. Findings show that there is no long run relationship among variables and hence VAR (2) model was applied in the analysis. All the VAR models applied in the study satisfy the stability conditions as all eigenvalues are inside the unit circle (results withheld).

4.3 Determinants of Export Diversification

Results in Table 5 show that export concentration in the current year is reduced by levels of concentration in past two years and is similar using both the THEIL index and the HHI. The study relies mainly on findings obtained using the former while those based on the latter are

provided for comparison. This study may indicate the tendency of the country to move towards diversifying the economy. Consistent with findings by Elhiraika and Mbate (2014), the study shows the importance of path dependence in export concentration. The level of initial conditions in the country's diversification path is important as it requires a dynamic political leadership to improve the export performance over time. The inward flows of FDI have an expected negative and significant impact on export concentration using the THEIL index while the coefficients using the HHI are insignificant. This shows the potential of all forms of FDI, including financial flows, to improve the country's diversification efforts on both merchandise and commercial services exports. These findings are consistent with past studies (Khan *et al.*, 2021; Fosu, 2021; Gamariel *et al.*, 2022).

Findings show that GDP *per capita* has a positive and significant impact on export concentration. This implies that as the welfare of population improves, there is a tendency to change consumption patterns and shift towards less diversified exports which is consistent with Giri *et al.* (2019). This agrees with the view that changes in elasticities of demand cause the productivity of primary sectors to change, which also shifts the composition of the economy's productive areas. Consequently, primary products will undergo advancement to secondary and tertiary sectors. The economy then fails to take advantage of diversification efforts due to lack of capital and indivisibility of investment projects. Imbs and Wacziarg (2003) argue that GDP *per capita* increases diversification at lower income levels, while at high income levels it leads to export concentration.

Findings show that remittances flows have a negative and significant impact on export concentration. Consistent with results from past studies (Brahim *et al.,* 2017; Bahadir *et al.,* 2018), our results suggest that an increase in remittances may cause a depreciation in the exchange rate due to increased productivity in the non-tradables sectors in Botswana. This happens when remittances are mainly received by credit constrained entrepreneurs.

Findings show that exchange rate volatility has a positive effect on export concentration. This means that an appreciation of the exchange rate would increase the level of export concentration or alternatively reduce diversification. A devaluation of the exchange rate would result in low concentration of exports or alternatively increase export diversification. These results are consistent with past studies (Hericourt and Poncet, 2015; Kwasi Obeng, 2018) which have shown

the importance of exchange rate policy in ensuring that a country's diversification efforts improve. High volatility in exchange rate poses risks to domestic producers who are then forced to divert more resources to the local market as the currency appreciates.

Our measure of domestic investment, GFCF, does not influence export diversification using both proxies for the dependent variable.

TABLE 5 - *Findings using both HHI and THEIL Index*

	d.THEILa		**d.HHI**	
Variable	Lag 1	Lag 2	Lag 1	Lag 2
d.EXD	-0.3084**	-0.2724**	-0.3803***	-0.0648
d.GDPPC	0.0112*	0.0111*	0.0119	-0.0113
d.REM	-0.0151***	0.0113**	-0.0197**	0.0176**
d.FDI	-0.0125***	0.0110**	-0.0156	-0.0138
EXV	0.0419**	0.0756***	-0.0196	0.0513
GFCF	0.0112	-0.0110	0.0150	0.0117
Constant	-0.0193		-0.1892***	

Findings on Granger Causality are provided in Table 6 and the null hypothesis of no Granger causality is rejected between export concentration and its covariates (GDPPC, REM, FDI and EXV). The study confirms that there is unidirectional causality among the variables. Using the THEIL index as the dependent variable, the test indicates that there is one-way causal relationship moving from GDPPC to export concentration (EXD), from remittances to EXD, from foreign direct investment to EXD and exchange rate volatility to EXD. Domestic investment variable does not Granger cause export concentration. Based on the HHI, the study shows that domestic investment and remittances Granger cause export concentration. Some causal linkages are noted between the covariates, but they are not discussed in this study. The study confirms significance of the selected covariates on export diversification, and this is consistent with some past studies (Altıner *et al.*, 2018; Cismaş *et al.*, 2020) that find unidirectional causality.

TABLE 6 - *Granger Causality Tests*

	Dependent variable: D.THEILa		Dependent variable: D.HHI	
Causality from	Causality to	Probability	Causality to	Probability
D.GDPPC	D.EXD	0.040	HHI	0.760
D.REM		0.016		0.063
D.FDI		0.001		0.317
EXV		0.001		0.930
GFCF		0.230		0.014
All		0.000		0.073
D.EXD	D.REM	0.856	D.REM	0.244
D.GDPPC		0.131		0.155
D.FDI		0.529		0.574
EXV		0.007		0.003
GFCF		0.003		0.005
All		0.016		0.005
D.GDPPC	GFCF	0.031	GFCF	0.015
D.EXD			D.FDI	0.007
D.GDPPC				0.406
D.REM				0.107
EXV				0.238
GFCF				0.013
All				0.016

5. CONCLUSIONS AND POLICY IMPLICATIONS

In this study, an attempt was made to isolate the main drivers of diversification for the Botswana economy. A vector auto regression model was applied in modelling, being selected as the most suitable approach to analyse the data for the period 1961 to 2020. Following an econometric analysis, the study argued that the country's level of economic welfare, the type of recipients of remittances, outward generated financial flows, and exchange rate policy matter in explaining export diversification. The study confirmed that there is an asymmetric relationship between export diversification and exchange rate volatility. Path dependence is also confirmed in this context which has implications for setting the country's initial conditions for boosting the export sector. The study showed the need to ensure that adequate capital is available for investment to overcome the problem of indivisibility of projects. Provision of adequate capital

ensures that the country takes advantage of diversification efforts as her income levels rise in pursuit of the high income status agenda. Priority should be given towards policies that promote foreign direct investment meant for boosting merchandise and commercial services exports-oriented industries. It is important to implement policies that support provision of strong infrastructure to reduce the cost of doing business and improve domestic and foreign financial flows into the country. Policies that result in the appreciation of currency need careful consideration as they may send signals that are interpreted as posing risks to domestic producers whose actions may dampen the diversification drive. Whilst Botswana is on growth trajectory, policies that attract foreign oriented financial flows and stabilise the exchange rate management system are ideal for reducing the current concentration of exports in merchandise and commercial services sectors.

REFERENCES

Aditya, A. and R. Acharyya (2013), "Export Diversification, Composition, and Economic Growth: Evidence from Cross-Country Analysis", *The Journal of International Trade & Economic Development*, *22*(7), 959-992.

AfDB (2022), Republic of Botswana - Bank Group Country Strategy Paper 2022-2026, RDGS/ECCE, African Development Bank.

Agosin, M.R., R. Alvarez and C. Bravo-Ortega (2012), "Determinants of Export Diversification around the World: 1962–2000", *The World Economy*, 35(3), 295-315.

Ahmadov, V. (2022), "Remittances and Competitiveness: A Case Study on Armenia and Georgia", *Hungarian Statistical Review*, 5(1), 94-108.

Ajmi, A.N., G.C. Aye., M. Balcilar and R. Gupta (2015), "Causality between Exports and Economic Growth in South Africa: Evidence from Linear and Nonlinear Tests", *The Journal of Developing Areas*, 49(2), 163-181.

Altıner, A., K.A. Cihan and E. Bozkurt (2018), "Export Diversification and Growth: A Bootstrap Panel Causality Analysis for Selected Emerging Market Economies", *Journal of Management and Economic Research*, 16(3), 24-36.

Arawomo, D.F., A.O. Oyelade and A.T. Tella (2014), "Determinants of Export Diversification in Nigeria: Any Special Role for Foreign Direct Investment (FDI)?", *Journal of Economics and Business Research*, 20(2), 21-33.

Bahadir, B., S. Chatterjee and T. Lebesmuehlbacher (2018), "The Macroeconomic Consequences of Remittances", *Journal of International Economics*, 111(March), 214-232.

Bahmani-Oskooee, M., F. Halicioglu and S.W. Hegerty (2016), "Mexican Bilateral Trade and the J-Curve: An Application of the Nonlinear ARDL Model", *Economic Analysis and Policy*, 50(June), 23-40.

Balavac, M. and G. Pugh (2020), "Determinants of Export Diversification at Different Margins of Export Growth in Developing and Transition Countries", available at: <https://www.cergeei.cz/pdf/gdn/rrc/RRC14_09_paper_01.pdf>, [Accessed 20 April 2023].

Banga, R. (2006), "The Export-Diversifying Impact of Japanese and US Foreign Direct Investments in the Indian Manufacturing Sector", *Journal of International Business Studies,* 37(4), 558–568.

Basnet, H.C., F. Donou-Adonsou and K. Upadhyaya (2019), "Workers' Remittances and the Dutch Disease: Evidence from South Asian Countries", *International Economic Journal*, 33(4), 662-678.

Bayangos, V. and K. Jansen (2011), "Remittances and Competitiveness: The Case of the Philippines", *World Development*, 39(10), 1834-1846.

Berg, A., M. Hussain, S.K. Roache., A.A. Mahone., T.N. Mirzoev and S. Aiyar (2007), "The Macroeconomics of Scaling Up Aid: Lessons from Recent Experience", IMF Occasional Paper No. 002.

Brahim, M., N. Nefzi and H. Sambo (2017), "Remittances and the Real Effective Exchange Rates in MENA Countries: What is the Long Run Impact?", Centre d'Economie de l'Université de Paris Nord , UMR-CNRS, 7234.

Cadot, O., C. Carrère and V. Strauss-Kahn (2011a), "Export Diversification: What's behind the Hump?", *Review of Economics and Statistics*, 93(2), 590-605.

Cadot, O., C. Carrère and V. Strauss-Kahn (2011b), *Trade Diversification: Drivers and Impacts*, in: M. Jansen, R. Peters, J.M. Salazar-Xirinachs (Eds), "Trade and Employment: From Myths to Facts", International Labour Office: Geneva.

CEDA (2020), Assessment of Investment Opportunities within the Manufacturing Sector in Botswana, The Citizen Entrepreneurial Development Agency: Gaborone, pp. 30-31.

Cismaş, L.M., R.1. Curea-Pitorac and I. Vădăsan (2020), "The Impact of Remittances on the Receiving Country: Some Evidence from Romania in European Context", *Economic Research*, 33(1), 1073-1094.

Elhiraika, A.B. and M.M. Mbate (2014), "Assessing the Determinants of Export Diversification in Africa", *Applied Econometrics and International Development*, 14(1), 147-160.

Fosu, A.K. (2021), "Infrastructure and the Impact of Foreign Direct Investment (FDI) on Export Diversification: Evidence from Africa", *Journal of African Development*, 22(1), 102-123, <https://doi.org/10.5325/jafrideve.22.1.0102>.

Gamariel, G., M. Bomani., L. Musikavanh and J. Juana (2022), "Foreign Direct Investment and Export Diversification in Developing Countries", *Risk Governance and Control: Financial Markets & Institutions*, 12(1), 74-89, <https://doi.org/10.22495/rgcv12i1p6>.

Giri, R., M.S.N. Quayyum and R. Yin (2019), "Understanding Export Diversification: Key Drivers and Policy Implications", International Monetary Fund Working Paper No. 105.

Görg, H. and D. Greenaway (2003), "Much Ado about Nothing? Do Domestic Firms Really Benefit from Foreign Direct Investment?", IZA Discussion Paper No. 944

Goya, D. (2014), "The Multiple Impacts of the Exchange Rate on Export Diversification", Cambridge Working Papers in Economics No.1436, University of Cambridge.

Hamdar, B. and S. Nouayhid (2017), "Remittances and Foreign Aid as Sources of External Development Finance: Impacts on Savings and Investment in Post-War Lebanon", *Economia Internazionale/International Economics*, 70(1), 47-72.

Hausmann, R., C.A. Hidalgo, S. Bustos, M. Coscia, A. Simoes and M.A. Yildirim (2014), The Atlas of Economic Complexity: Mapping Paths to Prosperity, Mit Press.

Hausmann, R., P. Goldstein., A. Grisanti., T. O'Brien., J.A. Tapia and M.A. Santos (2020), "A Roadmap for Investment Promotion and Export Diversification: The Case for Jordan", CID Faculty Working Paper No. 374, Center for International Development at Harvard University.

Hericourt, J. and S. Poncet (2015), "Exchange Rate Volatility, Financial Constraints, and Trade: Empirical Evidence from Chinese Firms", *The World Bank Economic Review*, 29(3), 550-578.

Hesse, H. (2008), "Export Diversification and Economic Growth", Commission on Growth and Development Working Paper No. 21, World Bank: Washington, DC.

Hosein, R., R. Deonanan and K. Evans (2019), "Foreign Direct Investments, Exports and Economic Growth in SIDS: Evidence from Santa Lucia", *Economia Internazionale/International Economics*, 72(1), 47-76.

Imbs, J. and R. Wacziarg (2003), "Stages of Diversification", *American Economic Review*, 93(1), 63-86.

Ito, K. (2017), "Remittances and the Dutch Disease: Evidence from the Republic of Moldova", *International Economic Journal*, 31(3), 462-469.

Ito, K. (2019), "Remittances and the Dutch Disease: Evidence from Panel Data for 18 Developing Countries", *International Economic Journal*, 33(1), 1-8.

Iwamoto, M. and K. Nabeshima (2012), "Can FDI Promote Export Diversification and Sophistication of Host Countries? Dynamic Panel System GMM Analysis", IDE Discussion Paper No. 347, Institute of Developing Economies, Japan External Trade Organization (JETRO).

Jolo, A.M., I. Ari and M. Koç (2022), "Driving Factors of Economic Diversification in Resource-Rich Countries via Panel Data Evidence", *Sustainability*, 14(5), 2797.

Khan, H., M.A. Khan, M. Ahmed., J. Popp and J. Oláh (2021), "The Nexus between Export Diversification and Foreign Direct Investment: Empirical Evidence from China" *Montenegrin Journal of Economics*, 17(2), 121-134.

Kwasi Obeng, C. (2018), "Is the Effect of Exchange Rate Volatility on Export Diversification Symmetric or Asymmetric? Evidence from Ghana", *Cogent Economics & Finance*, 6(1), 1460027.

Mongardini, J. and B. Rayner (2009), "Grants, Remittances, and the Equilibrium Real Exchange Rate in Sub-Saharan African Countries", International Monetary Fund, Working Paper No. 75.

Ofa, S., M. Spence, S. Mevel and S. Karingi (2012), "Export Diversification and Intra-Industry Trade in Africa", United Nations Economic Commission for Africa: Addis Ababa.

Okello, J.A., M. Brownbridge and S. Canagarajah (2021), "Have Remittances Affected Real Unit Labor Costs in the Transition Economies of Eastern Europe, the South Caucasus, and Central Asia?", Policy Research Working Paper No. 9513, World Bank Group: Washington, DC.

Paudel, R.C. and T.P. Bhusal (2021), "Role of Workers' Remittances in Export Performance of Nepal: Gravity Modelling Approach", *NRB Economic Review*, 33(1-2), 1-13.

Parteka, A. and M. Tamberi (2011), "Export Diversification and Development – Empirical Assessment", Università Politecnica delle Marche, Dipartimento di Scienze Economiche e Sociali Working Paper No. 359.

Phiri, H. (2022), "Public Investment and Export Diversification in Low Skilled Labor Force Economies. Evidence from sub–Saharan Africa", *Cogent Economics & Finance*, 10(1), 2008586.

Polat, B. and A.R. Andrés (2019), "Do Emigrants' Remittances Cause Dutch Disease? A Developing Countries Case Study", *The Economic and Labour Relations Review*, 30(1), 59-76.

Roy, R. and R. Dixon (2016), "Workers' Remittances and the Dutch Disease in South Asian Countries", *Applied Economics Letters*, 23(6), 407-410.

Sannassee, R.V., B. Seetanah and M.J. Lamport (2014), *Export Diversification and Economic Growth: The Case of Mauritius*, in: M. Jansen, S. Jallab, M. Smeets (Eds) "*Connecting to Global Markets*", World Trade Organization: Geneva.

Shahzad, S.J.H., M.U. Rehman., F. Abbasi and M. Zakaria (2014), "Relationship between Remittance, Export, Foreign Direct Investment and Growth: A Panel Cointegration and Causal Analysis in South Asia", Available at: <https://mpra.ub.uni-muenchen.de/60290/>, [Accessed 12 October 2022].

Singh, R.J., M. Haacker., K-W. Lee and M. Le Goff (2011), "Determinants and Macroeconomic Impact of Remittances in Sub-Saharan Africa", *Journal of African Economies*, 20(2), 312-340.

Uddin, M.B. and S.M. Murshed (2017), "International Transfers and Dutch Disease: Evidence from South Asian Countries", *Journal of the Asia Pacific Economy*, 22(3), 486-509.

Ugarte, C. (2014), "Weak Links and Diversification", Policy Issues in International Trade and Commodities Research Study Series No. 67, United Nations Conference on Trade and Development: Geneva.

UNCTAD (2022), Economic Development in Africa Report 2022 – Rethinking the Foundations of Export Diversification in Africa: The Catalytic Role of Business and Financial Services, United Nations Conference on Trade and Development: Geneva.

UNIDO (2009), Industrial Development Report, 2009 – Breaking In and Moving Up:

New Industrial Challenges for the Bottom Billion and the Middle-Income Countries, United Nations Industrial Development Organization: Geneva.

Upadhyaya, K., R. Bhandari and F. G Mixon (2020), "Exchange Rate Volatility and its Impact on China's Trade with the United States", *Economia Internazionale/International Economics*, 73(3), 373-388.

Urama, N.E., H.C. Edeh and E.C. Urama (2019), "Do Migrant Remittances Cause Dutch Disease in Nigeria?", *International Migration*, 57(4), 151-166.

Vardanyan, E. (2019), "Do Remittances Worsen Export Diversification?", Economics Discussion Papers No. 2019-46, Available at: <http://www.economics-ejournal.org/dataset/PDFs/discussionpapers_2019-46.pdf>, [Accessed 12 October 2022].

Vogel, T. (2022), "Structural and Policy Determinants of Export Diversification in Africa: A Bilateral Panel Approach using Bayesian Model Averaging", Economic Development in Africa Report- UNCTAD Background Paper.

World Bank (2021), Data Bank, Available at: <https://databank.worldbank.org/home.aspx>, [Accessed 01 October 2022].