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Construction of an Export-Weighted GDP Index:
Assessing Economic Activity in Zambia's Major Trading Partner Countries.

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Abstract

The external environment plays a critical role in domestic economic dynamics through the trade channel with implications on policy implementation, including monetary policy. To assess the external environment, some central banks use aggregate index measures. Nonetheless, unlike most central banks in advance economies, the Bank of Zambia does not have an aggregate measure for formally assessing external demand conditions in major trading partner countries. In this regard, this paper constructs an export-weighted GDP Index comprising the top nine Zambia's major trading partner countries (GDP-9 Index). The Index is based on the Fisher Ideal Index, a geometric mean of the Laspeyres and Paasche indices.

Keywords: GDP-9 Index, Fisher Ideal Index, Exports

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1.0 Introduction

External economic conditions influence domestic growth especially as countries integrate into the global economy. The underlying channel through which this is achieved is international trade as economies exploit their relative resource endowments and trade with each other. In addition, international trade facilitates knowledge transfer, technological advancement, innovation and improved economic efficiency. Accordingly, extant literature provides ample evidence on the link between trade and economic growth (Quddus and Ikram, 2005; UNCTAD, 2013; ESCAP[2], 2018). Trade with other countries, therefore, becomes critical in enhancing development, bolstering competitiveness, and has positive effects on productivity, employment, wealth creation, as well as overall standards of living.

The export-growth nexus has been extensively discussed in literature, particularly in countries with export-led policies. This is because export-oriented policies allow for better utilization of resources, economies of scale, capacity utilization as well as increased technological advancement. This ultimately contributes to boosting economic growth. Furthermore, foreign exchange earned from exports allows for imports necessary for increased production (Quddus and Ikram, 2005). Moreover, Feder (1982) suggested that efficiency in the export sector generates growth by raising total labor and capital.

Since liberalization in the early 1990s, Zambia has increasingly become integrated in the world economy. Her key trading partner countries continue to have a significant bearing on domestic aggregate demand and economic prospects. As such, analysing developments in the global economy is necessary for sound macroeconomic policy formulation as this gives a picture of external demand conditions that have significant implications for Zambia's export volumes and prices. In addition, having a clear understanding of the evolution of global economic activity is critical in supporting monetary policy decision-making.

Globally, central banks follow different forms of the Taylor rule in their decision-making process. The output gap is a component of the Taylor rule influenced by both domestic and external economic conditions. Several approaches are used by central banks to measure external economic conditions. One such approach is the use of indices which largely rely on aggregate trading partner gross domestic product (GDP). Central banks such as the Federal Reserve Bank, Bank of England and Bank of New Zealand employ aggregate statistic measures to evaluate trading partner GDP that also serve as input into the forecasting models. For instance, the Bank of New Zealand uses the GDP-12 statistic to assess the strength of external demand. GDP-12 is a weighted average of economic growth in New Zealand's 12 largest export destinations. The Bank of England on the other hand uses the UK export-weighted world GDP and the purchasing power parity (PPP) weighted world GDP to estimate global economic growth. The Federal Reserve System utilises the Global Conditions Index (GCI) to assess business conditions.

[2] The United Nations Economic and Social Commission for Asia and the Pacific (ESCAP) is one of the five regional commissions under the jurisdiction of the United Nations Economic and Social Council.

Unlike other central banks, the Bank of Zambia (BoZ or Bank) does not have a statistical measure of assessing economic activity in Zambia's trading partner countries. Currently, the Bank analyses economic data on growth, inflation and monetary policy developments for individual trading partner economies to form an opinion about global growth and underlying implications for the domestic economy. Therefore, developing a single statistical measure, in an index form, will provide a useful assessment of underlying economic conditions in trading partner economies which have a direct bearing on economic prospects for the Zambian economy. The index is intuitively easy to understand and provides insights into domestic economic prospects. In addition, the index shows the relative importance of each country as a trading partner given that weights are assigned to each country. This gives information on the extent to which domestic economic activity could be affected by shocks in any of the trading partner countries depending on the level of trade with the respective countries: the greater the value of trade with a particular country, the higher the influence on the overall index. An export weighted aggregate measure, therefore, captures the combined weighted influence of Zambia's main trading partner countries.

This paper, therefore, attempts to construct an export-weighted GDP Index, a single statistic measure, to gauge external demand conditions in trading partner country's demand for Zambian products. The rationale is to construct an index that will summarise external demand conditions for Zambia's exports and their implications on aggregate demand in Zambia. The index will complement the current descriptive assessment of global economic developments and prospects as well as allow for an in-depth analysis of external demand conditions.

The paper is organised as follows: Section 2 provides a brief review of relevant literature. Section 3 outlines the methodology while variable selection and data sources are presented in section 4. The estimated GDP-9 index is discussed in section 5 and the conclusion is given in section 6.

2.0 Brief Look at the Literature

The relationship between trade openness and economic growth has been widely investigated in the literature. Theoretically, international trade facilitates specialization, improved economic efficiency, innovation, productivity improvement, knowledge and technological advancement. For instance, the theory of comparative advantage propagated by Ricardo (1817) suggests that trade openness leads to economic efficiency. Helpman and Grossman (2015) identify the channels through which trade liberalization can lead to economic growth. These include product market integration which leads to price changes that affect cost efficiency, productivity growth and innovation. Further, integration of peoples and cultures facilitates the flow of ideas between national borders.

The modernisation theory initially advanced by Weber (1864-1920) and later developed by Parsons (1902-1979), cited in Joshua et al (2020), posits that trade openness acts as a conduit for growth. This is achieved through technological and knowledge transfer as well as efficient use of material and human resources. The Heckscher-Ohlin theory emphasises

differences in factor endowment as the basis for growing the economy through trade openness.

While comparative and modernisation theories argue in favour of trade openness, other theories such as the dependency theory (Prebisch, 1960) contend that trade openness leads to underdevelopment through unequal relationships between advanced and developing countries.

Consistent with theoretical constructs, evidence from empirical studies generally supports the existence of the trade-growth nexus. Arora and Vamvakidis (2004) argue that relative income levels and growth rates of trading partner countries have strong positive impacts on a country's economic growth. Further, Arora et al (2005) show that trading partner growth spurs domestic growth. Frankel et al (1999) and Brunner (2003) established a positive effect of external trade on income and growth. This view is in line with Fitzová and Žídek (2015) who found that exports have a significant role in influencing economic growth in Czech and Slovak Republics. Jonsson and Subramanian (2001) also established that trade openness contributes to economic growth through spillovers on total factor productivity. Alsamara et al (2019) also found that trade openness spurred economic growth in Turkey.

Other studies which have revealed a positive trade effect on economic growth through research and development include Coe et al (1995 and 1997) and Joshua et al, 2020. Further, Priyankara (2018) found a positive relationship between services exports and long-run economic growth using annual data from 1984 to 2013 in Sri Lanka.

3.0 Methodology

Different methodologies have been used to measure effective demand in trading partner countries. The Bank of New Zealand utilises the "GDP-12" Index as an aggregate measure of GDP for major trading partner countries to represent demand for New Zealand's exports as well as assess prospects for the domestic economy (Smith (2004). The 12 countries are New Zealand's major export destinations and account for about 80 percent of New Zealand's exports by value. The GDP-12 is therefore used to evaluate economic activity in the top 12 export destinations for New Zealand. The Index is also used as an input into the Bank's Forecasting and Policy System (FPS) model. An export-weighted aggregate is used because it is a good proxy of demand for New Zealand exports. The use of GDP volumes and exports is due to the strong correlation between the two variables as growth rates for the GDP-12 have tracked changes in world prices for New Zealand's merchandise exports.

In constructing the GDP-12 Index, individual countries' GDP volumes are converted to index form with the base period set to 100 to deal with volatility in GDP volumes. Export weights are generated based on each country's share in total merchandise export values computed on a 2-year moving average basis. The use of the moving average allows for capturing of the changes in the relative importance of each country's contribution to total exports. Countries with larger shares in total exports are assigned bigger weights in the GDP-12 Index. To

ensure the aggregate index appropriately reflects the evolution of export patterns, the GDP-12 Index is computed as a Fischer Ideal Index[3].

The Bank of England uses two indices to assess the strength of global economic activity. These are the UK Export-Weighted World GDP Index and Purchasing Power Parity (PPP)-Weighted World GDP Index. The Export-Weighted World GDP Index is constructed via nowcasting GDP growth for major economies and regions which are eventually aggregated to generate an estimate of world GDP (Kindberg-Haulan and Sokol, 2018). The major economies included in this index are the US, China and Euro Area. Growth in the UK export-Weighted World GDP represents changes in external demand for UK products which the authorities use to form a view about the strength of economic activity in major trading partner countries. In addition to its use as a proxy for overseas demand for UK products, the UK Export-Weighted World GDP Index is a direct input into the Bank of England's forecasting model. With regard to the PPP-Weighted World GDP Index, economies are weighted in terms of their output. This measure provides a more general picture of global economic activity and is more robust as it considers idiosyncratic developments in the UK's key trading partners. It is useful in generating insight into non-trade factors such as the health of financial markets and other shocks affecting global consumer and business confidence, which may eventually have implications on the domestic economy.

To complement the two indices in predicting world GDP, the Bank of England uses three models which include Mixed Data Sampling (MIDAS), Dynamic Factor Model (DFM) and the Mixed-Frequency Bayesian VAR (MF-BVAR). These models capture a larger number of countries compared to the Export-Weighted World GDP and PPP-Weighted World GDP Indices. The MIDAS predicts lower frequency world GDP outcomes, particularly quarterly GDP growth, by utilising higher frequency predictors (monthly), which include industrial production (IP) and new export orders captured in the Purchasing Managers' Indices (PMI). The DFM employs daily and monthly indicators (about 90 indicators) to estimate world GDP by utilizing a vector autoregressive (VAR) model. Four factors are generated by the DFM model from the available data which represent global monthly data aggregates. These include: (i) PMIs, IP and trade; (ii) market data (equities, bonds, commodities); (iii) monthly data from advanced economies on job creation, trade, PMIs, IP, and retail sales; and (iv) summary of monthly data on PMIs, trade and IP for emerging-market individual economies. These four factors are then used to predict global GDP using a VAR. Lastly, the relationship between quarterly world GDP and quarterly GDP of the main economies is jointly modelled using the MF-BVAR. This model also provides nowcasts and forecasts of world GDP simultaneously as it includes other monthly indicators.

The Federal Reserve Bank uses a Global Conditions Index (GCI) to assess global business conditions (Pablo, Mechanick, and Raffo, 2018). To construct the Index, a parsimonious statistical model, which summarises the evolution of variables of interest, is estimated. The model uses four key world economic variables: industrial production, new export orders, retail sales and gross domestic product. In estimating the GCI, past values of the GCI and

[3] A Fischer Ideal Index is a geometric mean of the Laspeyres and a Paasche indices. The Laspeyres index uses weights in a particular base period while the Paasche index uses weights in the current period.

current information about the four variables are used. Each variable's contribution to changes in the GCI is computed. The GCI increases during periods of economic growth, declines at the start of downturns and remains around its zero-mean during periods of average growth. In addition, the Energy Information Administration (EIA) in the United States developed an oil-weighted world GDP index to assess global economic activity (Arora, Hodge and Lidderdale, 2016). GDP for each country in the index is used as a measure of economic activity. Oil consumption for individual countries is expressed as a share of total world oil consumption. Each country is then weighted based on the calculated shares. A GDP index for each country is then computed and the base year set equal to zero. Using the individual countries' GDPs and shares of total global oil consumption, an overall GDP index for the world is computed using a weighted geometric mean.

After a careful review of the literature and various methodologies employed by central banks to gauge demand conditions in key trading partner countries, it is noted that export-weighted measures are commonly used. This is because export weights are useful in assigning the level of importance of each trading partner country in determining external demand conditions. The use of merchandise exports in constructing weights is broadly supported, as unlike services, commodities are homogeneous and traded in a global market.

It is also observed that most central banks use trading partner GDP to measure economic activity. Only one central bank uses higher frequency predictors (monthly) which include industrial production, PMI, market data, job creation and retail sales to gauge economic activity. Further, it is established that only major trading partner countries are included in the construction of indices. This is necessitated by the need to avoid challenges associated with analysing data pertaining to countries that make very minimal contributions to total exports. Thus, the focus is on countries that make the most contributions to total exports. This notwithstanding, the cut-off points vary across countries depending on the number of trading partners and their respective shares in total exports.

This study adopts the approach taken by the Reserve Bank of New Zealand. This is because data inputs required to construct the index are more readily available for a developing country like Zambia. The use of models that use high frequency data such as PMI, industrial production, stock market data, job creation and retail sales is not practical for Zambia due to data constraints. For instance, PMI, job creation, retail sales and stock market data for potential countries to be included in the index such as the Democratic Republic of Congo (DRC), Tanzania and Malawi are not readily available. On the other hand, data on exports and GDP for trading partner countries is readily available to facilitate the construction of an export-weighted GDP index. Moreover, the GDP-12, as a Fisher Ideal Index (FII), uses the geometric mean of two indices, Laspeyres and Paasche, to capture influences of each trading partner country across time. In addition, the sensitivity of the index to outliers is minimized as it does not fluctuate substantially based on extreme developments.

Thus, a GDP-9 or G-9 Index, a summary statistic of top nine trading partner countries' activity, is used to assess trading partner demand for Zambia's exports. The countries included in the GDP-9 Index are selected based on their relative importance as destination countries for Zambia's exports. Export data from Q1 2015 to Q4 2019 show that the key

trading partner countries for Zambia were Switzerland, China, Democratic Republic of the Congo (DRC), Singapore, South Africa, United Kingdom, United Arab Emirates, Malawi, Hong Kong and Tanzania. However, Switzerland was excluded from the sample as further investigation of the data revealed that it is predominantly an invoicing country for copper, Zambia's major export commodity, and that the data simply captures financial flows in the global trade of copper as opposed to actual commodities. This is confirmed by mirror data from Comtrade[4] that show very low levels of imports from Zambia[5] reported by Switzerland as opposed to the levels of exports to Switzerland reported by Zambia. It is, therefore, plausible to conclude that demand dynamics in Switzerland may not have direct and significant implications for Zambia's exports[6].

Thus, the top nine (9) export destination countries in the GDP index (China, DRC, Singapore, South Africa, United Arab Emirates, United Kingdom, Hong Kong, Malawi and Tanzania) collectively accounted for 82.1 percent of total exports by value over the period 2015 -2019. In 2019 alone, these countries accounted for 87.5 percent of total exports. Major export products to the GDP-9 countries for 2019 are presented in the appendix.

The FII is a geometric mean of the Laspeyres and Paasche indices computed based on export shares in the base and current periods, respectively. The "Laspeyres weights" are computed based on export shares from 2014 Q1 to 2015 Q4 while the "Paasche weights" are based on export shares from 2018 Q1 to 2019 Q4. The weights for each country are expressed as a proportion of total export receipts from selected countries in the sample. Individual trading partner GDP is weighted according to its share in Zambia's exports in the base and latest periods, respectively. The year 2015 was selected as a base as there has been no significant disruption to the domestic economy since then[7]. Countries taking a larger share of exports are assigned a proportionately greater weight in the GDP-9 Index. Therefore, China, being the largest consumer of copper in the world and one of Zambia's largest trading partners, was assigned a bigger weight (Table 3.1).

Table 3.1: Weights for Zambia's trading partner countries

	UK	RSA	China	DRC	Singapore	Malawi	Hong Kong	Tanzania	UAE
2-Year Average 2015	2.3	16.7	38.8	19.1	12.3	3.5	1.8	1.4	4.2
2-Year Average 2019	6.5	12.4	49.1	29.7	0.0	0.0	0.3	1.9	0.0

Source: Authors' Calculations using Zamstats trade data

[4] Comtrade is a United Nations international trade statistics database that provides detailed global trade data accessible through API.

[5] On average, between 2015 and 2019, Switzerland reported nominal imports from Zambia which are effectively zero while data from the Zambia Statistics Agency indicate over US$16.0 billion as exports to Switzerland.

[6] There is a big discrepancy between exports to Switzerland as reported by Zambia and imports from Zambia as reported by Switzerland. This could be attributed to the difference between merchandise trade and the associated financial flows.

[7] Copper prices fell in 2015 largely due to a shift in the composition of growth in China, a strong dollar and moderation in global growth.

Similar to the Reserve Bank of New Zealand, the export weights used are based on a 2-year moving average calculated in the base and current periods, respectively as shown in Table 3.1. The use of the 2-year moving average addresses volatility in weights and ensures that export weights applied to each country reflect their evolving influence as an export destination.

Specifically, the Fisher Ideal Index (FII) is calculated as:

$$Q^F = (Q^L * Q^P)^{1/2} \quad (1)$$

where

$Q^L = Q^1W^0/Q^0W^0$
$Q^P = Q^1W^1/Q^0W^1$
Q = GDP index at time t=0 and 1
W=Export weight in time t=0 and 1.

The Laspeyres weighted GDP index given by Q^L is constructed such that in period t=0 (base period):

$$Q^{\mathrm{L}} = (\prod_{i=1}^{N} gdp_{i,b}{}^{sh_0}) \quad (2)$$

The Paasche weighted GDP index was computed such that in period t=1 (current period), Q^{P} was given by:

$$Q^{\mathrm{P}} = (\prod_{i=1}^{N} gdp_{i,1}{}^{sh_1}) \quad (3)$$

The final values of the Laspeyres and Paasche indices are proportional to the product of each country's GDP raised to the power of its export share (i.e. the weight), where $gdp_{i,b}$ and $gdp_{i,1}$ are the GDP for country *i* in the base and current periods, respectively, and sh_0 and sh_1 are each country's 2-year moving average export shares in the base and latest periods, respectively.

A FII for Zambia (GDP-9) is then computed as a geometric mean of the Laspeyres and Paasche indices with the base year being 2015 = 100 such that:

$$Q^F = (Q^L * Q^P)^{1/2} \quad (4)$$

The advantage of using the geometric mean of two indices is that it captures the influence of each trading partner country in both periods and its sensitivity to outliers is reduced as it does not fluctuate substantially based on outliers. Thus, volatility is smoothened from quarter to quarter.

4.0 Variable Selection and Data Sources

The choice of variables included in the index is largely informed by the strength of correlation between them and availability of data. Literature has reviewed that GDP is commonly used to proxy economic activity in trading partner economies and merchandise exports are, in most cases, used as a measure of trading partner demand. This is because data on GDP and exports is readily available. Given the foregoing, this study uses trading partner nominal GDP and merchandise exports to construct the GDP-9 Index.

GDP data was obtained from the International Monetary Fund (IMF) website, Focuseconomics and Trading Economics. Non-seasonally adjusted GDP estimates on a quarterly basis is available for most countries in the sample. However, for some countries, only annual data is available and as such data is interpolated[8] to obtain quarterly estimates for each year. Data on merchandised exports, denominated in millions of US dollars, was obtained from the Zambia Statistics Agency (ZSA). The data series covered the period starting from the first quarter of 2005 to fourth the quarter of 2019.

Further, an essential element in empirical analyses of trading partner data is the use of appropriate weights. Theoretically, various methods have been used in the construction of weights. These include:

- exports weights;
- total trade—average of import and export weights;
- direct sum—direct sum of real GDP of the chosen set of countries; and
- purchasing power parity-weighted GDP.

In this study, merchandise export weights are used. The advantage of using merchandise exports is that, unlike services, commodities are homogeneous and traded in a global market. Therefore, since commodity competition between countries occurs in a single market, a country's importance as a trading partner is determined by its share in the total market for that product. This simplifies the calculation of weights for homogeneous commodity groups. In this regard, export weights capture the relative importance of trading partner countries as Zambia's export destinations unlike total trade or direct sum. Further, exports data is readily available compared to other methods such as PPP which requires the use of high frequency data. For these reasons, export weights are preferred in the construction of the GDP-9 Index.

In addition, extant literature suggests that export weights could be based on a fixed point in time, varied across time or based on an average calculated over a period (Arora et al, 2016). However, export weights based on a fixed point in time may not accurately capture the relevance of the trading partner countries over time. This study, therefore, uses export weights based on a two-year moving average in the base and current periods. The weights are computed based on each country's share of total merchandise export values obtained

[8] The interpolated data is for countries with small export shares and therefore does not substantially affect the index.

from Zamstats. For Zambia, merchandise exports constitute about 86.0 percent of total exports and, therefore, a measure based on demand for Zambia's merchandise exports is more appropriate.

5.0 Estimated GDP-9 Index

The two variables used to construct the GDP-9 Index, GDP and exports, were subjected to covariance analysis which revealed a very high correlation coefficient of 0.9 (Table 5.1).

Table 5.1: Covariance Analysis of Exports (EXPO) and GDP

Correlation Probability	GDP	EXPO
GDP	1.000000 -----	
EXPO	0.938208 0.0000	1.000000 -----

In addition, relative to imports and total trade, exports were found to have a higher correlation with GDP (Table 5.2).

Table 5.2: Correlation between GDP and Trade

	Exports	Imports	Total Trade
GDP	0.7	0.3	0.6

Source: Author Calculations

In constructing the GDP-9 Index, the export shares used in the base and current periods were derived from the 2-year moving average chosen based on the results from the ARMA maximum likelihood with a two-period lag structure significant at 5.0 percent level (Table 5.3).

Table 5.3: Lag Structure by ARMA Maximum Likelihood

Dependent Variable: EXPO

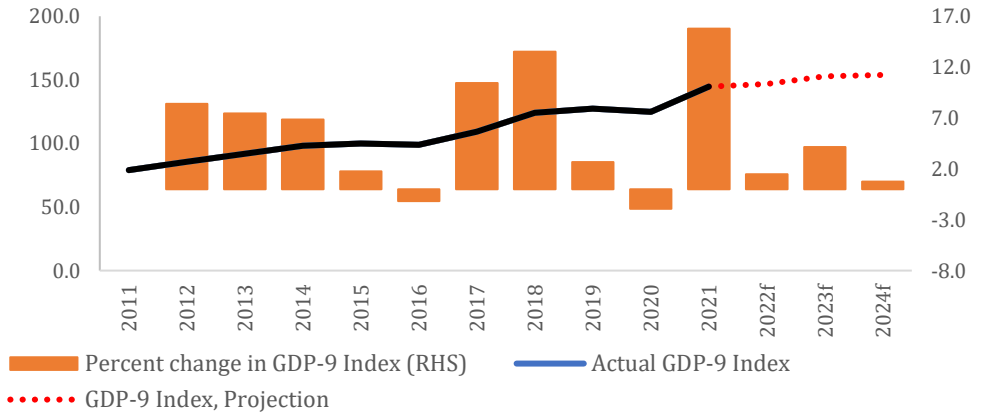
Variable	Coefficient	Std. Error	t-Statistic	Prob.
AR(1)	1.165623	0.663387	1.757079	0.0843
AR(2)	-0.172011	0.656013	-0.262207	0.7941
MA(1)	-0.049445	0.573466	-0.086221	0.9316
MA(2)	-0.295770	0.143852	-2.056062	0.0444
SIGMASQ	45515.24	7956.298	5.720656	0.0000

R-squared	0.881329	Mean dependent var	1533.271
Adjusted R-squared	0.873002	S.D. dependent var	624.3640
S.E. of regression	222.5035	Akaike info criterion	13.78791
Sum squared resid	2821945.	Schwarz criterion	13.95946
Log likelihood	-422.4254	Hannan-Quinn criter.	13.85527
Durbin-Watson stat	1.941157		

Inverted AR Roots	.99	.17
Inverted MA Roots	.57	-.52

Chart 5.1 depicts the constructed GDP-9 Index. The Index rises in periods of economic upswing in trading partner countries (approximating global economic conditions) and vice-versa. For instance, in 2016 and 2020, the GDP-9 Index declined as the global economic conditions deteriorated and weighed on export demand. In periods following economic upturns, the Index rises, reflecting an expansion in economic activity and a pick-up in export demand by trading partner countries. More specifically, the GDP-9 Index plummeted in 2020 compared to 2019, indicating a weakening in demand conditions in Zambia's major trading partner economies induced by the adverse impact of the COVID-19 pandemic.

Chart 5.1: GDP-9 Index: 2011 - 2024[9]



Source: Authors' compilation

[9] The projected GDP-9 index is based on forecast GDP values for trading partner countries.

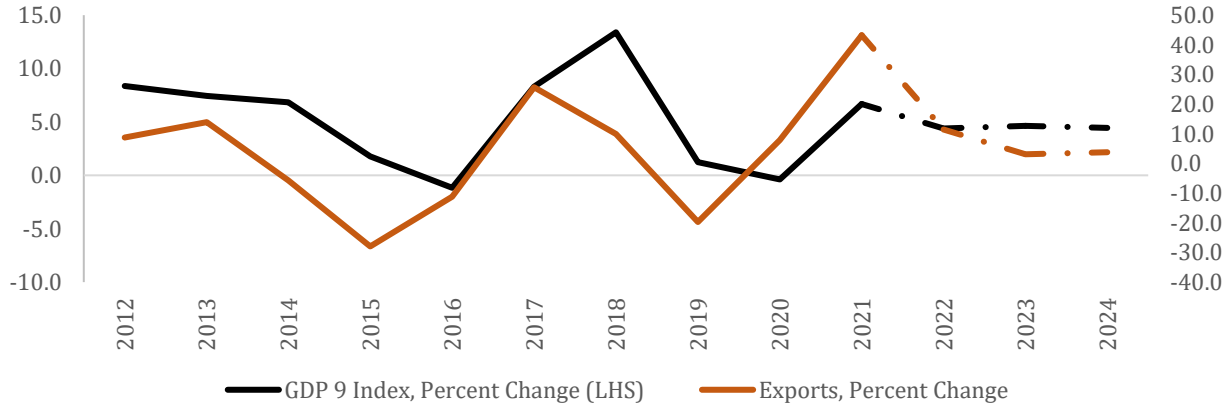
Following marked declines in 2019 and 2020, the GDP-9 Index recovered in 2021, indicating improved trading partner economic conditions. The rebound in 2021 was mainly driven by a strong expansion in China and firm economic recovery in the Democratic Republic of Congo (DRC) as COVID-19 containment measures eased.

Based on the economic outlook in trading partner countries, a medium-term projection for the GDP-9 Index can be made. In 2022, the Index shows a slowdown in growth largely reflecting risks to the global economy associated with the Russia-Ukraine conflict and tightening global financial conditions especially in advanced countries.

Overall, the variation in the Index is interpreted as average change in demand conditions in Zambia's trading partner countries. A positive change implies a general improvement in demand conditions in Zambia's trading partner countries, and therefore improved demand for Zambia's exports. Conversely, a negative change implies a fall in demand for Zambia's exports with attendant consequences on domestic aggregate demand.

Further, changes in the Index in Chart 5.2 generally tracks variations in Zambia's exports. Barring structural and supply-side factors, this evidence suggests that Zambia's exports and ultimately GDP are partially influenced by external demand conditions.

Chart 5.2: Changes in the GDP-9 Index and Merchandise Exports



Source: Authors' Calculations

6.0 Conclusion

The GDP-9 (G-9) Index constructed for Zambia is a statistical measure intended to enhance the analysis of external demand conditions or more broadly global economic conditions. In addition, the Index provides a sense of the strength of economic growth and demand conditions in Zambia's trading partner countries relevant in assessing the dynamics in domestic aggregate demand and ultimately monetary policy decisions.

Although the GDP-9 Index appears to provide a reasonable measure of global demand conditions, it has limitations. Literature reveals that GDP may not be a good proxy for export demand in certain situations. For instance, fluctuations in Zambia's metal exports to China

could be more closely correlated with the Chinese construction sector than with cycles in Chinese GDP per se. This is because developments in GDP in China could be driven by other sectors such as the tertiary sector which may not necessarily translate into higher metal imports. Similarly, changes in household consumption may be more closely correlated with movements in non-traditional exports than GDP for the Democratic Republic of Congo. Further, other factors, such as, supply conditions affecting other world producers and institutional changes, for instance changing subsidies, can also have an important bearing on demand for exports. These factors may partly explain some of the observed tracking errors between exports and changes in the FII.

It is also important to note that external demand is not the only factor that explains exports. The GDP-9 Index captures relative income of trading partners, which represents the demand-side of exports. However, exports are also affected by structural and supply-side factors. On the structural side, exports are affected by international competitiveness of a product which is a function of factor productivity. The domestic price level and exchange rate also determine the competitiveness of domestically produced exports.

Therefore, the GDP-9 Index, while helpful, does not capture all the factors influencing demand for Zambia's exports. These considerations underscore the importance of looking beyond simple statistical measures when analyzing growth prospects. Hence, it is recommended that other influences affecting the demand for Zambia's exports be considered.

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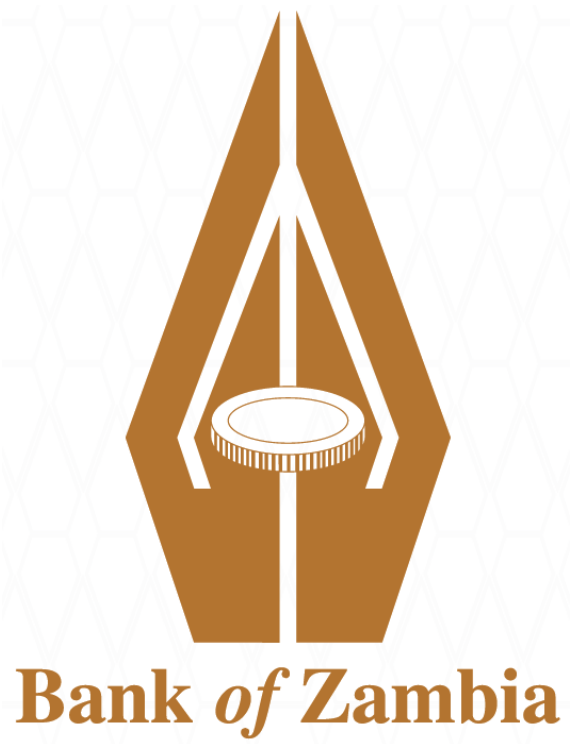
APPENDIX

Major Products Exported to GDP-9 Countries (2019)

Trading Partner	Exported Products
China	▪ Copper and articles thereof (97.0percent)
Democratic Republic of Congo	▪ lime and cement (19.5percent) ▪ Inorganic chemicals and compounds of precious metals (17.8percent) ▪ Sugars and sugar confectionary (7.2percent) ▪ Industrial boilers and equipment (7.1percent) ▪ Beverages, spirits and vinegar (6.7percent) ▪ Electrical energy (5.3percent) ▪ Soap, active agents, washing preparations (5.3percent) ▪ Preparations of cereal, flour, starch/milk (4.0percent) ▪ Miscellaneous chemical products (3.1percent) ▪ Fertilisers (2.8percent) ▪ Explosives and pyrotechnic products (2.4percent) ▪ Articles of iron and steel (2.2percent) ▪ Vehicles and vehicle accessories (2.0percent) ▪ Plastics and articles thereof (1.8percent) ▪ animal/vegetable fats, oils and their cleavage products (1.7percent) ▪ Iron and steel (1.6percent)
Singapore	▪ Copper and articles thereof (85.0percent) ▪ Natural/cultured pearls, precious stones and metals (13.1percent)
South Africa	▪ Natural/cultured pearls, precious stones and metals (24.7percent) ▪ Other base metals, cermets and articles thereof (13.8percent) ▪ Industrial boilers and equipment (9.0percent) ▪ Copper and articles thereof (8.6percent) ▪ Iron and steel (7.8percent) ▪ Cotton (7.6percent) ▪ Sugars and sugar confectionery (7.0percent) ▪ Electrical machinery, equipment and parts thereof (3.6percent) ▪ Explosives and pyrotechnic products (2.5percent) ▪ Residues and waste from the food industry (1.8percent) ▪ Vehicles and vehicle accessories (1.6percent) ▪ Inorganic chemicals and compounds of precious metals (1.5percent) ▪ Oil seed, oleagi fruits, grain, seed and fruit (1.2percent)
Malawi	▪ Burley Tobacco (31.7percent) ▪ Cement and lime (20.4percent) ▪ Iron and steel (8.7percent)

Trading Partner	Exported Products
	▪ Soap, active agents, washing preparations (5.5percent) ▪ Beverages, spirits and vinegar (5.2percent) ▪ Electrical energy (4.5percent) ▪ Sugars and sugar confectionery (4.4percent) ▪ Cereals (1.5percent) ▪ Preparations of cereal, flour, starch/milk (1.5percent) ▪ Industrial boilers and equipment (1.5percent) ▪ Vehicles and vehicle accessories (1.2percent) ▪ Paper and paperboard (1.0percent) ▪ Copper and articles thereof (0.9percent) ▪ Miscellaneous edible preparations (0.8percent) ▪ Electrical machinery, equipment and parts thereof (0.8percent) ▪ Other made-up textile articles (0.8percent)
United Kingdom	▪ Copper and articles thereof (87.6percent) ▪ Edible vegetables and certain roots and tubers (4.5percent)
Hong Kong	▪ Copper and articles thereof (67.3percent) ▪ Natural/cultured pearls, precious stones and metals (26.8percent)
Tanzania	▪ Copper and articles thereof (23.4percent) ▪ Cereals (19.2percent) ▪ Preparations of cereal, flour, starch/milk (10.7percent) ▪ Residues and waste from the food industry (9.8percent) ▪ Explosives and pyrotechnic products (7.5percent) ▪ Industrial boilers and equipment (5.9percent) ▪ Electrical energy (5.8percent) ▪ Vehicles and vehicle accessories (3.5percent) ▪ Iron and steel (3.4percent) ▪ Electrical machinery, equipment and parts thereof (3.0percent)
United Arab Emirates	▪ Copper and articles thereof (53.9percent) ▪ Iron and steel (14.9percent) ▪ Natural/cultured pearls, precious stones and metals (12.3percent) ▪ Lead and articles thereof (7.3percent) ▪ Other base metals, cermets and articles thereof (3.9percent)



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