

Capital flight Effects on Government Income and Budget Balance in Nigeria (2019-2030): A Dynamic SCGE Modelling Approach

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ABSTRACT: *This research analyse the dynamic effects of capital flight on government income and budget balance in Nigeria. The study used a dynamic structuralist computable general equilibrium (SCGE) model to run simulations that indicate the nature of capital flight effect on Nigerian government income and budget balance over the period 2019–2030. The findings show that a successive increase in capital flight in Nigeria will exerts a negative effect on government income and positive effect on government budget balance in the immediate, short, medium and very long term. This study concluded that the government income is vulnerable to capital flight and is affected by successive outflow of legal or illegal capital. On the basis of the findings, this study recommends the following strategies to curb capital flight from Nigeria, these include, plugging the holes through which money leaks, transparency and quality of bilateral trade data, checking the role of multinational corporations in trade misinvoicing, CBN should introduce selective, targeted, and time-bound capital controls to stem outflows, especially outflows through banking channels. Government should thus depend more on domestic borrowing as a means of supplementing its resources. Government and policymakers must establishment of well-functioning political and judicial institutions that will ensure political stability within a country and overly expansionary monetary and fiscal policies, an incompatible exchange-rate policy, and a repressive set of financial policies should be designed to divert resources toward the public.*

KEYWORDS: capital flight, government income and budget balance, Nigeria, SCGE

JEL classification: F38, H61, C68

INTRODUCTION

Government revenue as well as government spending are components of the government budget and important tools of the government's fiscal policy income - the financial gain (earned or unearned) accruing over a given period of time. The empirical relationships between capital flight and government fiscal behaviour have been the thrust of several studies in recent years and have focused attention on the determinants and roles of capital flight in the development process. The devastating effects have been empirically ascertained on the ground that it widens fiscal deficits to the extent that deficits are most often financed by printing money.

Increase in capital flight can raise uncertainty about the government's capacity to finance its budget deficit or its debt. Continued budget deficits increase government financing needs, resulting in inflationary tensions. This situation increases the risks of erosion of domestic assets held by private investors. It implies a reduction in private investment. The government budget balance, also alternatively referred to as general government balance public budget balance, or public fiscal balance, is the overall difference between government revenues and spending. A positive balance is called a government budget surplus, and a negative balance is a government budget deficit.

Reduction in capital flight raises government incomes and contributes considerably to the public funds available for development in the countries of origin (typically developing countries). Government income or national revenue is money received by a government from taxes and non-tax sources to enable it to undertake public expenditure. Also, reduction in capital flight would reduce the incentive to place profits outside the country of origin, which might lead to increased domestic investments, jobs and growth. It would reduce income gaps between the rich and poor. Reduction in capital flight intends to facilitate the achievement of the Sustainable Development Goals in the Least Developed Countries The goals and targets of the 2030 Agenda for Sustainable Development will guide development. policy action over the coming years, in the pursuit of a revitalised Global Partnership for Sustainable Development.

In Nigeria, one of the unresolved and perturbing macroeconomic problem remains the growing rate of capital flight. Global financial crisis and its generated problem of enormous movement of funds massively out of the country has contributed to the regeneration of the growth of capital flight. According to Muhammadu Buhari while addressing the 74th session of the United Nations General Assembly in New York, said that Nigeria lost an estimated US\$157.5 billion to illicit financial flows between 2003 and 2012 (Royal, 2019).

On the current debate on the effects of capital flights on the Nigerians, the major concerns of Nigerian citizens are the relative burden of capital flights on the economy. The study seeks to verify if capital flight is indeed an important concern to economic management in Nigeria by

exploring various economic issues that existing body of theoretical and empirical literature had linked to capital flights.

The recent macroeconomic literature about Nigeria has paid no attention to the effects of growth in capital flight using the computable general equilibrium (CGE) modeling for Nigeria. Over the past 30 years, Computable General Equilibrium (CGE) Models have become a standard tool of empirical economic analysis. A general equilibrium model provides an analytical framework in which widely different policies can be examined and enables to reveal the direct and indirect impacts of a specific economic policy in a multi-sectoral manner. In recent years, improvement in model specification, data availability, and low costs of policy analysis based on CGE models have paved the way for their wide-spread use by policy analysts. (Lofgren et al., 2002). CGE models are essentially applied macroeconomic models designed to study issues of distribution of various types, external shocks or policy interventions (Agénor and Monteil, 1999).

Thus, the structuralist CGE model will enable us to tackle our basic question: does an increase or decrease in flight of capital from Nigeria boost the size and growth of the government budget balance and government income or shrink it, and if so by how much? Few studies yet exist on the counterfactual quantitative analysis, using a more robust method and its effect on key government variables like government income and government budget balance. This evidence calls for more detailed and deeper country level investigation of the effects of capital flight on government budget balance and government income in Nigeria over the period 2019–2030, because, it is being hypothesised and expected that continuous event of capital flight from Nigeria will lead to decrease in government income and government budget balance

This study fills this gap and take cognizance of these limitations by using the Structuralist Computable General Equilibrium (SCGE) model in estimating and subsequent analysis of trends of capital flight flows in Nigeria. Filling this gap of using a better methodology to analysis the relationship between capital flight and the Nigerian government budget balance and the Nigerian government income. This study will provide a more comprehensive picture of government income and government budget balance effects of capital flight growth. Hence, we consider a general equilibrium approach that uses wide span of data to be a potentially important contribution to the literature and the current policy debate.

Brief Conceptual and Literature Review

The definitions associated with the concept of capital flight are divergent, with varieties of meanings implied, and the word “flight” itself used to connote illegal movement of capital from one country to another. This connotation implies that there may be “normal” or “legal” and “abnormal” or “illegal” flows (see, for example, Lessard & Williamson, 1987). Capital flight may be legal or illegal under domestic law. Capital flight, in its broadest sense, consists of the cross-border transfer

of licit as well as illicit capital. In other words, capital flight can also be differentiated into legal or illegal flows and capital flight is sometimes associated with “illegal flows”.

Thus, Kindleberger (1987) and Walter (1987) broadly define capital flight as all capital that “flees” irrespective of the motive. Similarly, Morgan Guaranty Trust Company (hereafter Morgan Trust, 1986) defines capital flight as the reported and unreported acquisition of foreign assets by the non-bank private sector and some elements of the public sector. Loosely put, Eggerstedt et al. (1995) define capital flight as the unreported private accumulation of foreign assets. Alternatively, capital flight can be considered as the change in the private sector’s net foreign assets (World Bank, 1985; Erbe, 1985; Morgan Trust, 1986; Chang & Cumby, 1991; Akanni, 2007)

According to Ajayi (1997) Capital flight leads to an erosion of the tax base, resulting in reduced government revenue. The consequence of this is decreased public investment, which, in return, can affect private investment. In Ajayi view, capital flight stems from the transfer abroad of part of private domestic savings. Hence it results in a decrease in savings and banks collecting less saving deposits. This can compel them to grant fewer credits, and leads to the dwindling of available resources for the financing of domestic investment.

Nölling (1986) examined ways of combating capital flight from developing economies. The study noted that the volume of capital flight that emanates from developing economies if not checked can result into crisis that makes it difficult to resolve international debt crisis. Amongst the actions suggested by the researcher which could limit the flow of capital flight includes instituting checks at customs offices in order to prevent the production of false invoices. Also, banks in the host countries can form a defensive cartel as this will repulse investible capital from debtor countries. Also, capital flight can be curbed through direct investment in developing economies and this would enhance capital flows within the economy.

Boyce and Ndikumana (2012) examine 30 sub-Saharan African countries and show that funds borrowed abroad are often re-exported as private assets. By comparing cumulative capital flight with private net external assets, they conclude that Sub-Saharan African countries are net creditors vis-a-vis the rest of the world. In the case of capital flight driven debt, capital flight forces governments to borrow from abroad since capital flight decreases national resources by lowering domestic savings and investment. In this case, capital flight provides the resources to finance loans to the same residents who export their capital, leading to a situation of ‘round-tripping’ or ‘back-to-back loans’, motivated by the desire to obtain government guarantees on foreign borrowing.

Asongu (2014) examined strategies of fighting Africa capital flight. The study surveyed about 37 African countries and developed the strategy of benchmarking policy harmonization. The study used the beta-convergence and found that many African countries that have little capital flights are catching up with other African countries with higher volume of capital flight and the implication

of this is that developing a unique policy that harmonizes the strategies of combating capital flight is feasible in Africa.

Theoretical framework

There are several frameworks used to provide estimates of illicit financial flows and capital flight. The two most common methods are the World Bank Residual Model and the DOTS-based Trade Mispricing Model, which uses the IMF's Direction of Trade Statistics (DOTS) database to analyse discrepancies in trade statistics between partner countries. Different definitions of capital flight discussed above lead to different measures. Over the years, the following methods have been proposed in the literature. The four most common approaches are the residual measure (used by the World Bank, Morgan Guaranty and Cline); measuring the stock of unreported foreign assets (Dooley's method); hot money measures (Cuddington); and measuring trade misinvoicing. For each, there are variations which lead to (minor) differences. We discuss only the residual but the starting point for all frameworks or measures is balance-of-payment figures measure.

The Balance-Of-Payments Identity

Let us take a stylized balance-of-payments framework, using standard notation, but supplemented by World Bank debt data and based on the IMF's Balance of Payments Yearbook (Table 1). Capital flight is defined here as the net unrecorded capital flows between a country and the rest of the world. The starting point for our estimates is the country's Balance of Payments (BoP) statistics, which record inflows and outflows of foreign exchange. Because the BoP data have been found often to under-report external borrowing, data on debt flows are instead taken from the World Bank's Global Development Finance database (www.worldbank.org). The difference between recorded inflows and the recorded uses of foreign exchange provides the baseline 'residual' measure of capital flight (Erbe, 1985, World Bank, 1985). Since all capital flight measures attempt to estimate private capital flows, this would imply that capital flight can be simply measured as the sum of identified outflows (C + D + E). And, if all unidentified capital flows were private capital outflows, then net errors and omissions (G) would also be included.

Table 1: Various Items of The BOP and External Debt for Estimating Capital Flight

A	Current account balance which includes A1. Travel: credit A2. Reinvested earnings on direct investment abroad A3. Reinvested earnings on direct investment domestically A4. Other investment income: credit
B	Net foreign direct investment
C	Other short-term capital of other sectors: net
D	Portfolio investment: bonds and corporate equities

E	Change in deposit money banks' foreign assets
F	Changes in reserves
G	Net errors and omissions
H	Changes in external debt or long-term capital flows of the official sector

Source: IMF Balance of Payments Yearbook

The balance-of-payments identity implies that:

$$A + B + C + D + E + F + G + H = 0 \quad (1)$$

$$CAB + \Delta FDI + STC + PI + \Delta BFA + \Delta FRES + NEO + \Delta EXD = 0 \quad (2)$$

where *CAB* is the current account deficit, *FDI* is net foreign direct investment, *STC* short-term capital flows, *PI* portfolio investments, *BFA* Change in deposit money banks' foreign assets, *FRES* is changes in reserves, *NEO* is the net errors and omissions *EXD* is the change in the stock of external debt outstanding (adjusted for exchange rate fluctuations and interest arrears and debt forgiveness) and Δ is the change.

A country's balance of payments identity implies that the following must be true

$$-CAB = FDI + STC + PI + \Delta BFA + \Delta FRES + NEO + \Delta EXD \quad (3)$$

Equation 3, defined the BOP in terms of current account deficit (*CAB*). The identity in (3) implies that if there is a current account deficit (meaning that $-CAB$ is positive), it needs to be financed by the items at the right-hand side.

Rewriting the identity gives

$$C + D + E + G = -(A + B + F + H)$$

$$STC + PI + \Delta BFA + NEO = -(CAB + \Delta FDI + \Delta FRES + \Delta EXD) \quad (4)$$

The fourth equation implies that private capital flows plus net errors and omissions (capital flight) is equal to (the negative of) the sum of the current-account deficit, net foreign direct investment, increases in reserves, and other long-term capital of the official resident sector.

Measuring capital flight through either side of the equation give the same result. On the left-hand side of the equation, however, analysts can use only balance-of-payments for some statistics. On the right-hand side, however, there is more (and presumably better) information available elsewhere. So, the starting point for most capital flight methods is the right-hand side of the equation.

On the left, if sources (EXD + FDI) exceed uses of capital (CAB + FRES), this is due to capital flight. Because of the balance of payments identity, capital flight can also be measured using the right-hand side of (2). It is clear from this that this notion of capital flight includes many legitimate investments, captured by PI and BA, maybe also STC.

The ‘Residual’ Measure of Capital Flight

It is defined as a residual of the Balance of Payments consisting of discrepancies between recorded foreign exchange inflows and recorded uses of these inflows. Capital flight represents outflows of financial resources from a country in a given period that are not recorded in official government statistics. In that sense, capital flight is narrower than the phenomenon of illicit financial flows, which includes also flows that may be duly recorded but are illicit by virtue of the illicit nature of the activities that generated them, or failure to report the earnings associated with them. In other words, illicit financial flows are all flows that are associated with violation of the law in their mode of acquisition, cross-border transfer, and holding abroad (Ndikumana & Boyce, 2018)

The residual approach was developed by the World Bank (1985) and Erbe (1985) and was modified further by Morgan Guaranty Trust Company (1986). This residual approach arose out of the belief that the balance of payments accounts approach was not sufficient to estimate resident capital outflows. This measures the "residual" of the "sources of funds" over the "uses of funds". That is capital flight is calculated as the difference between sources and uses of capital inflows. Sources of capital include all net official inflows (increases in net external indebtedness of the public sector) and the net flow of foreign direct investment. These capital inflows are used to finance either current account deficits or increases in official reserves. Inflows that finance neither current account deficits nor increases in reserves constitute capital flight.

Capital flight in the World Bank (1985) & Erbe (1985) versions of the residual approach (CAF_{it}) is measured as

$$CAF_{it} = \Delta EXD_{it} + \Delta FDI_{it} - (CAB_{it} + \Delta FRES_{it}) \quad (5)$$

where ΔEXD_{it} is the change in the stock of external debt outstanding (adjusted for exchange rate fluctuations and interest arrears and debt forgiveness), net foreign direct investment (FDI_{it}), CAB is the current account deficit, and ΔRES is net additions to the stock of foreign reserves or the change in foreign reserves.

Morgan Guaranty (1986) adjusted the World Bank (1985) and Erbe (1985) measure for changes in foreign assets held by domestic agents other than the banking system. According to Morgan Guaranty (1986), capital flight is measured as

$$CAF_{it} = \Delta EXD_{it} + \Delta FDI_{it} - (CAB_{it} + \Delta FRES_{it}) - STC_{it} \quad (6)$$

where CAF_{it} is the measure of capital flight, STC_{it} refers to the short-term foreign assets of the banking system and monetary authorities. Is a change in foreign assets of the domestic banking system. As with the other residual measure of capital flight, positive values of CAF_{it} represent capital flight, whereas negative ones are reverse capital flight.

The residual approach to the measurement of resident capital outflow faces the problem of inadequacies in the debt statistics. The statistics may not always be correctly recorded, especially if the private sector also borrows from foreign creditors. When some debts are denominated in currencies other than the U.S. dollar, changes in exchange rates may increase (or decrease) the debts even if no new borrowing has taken place (Zedillo, 1987). The changes in debts denominated in currencies other than the U.S. dollar should thus be adjusted for exchange rate variations.

Capital Flight Under the Residual Method in Terms of Balance-Of-Payments Items: In terms of balance-of-payments items, capital flight under the residual method is thus the sum of: A + B + F + H. By the balance of payments identity, this is also equal to - (C + D + B + G). The residual method, however, does not rely only on balance-of-payments data

Most notable is item H (other long-term capital of resident official sector or net official external borrowing), for which the year-to-year change in external debt according to World Bank data may be more accurate. Thus, the residual method measures capital flight as A + B + F + H; by the balance-of-payments identity, this is equal to - (C + D + E + G + H). Capital flight is simply the sum of identified private capital outflows (C + D + E), the net errors and omissions from the balance-of payments accounts (G), and the difference between reported net official capital and the change in external debt according to World Bank data (H)

METHODOLOGY

Specification of Equations of the SCGE Model

Specification of a complete model requires that the market, behavioural, and system relationships embodied in each account in the SAM be described in the model. Activity, commodity, and factor accounts all require the specification of market behaviour: supply; demand; and clearing conditions. The household and government accounts embody the budget constraints of private households and the public sector budget: income equals expenditure. Finally, the capital and the rest of the world accounts represent the macro-economic requirements for internal balance (savings equal investment) and external balance (exports plus net-capital inflows equal imports).

The analysis and specifications of model are done with a standard model structure derived from Lofgren et al (2002) and Provide (2003). Specification of Equations of the Model A non-linear

programming (NLP) model of 9 blocks and of sixty-two (62) simultaneous complete equations model were used in this work, but only the behaviour of the government equations and capital movement are specified as follows;

Government income (revenue)

Government Income and Budget Balance is made up of tax revenue and other sources. The latter is exogenous in the model. Tax revenue is made up of import tariffs, direct and other indirect taxes.

$$YG = DTAX + VTAX + STAX + HTAX + TARIFF + govwor \cdot EXR_i \quad (7)$$

Expanded as;

$$YG = \sum_{i \in INSDNG} tins_i \cdot YI_i + \sum_{f \in F} tf_f \cdot YF_f + \sum_{a \in A} tva_a \cdot PVA_a \cdot QVA_a + \sum_{a \in A} ta_a \cdot PA_a \cdot QA_a + \sum_{c \in CM} tm_c \cdot pwm_c \cdot QM_c \cdot EXR$$

$$+ \sum_{c \in CE} te_c \cdot pwe_c \cdot QE_c \cdot EXR + \sum_{c \in C} ts_c \cdot PQ_c \cdot QQ_c + \sum_{f \in F} YI_{gov.f} + trnsF_{i.gov.row} \cdot EXR \quad (8)$$

$$\begin{aligned} \left[\begin{array}{c} \text{government} \\ \text{revenue} \end{array} \right] &= \left[\begin{array}{c} \text{direct taxes} \\ \text{from institutions} \end{array} \right] + \left[\begin{array}{c} \text{direct taxes} \\ \text{from factors} \end{array} \right] + \left[\begin{array}{c} \text{value} \\ \text{added tax} \end{array} \right] + \left[\begin{array}{c} \text{activity} \\ \text{tax} \end{array} \right] \\ &+ \left[\begin{array}{c} \text{import} \\ \text{tariffs} \end{array} \right] + \left[\begin{array}{c} \text{export} \\ \text{taxes} \end{array} \right] + \left[\begin{array}{c} \text{sales} \\ \text{tax} \end{array} \right] + \left[\begin{array}{c} \text{factor} \\ \text{income} \end{array} \right] + \left[\begin{array}{c} \text{transfers} \\ \text{from RoW} \end{array} \right] \end{aligned}$$

where

YG = Government income (revenue)

$DTAX$ = direct tax on domestic institutions

$VTAX$ = Value added tax

$govwor$ = Transfers from RoW to government

$trnsF_{irow}$: institutions transfer from the rest of the world

Government finances its expenditures with the tax revenues as well as other sources of public income. Equation 8 show how government gets the income tax, the import tariff tax and the other indirect tax revenues. Addition to these revenues, government income, includes the corporation taxes and public factor income and the net unilateral transfers to the government from the abroad.

Tariff revenue

$$TAR_c = tm \cdot PWM_c \cdot EXR \cdot QM_c \quad (9)$$

$$\left[\begin{array}{c} \text{tariff} \\ \text{revenue} \end{array} \right] = \left[\begin{array}{c} \text{import} \\ \text{tariff rate} \end{array} \right] \cdot \left[\begin{array}{c} \text{import price} \\ \text{in FCU} \end{array} \right] \cdot \left[\begin{array}{c} \text{exchange rate} \\ \text{(LCU per FCU)} \end{array} \right] \cdot \left[\begin{array}{c} \text{import of} \\ \text{commodity} \end{array} \right]$$

TAR = Tariff revenue

Sales tax revenue

$$STAX_i = (tm \cdot PQ_i \cdot (CD + GD + INVD)) \quad (10)$$

$$\begin{bmatrix} \text{sales tax} \\ \text{revenue} \end{bmatrix} = \begin{bmatrix} \text{sales tax} \\ \text{rate} \end{bmatrix} \cdot \begin{bmatrix} \text{price of} \\ \text{composite} \\ \text{commodity} \end{bmatrix} + \begin{bmatrix} \text{household} \\ \text{consumption} \\ \text{volume} \end{bmatrix} + \begin{bmatrix} \text{government} \\ \text{consumption} \\ \text{volume} \end{bmatrix} + \begin{bmatrix} \text{investment} \\ \text{consumption} \\ \text{volume} \end{bmatrix}$$

$STAX$ = Sales tax revenue

GD_c = Government consumption volume for commodity

Household direct tax revenue

$$HTAX = ty_h \cdot YH \quad (11)$$

$$\begin{bmatrix} \text{household} \\ \text{direct tax} \\ \text{revenue} \end{bmatrix} = \begin{bmatrix} \text{household income} \\ \text{tax rate} \times \text{income to} \\ \text{household} \end{bmatrix}$$

$HTAX$ = Household direct tax revenue

Government Expenditure:

$$EG = \sum_{c \in C} PQ_c \cdot QG_c + \sum_{i \in INSDNG} trns_{igov} \cdot CPI \quad (12)$$

$$\begin{bmatrix} \text{government} \\ \text{spending} \end{bmatrix} = \begin{bmatrix} \text{government} \\ \text{consumption} \end{bmatrix} + \begin{bmatrix} \text{transfers to domestic} \\ \text{non-government institutions} \\ \text{and servicing of debts} \end{bmatrix}$$

where EG = government expenditure

QG_c = Government consumption demand for commodity c

Government expenditure is made up of expenditure on the goods in the economy and transfers to households. That is, government spends its revenue on consumption demand, investment, and interest payments (on its foreign and domestic debt). Total government spending is the sum of government spending on consumption and transfers. Government expenditures consist of the purchases of goods and services, the public foreign debt payments (EXD) and other form of transfers

$$GSAV = sav^g YG = YG - EG \quad (13)$$

$$\begin{bmatrix} \text{government} \\ \text{savings} \end{bmatrix} = \begin{bmatrix} \text{government} \\ \text{income} \end{bmatrix} - \begin{bmatrix} \text{government} \\ \text{expenditure} \end{bmatrix}$$

where $GSAV$ = Government savings

Foreign Savings (Balance of Payments)

The part of total savings arising from foreign sources is calculated residually in the model. The difference between total imports and total exports plus net non-official and official payments constitute the foreign contribution to domestic savings. The relationship is shown below in its structural form.

$$FSAV_i = \sum_{c \in CM} PM_c + \sum_{f \in F} WF_f \cdot QFS_f - \sum_{c \in CE} PE_c + \sum_{i \in INS} (EXTC_{ia} \text{extc}_{tia} - EXTC_{ai} \text{extc}_{fai}) \quad i \in INS \quad (14)$$

Where;

$FSAV$ = foreign savings (FCU) (exogenous variable)

$EXTC_{ai}$ = transfer capital from country a to institution i

$EXTC_{ia}$ = transfer capital to country a from institution i

extc_{ai} = rate of transfer capital from country a to institution i

extc_{ia} = rate of transfer capital to country a from institution i

Total External Outflows Capital is Given As:

$$\text{extc}_{fai} = F\text{extc}_{fai} \cdot \text{exr}_a \quad (15)$$

$F\text{extc}_{fai}$ = the transfers of capital from country a to institution i in foreign currency

exr_a = is the exchange rate of country a

The foreign savings measure the differences between inflow funds to the home country and outflow funds to trading partners and are merely equal to the trade deficit.

Macro System Constraints Block

Market clearing and macroeconomic closures are government balance, direct institutional tax rates, foreign exchange market balances, government account balance, and savings-investment balance.

Government Balance:

$$YG = EG + GSAV \quad (16)$$

Direct Institutional Tax Rates:

$$TINS_i = \text{tins}_i \cdot (1 + TINSADJ \cdot \text{tins}01_i) + DTINS.t \quad (17)$$

$$\left[\begin{array}{l} \text{direct tax} \\ \text{rate for} \\ \text{institution } i \end{array} \right] = \left[\begin{array}{l} \text{base rate adjusted} \\ \text{for scaling for} \\ \text{selected institutions} \end{array} \right] + \left[\begin{array}{l} \text{point charge} \\ \text{for selected} \\ \text{institutions} \end{array} \right] \quad i \in INSDNG$$

$TINS_i$ = Rate of direct tax on domestic institution i

$tins_i$ = Exogenous direct tax rate for domestic institution i (exogenous)

$TINSADJ$ = Direct tax scaling factor (exogenous)

$tins01_i$ = parameter with 1 for institutions with potentially flexed direct tax rates

$DTINS.t$ = Change in domestic institution tax share(exogenous)

Equation (17) defines the direct tax rates of domestic nongovernment institutions. For the basic model version, all variables on the right-hand side are fixed, in effect fixing the values for the direct tax rate variable for all institutions. In this setting, government savings is the endogenous variable that clears the government balance.

Current Account Deficit (CAD) (foreign trade equilibrium)

Current Account Balance for the Rest of the World, in Foreign Currency:

$$CAD: \sum_{c \in CM} p w m_c \cdot Q M_c + \sum_{f \in F} t r n s T_{i r o w f} = \sum_{c \in CE} p w e_c \cdot Q E_c + \sum_{i \in INSD} t r n s F_{i r o w} + F S A V \quad (18)$$

$$\left[\begin{array}{l} \text{import} \\ \text{spending} \end{array} \right] + \left[\begin{array}{l} \text{institutions} \\ \text{factor capital} \\ \text{(net of tax)} \\ \text{transfers to RoW} \end{array} \right] = \left[\begin{array}{l} \text{export} \\ \text{revenue} \end{array} \right] + \left[\begin{array}{l} \text{institutional} \\ \text{transfers} \\ \text{from RoW} \end{array} \right] + \left[\begin{array}{l} \text{foreign} \\ \text{saving} \end{array} \right]$$

$t r n s T_{i r o w}$ = institutions factor transfers to the rest of the world

$t r n s F_{i r o w}$ = institutions transfer from the rest of the world

The current-account balance, which is expressed in foreign currency, imposes equality between the country's spending and its earning of foreign exchange. For the basic model version, foreign savings is fixed; the (real) exchange rate (EXR) serves the role of equilibrating variable to the current-account balance. The fact that all items except imports and exports are fixed means that, in effect, the trade deficit also is fixed. Alternatively, the exchange rate may be fixed and foreign savings unfixed. In this case, the trade deficit is free to vary.

The final institution is the rest of the world. As noted, transfer payments between the rest of the world and domestic institutions and factors are all fixed in foreign currency.

Foreign savings (or the current account deficit) is the difference between foreign currency spending and receipts.

Government Account Balance (Internal Balance)

$$CAPGOV = YG - (PQ \cdot GD) - hogov - EXSUB \quad (19)$$

$$\begin{bmatrix} \text{government} \\ \text{account} \\ \text{balance} \end{bmatrix} = \begin{bmatrix} \text{government} \\ \text{income} \end{bmatrix} - \begin{bmatrix} \text{governemnt} \\ \text{consumption} \\ \text{volume} \end{bmatrix} - \begin{bmatrix} \text{government} \\ \text{transfers to} \\ \text{household} \end{bmatrix} - \begin{bmatrix} \text{export} \\ \text{subsidy} \\ \text{expenditure} \end{bmatrix}$$

Saving-investment Balance or Capital account balance

$$TOTSAV = INVEST + WALRAS$$

WALRAS Savings–Investment imbalance (should be zero)

$$Walras = \sum_{i \in INSDG} MPS_i \cdot (1 - tins_i) \cdot YI_i + GSAV + EXR.FSAV = \sum_{c \in C} PQ_c \cdot INVEST_c + \sum_{c \in C} PQ_c \cdot qdst_c \quad (20)$$

$$\begin{bmatrix} \text{non - government} \\ \text{savings} \end{bmatrix} + \begin{bmatrix} \text{goverrment} \\ \text{savings} \end{bmatrix} + \begin{bmatrix} \text{foreign} \\ \text{savings} \end{bmatrix} = \begin{bmatrix} \text{fixed} \\ \text{investment} \end{bmatrix} + \begin{bmatrix} \text{stock} \\ \text{change} \end{bmatrix}$$

where MPS_i = Marginal propensity to save for domestic non-government institution

Capital Movement

A critical element of the dynamic character of the model is the determination of the effects of capital flight on the level of government budget balance and government income. The standard CGE model does not incorporate explicit capital outflow behaviour by institutions and non-institutions either at the sectoral or aggregate level. The intertemporal component of the model is captured by a series of equations in the model that describe how exogenous characteristics such as the policy environment and international prices, international rate of return on capital and as well as model-driven conditions such as capital outflow, evolve over time. Perfectly ‘normal’ outflows of capital are clubbed with ‘abnormal’ flows in the capital flight measure. It is difficult to delineate the ‘normal’ from the ‘abnormal’ flow because of the inadequate statistics on these components capital flight emphasizing that capital flight is only a sub-set of the gross capital outflow.

A consensus cannot be reached on what precisely constitutes capital flight. In its simplest form, any illicit transfer of financial assets across national borders constitutes illicit capital flight (ICF), as opposed to legal capital outflows (LCO). One imprecise estimate of ICF is obtained by simply subtracting foreign currency payments for imports, debt service and additions to official reserves from total sources of foreign exchange (exports, borrowing, investment by multinationals, etc.) The unaccounted-for dollar difference is labeled as capital flight (Concise Encyclopedia of Economics).

In each period the total level of capital flight (legal and illegal) is defined as the sum of outflow from total trade misinvoicing, transfer of foreign remittances through banking channels, direct investment, portfolio investment, other bank transfers, private transfers, firm transfers, Corrupt government officials transfers, household outright money smuggling, external debt servicing, the government sector’s net balance and the net inflow of foreign capital given by the balance of payments.

Balance of Payments Identity

$$-CAD = \Delta FDI + STC + PI + \Delta BFA + \Delta FRES + NEO + \Delta EXD \quad (21)$$

$$\begin{aligned} \left[\begin{array}{c} \text{current} \\ \text{account} \\ \text{deficit} \end{array} \right] &= \left[\begin{array}{c} \text{net foreign} \\ \text{direct} \\ \text{investment} \end{array} \right] + \left[\begin{array}{c} \text{short-term} \\ \text{capital flows} \end{array} \right] + \left[\begin{array}{c} \text{portfolio} \\ \text{investments} \end{array} \right] + \left[\begin{array}{c} \text{banks' deposit} \\ \text{foreign} \\ \text{assets change} \end{array} \right] \\ &+ \left[\begin{array}{c} \text{change in} \\ \text{reserves} \end{array} \right] + \left[\begin{array}{c} \text{net errors} \\ \text{and omissions} \end{array} \right] + \left[\begin{array}{c} \text{change in the} \\ \text{stock of} \\ \text{external debt} \end{array} \right] \end{aligned}$$

A country's balance of payments identity implies that the following must be true in equation (eq 21). The identity in (21) implies that if there is a current account deficit (meaning that -CAD is positive), it needs to be financed by the items at the right-hand side.

where CAD is the current account deficit, FDI is net foreign direct investment, STC short-term capital flows, PI portfolio investments, BFA Change in deposit money banks' foreign assets, FRES is changes in reserves, FDI is the net foreign direct investment, EXD is the change in the stock of external debt outstanding (adjusted for exchange rate fluctuations and interest arrears and debt forgiveness) and Δ is the change. Rewriting the identity gives:

$$STC + PI + \Delta BFA + NEO = -(CAD + \Delta FDI + \Delta FRES + \Delta EXD) \quad (22)$$

$$\begin{aligned} \left[\begin{array}{c} \text{short-term} \\ \text{capital flows} \end{array} \right] + \left[\begin{array}{c} \text{portfolio} \\ \text{investments} \end{array} \right] + \left[\begin{array}{c} \text{deposit banks'} \\ \text{foreign} \\ \text{asset change} \end{array} \right] + \left[\begin{array}{c} \text{net errors} \\ \text{and omissions} \end{array} \right] \\ = - \left[\begin{array}{c} \text{current} \\ \text{account} \\ \text{deficit} \end{array} \right] + \left[\begin{array}{c} \text{net of foreign} \\ \text{direct} \\ \text{investment} \end{array} \right] + \left[\begin{array}{c} \text{change in} \\ \text{reserves} \end{array} \right] + \left[\begin{array}{c} \text{change in the} \\ \text{stock of} \\ \text{external debt} \end{array} \right] \end{aligned}$$

The fourth equation implies that private capital flows plus net errors and omissions (capital flight) is equal to (the negative of) the sum of the current-account deficit, is the net foreign direct investment, increases in reserves, and other long-term capital of the official resident sector.

Measuring capital flight through either side of the equation give the same result. On the left-hand side of the equation, however, analysts can use only balance-of-payments for some statistics. Because of the balance of payments identity, capital flight can also be measured using the left-

hand side of (equation 21). It is clear from this that this notion of capital flight includes many legitimate investments, captured by PI and BFA, maybe also STC. The hot-money-narrow measure, therefore, takes into account only NEO (net errors and omissions) and, in some variants, also STC (short-term capital). At least the former arguably reflects more closely solely illicit flows, although, as the name says, it can also be a statistical error.

On the right-hand side, however, there is more (and presumably better) information available elsewhere. On the left, if sources (EXD + FDI) exceed uses of capital (CAD + FRES), this is due to capital flight. So, the starting point for most capital flight methods is the right-hand side of the equation.

$$CAF_{it} = \Delta EXD_{it} + \Delta FDI_{it} - (CAB_{it} + \Delta FRES_{it}) + MISINV_{it} + RID_{it} \quad (23)$$

$$\left[\begin{array}{c} \text{capital} \\ \text{flight} \end{array} \right] = \left[\begin{array}{c} \text{change in the} \\ \text{stock of} \\ \text{external debt} \end{array} \right] + \left[\begin{array}{c} \text{net of foreign} \\ \text{direct} \\ \text{investment} \end{array} \right] - \left[\begin{array}{c} \text{current} \\ \text{account} \\ \text{deficit} \end{array} \right] - \left[\begin{array}{c} \text{change in} \\ \text{reserves} \end{array} \right] + \left[\begin{array}{c} \text{net trade} \\ \text{misinvoicing} \end{array} \right] + \left[\begin{array}{c} \text{remittance} \\ \text{inflow} \\ \text{discrepancy} \end{array} \right]$$

where CAF is capital flight, EXD is change in debt stock adjusted for exchange rate fluctuation, interest arrears and debt forgiveness, FDI is the net foreign direct investment, CAB is the current account (deficit), FRES is net additions to reserves, and MISINV is net trade misinvoicing. RID is the remittance inflow discrepancy in country (all variables in country i in year t).

On the right-hand side, however, there is more (and presumably better) information available elsewhere. On the left, if sources (EXD + NEF) exceed uses of capital (CAB + FRES), this is due to capital flight. So, the starting point for most capital flight methods is the right-hand side of the equation

where CAB is the current account deficit, FDI is net foreign direct investment, STC short-term capital flows, PI portfolio investments, BFA Change in deposit money banks' foreign assets, FRES is changes in reserves, NEO is the net errors and omissions EXD is the change in the stock of external debt outstanding (adjusted for exchange rate fluctuations and interest arrears and debt forgiveness) and Δ is the change.

Model Calibration

Dynamic Calibration of Parameters of the Model

This study constructed a Social Accounting Matrix (SAM) for Nigeria economy that included the capital flows to investigate the effects of the capital flight government budget balance and government income, and developed a structuralist and recursive dynamic CGE model that served as the database for the calibration of all parameters in the dynamic CGE model. Calibration is the process where numerical values are assigned to the share parameters of the model. Calibration of the model involves determining a set of parameters and exogenous variables so that

the CGE model solution exactly replicates the economy represented in the SAM. In other words, calibration method is a deterministic approach to calculating parameter values from a bench-mark equilibrium data set.

The parameter values are calculated using a calibration method that enables the static module equations to generate a base-year equilibrium observation or short-run solution. The calibration method relies on the assumption that the economy is in equilibrium. This is established by a bench-mark data set that represents an equilibrium for the economy so that the model is actually solved from equilibrium data for its parameter values rather than vice versa (Shoven & Whalley, 1992). In our particular case, the bench-mark data set is systematically represented in the compiled SAM. Equilibrium exists because the SAM is square and row and column sums for a given account are equal because all income must be accounted for by an outlay of one type or another (Pyatt, 1989).

The dynamic models are calibrated subject to the assumption that the base year is a stationary state or a steady state. The share parameters are calibrated from synthetic benchmark equilibrium data sets which portray the Nigeria economy in a notional typical year, 2019 and the accounting information obtained from relevant and major Database (NBS, 2019; CBN, 2019; IMF, 2019). The parameter and elasticity values that feed the equations of the CGE model are crucial to assess the effects of capital flight shocks on the economy.

Definition of Policy Simulation Experiments

Large and negative variable items can be indicative of capital flight especially in the face of pending devaluation or anticipated depreciation of the currency, and of uncontrolled outflows to bypass exchange controls. Net foreign assets, net international investment position and net errors and omissions are combination of both legal and illegal capital flight. Equally, positive NEO can be indicative of proceeds from illegitimate activities flowing into the country, while negative NEO are treated as illicit capital outflow which may arising from tax evasion and avoidance practices by multinational companies, trade misinvoicing, transfer mispricing, round tripping. The errors and omissions line are the statistical discrepancy in the credit and debit entries in the current and capital account. Negative NEO are used as a proxy for capital flight. Also, from criminal activities, such as drug trade, smuggling, human trafficking, illegal trade with weapons, corruption (bribery and embezzlement of national wealth). Errors and omissions in BOP of Nigeria are presumed to be huge. They are very volatile, for example between 2005-2009 Nigeria recorded an average of 19,210.84 USD negative errors and omission. In 2015 and 2018, Nigeria recoded positive errors and omissions in its BOP, 20,773.2 and 9,223.3 USD respectively.

Table 2.: Total External outflow: Legal and Illegal

Year	Net Foreign Assets (NFA) (Millions of Naira)	Net International Investment (Millions of USD)	Total Capital Outflow (Millions of USD)	Net Errors & Omissions (Millions of USD)
2005	3,425,430.18	-22,389.01	41,832.27	-17,344.5
2006	5,586,992.65	5,292.89	60,495.43	-17,151.1
2007	6,620,856.99	8,538.77	75,506.82	-14,401.3
2008	7,308,128.13	14,530.17	91,382.20	-20,775.8
2009	6,220,620.08	-7,891.30	80,764.23	-26,381.5
2010	5,044,727.06	6,821.49	87,082.10	-14,913.7
2011	5,485,833.84	6,648.45	99,440.91	-5,264.8
2012	7,055,154.92	17,078.57	123,535.41	-4,998.5
2013	6,686,863.26	10,386.27	120,706.19	-26,734.8
2014	5,889,330.77	-10,445.61	108,694.46	-13,192.8
2015	5,328,171.26	-17,022.68	103,647.27	20,773.2
2016	7,695,846.17	-29,931.97	95,069.90	-5,622.0
2017	10,825,507.86	-41,184.76	115,425.63	-6,401.7
2018	12,126,676.39	-40,119.68	129,684.68	9,223.3
2019	7,797,174.29	-72,916.69	115,266.12	-1,071.6
Average Annual Growth Rate (AAGR)	9.31%	11.63%	8.75%	28.66%
Average AAGR	14.60%			
50% Increase in AAGR	13.97%	17.45%	13.13%	42.99%
Change in AAGR Increase	21.89%			

Source: The 6th Edition of the Balance of Payments Manual (BPM6) of the IMF and Authors' Computation

A capital flight shock arising from global capital price increases. The growth rate of any economy by destination is defined by arbitrary constants, the parameters and the elasticities, so our model will be calibrated with respect to the parameters and the elasticities. The parameter to carry the change in total capital flight is the growth rate of total external outflows capital in form of legal and illegal to foreign countries as given in the database by the IMF

A constant growth rate of 50% increase in total external outflows capital from Nigeria with respect to the base cases are simulated under the different macro-economic, factor markets closures and different benchmarks. This simulation may reflect for instance the situation actually faced by most oil-importing less-industrialized countries, which, between 2000 and 2019 had to face a sharp and lasting increase in capital flight.

This research identifies two (2) different scenarios to investigate the distributional effects of capital flight on government budget balance and government income in Nigeria (2020-2030), these include the base experiment values of 2019. The "base" in the set serves as comparator. These experiments change the scaling factors on the capital flight growth rate. Hence, normalised prices and exchange rate will remain constant. The base values are obtained from SAM in which the benchmark equilibrium parameters are calibrated. Our scenarios are measure by the average annual growth rate (AAGR), elasticities and percent changes on the current substantial capital flight then the future capital flight.

- 1) In Scenario 1, the focus is on the real values of the Average Annual Growth Rate (AAGR) capital flight from Nigeria, that is, allowing 0% decrease or increase in the AAGR. Then compared to the base case scenario of 2019 in which the benchmark equilibrium parameters are calibrated and ascertain the immediate, short run, medium run, long and very long run effects on government budget balance and government income from 2020 to 2030. For that purpose; we apply 14.60% AAGR of capital flight from Nigeria derived from total external outflows from 2005-2019.
- 2) In Scenario 2, we test the effects of 50% (AAGR = 21.89%) increase in the Average Annual Growth Rate of capital flight in Nigeria using a different elasticity (elasticity demand for loanable capital from Nigeria). Then compared to the base year values and ascertain the immediate, short run, medium run, long and very long run distributional effects from 2020 to 2030.

With the results from these experiments or scenarios, we will be able to ascertain the effects of capital flight on government budget balance and government income. Thus, the second simulation scenario experiments increased the actual growth of capital flight (deviates from the base-run, 2019). These deviations are structuralist effects from 2020-2030. The base value has an index of 1.00 for the prices. The normalized prices are $PDD = 1$, $PDS = 1$, $PE = 1$, $PMO = 1$. While, PX is a weighted average of prices that are initially normalized, since the model is homogeneous of degree zero in prices, one good must be chosen as the numéraire. The default numéraire is the exchange rate or, equivalently, a price index representing the bundle of imports. Hence $PX = 1$, $ER = 1$ (see model equations). The main research hypothesised issues is that, capital flight is a negative function of the growth differential government budget balance and government income in Nigeria. This hypothesis will be tested using the parameters as specified in the model.

Data Requirement and Sources

This study relies mainly on published data from a number of agencies and sources. The Macro-Social Accounting-Matrix (SAM) use for this study is constructed by Odior et al. (2019) purposely, for this work. The data used to construct the Nigerian SAM were extracted from various sources such as macroeconomic data reported in National Accounts (NA) of the Nigerian Gross Domestic Product Report (Expenditure and Income Approach) of the National Bureau of Statistics (NBS) 2019, the Nigerian Statistical Fact Sheets on Economic (NBS, 2019), CBN Statistical Bulletin (2019), IMF-IFS, IMF-GFS and IMF-DOT (2019). Balance of Payments (BoP), supply and use tables (SUT); government reports on revenue and budget and any other sources containing information on the transaction between agents within the economy. All monetary flows are recorded or converted to Nigeria's national currency, the Naira (abbreviated by ₦.). The average annual ₦-US-Dollar exchange rate for the base year 2019 is 360.40 (Nig-₦/US-\$). The Macro-SAM has nine blocks namely, Activities, Commodities, Factors, Households, Enterprises, Government, Taxes, Savings-Investment (capital) and Rest of the World (RoW). The 2019 macro-SAM for Nigeria is compiled based on macro aggregates following a top-down process. It is designed to suit our current analysis. The Macro-SAM on which the CGE model is based shows GDP at current base price amounting to 144,210,492.07 million of current (2019) Nigerian Naira.

ANALYSIS AND DISCUSSION OF SIMULATION RESULTS

Effects of Capital Flight on Government Income and Budget Balance Scenarios

Two simulations experiments have been considered under our scenarios to investigate the effects of capital flight on government income and budget balance in Nigeria from 2019 to 2030. Base parameter or coefficient values are simulated from social accounting matrix, which provides a benchmark against which the two scenarios were compared. The base growth path therefore includes the projected effect of all the relevant variables. The base year (2019) period parameters share is maintained throughout the simulation period for the variables given the rate of changes. The parameters result of the distributional effects of capital flight on the variables of interest are summarized in Table 3 to 11. The immediate and short run effects are capture from 2020 to 2023, the medium run effects captured from 2024 – 2026, while the long and very long run effects are capture from 2027 to 2030.

Analysis of Simulation Results of Scenario 1

Scenario 1 focus on actual percentage growth rate of capital flight (zero increase) for the simulation of the model and then compared to the base year (2019) values in which the benchmark equilibrium parameters are calibrated. With the actual growth rate of 14.60%, we ascertained the distributional effects from 2020 to 2030.

- **Table 3** from Scenario 1, present the summary of parameters results of the values of the

marginal effects on base year values, 2019, for the immediate and short run, medium run and long and very long run periods.

- **Table 4** from Scenario 1, shows summary of parameters results of the values of the marginal effect deviation from base year values.
- **Table 5** from Scenario 1, illustrates the values of percentage (%) of marginal deviation from base year values based on Table 4 for the immediate, short run, medium run, long and very long run periods.
- **Table 6** from Scenario 1, presents the values of the parameter’s marginal annual growth difference overtime of the variables.

Scenario 1: Effect on Government Income and Budget Balance

Effects on Government Income

The simulation results in Table 3, shows declining values for government income from short run 2020 to the very long run 2030. When compared to their base year values in 2019, both variables when invariably lower than the base values. On the average, government income of Nigeria will reduce by 9.2% from 2020 to 2030 due to capital flight (see Tables 4 &5).

Simulation Results: Scenario 1													
Table 3: Result of Actual AAGR of Capital Flight from Nigeria													
Summary of the Parameters Results													
Values of the Marginal Effects on Base Year Values													
Scenario Variables	Base Year Values	Immediate & Short Run Effect				Medium Run Effect			Long & Very Long Run Effect				Average
	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2020-2030
Effects on Government Income and Budget Balance													
Government Income	0.723	0.633	0.638	0.641	0.643	0.646	0.648	0.644	0.627	0.616	0.611	0.600	0.631
Government Budget Balance	0.542	0.599	0.619	0.657	0.676	0.735	0.801	0.847	0.875	0.906	0.944	0.976	0.785

Simulation Results: Scenario 1													
Table 4: Result of Actual AAGR of Capital Flight from Nigeria													
Summary of the Parameters Results													
Values of the Marginal Effect Deviation from Base Year Values													
Scenario Variables	Base Year Values	Immediate & Short Run Effect				Medium Run Effect			Long & Very Long Run Effect				Average
	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2020-2030
Effects on Government Income and Budget Balance													
Government Income	0.723	-0.09	-0.085	-0.082	-0.08	-0.077	-0.075	-0.081	-0.096	-0.107	-0.112	-0.123	-0.092
Government Budget Balance	0.542	0.057	0.077	0.115	0.134	0.193	0.259	0.305	0.333	0.364	0.402	0.434	0.243

Source: Authors’ Computations from Simulated Results of Structuralist NLPCG. AAGR for Base Period = 21.89%. The Base Year value has a Normalized index Price = 1.00. With constant exchange rate fluctuation and increasing flight of capital.

From the result in Table 5, it is observed that the immediate and short run and medium run effect of capital flight on government income when lower than the long and very long run effects. The

values of the marginal effect from base year values show percentage deviation of -8.0% in 2023, -8.1% in 2026 for the medium run and -10.7% and -12.3% in 2028 and 2030 respectively, for the long and very long run. The results in Table 6 also show that, government income will maintain negative annual growths from immediate to very long run periods. The government income witnessed an annual average growth difference of -0.3%, between 2021 and 2030.

Simulation Results: Scenario 1													
Table 5 Result of Actual AAGR of Capital Flight from Nigeria													
Summary of the Parameters Results													
Percentage (%) of Marginal Deviation from Base Year Values													
Scenario Variables	Base Year Values	Immediate & Short Run Effect (%)				Medium Run Effect (%)			Long & Very Long Run Effect (%)				Average Deviation
	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2020-2030
Effects on Government Income and Budget Balance													
Government Income	0.723	-9	-8.5	-8.2	-8	-7.7	-7.5	-8.1	-9.6	-10.7	-11.2	-12.3	-9.2
Government Budget Balance	0.542	5.7	7.7	11.5	13.4	19.3	25.9	30.5	33.3	36.4	40.2	43.4	24.3

Simulation Results: Scenario 1													
Table 6: Result of Actual AAGR of Capital Flight from Nigeria													
Summary of the Parameters Results													
Values of the Parameters' Marginal Annual Growth Difference													
Scenario Variables	Base Year Values	Immediate & Short Run Effect				Medium Run Effect			Long & Very Long Run Effect				Average
	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2020-2030
Effects on Government Income and Budget Balance													
Government Income	0.723	-0.09	0.005	0.003	0.002	0.003	0.002	-0.006	-0.016	-0.011	-0.005	-0.011	-0.003
Government Budget Balance	0.542	0.057	0.02	0.038	0.019	0.059	0.066	0.046	0.028	0.031	0.038	0.032	0.038

Source: Authors' Computations from Simulated Results of Structuralist NLPCG. AAGR for Base Period = 21.89%. The Base Year value has a Normalized index Price = 1.00. With constant exchange rate fluctuation and increasing flight of capital.

Effect on Government Budget Balance

This study demonstrated that government budget balance is positively related to capital flight in Nigeria. In others words, government budget balance will increase for all time with actual capital flight rate simulation, when compared to its base value.

The preceding analysis shows that, government budget balance followed a rising trend from 2020 to 2030. On the average, between 2020 and 2030, government budget balance rises by 24.3%. This study reveals that in the long and very long run government budget balance will rise by 33.3%, 36.4%, 40.2% and 43.4% in 2027, 2028, 2029 and 2030, respectively. This effect may be due to the transmission mechanism exist between capital flight, current account deficit, foreign reserves manipulation and government budget balance in the economy (see Table 5). Also, Table 6 results show rising annual growth from short run 2021 to the very long run 2030 for government budget

balance. The government budget balance witnessed an average positive annual growth difference of 3.8%.

Analysis of Simulation Results of Scenario 2

Scenario 2 aims to test the government income and budget balance effects of 50% increase on the actual capital flight growth rate. The same bench-mark values of 2019 in scenario 1 is simulated with 21.89%. With the growth rate of 21.89%, we ascertained the effects of capital flight on government income and government budget balance in Nigeria from 2020 to 2030, then compared to the base year (2019) values. Table 7-10 present the effects of 50% increase on the actual capital flight growth rate.

Table 7 from Scenario 2, presents the summary of parameters results of the values of the marginal effects on base year values, 2019, for the immediate and short run, medium run and long and very long run periods of the 50% rise on the actual AAGR of capital flight from Nigeria.

Table 8 from Scenario 2, shows summary of parameters results of the values of the marginal effect deviation from base year values of the 50% increase on the actual AAGR of capital flight from Nigeria

Table 9 from Scenario 2, illustrates the values of percentage (%) of marginal deviation from base year values based on Table 8 of the 50% increase on the actual AAGR of capital flight from Nigeria

Table 10 from Scenario 2 presents the values of the parameter’s marginal annual growth difference of the 50% increase on the actual AAGR of capital flight from Nigeria.

Simulation Results: Scenario 2														
Table 7: Result of 50% increase in the Actual AAGR of Capital Flight from Nigeria														
Summary of the Parameters Results														
Values of the Marginal Effects on Base Year Values														
Scenario Variables	Base Year Values	Immediate & Short Run Effect					Medium Run Effect			Long & Very Long Run Effect				Average Deviation
	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2020-2030	
Effects on Government Income and Budget Balance														
Government Income	0.723	0.625	0.629	0.632	0.634	0.635	0.632	0.624	0.591	0.577	0.548	0.531	0.605	
Government Budget Balance	0.542	0.604	0.637	0.681	0.704	0.779	0.814	0.876	0.907	0.925	0.988	1.071	0.817	

Simulation Results: Scenario 2														
Table 8: Result of 50% increase in the Actual AAGR of Capital Flight from Nigeria														
Summary of the Parameters Results														
Values of the Marginal Effect Deviation from Base Year Values														
Scenario Variables	Base Year Values	Immediate & Short Run Effect					Medium Run Effect			Long & Very Long Run Effect				Average Deviation
	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2020-2030	
Effects on Government Income and Budget Balance														
Government Income	0.723	-0.098	-0.094	-0.091	-0.089	-0.088	-0.091	-0.099	-0.132	-0.146	-0.175	-0.192	-0.118	
Government Budget Balance	0.542	0.062	0.095	0.139	0.162	0.237	0.272	0.334	0.365	0.383	0.446	0.529	0.275	

Source: Authors' Computations from Simulated Results of Structuralist NLPCG. AAGR for Base Period = 21.89%. The Base Year value has a Normalized index Price = 1.00. With constant exchange rate fluctuation and increasing flight of capital.

Scenario 2: Effect on Government Income and Budget Balance

Effects on Government Income

The simulation result Table 9 reveals that successive capital flight will not affect government income in the short and medium run, but in the long and very long run. In the long and very long 50% capital flight rise will cause government income to have percentage (%) of marginal effect deviation from base year values 2019 of -14.6% in 2028, -17.5% in 2029 and 19.2% in 2030. On the average, government income of Nigeria will reduce by 11.8% from 2020 to 2030. These values are invariably lower compared to Table 5 in scenario 1. Table 10, shows that government income will witness an annual average growth difference of -0.9% in scenario 2 compares to -0.3% in Table 6 scenario 1, between 2021 and 2030.

Effect on Government Budget Balance

The result in Table 9 shows that with 50% rise in capital flight capital flight scenario, government budget balance is invariably higher compare to Table 5 result. On the average government budget balance in Nigeria will rise by 27.5% from 2020 to 2030. Table 10, shows that 21.89% capital flight scenario will cause government budget balance to witness an annual average growth difference of 4.7% in scenario 2 compares to 3.8% in Table 6 scenario 1, between 2021 and 2030. This implies that, government budget balance will increase for all time as capital flight rate grows.

Simulation Results: Scenario 2													
Table 9: Result of 50% increase in the Actual AAGR of Capital Flight from Nigeria													
Summary of the Parameters Results													
Percentage (%) of Marginal Deviation from Base Year Values													
Scenario Variables	Base Year Values	Immediate & Short Run Effect (%)				Medium Run Effect (%)			Long & Very Long Run Effect (%)				Aver (%) Deviation
	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2020-2030
Effects on Government Income and Budget Balance													
Government Income	0.723	-9.8	-9.4	-9.1	-8.9	-8.8	-09.1	-09.9	-13.2	-14.6	-17.5	-19.2	-11.8
Government Budget Balance	0.542	6.2	9.5	13.9	16.2	23.7	27.2	33.4	36.5	38.3	44.6	52.9	27.5

Simulation Results: Scenario 2													
Table 10: Result of 50% increase in the Actual AAGR of Capital Flight from Nigeria													
Summary of the Parameters Results													
Values of the Parameters' Marginal Annual Growth Difference													
Scenario Variables	Base Year Values	Immediate & Short Run Effect				Medium Run Effect			Long & Very Long Run Effect				Average
	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2020-2030
Effects on Government Income and Budget Balance													
Government Income	0.723	-0.098	0.004	0.003	0.002	0.001	-0.003	-0.008	-0.033	-0.014	-0.029	-0.017	-0.009
Government Budget Balance	0.542	0.062	0.033	0.044	0.023	0.075	0.035	0.062	0.031	0.018	0.063	0.083	0.047

Source: Authors' Computations from Simulated Results of Structuralist NLPCG. AAGR for Base Period = 21.89%. The Base Year value has a Normalized index Price = 1.00. With constant exchange rate fluctuation and increasing flight of capital.

Comparative Analysis of Scenario 1 and 2

Table 11 illustrates the difference between percentage marginal deviation from base year values in Table 9, scenario 2 and Table 5, scenario 1. In other words, Scenario 2 minus Scenario 1.

Government Income:

Table 11 shows the percentage (%) difference between Table 9 in scenario 2 and Table 5 in scenario 1. The result shows that government income will have percentage difference between scenario 2 and scenario 1 of -0.9% in 2023 for the immediate and short run, -1.8% in 2026 for the medium run while, -3.9% in 2028 and -6.9% in 2030 for the long and very long run. And the average marginal deviation difference from base year values between Table 9 in scenario 2 and Table 5 in scenario 1 difference when compared to Table 5 in scenario 1 is -2.61%.

Table 11: Simulation Results: Values of Percentage (%) Difference Between Scenario 2 & Scenario 1

(Scenario 2 – Scenario 1)													
Scenario Variables	Base Year Values	Immediate & Short Run Effect (%)				Medium Run Effect (%)			Long & Very Long Run Effect (%)				Average (%) Deviation
Effects on Government Income and Budget Balance	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2020-2030
Government Income	0.723	-0.8	-0.9	-0.9	-0.9	-1.1	-1.6	-1.8	-3.6	-3.9	-6.3	-6.9	-2.61
Government Budget Balance	0.542	0.5	1.8	2.4	2.8	4.4	1.3	2.9	3.2	1.9	4.4	9.5	3.20

Source: Authors' Computations from Simulated Results of Structuralist NLPCG. AAGR for Base Period = 21.89%. The Base Year value has a Normalized index Price = 1.00. With constant exchange rate fluctuation and increasing flight of capital.

Government Budget Balance:

Also, the result in Table 11 shows that with 50% rise in the actual capital flight scenario government budget balance will have percentage difference between scenario 2 and scenario 1 of 2.8% in 2023 for the immediate and short run, 2.9% in 2026 for the medium run while, 1.9% in 2028 and 9.5 % in 2030 for the long and very long run. The simulation shows government budget balance has 3.2% average marginal deviation difference from base year values between Table 9 and Table 5. The result reveals that capital flight has positive effect on government budget balance from the immediate run to very long run.

CONCLUSION AND POLICY IMPLICATIONS

The objective of this study is to analyse the effects of capital flight on government income and budget balance in Nigeria over the period 2019–2030 and measure the magnitude of such effects on government budget balance and government income from the immediate, short, medium, long and long run period. Methodologically, the study used a Structuralist Computable General Equilibrium (SCGE) model of an archetype country to run simulations that indicate the nature of the dynamic effects of capital flight on Nigeria. Using a CGE model overcomes the limitation and ambiguity associated with an econometric model. This study carried out basic two scenarios' simulations of using the total average annual growth rate of capital flight from Nigeria, while the "base experiment 2019" in the set serves as comparator.

The study shows that the significant estimated propensities for capital flight from Nigeria will not be declined appreciably over the 2019-2030 period. The simulation scenarios results show that for each dollar that leaves Nigeria in the form of capital flight between 2020 and 2030 will reduce government income on the average, by 9.2% in scenario 1 and 11.8% in scenario 2. It also shows that, a continuous and persistent build-up of capital flight exerts a negative effect on government income. Government income will be better off when government prevent capital from fleeing abroad and give more attention to the prevention and repatriation of capital flight to mobilize domestic resources.

Also, the scenarios result reveal that government budget balance is positively related to capital flight in Nigeria. On the average, Government Budget Balance will rise by 24.3% in scenario 1 and 27.5% in scenario 2 from 2020-2030. The implication is that government budget balance will increase for all time capital flight and reduction in government revenue and government debt-servicing capacity. Capital flight can exacerbate a balance of payments crisis if, at the time the balance of payments difficulty is being experienced, capital outflows are taking place. This study demonstrated that for each dollar that leaves Nigeria in the form of capital flight government budget balance will raise to make up for the lost revenue either through tariff revenue or through direct tax revenue due to capital flight. For government budgets to meet with up with public service provision such as education and health and infrastructural development, government must result to external borrowing to meet up with the limited budgets for public spending and investment.

The findings from this study tend to confirm a priori expectations on the effect of capital flight on government income and government budget balance in the Nigeria. This study confirm that such capital flight is high in Nigeria and it will continue to rise over time. This disaggregated analysis provides insights into possible strategies to stem the country and continent's financial haemorrhage. This study shows that the Nigerian economy is very vulnerable to capital flight and the economy is affected by successive outflow of legal or illegal capital in the immediate, short, medium and very long term on growth items. This study provides a basis for recommendations.

Policy Recommendations

Following our analysis of the magnitude and the determinants of capital flight from Nigeria, we have proposed some strategies for curbing capital flight from Nigeria and also inducing repatriation of the hidden wealth stashed abroad. On the basis of our findings, strategies to curb capital flight should be designed to address following issues:

- i. **Plugging the Holes Through Which Money Leaks:** To curb capital flight, the focus should be on plugging the holes through which money leaks out of the countries. This would be done notably by increasing transparency and accountability in the management of government finances, including borrowed funds as well as domestically mobilized resources. Indeed, our analysis shows that a substantial fraction of borrowed funds is embezzled by the political elites and ends up fuelling capital flight.
- ii. **Transparency and Quality of Bilateral Trade Data:** Another key channel of capital flight that must be handled is trade misinvoicing. This requires reforms in the customs services and transparency in the recording of trade statistics to ensure consistency between the values reported by Nigeria and those recorded by their trading partners. Nigeria, with the support of their development partners, need to beef up the technological and human capacity of the customs services to improve the monitoring, tracking, and reporting of international trade.

- iii. **The Role of Multinational Corporations in Trade Misinvoicing:** Capital flight through trade misinvoicing is facilitated by the increasing dominance of intra-company trade which is monopolized by large multinational corporations (MNCs). Trade transactions between affiliates of the same company are vehicles for import and export misinvoicing, enabling to move money across borders, as well as transfer pricing, enabling companies to evade taxation through shifting profits into low-tax territories – the so-called secrecy jurisdictions.
- iv. **Balance of Payment Crisis:** In the midst of a BoP crisis, often purchase assets abroad in anticipation of an imminent currency devaluation or depreciation or “fleeing” their own domestic assets to purchase foreign assets (or capital) that now have a greater expected return. CBN established should a stable exchange rate regime. This will reduce capital flight and increase capital inflows in the form of foreign private investments. It will also boost private domestic investment
- v. **Monetary Policy, Financial Market Stability and Exchange Rate Policy Measures:** Overly expansionary monetary and fiscal policies, an incompatible exchange-rate policy, and a repressive set of financial policies designed to divert resources toward the public sector will cause widespread distortions and imbalances even in the short run. Also, CBN should introduce selective, targeted, and time-bound capital controls to stem outflows, especially outflows through banking channels. There is need for policy measures capable of further reducing the degree of misalignment in the country's exchange rate, by setting the rate at a realistic level with minimal control or influence so as to close the existing premium gap.
- vi. **Reduction of External Borrowing:** Accumulation of external debt appears to have over the years driven capital flight in Nigeria, therefore dependence on external borrowing needs to be reduced. Caution must be taken not to accumulate fresh external debt, but rather to take advantage of domestic borrowing to finance government expenditure where necessary. Domestic debt instruments appear to discourage capital flight; as private wealth holders perceive them as viable investment alternatives to moving wealth abroad. Government should thus depend more on domestic borrowing as a means of supplementing its resources.
- vii. **Functioning Institutions:** Finally, this study recommends that governments and policymakers must establishment of well-functioning political and judicial institutions that will ensure political stability within a country. This calls for the building and strengthening of institutions, which in the result was found to be a significant variable influencing domestic investment in Nigeria.

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