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# Constructing an Exchange Market Pressure Index: A Mechanism for Predicting Currency Crises in The Gambia

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## Abstract

The aim of this paper is to construct an early warning signaling mechanism (exchange rate market pressure index) for predicting currency crises in The Gambia. The analysis revealed that the Gambian economy suffered six major currency crises between 2002 and 2023. These episodes stemmed from both domestic and external shocks, with more vulnerability from domestic shocks. However, the observed pressures are mostly short-lived with market absorbing shocks, on average between 1-2 months. Importantly, a threshold has been determined to identify pressures in the forex market before a currency crisis.

*Keywords:* Exchange rate market pressure index, Currency crises, The Gambia<sup>1</sup>

## 1.0 Introduction

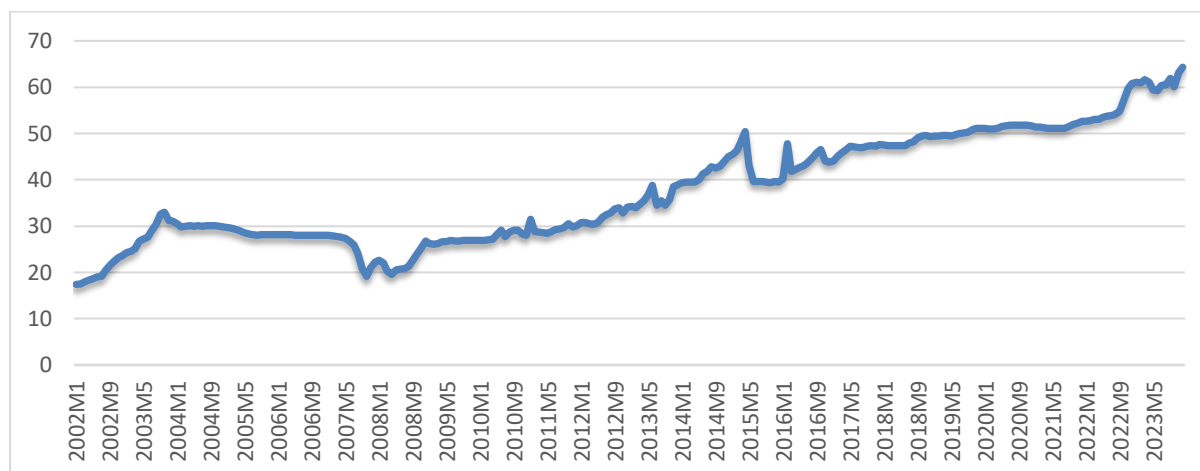
Exchange rates often undergo significant fluctuations, reflecting the underlying pressures of the foreign exchange markets; but relatively stables at other times, however, this stability does not essentially imply the absence of pressures (Klaassen & Jager, 2011). The stability could be due to the interventions of the monetary authorities to mitigate exchange rate fluctuations using policy instruments (high interest rates, purchase of domestic currency on the forex market, and or imposing restrictions on capital markets) (Klaassen & Jager, 2011).

The recent global turmoil (COVID-19 pandemic, and the Russia-Ukraine war etc.) has amplified exchange rate fluctuations in many emerging markets and developing countries and The Gambia is not an exception. Figure 1 shows an upward (depreciation) trajectory of the Dalasi against the US dollar.

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<sup>1</sup> Views expressed in this paper are that of the author and not the Central Bank of The Gambia. The author has supplied an Excel spreadsheet containing computation of the index (<http://dx.doi.org/10.13140/RG.2.2.34617.38248>), which researchers and policymakers can utilize to replicate the methodology.

**Figure 1: Gambian Dalasi/ US Dollars**



Considering the economic and the societal costs of a currency crisis, developing a precise signaling mechanism is unquestionably critical. To develop early warning signals for potential currency crises, the exchange rate market pressure index was proposed by Girton and Roper (1977), which was further developed by (Eichengreen et al., 1995; Sach et al., 1996; Weymark, 1997). Waymark (1997) stated that “exchange rate market pressure on a currency is its excess supply on the foreign exchange market if policymakers would be passive, that is, refrain from actions to offset that excess supply, where this positive (negative) excess supply is expressed in the relative appreciation (depreciation) required to remove it.” Thus, for other exchange rate regimes (pegged) the EMP measures the depreciation-equivalent of surplus supply in the counterfactual of a passive policymaker and for floating regimes it corresponds with the observed depreciation (Klaassen & Jager, 2011; McFarlane, 2010). To sum it up, if an economy has bad fundamentals (overvalued real exchange rate and low level of international reserves relative to liquid liabilities) (Feridun, 2009) it will be “the likely victim of a currency crisis” (Sachs et al. 1996, p. 9). And considering the economic and the societal costs of a currency crises, developing a precise signaling mechanism is unquestionably critical.

Thus, this study attempts to construct an EMPI as an early warning signal for potential currency crises for Th Gambia. The construction of this EMPI is critical for exchange rate management and foreign exchange market interventions. Furthermore, it will help monetary authorities to comprehend the intensity of such pressures when they arise and act accordingly.

The rest of the paper is organized as follows: section 2 explains the methodology of the EMPI; section 3 shows the analysis of the computed EMPI; chapter 4 presents the conclusion and recommendation. The paper has a supplementary excel file for the calculation of the said index.

## 2.0 Methodology

The study uses monthly time series data obtained from Central Bank of The Gambia Data warehouse<sup>2</sup> from 2002M1 to 2023M12 using the EMPI model-independent (applicable under all exchange rate regimes) proposed by Eichengreen et al. (1995). The index entails weighted averages of normalized changes in the exchange rate, the ratio of international reserves to M1, and the nominal interest rates. The EMPI is computed as:

$$EMPI = \alpha \Delta e_t + \beta \Delta i_t - \gamma \Delta r_t$$

Where:  $\Delta e_t = \frac{exc_t - exc_{t-1}}{exc_{t-1}}$ ;  $\Delta i_t = (i - i^*)$  and  $\Delta r_t = \frac{NFA_t - NFA_{t-1}}{M1_{t-1}}$

$$\alpha = \frac{1}{\sigma_e} \quad \beta = \frac{1}{\sigma_i} \quad \text{and} \quad \gamma = \frac{1}{\sigma_r}$$

where  $\alpha$ ,  $\beta$ , and  $\gamma$  are the weights (the inverse of the standard deviation of  $\Delta e_t$ ,  $\Delta i_t$ , and  $\Delta r_t$ , respectively). To ensure that the assigned weights reflect the impact of the variables in the index, I applied the precision approach. The value  $\Delta$  is monthly percent change,  $e_t$  is the nominal exchange rate of the Gambian dalasi/ U.S dollar,  $i_t$  is the domestic interest rate (three-month T-bills rate),  $i^*$  corresponds to the same variable for the United States<sup>3</sup>,  $r_t$  is the ratio of net foreign asset (NFA) to narrow money (M1) and  $t$  is period .

### 2.1 Identifying a Currency Crises

Feridun, (2009, p.9) stated that ... “a positive value of the index indicates increased pressure in the exchange market, which can stem from any combination of a devaluation, an expansion of the interest rate spread, or a loss of international reserves”. Furthermore, Eichengreen et al. (1996) describes a crisis as when the EMPI value is higher than  $1.5\sigma$  of the whole sample’s means value. This is shown as:

$$Crisis = 1 \text{ if } EMPI_t > \mu_{EMPI} + 1.5\sigma_{EMPI}$$

$$Crisis = 0 \text{ otherwise,}$$

Where  $\mu_{EMPI}$  and  $\sigma_{EMPI}$  denote the respective mean and the standard deviation for the entire sample of the EMP index.

<sup>2</sup> <https://gambia.datawarehousepro.com/>

<sup>3</sup> <https://fred.stlouisfed.org/series/TB3MS>

### **3.0 Analysis of the EMPI**

The EMPI presented in Figure 2 shows that the Gambian economy during the 22-year sample period between 2002 and 2023, suffered six major currency crises: the collapse of the groundnut harvest of 2002-2003, the 2008 financial crises, the Arab Spring of 2011, the 2016 election year, the COVID-19 pandemic in 2020 and the restriction of foreign currency deposit withdrawals (FCD) in 2022. Furthermore, a crisis is identified when the EMPI is greater than 2.5 threshold, which is computed based on the approach proposed by (Eichengreen et al., 1996).

First, the exchange rate market pressure can be between 2002 and 2003 can be attributed to the collapse of the groundnut harvest of 2002 which resulted in a 3% contraction in GDP in 2003. Moreover, “poor execution of monetary and fiscal policy, reflecting serious deficiencies in governance, caused the exchange rate to depreciate (IMF, 2004).” Consequently, the dalasi (GMD) depreciated by 45% and 60% against the US dollar and Euro at end December 2003.

Second, during the 2008 global financial crises (GFC) the Gambian dalasi experienced various pressure starting from September 2008 and lasted for four months. This might have been triggered by the collapsing trade and capital flows brought by the GFC, creating considerable balance of payment (BOP) gap, and eventually rapid depreciations and higher exchange rate volatility (Kaendera, 2009).

Third, the dalasi experienced another crisis in January 2011, during the start of the Arab spring and toward the end of the sovereign debt crises of 2010. These events might have affected GMD via numerous channels. The ripple effects as a result of trade and investment connectedness with affected nations. Furthermore, volatility in global commodity prices coupled with high borrowing costs and declined in remittances flows to The Gambia due to economic turmoil in crisis-hit countries might have contributed to the pressure on the GMD.

Fourth, coinciding with an election year, the GMD experienced its highest peak pressure in February 2016. This pressure can be explained by the decline in net foreign assets by 80% between January to February 2016. Moreover, prior to this episode executive directive attempted to stabilize the GMD by pegging it against the U.S. dollar at 35-40 GMD (CBG, 2016). However, due to the low levels of foreign reserves (decline in foreign reserve by 80% between January to February 2016), deteriorating BOP and debt servicing obligations, the peg eventually collapsed (CBG, 2016). Although the peg was lifted in

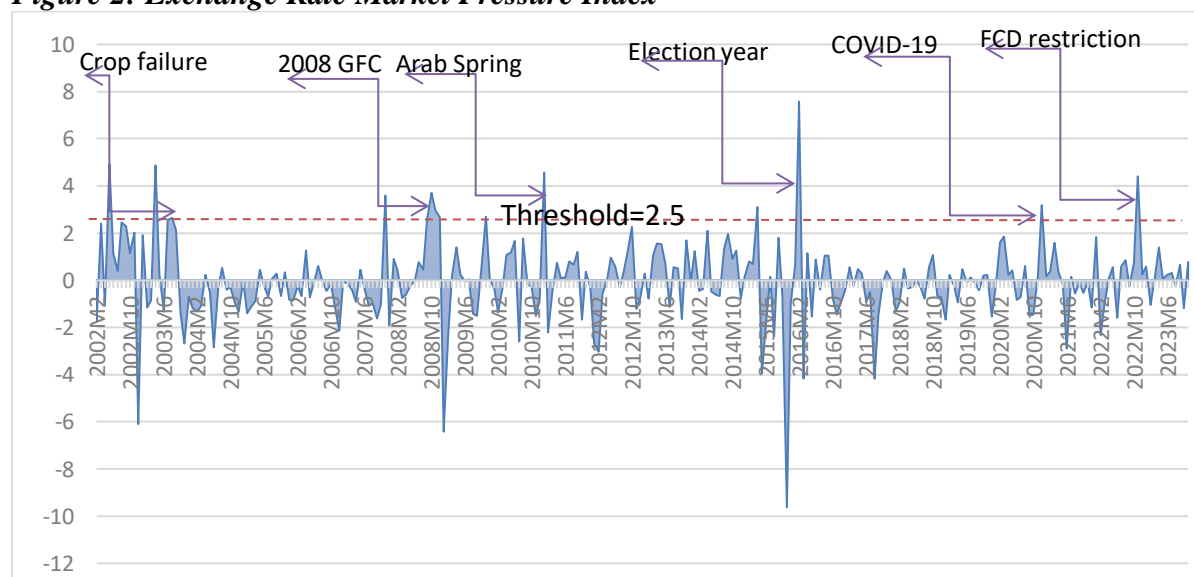
January 2016, but it created uncertainties in the forex market causing the highest exchange rate crises over the sample period but eventually stabilized the following month.

Fifth, another crisis was observed during the peak period of the COVID-19 pandemic in 2020 December. COVID-19 led to prevalent uncertainty, resulting in appreciation of the dollar against many currencies due to the search for safe-haven currencies.

Finally, the GMD suffered another crisis in November 2022, this might be attributed to the CBG directive to restrict the withdrawal from foreign currency denominated accounts was issued in May 2022 with the hope of stabilizing the GMD. As shown in Figure 1, the EMPI was at negative value months prior to the directive (indicating no pressure or even appreciation), but suddenly became positive afterward (exchange rate pressure). Although the directive was rescinded three months later (September 2023) but was too late to prevent a crisis due to the uncertainties in the forex market before stabilizing in the following month.

In summary, the pressure on the GMD reaches its peak in 2016-elections year, followed by 2002-2023 collapse groundnut harvest and the restriction of foreign currency deposit withdrawals in 2022. However, these pressures mostly did not last long, on average the market absorbs the shocks between 1-2 months.

**Figure 2: Exchange Rate Market Pressure Index**



Note: computed by author, FCD denotes foreign currency denominated deposit accounts, GFS is the 2008 global financial crises.

#### 4.0 Conclusion

An exchange rate market pressure index is constructed herein to serve as an early warning signaling for currency crises in The Gambia. The methodology of Eichengreen et al. (1995) is used in constructing the EMPI using monthly data from 2002:M1 to 2023:M12. The analysis

identifies six major currency crises in The Gambia: 2002-2003, 2011, 2008, 2016, 2020 and 2022. Moreover, the results indicate that the shock to the GMD is short-lived, indicating absence of long memory effects. Furthermore, the index was able to identify a buildup in the forex market before a currency crisis. Moreover, the index suggests that the dalasi is vulnerable to domestic and external shocks but more susceptible to domestic shocks.

The following recommendations are made:

- Two out of the six major crises are attributed to directives issued by the authorities; this is an indication that monetary authorities should desist from issuing directives in an attempt to stabilize GMD.
- Monetary authorities should actively track the EMPI to be able to detect pressures in the forex market before they materialize and intervene according (sale or purchase of forex).
- Implementation of effective exchange rate management policies.
- Since the dalasi is highly vulnerable to domestic shocks, the authorities must priorities domestic economic stability through prudent fiscal management.
- Authorities should foster economic diversification to reduce the impacts of shocks on highly susceptible sectors (agriculture and tourism), towards manufacturing and services.
- Embrace climate mitigation and adaptation strategies to mitigate the effects of climate-related shocks on the vulnerable sectors.

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