IFG Progress Digest

Unveiling Total Pressure of Rupiah's Volatility

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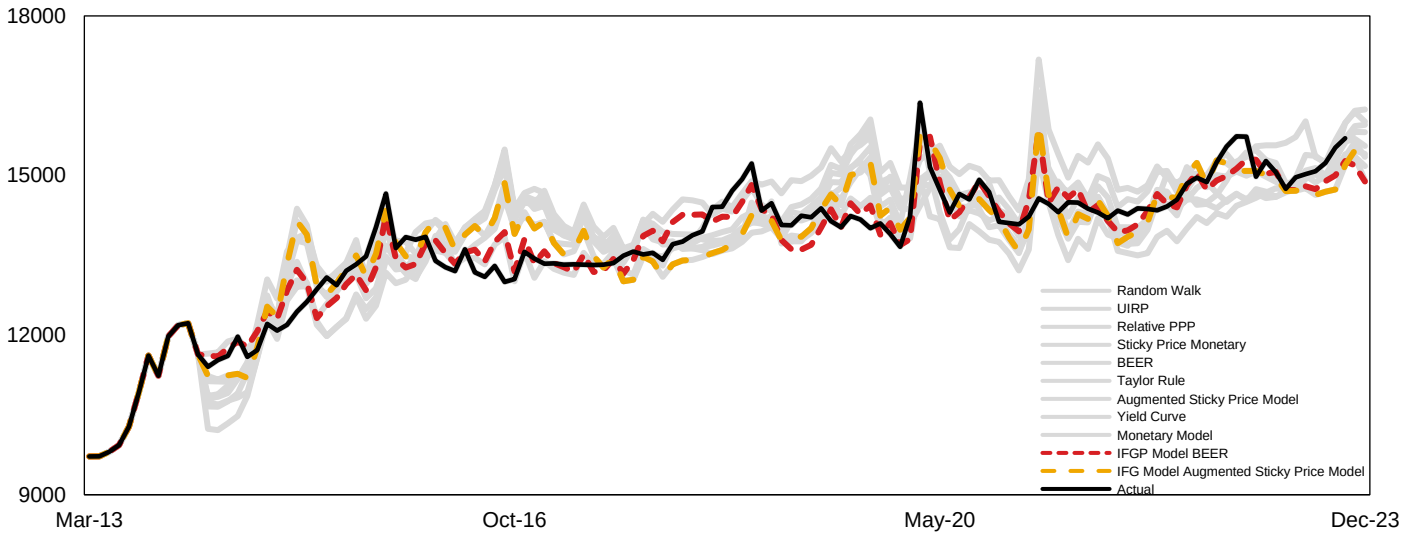
- *On September 11, 2023, our report on Indonesia's exchange rate was published, projecting a strong Rupiah with robust economic fundamentals, expected to hover around Rp14,800 – Rp15,200. However, it also warned of the potential for the Rupiah to overshoot to Rp15,600 – Rp15,900, which subsequently occurred. The report also noted the importance of Bank Indonesia's policies in managing the currency, such as its Foreign Exchange Intervention (FXI);*
- *To include the role of FXI into our analysis of Rupiah's path and the total pressure it currently experiencing, we build eight indices of Exchange Market Pressure (EMP) and three Resistance Indices. Regular updates of these indices will be available at ifgprogress.id.*

On 11th of September 2023, we published Economic Bulletin (EB) – Issue 34 Indonesia's Exchange Rate: Fundamental Value & Path (Exhibit 1), which describes the movement of the Rupiah, both in terms of fundamental value and also the potential of Rupiah to overshoot using ten different models. Regarding fundamental value, the Rupiah is a relatively strong currency with strong economic growth and managed inflation. Our EB estimated, with these strong fundamentals, the Rupiah will revolve around Rp14,800 – Rp15,200 until the end of 2023. In that same publication, however, we also stated that there's a potential for the Rupiah to overshoot to Rp15,600 – Rp15,900, with four out of ten models resulting in that range. As of this paper being written (30th of October 2023), the Rupiah has revolved around ±Rp15,900 level, the highest-level excluding COVID-19 and the Asian Financial Crisis.

Exhibit 1. Rupiah Projection From Economic Bulletin (EB) – Issue 34 Indonesia's Exchange Rate: Fundamental Value & Path



Source: IFGP Research.

Though the accuracy and precision of our models are very high, one weakness, among several, is that we didn't include the role of Bank Indonesia's (BI) response through its policy instrument. Bank Indonesia's policy instrument, such as Foreign Exchange Intervention (FXI), is crucial in managing Rupiah's level. From August to September 2023, the FX reserve has dropped more than 2 billion US$, and we expect this to decrease even further to contain the pressure the Rupiah has experienced recently. To further complement our model and dissect the real "pressure" of the Rupiah before being absorbed by FX reserve, in this IFG Progress Digest #15, we build several indices to monitor a more comprehensive "pressure" of the Rupiah by incorporating Bank Indonesia's FXI.

Exhibit 2. Literature Study

No	Study	EMP Index	Variables	Notes
1	Girton & Roper (1977)	$\frac{de}{e}+\frac{dR}{M_0}$	Exchange rate, Foreign Exchange Reserve, Monetary Base	X
2	Eichengreen, Rose, and Wyplosz (1994) & Forbes (2002)	$\alpha\frac{de}{e}+\beta d(i-i^*)-\gamma\frac{(dR-dR^*)}{M_1}$	Exchange rate, Foreign Exchange Reserve, Monetary Base, Interest Rate	X
3	Weymark (1995)	$\alpha\frac{de}{e}+\beta\frac{dR}{M_0}$	Exchange rate, Foreign Exchange Reserve, Monetary Base	X
4	Sachs, Tornell and Velasco (1996)	$\alpha\frac{de}{e}-\gamma\frac{(dR-dR^*)}{R}$	Exchange rate and Foreign Exchange Reserve	X
5	Kaminsky and Reinhart (1999)	$\alpha\frac{de}{e}+\beta\frac{dR}{R}$	Exchange rate and Foreign Exchange Reserve	REER rather than NEER
6	IMF (2007)	$\frac{1}{\sigma_{\Delta\%er_{i,t}}}\Delta\%er_{i,t}+\frac{1}{\sigma_{\Delta res_{i,t}}}\Delta res_{i,t}$	Exchange rate and Foreign Exchange Reserve	X
7	Aizenman, Lee and Sushko (2012)	$\alpha\frac{de}{e}+\beta d(i-i^*)-\gamma\frac{(dR-dR^*)}{R}$	Exchange rate, Foreign Exchange Reserve, Interest Rate	X
8	Aizenman, Chinn and Ito (2016)	$\alpha\frac{de}{e}+\beta d(i-i^*)-\gamma\frac{(dR-dR^*)}{R}$	Exchange rate, Foreign Exchange Reserve, Interest Rate	X
9	Patnaik, Felman and Shah (2017)	$\frac{de}{e}-\alpha dR$	Exchange rate & Foreign Exchange Reserve	Data limitation
10	Frankel (2019)	$\Delta log(H_t)+(\Delta Res)/MB_t$	Exchange rate, Foreign Exchange Reserve, Monetary Base	X

Source: Various, IFGP Research. Note: These ten models are only the selected few of EMP's variation and does not represent the whole variation

To capture the impact of BI's monetary policy, mainly the influence of its foreign exchange reserve in holding the pressure of the Rupiah, we build eight different indices (in the reference above, we have ten indices; however, we see that two of them are not relevant to our objectives due to the use of dependent variable and data limitation) to capture the dynamics of foreign exchange reserve and Rupiah. These indices are commonly known as the Exchange Market Pressure (EMP) Index.

$$EMP = f(Exchangeratemovement, interestrate, andreserve)$$

$$\Delta EMP \geq 0;\ Pressure\ \uparrow$$

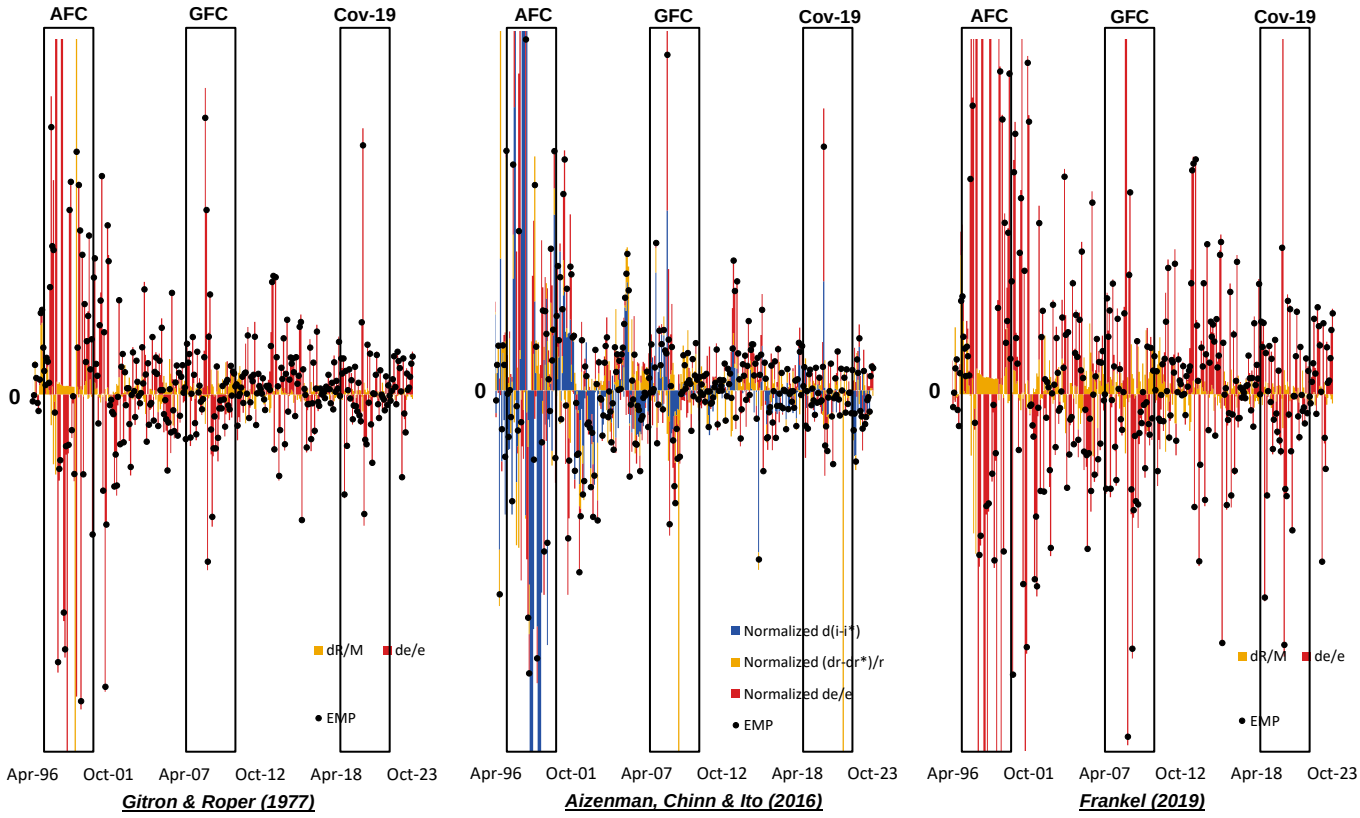
$$\Delta EMP \leq 0;\ Pressure\ \downarrow$$

EMP, named by Girton & Roper (1997), firstly defined as the sum of exchange rate (depreciation or appreciation) and reserve (inflow or outflow). In the first EMP, Girton & Roper (1997) assumed that the supply and demand of US Dollar is the representation of world monetary condition. An increase in EMP indicates that Rupiah also experiencing a depreciation, *vice versa*.

From 1977 to 2019, EMP has evolved in many ways, from assuming that the intervention from foreign exchange

reserves was unsterilized, uniform weight from all indicators, precise weight through econometrics approach, and others (Exhibit 2). We build all the indices from 1977 to 2019 to compare their performances and select the best indices that fit and answer the objective of this paper. Eight indices that we mentioned above can be seen in the Appendix. We picked three EMPs for our analysis, the first EMP from Girton & Roper (1997), the second EMP from Aizenman, Chinn, and Ito (2016), and the last EMP from Frankel (2019), to summarize the analysis of this paper.

Exhibit 3. 3 Chosen EMP Indices



Source: Gitron & Roper (1977), Aizenman, Chinn & Ito (2016), and Frankel (2019), IFGP Research. Note: The black dot is the level of EMP index. The scale of indices is not shown as they have different scales due to their weighting. Value greater than 0 indicates more pressure, *vice versa.* For October data, we use Rupiah's level at Rp15,900.

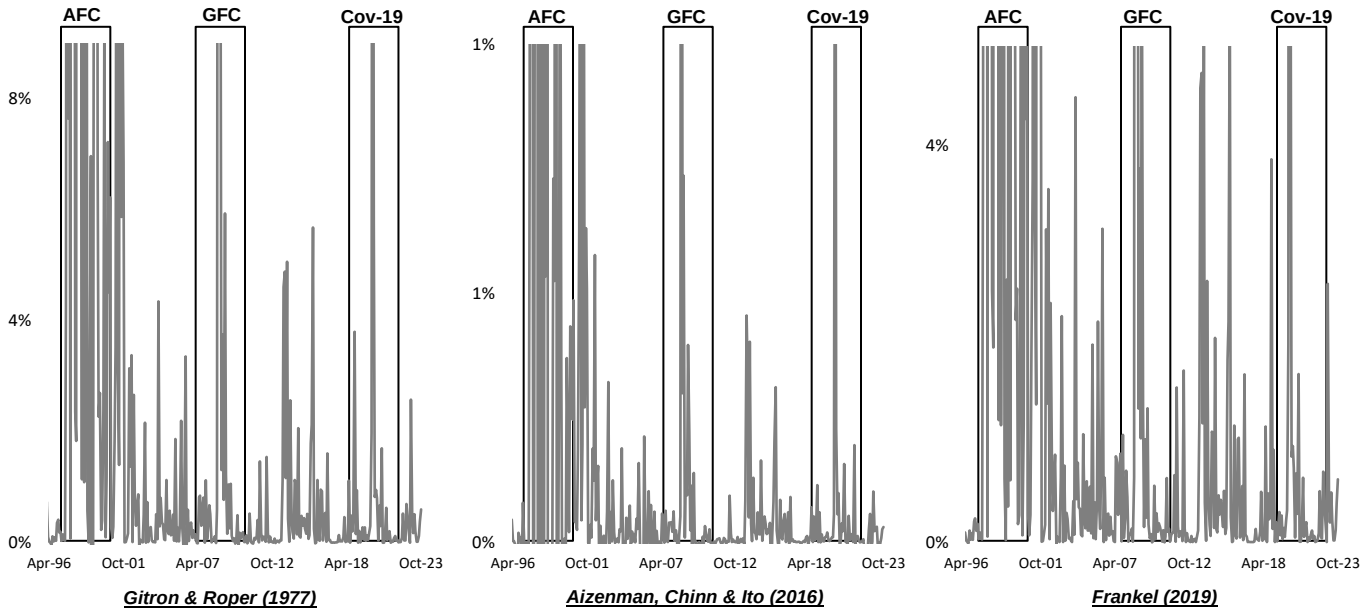
Exhibit 3 above shows the movement of our three EMP indices. The first and the third indices used the same indicators, while the second used one additional indicator. The indicators that we use are 1) USD-IDR (nominal exchange rate), 2) Foreign Exchange Reserve (Broad terms, including gold, SDR, and others), 3) Interest rate, and 4) Monetary Base. From the three case studies that we use, the Asian Financial Crisis (AFC 1997), the Global Financial Crisis (2007 – 2008), and the Covid-19 Crisis (2020), all three indices have successfully captured the total pressure on the Rupiah exchange rate from all three cases. The differences come from the magnitude of its methodology. Furthermore, all three indices also showed their ability to capture another high-volatility environment, for example, in 2001 (dot.com bubble), 2004 (Oil Fluctuation), 2013 (Oil Fluctuation), and others (Exhibit 3).

From Exhibit 3, we can also learn that the role of foreign exchange reserves in "absorbing" or "Resisting" the total

pressure from foreign exchange rates is relatively limited in period outside our case studies. This condition partly reflected by the recent Rupiah's volatility and BI's stance. BI's choice of Policy mix by switching from using foreign exchange reserves to 7D reverse-repo can be explained by two reasons, 1) The source of the shock, and 2) The cost of foreign exchange reserves intervention. One of the main cause of Rupiah's volatility is from the narrowing of the interest rate differential between BI policy rate and the U.S. FED fund rate. This in turn create spill-over effect and pressure Rupiah. At the beginning, through many of its statements, BI's choice of policy still focuses on FXI, both in primary and secondary market.

However, as what our EMPs have shown above, BI's FXI can't fully "absorbed" the pressure, even more so when the source of the shock comes from interest rate differential. Furthermore, based on Chutasripanich & Yetman (2015), intervention costs will be exceptionally high when exchange rate movements are driven by interest rate shocks. These conditions can partly justify the sudden, surprising, and contradictive policy rate hike by BI from many of its previous statements. To extend and complete our analysis, we also build a resistance index from three indices in Exhibit 3 following IMF (2007).

Exhibit 4. 3 Chosen Resistance Index Derived from EMP Indices



Source: IFGP Research. Note: the calculation of this index follows IMF (2007).

IMF (2007) defined resistance index as follows:

$$Resistance\ Index_{i,t} = 1 - \frac{\Delta\%er_{i,t}}{\sigma_{\Delta\%er_{i,t}} EMP_{i,t}}$$

The index is standardized between 0 – 1 where 0 indicates that there's no resistance to the pressure or in other words, exchange rate float freely, whether intended or unintended. Conversely, if the index is equal to 1, it indicates that the pressure is completely absorbed or resisted. The value of the resistance index will give us some guidance on the degree of sterilization or commitment of BI in managing volatility of Rupiah using foreign exchange reserves.

In all three resistance indices, except from our three case studies, foreign exchange reserves showed relatively low resistance. Outside the case study, the resistance magnitude is always below the 10% level, even lower for the Aizenman, Chinn & Ito-based index. This means that, from the total pressure coming to Rupiah, the foreign exchange reserve only "absorbs" below 10% of the pressure (Exhibit 4)[1].

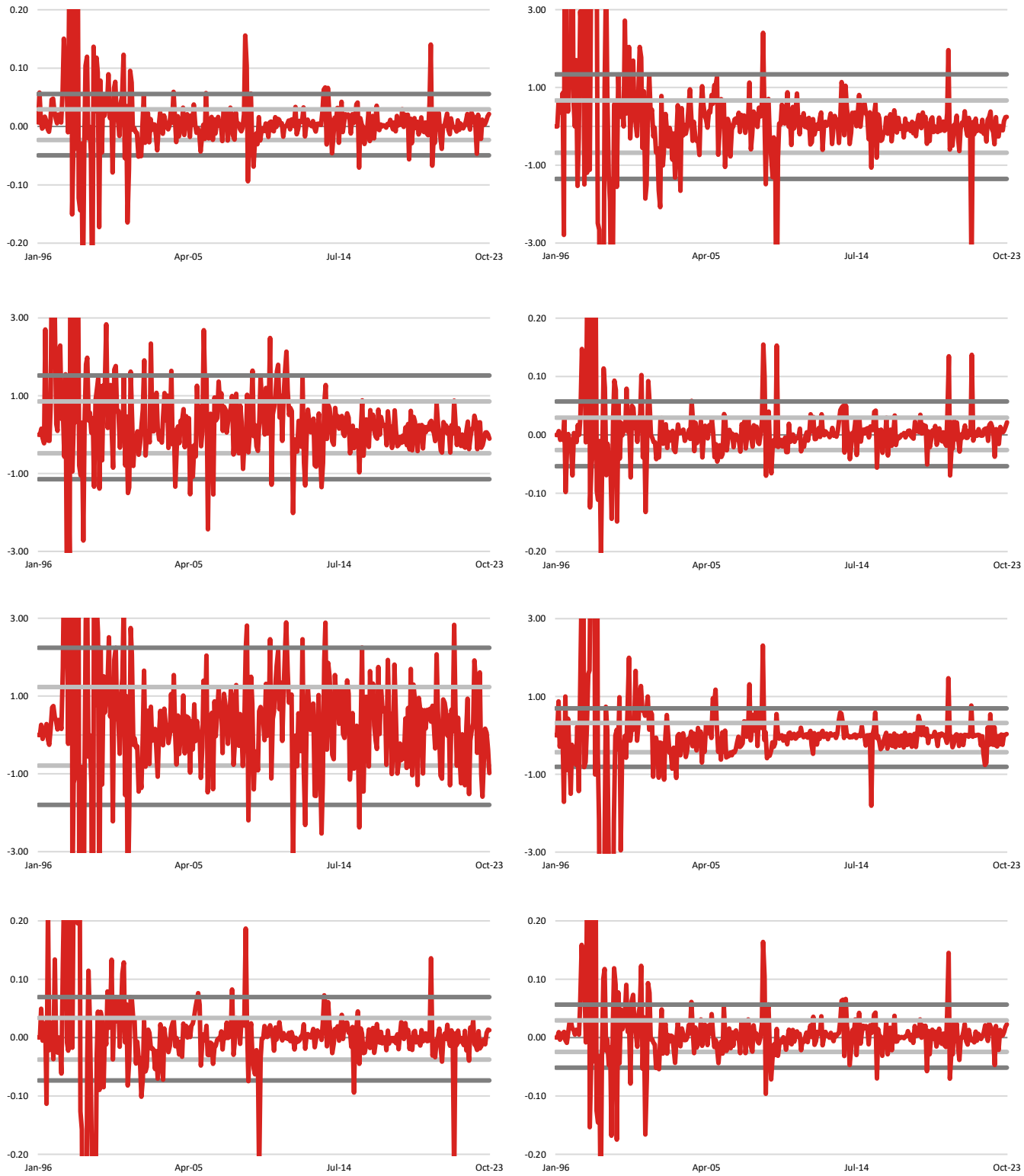
In recent developments, particularly between June'23 and Oct'23, an increased tension between Palestine & Israel, along with Ukraine & Russia; OPEC+ maintain its cut in oil supply, monetary tightening by the U.S. FED, El-nino, and sluggish growth from China seemed to push volatility and uncertainty back upward. These phenomena give Rupiah a strong pressure as captured by all three EMPs which shows an upward trend, indicating an increase in pressure. Nevertheless, when we compare the pressure to the previous episodes of high EMP, the pressure that we recently experienced is still below the three cases (AFC, GFC, Cov-19) or even other cases such as 2001 (dot.com bubble), 2004 (Oil Fluctuation), 2013 (Oil Fluctuation) and others, at least for now.

In conclusion, capturing and dissecting total pressure, including the absorbed and resisted pressure by the foreign exchange pressure, is essential in depicting the whole picture of the Rupiah. Exchange Market Pressure (EMP) along with the Resistance Index will give an additional analysis that will complete our previous paper (Economic Bulletin (EB) – Issue 34 Indonesia's Exchange Rate: Fundamental Value & Path). We will update both indices periodically through our website at https://ifgprogress.id/.

[1] Looking at the Effectiveness of this absorption level and which shock can be absorbed is beyond the scope of this paper. Many studies have also addressed this issue (Effectiveness: Juhro & Azwar (2021), Rakhmat, Warjiyo and Handoyo (2020), and others; Effectiveness based on the origin of shock: For Indonesia's specific case, we haven't found a proper study)

Appendix

Appendix 1. 8 Indices of Exchange Market Pressure (EMP)



Source: IFGP Research.

Appendix 2. References

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Source: IFGP Research.

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