Photo: WFP/Tobias Flaemig

Exchange rate monitoring
## Guidance note

WFP VAM | Food Security Analysis

Why exchange rates?

Exchange rate fluctuations can impact food prices and, consequently, **access to food**. If the local currency depreciates relative to the USD, food imports get more expensive. This leads to a rise in domestic food prices for imported items and, through substitution of these items with less expensive ones and shifting consumption, to increasing domestic food prices in general. At the same time, food exports become more competitive. Ensuing higher export demand can also drive up domestic food prices. Moreover, if a currency rapidly loses value, holding on to food commodity stocks can be perceived as a more reliable form of saving than keeping local currency and lead to lower food availability in the market.

Looking at exchange rate movements together with food price inflation for Egypt, it is evident that the steep depreciation of the Egyptian pound in

November 2016 coincided with accelerated food price inflation (figure 1). Within four months, year-on-year food inflation hiked up from less than 14 percent in October 2016 to more than 40 percent in February 2017, before returning back to normal levels in 2018 when the exchange rate stabilized.

Figure 1: Exchange rate and food price inflation in Egypt
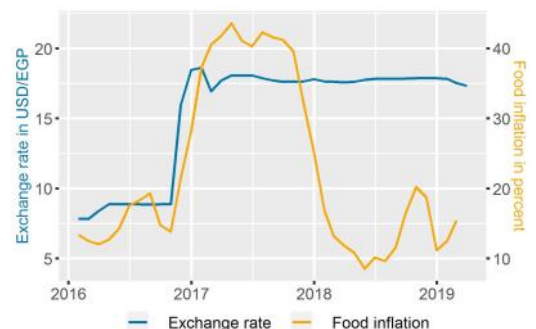
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Currency exchange jargon

In general, there are **two different perspectives** when measuring rates. For example, you can think of velocity in terms of the distance covered within an hour or in terms of the time necessary to move a kilometer, that is, $^{km}/_h$ or $^h/_{km}$. Accordingly, a change in velocity from, for example, 2 $^{km}/_h$ to 4 $^{km}/_h$ can also be expressed as a change from 0.5 $^h/_{km}$ to 0.25 $^h/_{km}$. While the first implies an increase by 100 percent in distance covered within an hour, the second implies a 50 percent decrease in the time necessary to cover one kilometer. Whether it is more sensible to think about the change as a 100 percent increase or a 50 percent decrease, depends on the context (i.e. whether the time or the distance is fixed) as well as conventions.

Correspondingly, there are two different perspectives when it comes to exchange rates. You can ask how many Local Currency Units (LCU) are needed to buy a USD; or what share of a USD you can buy with one LCU. In other words, you can think of an exchange rate in terms of $^{LCU}/_{USD}$ or $^{USD}/_{LCU}$. Staying with the numbers above, this means thinking of a change from 2 $^{LCU}/_{USD}$ to 4 $^{LCU}/_{USD}$ as a 100 percent (positive) change in $^{LCU}/_{USD}$; or a 50 percent (negative) change in $^{USD}/_{LCU}$, from 0.5 $^{USD}/_{LCU}$ to 0.25 $^{USD}/_{LCU}$. Again, the context decides which viewpoint is more sensible. If interested, for example, in the cost in LCU to import a certain quantity of wheat, it is useful to think in terms of $^{LCU}/_{USD}$: an exchange rate movement from 2 $^{LCU}/_{USD}$ to 4 $^{LCU}/_{USD}$ implies that the import costs will rise by 100 percent in LCU, provided the import price of wheat in USD stays the same. However, when interested in how much wheat a fixed quantity of LCU buys, thinking in terms of $^{USD}/_{LCU}$ is helpful — the exchange rate movement implies that the quantity you can purchase decreases by 50 percent.

Exchange rates for low- or middle-income countries are typically quoted in $^{LCU}/_{USD}$. This is called "**direct quotation**" and also referred to as "USD/LCU" or "USDLCU", where the USD is the base currency equal to one and the LCU is the quote currency. Conversely, $^{USD}/_{LCU}$ is called the "**indirect quotation**" and also referred to as "LCU/USD" or "LCUUSD", where the LCU is the base currency and the USD is the quote currency. **While exchange rates are commonly quoted directly, the depreciation or appreciation of the LCU refers to a change in the value of one LCU or the indirectly quoted rate; that is, exchange rates and their changes are typically reported within two different frameworks.**

While mixing up direct and indirect quotation does not have major implications on depreciation or appreciation in the example in the table below (e.g. referring to 12.3 percent instead of 10.9 percent depreciation of the LCU), in other cases it can lead to statements that do not make sense. The Argentine peso was traded at an average rate of 17.37 USD/ARS in October 2017 and 39.40 USD/ARS a year later (figure 2). Between October 2017 and 2018, the USD appreciated by 126.8 percent against the Argentine peso; while the Argentine peso depreciated by 55.9 percent against the USD. Mixing up direct and indirect quotation in this case would lead to the statement that the Argentine peso depreciated by 126.8 percent. However, what does a depreciation by more than 100 percent mean? That the exchange rate between the Argentine peso and the USD has fallen below zero?

Figure 2: Exchange rate of the Argentine peso
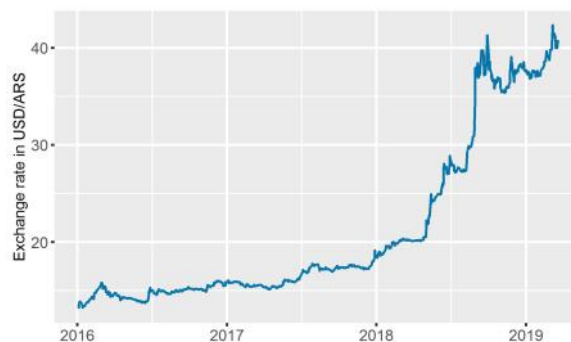
A more subtle distinction to keep in mind when talking about currency value losses — **devaluation** versus **depreciation**. This is linked to the type of exchange rate regime, whether the currency is pegged or floats. When a government lowers a (pegged) currency's value, the currency devaluates. Meanwhile, when market forces determine a (floating) currency's value loss, the currency depreciates.

Note that, counter-intuitively, a rising graph of the exchange rate reflects a value loss of the currency — assuming that the exchange rate is quoted directly, which is typically the case — as shown in figure 2.

Quotation					Value			Difference		Percentage change	
Type	Notation	Base currency	Quote currency	Formula	e_{t-1}	e_t	Interpretation	$e_t - e_{t-1}$	Interpretation	$(e_t - e_{t-1})/e_{t-1}$	Interpretation
Direct	USD/LCU	USD	LCU	$^{LCU}/_{USD}$	23.6	26.5	1 USD buys 26.5 LCU at time t	2.9	1 USD buys 2.9 LCU more at time t than at time t-1	0.123	The USD appreciates by 12.3% relative to the LCU
Indirect	LCU/USD	LCU	USD	$^{USD}/_{LCU}$	$^1/_{23.6}$	$^1/_{26.5}$	1 LCU buys 0.038 USD at time t	-0.004	1 LCU buys 0.004 USD less at time t than at time t-1	-0.109	The LCU depreciates by 10.9% relative to the USD

How do we monitor exchange rates?

We monitor exchange rates by keeping track of their movements and flagging those currencies that lose value at an abnormally high rate; or whose value loss accelerates unusually fast. This is the purpose of DataViz Economic Explorer's 'Currencies – Global' dashboard. We create alerts and establish currency hotspots based on (but slightly adjusting) the criteria suggested in a seminal paper[1] on currency crashes. Considering the year-on-year change

$$\Delta_t = 100 \ (\log e_t - \log e_{t-12})$$

where e_t denotes the USD/LCU rate for month t, we raise an **alert** if one of the following two conditions holds,

1) Year-on-year, the USD appreciates by at least 25 percent relative to the currency in question, $\Delta_t \geq 25$

2) Year-on-year, the USD appreciation relative to the currency in question accelerates by at least 10 percent, $\Delta_t - \Delta_{t-12} \geq 10$.

If both conditions (1) and (2) apply, we declare a currency **hotspot**. Figure 3 illustrates this for the case of Argentina.

*Figure 3: Exchange rate of the Argentine peso*
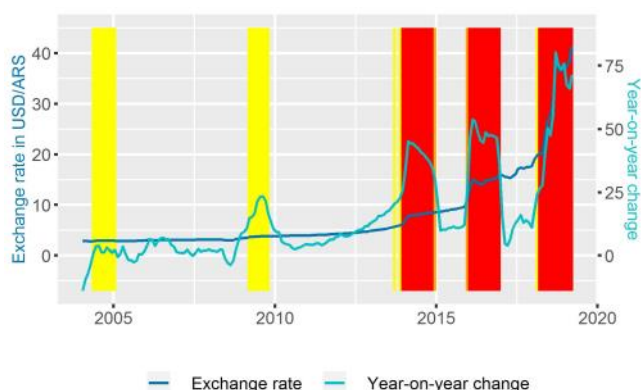
Notes: Orange and yellow areas indicate when an alert is raised according to conditions one or two, respectively; red areas when a hotspot is declared.

While the 'Currencies – Global' dashboard focuses on official exchange rates, we also record unofficial/**black market exchange rates**. Whenever such data are available, we include them in DataViz Economic Explorer's 'Prices' section.

If there is a black market rate, it exists in parallel to the official exchange rate. It is determined freely in the black market, which caters to excess supply or demand for foreign exchange. The latter results from government control of foreign exchange, a precondition for a black market to emerge. Such intervention typically happens when a government tries to keep the exchange rate at a certain level, maintaining some form of a pegged regime.

Figure 4: Official and unofficial exchange rates in South Sudan
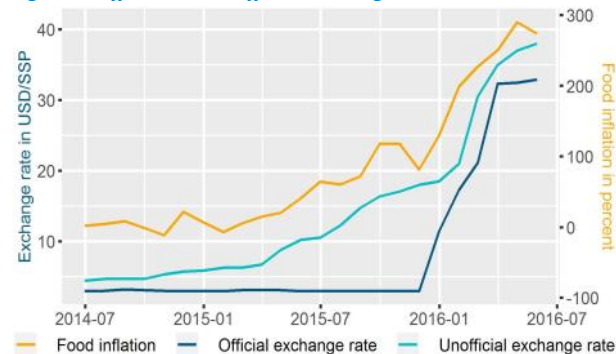
When importers procure foreign exchange at the unofficial instead of the official rate, domestic food price inflation reflects changes in the cost of food imports according to the black market rate. We see this, for example, in South Sudan (figure 4). While the official exchange rate remained stable at around 3 USD/SSD until November 2015, food price inflation increased continuously over the course of the year, surpassing 100 percent in October 2015. However, rapidly rising domestic food prices did not come as a surprise when considering that on the black market the South Sudanese pound lost almost 70 percent of its value between November 2014 and November 2015.

Footnotes
[1] **Frankel, J. A. & Rose, A. K.** 1996. Currency Crashes in Emerging Markets: An Empirical Treatment. *Journal of International Economics* 41(3-4): 351-366.
[2] **Frankel, J. A.** 2012. Choosing an Exchange Rate Regime. In J. James, I. W. Marsh & L. Sarno, eds. *Handbook of Exchange Rates*, p. 767-784. https://onlinelibrary.wiley.com/doi/book/10.1002/9781118445785
[3] **Kamin, S. B. & Ghei, N.** 1999. The Use of the Parallel Market Rate as a Guide to Setting the Official Exchange Rate. In L. E. Hinkle & P. Montiel, eds. *Exchange Rate Misalignment: Concepts and Measurement for Developing Countries*, p. 497-538. http://documents.worldbank.org/curated/en/378151467987860517/Exchange-rate-misalignment-concepts-and-measurement-for-developing-countries

Exchange rate regimes

Exchange rate regimes differ in their degree of flexibility, ranging along a continuum from a freely floating currency via different forms of pegs to a fixed exchange rate. In particular, there are the following main categories:

FLEXIBLE	INTERMEDIATE	FIXED
Free float Managed float	Target band Basket peg Crawling peg Adjustable peg	Currency board Dollarization Monetary union

While the foreign exchange market determines the exchange rate in case of a free float, a managed float involves some government intervention to guard or stimulate a country's economy. The intermediate category includes various forms of pegs to another currency (or a weighted portfolio of currencies) that allow for different forms of adjustment, e.g. within a narrow band or steady value adjustment at an almost constant rate. An explicit legislative commitment to fix a country's own currency to that of another country, the substitution of the own with a foreign currency and the creation of a monetary union to share the same currency among two or more countries are at the fixed end of the spectrum.

There are arguments both for choosing a fixed as well as a floating exchange rate regime. Fixing the exchange rate can, for example, give credibility to the country's monetary authority's promise to keep the general price level stable (that is, serve as a nominal anchor to monetary policy). It further reduces the uncertainty inherent in the variability of a floating exchange rate. This elimination of exchange rate risk encourages international trade and investments. Meanwhile, a flexible exchange rate regime allows for an independent monetary policy, leaving room for the government to respond to an economic downturn and prevent the country from entering into a recession. A floating exchange rate also automatically adjusts to trade shocks, responding to developments in the country's export markets. How to weigh these and other aspects against each other and choose an exchange rate regime depends on country characteristics such as size and openness, trade partners, labor mobility or level of financial development.[2]

When deciding to manage its exchange rate, a country faces the challenging task of setting it at an adequate level, that is, a level representing the equilibrium rate that would persist in the long run if the country had a unified market for foreign exchange. If a black market rate exists, it is determined in a free market and, hence, provides guidance as to where this long-run equilibrium rate could be located; and where a fixed exchange rate might be headed once allowed to adjust. However, despite the appeal of the unofficial as a proxy for the long-run equilibrium exchange rate, various factors complicate the relationship between the two, suggesting to think of the former as an upper bound rather than an estimate for the latter.[3]