Is it common for central banks to intervene in foreign exchange markets in order to influence exchange rates? And if so, is it effective? From a German perspective, these questions seem surprising, since the European Central Bank (ECB) does not intervene in foreign exchange markets—rather, it lets the exchange rates float freely. The situation is very different in the emerging countries: according to the present analysis, central banks in these countries intervene in the foreign exchange market on almost one out of every three days.

This study draws upon both confidential and publicly available data on foreign exchange market interventions from 33 countries—including industrialized, emerging, and developing countries—between 1995 and 2011. According to these data, central banks primarily bought foreign currencies to build foreign exchange reserves. The average intervention volume on days when interventions took place was close to 50 million USD; projected onto the GDP of the European Monetary Union, this would equal roughly two billion USD. On average, interventions lasted for five days, but could also be significantly shorter or longer. Most interventions were carried out against the existing exchange rate trends. Measured against the standard success measures—without taking control variables into account—interventions were successful in 60 to 90 percent of the cases. These success rates are significantly higher than the likelihood of these exchange rates improving on their own. FX interventions are thus a non-negligible tool when it comes to economic policy strategies.

Concerns about the deceleration or even the reversal of globalization are on the rise. U.S. President Donald Trump’s inaugural address this past January, with its ostentatious emphasis on the slogan “America First,” made it clear that such concerns must be taken seriously; meanwhile in Europe, several parties have expressed similar sentiments with their political agendas. Clearly, many constituents believe that national institutions urgently need to regain control of national concerns—and foreign exchange market interventions (FX interventions) are an economic policy instrument that can serve this purpose.

**Foreign exchange markets also contribute to globalization**

Foreign exchange markets function as an important “lubricant” for economic globalization. When goods, services, or assets (such as stocks) are traded at the international level, an exchange of foreign currencies usually also takes place. In this way, foreign exchange market activities can serve as a kind of common denominator of international economic exchange. If globalization were to decelerate, for example, foreign exchange market activity would also decrease. An especially abrupt or one-sided deceleration could quickly be labeled a “currency war.” One possible instrument in such conflicts is FX intervention, which can be viewed as a critical “weapon” in a currency war.

Based on a DIW Berlin working paper, the following analysis investigates the mechanics, usage, and impact of this tool.

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Characteristics of FX intervention

Interventions in foreign exchange markets are similar to interventions in other markets, such as the fixing of minimum or maximum prices. They thus constitute a normal economic policy instrument. An FX intervention generally consists of buying or selling the corresponding foreign currency in order to influence its price formation. For Germany, the major foreign currencies are the U.S. dollar followed by the British pound and the Swiss franc. These currencies are bought and sold on the foreign exchange market with supply and demand determining the price—that is, the exchange rate.

Most of this trading takes place on the cash market. Accordingly, the transactions are executed and settled on the spot. They can also take place on the futures market, where orders are placed instantly but transactions are not carried out until a later date. There are not only diverse market segments, but also a number of different actors. Typically, central banks operate directly and on their own accounts, either as independent institutions (like the European Central Bank, ECB) or on behalf of the treasury, as is the case in most emerging and developing countries. However, other government agencies—such as state-owned enterprises or funds—frequently get involved as well. This may happen if it the aim is to conceal the interventions.

Such attempts at opacity are rather unusual, but they do highlight the channels through which these kinds of interventions can influence foreign exchange markets. A cover-up implies that market players are clearly trying to hide the fact that an intervention is taking place, which may be the case if the intervention does not fit within the framework of the general economic policy, for example. In any event, it is necessary to assume that the transaction as such has the power to influence the market outcome. This is not obvious, however, when the orders of magnitude are taken into account: the foreign exchange market is the most liquid of all financial markets, which means that a single transaction has only a very small impact on the market price. Influencing the price merely by altering the supply or demand of a currency is thus quite difficult, and it is assumed in economics that the typical intervention volume of a central bank—at least in the larger markets—is not high enough to have a sustainable impact on a currency. This may not be the case, however, in narrow markets in emerging or developing countries.

A FX intervention can influence the market via three channels: the portfolio balance channel, the signaling channel, and the coordination channel.

Interventions influence portfolio balance

The idea behind the portfolio balance channel is not too far off from the concept of direct price manipulation through the altering of supply and demand. For this channel, it is argued that investors are striving for an optimal distribution of their portfolios among various currencies, and the intervention of the central bank disrupts the equilibrium in domestic investors’ portfolios. Using the above example: when the central bank purchases securities from these investors in the domestic currency and sells them in a foreign currency, the composition of the portfolio also changes. If no new information has appeared apart from that, then investors are paying higher prices for a commodity that has become scarcer—domestic securities—and thus the domestic currency tends to appreciate. The mechanism operates through changes in demand that cannot be met by corresponding supply because domestic and foreign securities are not regarded as perfect substitutes.

Interventions function as signals

While the research results on the portfolio balance channel paint a mixed picture, it is agreed that the most important FX intervention channel is the signaling channel. The basic idea is that the central bank uses interventions to introduce new information into the market. What distinguishes this action from the mere disclosure of such information is the fact that it is backed by money (the intervention amount), which tends to impart a greater degree of credibility.

Skeptics object to the perceived importance of this information transmission by claiming that an intervention is not actually an effective way of disseminating information. According to them, a central bank’s main focus lies in monetary policy, primarily in maintaining monetary stability, while the foreign exchange market plays more of a secondary role. While this description applies to some central banks—such as the ECB—exchange rates do play a central role in the economic policy of many other countries. There is an economic interest in influencing the exchange rate, and all actions that contribute to it can be relevant to market participants.

There are different levels of intensity among interventions. A low-intensity intervention may simply signify...
that the central bank is paying attention to the foreign exchange market, which implies that current developments are cause for concern. When a central bank increases the intensity, a single intervention will typically herald a sequence of subsequent interventions. Furthermore, the intervention volume and possible coordination with other countries may contain signals. Combining intervention and other monetary policy measures will have more serious consequences. For one, selling foreign currency can decrease the domestic money supply, because the intervention is not sterilized. Secondly, the monetary policy impulse could also directly affect the exchange rate if it involved an interest rate hike alongside the sale of foreign currency. Finally, it is also conceivable that governments would resort to measures that restrict free market transactions, such as capital controls.

**Interventions coordinate market participants**

FX intervention’s third channel of influence is called the coordination channel. According to this effect, an intervention causes market participants in an uncertain environment to start aligning their transactions with the “benchmark” of the central bank. The background of this concept are persistent deviations from long-term equilibrium exchange rates in which it is unclear when a return to the “fundamental value” will occur. In such situations, the central bank can use interventions to coordinate the investment decisions in the private sector. In this respect, the coordination channel is a variant of the signaling channel.

**Stylized facts for FX interventions**

The three abovementioned channels can shed light on the efficacy of FX interventions. As well, the results of surveys conducted among central banks indicate that most of them use this instrument and, fittingly, believe it to be effective (Table 1).

At the same time, empirical literature on FX interventions is very limited, primarily due to a lack of data availability. Because most central banks do not publish their intervention data, the empirical literature consists predominantly of studies on the situations in individual countries—and because interventions are determined quite significantly by each country’s respective policy objectives and institutional environments, the findings from country-specific studies cannot always be generalized.

Against this background, a recent study that is largely based on confidential intervention data from central banks is of particular interest. These data provide a series of findings in aggregate form that—when measured against the current body of knowledge—can be viewed as stylized facts that impart information about the frequency, direction, volume, sequence, and exchange rate trends of interventions (Box 1).

**Fact 1: FX interventions are used frequently**

From Germany’s perspective—with regard to its own central bank, the ECB, and the major central banks in the neighboring countries—FX interventions are considered exceptional (Switzerland, which uses interventions to stabilize the exchange rate of the Swiss franc against the euro, provides one example). This impression is inaccurate, however, because the situation is very different in many of the emerging countries: a look at the activities of 33 central banks between 1995 and 2011 reveals that central banks in the emerging countries intervened in about 19 percent of the days under observation.

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7 When we speak of using foreign exchange market interventions as a monetary policy instruments, we are referring to “sterilized” interventions. This means that the change in foreign exchange reserves is compensated for in order to leave the domestic money supply unchanged. Only then can interventions be considered an economic policy instrument that acts independently of the interest rate or money supply changes resulting from the monetary policy.


10 The data used in the following are based on Fratzscher et al. (2017), supra.

11 “Stylized facts” are descriptive characteristics of typical correlations.

12 In fact, the major industrialized countries also had a successful history of interventions in the 1980s. See Jeffrey Frankel, “The Plaza Accord, 30 Years Later,” *Nber Working Paper* 21613 (2015).

13 Interventions now take place primarily in emerging markets. See Domanski et al. (2016), supra or Menkhoff (2013), supra.

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**Table 1**

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<tr>
<th>Central banks’ evaluation of FX intervention efficacy</th>
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<td>Share of affirmative responses from central banks</td>
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<td>Effectiveness</td>
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<tr>
<td>Intervention successful</td>
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<td>Intervention partially successful</td>
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<th>Views on mechanisms behind effectiveness</th>
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<td>Intervention effective through portfolio balance channel</td>
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<td>Intervention effective through signalling channel</td>
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<tr>
<td>Intervention effective through coordination channel</td>
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</tbody>
</table>

Notes: Central banks’ participation in the survey was voluntary. Cited studies are based on the responses of 19 and 22 central banks, respectively.

Sources: Mohanty and Berger (2013) in question 1; otherwise Neely (2008).
Here, there are also considerable differences depending on the exchange-rate regime. In a free-floating regime, which applies to the euro area, interventions take place on only nine percent of the observation days. This is also true in broad-band regimes. But the behaviors are quite different in narrow-band regimes: if a central bank wants to keep the exchange rate within a two-percent range against a reference currency (usually the U.S. dollar), then it will presumably intervene more frequently than would be necessary if it did not have an explicit exchange rate target. Under this monetary regime, interventions take place on around 34 percent of all days.

Fact 2: Foreign currency purchases dominate observation period

In the dataset mentioned above, 76 percent of the interventions involved purchases of foreign currencies—that is, transactions that aim to weaken the domestic currency against a reference currency. Such transactions can help strengthen the export potential of the central banks’ own economies. The frequent purchases of foreign currencies in the observation period between 1995 and 2011 were also likely part of deliberate attempts to build currency reserves. From a historical point of view, the sharp increase in foreign exchange reserves is rather surprising, since most countries would usually devalue their currency against the U.S. dollar or a “hard” currency—like the Deutsche mark in the past or the euro today—from time to time to support their own currency and continually mitigate this process with sales of foreign exchange reserves.

Considerable heterogeneity lurks behind the findings on most of the purchases, both between countries as well as over the course of time. Among the 33 countries surveyed, it was apparent that eight central banks never bought foreign currencies during the entire observation period. Another eight countries never sold foreign currencies. Over time, there are clear deviations from the average purchase rate of 76 percent. In two phases, a larger share of central banks actually showed a preference for supporting their own currencies over buying foreign currencies. These phases coincide with periods of relative instability in the global economy (Figure 1).14

During the financial crisis, high financial market volatility was associated with high levels of FX market activity.

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Box 1

Data

The dataset contains daily information on the net volume of sterilized interventions. It comprises 33 countries, 21 of which provided their data exclusively and confidentially for this analysis; the data from the other 12 countries are publicly available. The data come from highly developed economies as well as emerging countries and a few developing countries. The countries examined here are: Argentina, Australia, Azerbaijan, Bolivia, Chile, Costa Rica, Denmark, the European Monetary Union, Georgia, Hong Kong, Iceland, Israel, Japan, Canada, Kenya, Kyrgyzstan, Colombia, Croatia, Mexico, Moldova, New Zealand, Norway, Peru, Poland, Slovakia, South Africa, Sweden, Switzerland, Czech Republic, Turkey, Venezuela, the UK, and the U.S. For nine of these countries, the maximum data period runs from January 1995 to December 2011; in all but one of the remaining cases, the data cover at least ten years. Overall, more than 113,000 trading days are covered.1

1 For more details, see Fratzscher et al. (2017), supra.

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Figure 1

Central bank FX intervention and volatility in financial markets
Share of Intervening central banks, in percent

Note: All values smoothed using a centered six-month moving average process.
Source: Authors’ own calculations.

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During the financial crisis, high financial market volatility was associated with high levels of FX market activity.
Fact 3: A central bank’s average volume on an intervention day amounts to just under 50 million USD

According to the dataset, the average daily intervention volume of a central bank amounts to nearly 50 million USD. The scatter here is also considerable, however. For example, the volume depends on the size of the national economy; from this perspective, the volume amounts to roughly .02 to .05 percent of the country’s GDP (from free-floating regimes up to narrow-band regimes). For Germany, this means that the calculated average volume would amount to roughly 600 million USD per day (with free-floating exchange rates); for the euro area, it would be roughly three times as much, or nearly two billion USD.

There are other intervention volume determinants apart from the size of the economy, such as the urgency or desired strength of the intervention impulse. In Japan, which publishes its data, smaller interventions occur significantly more frequently than do larger ones (Figure 2). As well, the volume on the first day of an intervention is usually stronger than it is on the following days, when it starts to decrease (Figure 3).15

Fact 4: The average intervention sequence lasts five days

As suggested above, interventions typically do not take place on one day, but rather occur over the course of several days. Among the foreign currency purchases that dominated during the observation period, 69 percent of the purchase days followed a day in which a purchase had already taken place. If the three previous days are factored in, 87 percent of the cases had at least one purchase in this three-day window, with an overall average of 1.95 purchases. For sales, these values are slightly lower. Since interventions are carried out in clusters, it is necessary to delineate whether an intervention is “new” or part of an existing sequence. In the literature, a distance of ten trading days is often considered sufficient for defining a new intervention period.16

Under this definition, the average intervention period lasts roughly six days for purchases (which happen more frequently) and just under three days for sales. Interventions do not take place every day, however—and though they can go on for quite a long time, such cases are quite rare (Figure 4). The most common intervention length is one day; such interventions are mainly carried in nar-

15 Based on a standard definition of intervention episodes, we can assume that the following days are always part of the same episode.
Measuring interventions’ efficacy

To examine the effectiveness of FX interventions, adequate measures are necessary. It is not always possible to schematically determine what these intentions are because interventions’ objectives can differ considerably. Nevertheless, event studies use three generally accepted measures for determining the effectiveness of interventions (Box 2): the event criterion, the direction criterion, and the smoothing criterion. All three criteria are based on the assumption that the central banks are intervening against the existing exchange rate trend (which tends to be the case). The three criteria differ in how they measure success: the event criterion focuses on the most immediate success while the smoothing criterion is more concerned with longer-term success. In the order mentioned above, the criteria go from hardest to softest. Here, only the two “extreme” criteria—the event criterion and the smoothing criterion—are taken into account.

The event criterion is considered to have been met if the implicitly intended change in the exchange rate (which can be ascertained from the direction of the intervention) is achieved during the intervention period. The smoothing criterion is considered fulfilled if the exchange rate change for the ten days preceding an intervention period is within the range of the existing trend.

The vast majority of interventions lasted only one day.

Fact 5: Interventions are usually carried out against the exchange rate trend

A fifth fact concerns the relationship of interventions to exchange rates. In line with central banks’ intentions, interventions are mostly carried out against existing trends. To prove this empirically, we measure the exchange rate changes for the ten days preceding an intervention period. Interventions do not emerge independently of these trends, but rather are carried out against them two-thirds of the time and in line with them in the remaining cases.

For this fact as well, interesting differences can be observed depending on the exchange-rate regime. The share of intervention episodes that went against the trend in free-floating regimes dominates, with around 75 percent (Figure 5). This rate is roughly twice as high as in narrow-band regimes.

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change during and one week after the intervention period is smaller than in the five preceding days. To make this criterion meaningful, we apply it only to interventions that go against the trend of the previous five days. This means that fewer cases are observed than for the other criteria.

A new criterion is necessary to do justice to narrow-band regimes, where the goal is less about fundamentally changing the exchange rates and more about stabilizing them. We therefore introduce the stabilization criterion. According to this criterion, an intervention is successful when the exchange rate is kept within a narrow band of two percentage points both throughout the intervention period and in the two weeks thereafter.

Placebo exchange rate changes as the benchmark

One problem with the empirical application of the above-mentioned success criteria is determining an appropriate benchmark. Since exchange rates fluctuate daily no matter what, it is important to consider the counterfactual, i.e., what would have changed if no intervention had taken place? For the event criterion, it can be assumed that exchange rates follow a random walk, and in this respect the probability of a change in the desired direction without an intervention is 50 percent. Thus measurable success only exists if the event criterion is fulfilled in significantly more than 50 percent of the cases.

For the stabilization criterion, a benchmark is more difficult to determine. In exchange rate band regimes, it can be assumed in most cases that this criterion will be met even when no intervention takes place. Consequently, the bar for what constitutes a “successful” intervention needs to be set higher. In order to determine a benchmark value, the phases without interventions are taken as reference, and the success criterion is determined for these time periods. This placebo rate clearly exceeds 50 percent for the narrow-band regimes and amounts to 77 percent in this specific case. Thus even without the intervention of the central bank, no further action is needed to fulfill the stabilization criterion.

Effectiveness compared to placebo rates

Accordingly, it is important not to measure interventions against a simple 50 percent probability, but rather against the benchmark of placebo rates: that is, its chance of success in artificially generated episodes without any actual intervention. These are calculated separately for the three major exchange-rate regimes (free-floating, broad-band, and narrow-band). Not every criterion is relevant to every regime: for example, placebo rates for the event criterion are taken into account exclusively in free-floating regimes, since the changes in exchange rate developments are really only important in these contexts. The stabilization criterion, on the other hand, is likely to be more important for the broad- and narrow-band regimes. Placebo rates for the smoothing criterion are reported for all three regimes, since this objective can usually be assumed even if the smoothing criterion is not applicable in a specific country (Table 2).

It is evident that FX interventions are almost always effective, with two key results attesting to their efficacy. Firstly, interventions are successful in free-floating regimes according to the event criterion because the exchange rate moves in the desired direction in 61 percent of the cases as opposed to the placebo rate of 48 percent. In addition, the exchange rate is almost always smoothed—but this is also less difficult to achieve, since the smoothing criterion can be fulfilled even if the event criterion is not. Secondly, according to the stabilization criterion, interventions are successful in narrow-band regimes because the exchange rate is kept within the band in 84 percent of the cases as opposed to the placebo rate of 77 percent. Here, the successful smoothing is not only more striking, but also easier to achieve than in a free-floating
FOREIGN EXCHANGE MARKET INTERVENTIONS

Conclusion: FX intervention is a frequently used and effective instrument

On a global scale, interventions in foreign exchange markets are just one of several normal monetary policy instruments; the fact that the ECB or the U.S. Federal Reserve System rarely make use of them does not make them irrelevant.

The present study indicates that in all countries surveyed, interventions take place every five days on average, mostly in the form of foreign currency purchases; the average daily net volume amounts to nearly 50 million USD. An intervention sequence typically lasts for about five days and is mostly carried out against the exchange rate trend. The dispersion around the mean values is quite significant, however, and thus it ultimately comes down to an analysis of each individual country and its respective situation.

It is difficult to intervene against a market fundamental. In open foreign exchange markets there are therefore limits to the efficacy of intervention. It is possible, however, for central banks to use interventions to influence the basic environment.

The fact that the different criteria tend to confirm the efficacy of FX interventions should not be mistaken for a guarantee of success. Success reflects the qualified decision of a central bank regarding when and how it intervenes. These decisions do not follow a simple scheme; rather, they are based on the specific experiences and expectations as well as the credibility of the respective monetary policy actors.

In any case, it is only logical that we not neglect the FX intervention instrument overall; rather, it should be deliberately taken into account for economic policy strategies. Using the language of the currency war, it can be seen as a “powerful weapon.” Correspondingly, the International Monetary Fund (IMF) has started taking FX interventions seriously again over the past few years: among other things, this is reflected in the numerous new IMF documents devoted to this subject.19

Table 2

<table>
<thead>
<tr>
<th>Exchange Rate Regime</th>
<th>Free-floating</th>
<th>Broad-band</th>
<th>Narrowband</th>
</tr>
</thead>
<tbody>
<tr>
<td>Success Criterion</td>
<td>Event</td>
<td>Smoothing</td>
<td>Smoothing</td>
</tr>
<tr>
<td>Share of Successful Episodes</td>
<td>61.1%</td>
<td>88.3%</td>
<td>79.1%</td>
</tr>
<tr>
<td>Placebo Success Rate</td>
<td>48.1%</td>
<td>40.1%</td>
<td>39.6%</td>
</tr>
<tr>
<td>p-value</td>
<td>0.006</td>
<td>0.000</td>
<td>0.000</td>
</tr>
</tbody>
</table>

Note: p-values for a one-sided hypothesis test that interventions do not have a higher success rate than placebo episodes.

Source: Fratzscher et al. (2017).
