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Measuring the Costs of Exchange Rate Volatility

Many countries go to great lengths to manage their exchange rates. Probably the most prominent recent example is the European Monetary Union, where all the members abandoned their national currencies and adopted the euro. A number of developing countries maintain other kinds of regimes of managed exchange rates, even though they face potent market pressures to let their exchange rates float. One of the main motives for these arrangements stems from the extreme volatility of exchange rates. This volatility introduces an element of uncertainty into doing business across borders. Arguably, this uncertainty hinders international trade and, therefore, takes a toll in terms of economic welfare.

Recent work in economics has turned to reexamining the question of whether having a stable exchange rate is worth these efforts. This research has used new tools to assess the economic welfare costs of exchange rate volatility. Specifically, the aim is to measure the costs of exchange rate volatility as a loss in the utility that people expect on average over time. This *Economic Letter* summarizes this literature and draws preliminary conclusions.

How to approach the issue

Attempting to measure the welfare costs of exchange rate variability requires a theoretical model with some key features. First, it must specify the objectives of the people in the economy, as they decide about how much time to devote to work and how much money to spend on consumption. Summarizing these objectives formally in a utility function has the benefit of providing a means of measuring whether people are better or worse off. The typical utility function assumes that people like both consumption and leisure and that the more they get of them, the higher their utility. But people also know that consumption and leisure are part of a tradeoff—to increase consumption they have to give up some leisure time and devote it to work, and vice versa. People also balance enjoying consumption now against enjoying it in the future, and models generally imply that people prefer to consume roughly the same amounts in all periods rather than a lot in some periods and less in others.

Second, a model must specify the objectives of firms that produce and sell goods. Typically, firms are viewed as simply hiring workers at a going wage rate to produce output, which then is sold in either domestic or foreign markets. Key to the analysis is an understanding of the frictions and imperfections in economic markets. For example, the typical friction assumed is that firms must set prices before they know what conditions will prevail in the market; they then must adjust production to meet the level of demand for their good, given the preset price. This realistically captures how firms operate in many markets, for example, automobiles and durable goods.

Combining these features in a theoretical model suitable for welfare analysis is a technical challenge, because the model must be solved so as to retain the elements that form the basis for how risk affects behavior. Only in the last few years have theorists developed methods for examining these issues.

Exchange rate volatility may be costly for welfare

Leading the search into this issue was a paper by Obstfeld and Rogoff (1998). Their theoretical analysis finds that exchange rate volatility could lower welfare through both direct and indirect channels. The direct channel has been understood for some time. It is based on the assumption that people have a distaste for fluctuations; in other words, they would choose a constant value of consumption over an uncertain value that is sometimes higher and sometimes lower.

For example, take the case of a domestic firm that sets a price in terms of its own currency for goods that it exports abroad. If the domestic currency appreciates, it implies that the price the foreign

consumer faces in terms of his own currency is higher than the exporting firm intended. As a result, demand will be lower than planned, so the domestic firm will hire less labor; in turn, domestic workers will earn less and likely will have less consumption. Of course, the domestic currency also may *depreciate*, implying that consumption would then likely rise rather than fall. But averaging over cases of currency appreciation and depreciation, people are less happy overall because they don't like fluctuations in their consumption and leisure.

The indirect channel by which exchange rate volatility can lead to welfare loss is a new result. If firms that preset prices understand the risks of future exchange rate movements, they will try to hedge against those risks. When setting the price for their good, they will attach a risk premium as an extra markup to cover the costs of fluctuations. This higher price dampens demand, production, and, hence, consumption to levels that are less than optimal for society.

The indirect channel provides a more compelling reason to expect exchange rate volatility to have a negative effect on economic welfare. The significance of the welfare losses via the direct channel depends on the particular form of a person's utility function and on whether consumption volatility per se should be assigned a large weight, issues that may be debatable. But everyone can agree that a lower average level of consumption via the indirect channel will make people worse off. Such a negative effect could be a reason for a central bank to adopt a fixed exchange rate regime.

More recent results: volatility may be benign or even beneficial…

Several papers have extended the work of Obstfeld and Rogoff by introducing different characteristics into the model and have argued that the volatility of exchange rates may not always imply negative welfare effects. Devereux and Engel (2003) examined the case where prices are not fixed in the currency units of the exporter, but instead they are set in the currency units of their foreign customers. This case is well grounded in reality, especially when firms sell to a large market, such as the U.S.; for example, it is not uncommon for Japanese firms to invoice their exports in dollars. In this case, the consumer is not affected by exchange rate volatility.

A second extension looks at different preferences. Bacchetta and van Wincoop (2000) consider a case where consumption and leisure are complements, not substitutes, in utility. In other words, people derive more happiness from consumption when it is combined with extra leisure time; for example, the welfare benefit of buying a sailboat is greater when there is more time to sail.

To explore this case, the authors focus on monetary policy changes as a source of exchange rate volatility and on how those shocks affect other elements in the economy as well. For example, when the Fed eases monetary policy, the value of the U.S. dollar tends to fall against other currencies, so the policy change generates more volatility. At the same time, the easing tends to stimulate the U.S. economy. As a result, U.S. consumption and production increases and leisure decreases. Since consumption and leisure are viewed as complements in utility in this scenario, the decline in leisure dampens the welfare gains associated with greater consumption.

But there is more to the scenario, because one also has to factor in the way monetary policy changes from abroad affect exchange rates and the domestic economy. Of course, when a foreign central bank is trying to maintain a fixed rate regime vis-à-vis the U.S., it essentially would have to mimic U.S. policy changes, so that would only serve to intensify the effects in the scenario above. In other words, the foreign central bank would also ease policy, stimulating its domestic demand for all goods, including imports from the U.S., which then would increase U.S. production and reduce U.S. leisure even more. But when a foreign central bank maintains a flexible exchange rate regime vis-à-vis the U.S., its policy is independent of U.S. policy, and its policy changes may lessen the extent to which consumption and leisure move in opposite directions. For example, contractionary Japanese monetary policy lowers consumption in Japan without much effect on U.S. consumption. But if Japanese consumers purchase U.S. exports, Japanese policy may lower the demand for U.S. goods and hence, lower U.S. production and increase leisure. Everything works in the opposite direction, of course, when the Japanese follow an expansionary policy. But the point is that the Japanese action either way has no impact on U.S. consumption and thereby weakens the link between consumption and leisure. Thus, a monetary policy change by a foreign central bank can increase volatility in the exchange rate and also have a positive effect on utility on average, because it means that a rise in consump-

tion does not always imply a decline in leisure. This result provides an example that a higher degree of exchange rate variability may be associated with higher rather than lower economic welfare.

…and, the costs may be small

Another reason to doubt the costliness of exchange rate variability comes from quantitative studies of the issue. One early such investigation is Bergin and Tchakarov (2003). This paper fleshes out the theoretical models used above with additional economic features that are thought to be important for realism. These include more general forms for consumers' utility, more general specifications for production, and imperfect asset markets. The model is able to reflect key facts about the macroeconomy of a country, so it produces predictions that can be taken more seriously in a quantitative sense.

The main quantitative finding is that the welfare effects of exchange rate volatility are likely to be very small for many countries. When numbers are chosen to permit the model to reproduce basic characteristics of the U.S. economy, the model indicates that the loss of utility is equal in size to only about 0.1% of annual consumption; that is, people would be willing to exchange only about 0.1% of their annual consumption level to eliminate the exchange rate volatility in the economy.

Two caveats to this conclusion are in order. First, it is possible that countries with particular characteristics could face higher costs. One example might be a country that depends heavily on international trade, as do some of the small Asian economies, for which annual exports exceed annual GDP. Another example might be the case where international financial markets are not willing to purchase the country's domestic currency debt; such countries may find it very difficult to use financial markets to hedge against exchange rate risk. But neither case affects the U.S. or other large developed countries. Second, it is important to note that the welfare costs analyzed here do not take account of the costs of economic adjustment as labor and capital are reallocated within the economy in response to the up and down movements of the exchange rate. Therefore, even if the welfare costs of exchange rate volatility are small when averaged over a country's whole population, they may fall especially heavily on selected individuals and firms.

The general conclusion in the literature to date is that exchange rate variability probably does not impose substantial overall costs on the U.S. in terms of economic welfare. While further work should be done, this conclusion is receiving support from recent theoretical as well as quantitative exercises.

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