

Appendix 1

The new rules could be based on the effects of specific policies on the weighted average of welfares of individual countries. Countries' population could potentially be used as weights.

Assume there are 2 countries: X and Y, and 2 time periods: 1 and 2. X takes a policy action in period 1. The effect of X's policy on global welfare can be specified as follows:

$$(1) \quad dW = a * dW(x) + (1 - a) * dW(y)$$

$$(2) \quad dW(x) = dW_1(x) + dW_2(x)$$

$$(3) \quad dW(y) = dW_1(y) + dW_2(y)$$

$dW_k(x)$, and $dW_k(y)$ denote the effect of X's policy on welfare of countries X and Y in period k , where $k = 1, 2$.

Below we consider some principles, which could allow policymakers and relevant authorities to grade policies as green, red, or orange.

Case 1. X's policy action is rated green

If $dW(x) > 0$, $dW(y) > 0$, and $dW > 0$, such a policy would clearly be desirable, and should be rated green. Conventional monetary policy could fall in this category, as it would raise output in the home economy, and create demand for exports from the foreign economy.

Next, take the case when there are temporary negative spillovers for Y such that $dW_1(y) < 0$. The policy, however, through its effect on home economy growth and demand for foreign goods, can provide offsetting positive spillovers to Y in period 2,

such that $dW_2(y) > 0$. There may be temporary negative effects for Y through increased volatility in period 1 such that $dW_1(y) < 0$. But $dW(y) = dW_1(y) + dW_2(y) > 0$.

In this case, the policy could also be rated green. This would be the case if the policy, e.g. an unconventional monetary policy, acts as a booster shot and can jump-start a large home economy, and create significant positive spillovers for foreign economies through a large increase in the demand for their exports.

Case 2. X's policy action is rated red

If $dW(x) < 0$, $dW(y) < 0$ and $dW < 0$, such a policy would clearly be undesirable, and should be rated red.

Next, take the case when $dW(x) > 0$, but the magnitude of $dW(x)$ is small; such that the positive spillover effects for Y through higher growth and increased demand for export are weak, and the negative effect through increased volatility in Y dominates. $dW_1(y) < 0$, $dW_2(y) > 0$ but small in magnitude, such $dW(y) = dW_1(y) + dW_2(y) < 0$. In this case, the policy could also be rated red.

This would be the case if, for example, unconventional monetary policy actions lead to a weak recovery in X and only small positive effects on exports to Y, but large capital inflows and asset price bubbles in Y. In this case, the policy could also be rated red. Global welfare would decrease with this policy.

Case 3. X's policy action is rated orange

Assume a policy action is such that $dW(x) > 0$, but $dW_1(y) < 0$, $dW_2(y) < 0$, and $dW(y) < 0$ i.e. although there may be large positive effects in X, there are sustained negative effects in Y. In this case, even if $dW = dW(x) + dW(y) > 0$, such a policy could belong to the orange category. For example, conventional monetary policies in X to raise growth could fall in the orange category if X and Y are at a stage of financial cycle where low interest rates resulting from loose monetary policies could lead to

significant financial stability risks in X and Y. Even though the large positive effect in X could dominate any financial stability risks in X; that would not be the case in Y which would experience sustained negative spillovers. Such a policy would be rated orange.

Finally, take three examples of policies that could be graded based on the above rules. The three examples are described below.

1. Country X depreciates its exchange rate vis-à-vis Y, or prevents appreciation using direct intervention. 3 countries: X, Y, and Z, 2 periods 1 and 2.

Period 1: X gains as a depreciation of its exchange rate makes its exports more competitive. Y loses due to cheap imports from X which affect domestic output and employment, a third country say Z also loses as demand switches away from Z towards X.

Period 2: Growth in X increases. Increases demand for exports from Y and/or Z. Y and Z benefit.

If the elasticity of growth with respect to exchange rates is very high in X, such that it gives a booster shot to X, and also leads to a large increase in demand for exports from Y and Z, this policy could be rated green. If, however, there are supply constraints in X, which leads to a very weak recovery in X, and a small increase in exports from Y and Z; then the beggar-thy-neighbor effects in Y and Z would dominate, and therefore this policy could be rated red. It could be rated orange if there are sustained beggar-thy-neighbor effects in Y and Z; even if global welfare improves due to a large increase in output in X, the sustained negative effects in Y and Z would put this policy in the orange category.

2. Country X uses more subtle or indirect policies (e.g. conventional/unconventional monetary policies), which also affect the exchange rate. The effect on global welfare of these policies could be estimated in a similar way as in the case of direct exchange rate policies.

3. Country X uses policies, which leads to a depreciation of the exchange rate in X, but is also associated with large capital inflows into Y and Z, and could have implications for financial stability in Y and Z, and therefore on global financial stability. The change in global welfare would comprise of two components in this case – change in trade balance, and change in financial stability. Financial stability could be measured by a summary measure such as credit growth. The change in trade balance and financial stability would first be converted into an index between 0 and 1, before they are summed up.

More precisely, the effect of X's policy on global welfare in period k could be specified as follows:

$$dW = a * dW(x) + b * dW(y) + (1 - a - b) * dW(z)$$

$$dW(n) = dITB(n) + dICG(n)$$

where $n = x, y, z$. *ITB* and *ICG* denote the index of trade balance and credit growth, respectively. The policy could then be graded based on the same principles as discussed in Case 1.

Issues for discussion

There are several issues that may need to be considered in order to grade policies in the case of the three examples described above. Some of these issues are described below:

- How to deal with undervaluation versus depreciation? Large depreciations could have “beggar-thy-neighbor” effects, even if the exchange rate is not “undervalued” vis-à-vis some benchmark. Moreover, the determination of the benchmark itself is not straightforward.

- How do we take into account the fact that Y and Z could use other policies e.g. loosening of monetary policy to compensate for the loss in exports and welfare in period 1? Should we evaluate the global welfare effects from X's policies, ceteris paribus, or we should take into account the effects of “retaliatory” policies? As discussed in Section 3 of the paper, the spillover effects of could be based on Y and Z's welfare if the policy was not undertaken versus Y and Z's welfare after the policy is initiated and it responds.

- How to measure exchange rate depreciation? REER? Should the measure of REER take into account the increasing importance of global value chain? A depreciation of the exchange rate would give a lower boost to exports and welfare for countries whose exports use imported intermediates intensively.

- Should we use a composite measure of financial stability rather than credit growth?

- Should we use a simple sum of trade balance and credit growth, or a weighted sum? Weights could depend on country characteristics