Comments on
Jeffrey Frankel, "Commodity Prices and Monetary Policy"
by
Lars Svensson[*]
www.princeton.edu/svensson/

This paper makes two main points. The first point is empirical: Commodity prices are decreasing in the real interest rate. The second point is a recommendation about monetary policy: Central banks should stabilize the domestic price of exports, and such a policy is better than CPI inflation targeting.

I have no problems with the first point. Frankel provides considerable empirical evidence to support his conclusion. It also makes theoretical sense that commodity prices may be negatively correlated with real interest rates. Commodity prices can to a large extent be seen as asset prices. Asset prices are discounted present values of expected future returns. A rise in the real interest rate reduces the discount factors and thereby the present value of any given expected future returns. Hence, unless increases in real interest rates are systematically correlated with increases in expected returns or reductions in risk premia, the negative effect of the real interest rate on the present value should dominate.

I have serious problems with the second point. Counter to what Frankel argues, stabilizing the price of exports seems to me to be much inferior to inflation targeting. For an oil exporter such as Norway facing the recent doubling in the international oil price, the policy would imply a drastic deflation of the CPI by approximately 50%. Such a policy would be truly disastrous.

Regarding the first point, should we expect commodity prices to be decreasing in the real interest rate or not? Let us consider a storable commodity in period t that will be used up in period $t+1$. Consider its pricing in period t under the simplest possible circumstances and risk neutrality. Then the price in period t, p_t, would be given by

$$p_t = \frac{-c_{t+1|t} + p_{t+1|t}}{1 + r_t},$$

where $p_{t+1|t}$ is the price expected in period t that the commodity can be sold for in period $t+1$, $c_{t+1|t}$ is the expected storage cost between period t and period $t+1$ to be paid in period $t+1$, and r_t is the real interest rate between period t and period $t+1$. If $p_{t+1|t}$ and $c_{t+1|t}$ are given, we see that p_t is decreasing in r_t. We can make this case more realistic and complex by introducing production of the commodity in each period at increasing marginal cost and use of the commodity in each period at decreasing marginal benefit. As long as marginal cost and marginal benefit are relatively independent of the real interest rate, we would still expect commodity prices to be negatively correlated with the real interest rate.

Of course, in a more realistic and complex model, commodity prices and real interest rates are endogenous variables that are simultaneously determined by the structure of the

economy, the economic policies conducted, and the nature of the exogenous shocks in the economy. In particular, the correlation between commodity prices depends on the nature of the shocks that hit the economy and how these affect the variables on the right side of the asset-price equation above. Consider the relation between shocks to expected potential growth. From a simple Euler condition for optimal consumption choice, we get the following relation between the neutral (Wicksellian real) interest rate, r_t^*, the rate of time preference, ρ, and expected potential output growth, $g_{t+1|t}$:

$$r_t^* = \rho_t + \frac{1}{\sigma} g_{t+1|t},$$

where σ is the intertemporal elasticity of substitution. Here, potential output is the hypothetical flexprice level of output in an economy with sticky prices, and the neutral interest rate is the corresponding hypothetical flexprice real interest rate. Furthermore, monetary policy can be seen as determining the real interest-rate gap, the gap between the real interest rate and the neutral interest rate, $r_t - r_t^*$. In this setting, treat potential output growth as an exogenous stochastic process, and suppose that expected potential output growth $g_{t+1|t}$ increases. Suppose that monetary policy maintains a relatively stable real interest-rate gap. Then, both r_t^* and r_t increase. Furthermore, the increase in potential output growth might increase $p_{t+1|t}$, due to increasing demand for commodity use. In this case, both the numerator and denominator in the above expression for the current commodity price increase, so it is no longer obvious that, for this kind of shock, commodity prices and the real interest rate are negatively correlated.

Thus, Frankel's empirical results can be interpreted as stating that the direct negative effect of the real interest rate on commodity prices dominates in most cases. This is not an obvious result, but it is arguably also not that surprising.

The second main point is the shocking suggestion (to me, at least) that pegging the export price index (PEPI) would be a better monetary policy than the (core or headline) CPI inflation targeting currently pursued in many countries. The reasons for this suggestion are not very well developed. Frankel states that PEPI has the property that an adverse terms-of-trade movement would be associated with a currency depreciation. He seems to take for granted that such a property is desirable. Frankel also states that current CPI inflation targeting has the property that an adverse terms-of-trade movement is associated with a currency *appreciation*, which consequently is considered undesirable. It would have been good to have a simple model where these properties of PEPI and CPI inflation targeting and their desirability could be demonstrated.

Is it true that PEPI has the property that an adverse terms-of-trade effect is associated with a currency depreciation? First, consider a terms-of-trade deterioration for a small open economy caused by a fall in the world price (the foreign-currency price) of exports. At an unchanged exchange rate, the domestic-currency price of exports would fall. Keeping the domestic-currency price of exports stable, as PEPI implies, would hence indeed require a currency depreciation. Second, consider a terms-of-trade deterioration caused by a rise in the world price of imports at an unchanged world price of exports. At

an unchanged exchange rate, the domestic-currency price of exports would remain the same. Hence, in this case, PEPI requires a constant exchange rate and no currency depreciation. Third, consider a terms-of-trade deterioration associated with a rise in the world prices of both exports and imports (that is, with a larger rise in the price of imports than in the price of exports). At an unchanged exchange rate, the domestic price of exports would rise. Hence, in this case, PEPI requires an appreciation of the home currency. Thus, it is not always the case that PEPI implies that an adverse terms-of-trade effect is associated with a currency depreciation.

The optimal policy for the exchange rate in the face of a terms-of-trade deterioration is not obvious and requires a more elaborate model and analysis than there is room for here. Since that step is crucial for Frankel's argument, there should arguably be room for such a model and analysis in his paper.

Frankel does not provide any convincing argument that inflation targeting is problematic. To be more specific, consider flexible (core) CPI inflation targeting, which is practiced in many countries. This involves stabilizing both the inflation gap between inflation and an inflation target and the output gap between output and potential output. It seems to work fine in both advanced and emerging-market countries. That it works fine in advanced countries is well known. What is somewhat new is that it seems to work so well in many emerging-market countries. The IMF *World Economic Outlook* of September 2005 notes that inflation targeting has worked fine in a number of emerging-market countries. No country that has adopted inflation targeting has abandoned it, and no country has even expressed any regrets. In particular, inflation targeting seems to work fine even without a number of so-called "preconditions," such as good institutions, well-developed financial markets, responsible fiscal policies, and so forth.

Frankel's PEPI may be interpreted as inflation targeting with the CPI price index being replaced by the export price index. But what price index should inflation targeting ideally refer to? Theoretical work by Kosuke Aoki, Pierpaolo Benigno, and others, has emphasized that, from a welfare point of view, monetary policy should stabilize sticky prices rather than flexible prices. This minimizes the distortion caused by the existence of sticky prices and brings the economy closer to a flexprice equilibrium. These results can be interpreted as favoring a core CPI or domestic inflation targeting. In particular, these results suggest that central banks should not try to stabilize flexible commodity prices, in direct contradiction to PEPI. Other often mentioned reasons for choosing a CPI-related index is that the CPI is the index best known by the general public, that stabilizing it would simplify decisions for the average consumer, that it is frequently published, and that it is usually not revised. Indeed, all inflation-targeting central banks have chosen the CPI or a core CPI.

PEPI would imply riding a tiger. Consider Norway, a major oil exporter. The oil price has approximately doubled in a few years. This is a huge terms-of-trade improvement for Norway. Frankel would prefer that Norges Bank, the central bank of Norway, stabilizes the domestic price of oil. In order to keep the domestic-currency price of oil from rising, Norges Bank would have had to double the value of the Norwegian krone during this

time, that is, to have had to induce a 100% appreciation of the krone. This would be an extremely contractionary policy. Put differently, under the simplified assumption that the relative price of oil to consumer goods has doubled, achieving this new relative price in Norway at an unchanged domestic-currency price of oil requires that other consumer prices are reduced by 50%. Thus, Frankel is suggesting that it would have been better for Norway and the Norwegians if Norges Bank had induced such a huge deflation.

How should the central bank respond to oil-price changes (or any terms-of-trade changes)? This follows from the principles of Good Monetary Policy (Svensson 2002). Indeed, for monetary policy, oil-price changes are not very special: They are just another shock (although potentially large and persistent). Good Monetary Policy is flexible inflation targeting, which can more narrowly be specified as aiming at both stabilizing inflation around an inflation target and stabilizing the output gap around zero. Furthermore, the lags between monetary policy actions on one hand and the effects on inflation and output on the other hand imply that central banks should do "forecast targeting." That is, they should look at forecasts of inflation and set the interest-rate path (or plan) such that forecasts of inflation and the output gap "look good." Here, look good means that the inflation forecast (path) approaches the inflation target and the output gap forecast (path) approaches zero. In other words, look good means a reasonable compromise between stabilizing inflation and stabilizing the output gap. These principles for Good Monetary Policy are very simple to state. The practice of achieving them can be quite difficult, though.

Implementing inflation targeting requires interpreting and understanding the nature of the disturbances hitting the economy. Terms-of-trade movements are movements in the *relative* price between exports and imports. Relative-price movements have both income and substitution effects on aggregate demand that need to be sorted out. Terms-of-trade movements can also be accompanied by movements in world inflation or the world price level. Such movements are movements in *absolute* prices, which effects also need to be sorted out. A standard problem for inflation targeting central banks is to assess whether incoming shocks are temporary or persistent, for instance, whether a particular shock corresponds to a one-time price-level shift or a persistent inflation-level shift. Making such assessments is a standard part of the analysis by inflation targeting central banks.

These principles and analysis are routinely applied by central banks to oil-price changes (Svensson 2005). Oil-price changes shift inflation and output-gap forecasts at a given interest-rate path (they have both income and substitution effects and lead to shifts in the forecasted inflation, output, and potential-output paths). After such shifts, these forecasts may no longer look good. Then central banks adjust the interest-rate path so the inflation and output-gap forecasts look good again.

What happens to the exchange rate during these shifts? That depends, since the impact of oil-price changes are quite complex. A short answer is: whatever is consistent with the optimal inflation, output-gap, and interest-rate forecasts. In some cases, a depreciation is called for; in other cases, an appreciation. Importantly, under inflation targeting the exchange rate is not a target variable and there is no target exchange-rate level.

In each *Inflation Report* (available at www.norges-bank.no), Norges Bank routinely analyzes these issues and presents its conclusion and decision in the form of informative graphs of an optimal instrument-rate, inflation, output-gap, and exchange-rate forecast, with fan charts emphasizing the unavoidable uncertainty of the forecasts. This inflation and output-gap forecast represents the bank's best compromise between stabilizing the inflation gap and the output gap. The bank presents a baseline scenario but also alternative scenarios with alternative assumptions about exogenous disturbances and the transmission mechanism. This is an excellent example of current best-practice inflation targeting.

My point with this reference to routine elements of the *Inflation Report* of Norges Bank is that there is absolutely no reason to abandon flexible inflation targeting for PEPI. Flexible inflation targeting is superior in handling all kinds of disturbances. PEPI would be a disaster.

Svensson, Lars E.O. (2002), "Monetary Policy and Real Stabilization," in *Rethinking Stabilization Policy, A Symposium Sponsored by the Federal Reserve Bank of Kansas City*, Kansas City, www.kc.frb.org.

Svensson, Lars E.O. (2005), "Oil Prices and ECB Monetary Policy," Briefing Papers for the Committee on Economic and Monetary Affairs (ECON) of the European Parliament for the Dialogue with ECB, January 2005, www.princeton.edu/svensson.