Response to Comments by Ball and Mankiw and Verbrugge on "Inflation and the Distribution of Price Changes"

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Ball and Mankiw and Verbrugge make very different points in their comments on our paper. For this reason, we will respond to the them separately.

We applaud Verbrugge for his examination of the statistical properties of an alternative to the sample skewness coefficient. It is our view that it is always appropriate to study statistics with different properties to see if conclusions are robust. Nevertheless, we have two comments. The first has to do with the fact that Verbrugge is unable to implement his triples statistic using the weights used to form the price index. After some thought and correspondence, we agree that there is no clearly tractable method for doing this. This is unfortunate, as we do not know how important the weights are for the ultimate conclusion.

As we read it, the most interesting contribution in Verbrugge's comment arises from his study of the sample median in place of the sample mean in calculating the correlation between asymmetry and the central tendency of the price change distributions. Our original work on the median Consumer Price Index as a measure core inflation, in Bryan and Cecchetti (1994), justifies the use of the median as a way of eliminating exactly the noise caused by price rigidities of the type described in the Ball and Mankiw model. Verbrugge's finding that the sample median – sample triples correlation is both less biased and that the sample value is not significantly different from zero is exactly what we would have expected on both statistical and theoretical grounds. He has provided us with further support for the use of the median as a robust measure of the central tendency of the price change distribution, and confirmed the findings in our paper.

Ball and Mankiw criticize our paper on three grounds. They take issue with our statistics and use of data, with our interpretation of economic theory and with the implications we draw from our results. Following this classification, we will organize our response into three parts.

Beginning with the statistics, Ball and Mankiw criticize the construction of the Monte Carlo experiments we use to evaluate the statistical properties of the sample time-series correlation between the sample cross-sectional mean and sample cross-sectional skewness of inflation. Our experiments are constructed assuming that the fundamental random variable is a single component inflation for one time period — that is, a single element in the inflation panel data set. It is our strong belief that this is the most natural unit to

model. We then us the actual observed price panel in order to construct the distributions from which samples are to be drawn.

It is important that we be clear about the nature of these experiments. We are asking the following question: If price data were drawn randomly from these distributions, then what would the observed mean-skewness correlation be? This is simply the null hypothesis under which we examine the properties of this statistic in asking if the mean-skewness correlation observed in the data can be used to distinguish what happened in the world from this artificial experiment. The natural way to analysis the properties of any statistic is to set up an experiment where the null hypothesis of interest holds, so that you know the "truth." The experiment is to construct the statistic of interest knowing its true value, and compare the results with the estimate from the actual data. This is what we do, and we find that the mean-skewness correlation has very bad small-sample properties. As we say in the paper, the observed values in the actual data are completely consistent with a world in which there is no correlation at all.

Ball and Mankiw also take issue with our implicit claim that the BLS price data is a sample, noting that a very large number of prices are collected every month. They are correct that the number is large, but so what? We simply note that the BLS does not sample every price in every location in every month — there are price sampled monthly, prices sampled every two months, those sampled every three months, and those sampled every six months. In addition, prices such as those for owner-occupied housing, are constructed using complex moving averages of past data. Beyond this, the BLS does not necessarily return to every outlet every month even in constructing series for exactly the same product. In every sense, then, the BLS data is a sample.

Moving to the theory, Ball and Mankiw criticize what they see as our theory of inflation. First, let us say that we agree with the Friedman view they espouse, that inflation is a monetary phenomena. But our paper has no theory of inflation in it all, as we have no model of the behavior of the monetary authorities and how they react to the economic environment. But then, neither to Ball and Mankiw, as their own paper only implicitly assumes that monetary policymakers react to negative supply shocks by inducing inflation. They have no explanation for why this should be so.

Ball and Mankiw take issue with our interpretation of our results. They seem to

believe that the ubiquitous nature of the positive correlation between the sample mean and sample skewness of inflation across countries and data sets is somehow evidence in favor of their position and implies support for a particular economic theory. It is exactly our point that these statistics are biased, and so we would be surprised if we every saw anything but a positive sample correlation. These estimates are simply do not contain the information that a first, naive look suggests.

Finally, let us reiterate another point from the paper. The Ball and Mankiw model implies that over longer and longer time horizons, the mean-skewness correlation should disappear. In their model, the correlation arises from the fact that some price setter change prices immediately in response to a large shock, and some wait. As the horizon increase from one month to one year to two years, the importance of the non-adjustment should decline. Looking at Table 3 of our paper, we note that sample value of the correlation actually increases with the horizon. Not only is this exactly what we would expect given the small-sample bias in this statistic, it also means that when Ball and Mankiw's model is confronted with the data, it fails on their terms.

Ball and Mankiw close their comment on our paper by accusing us of "offering a statistical version of the laymen's misconception" that relative price changes are inflation. Instead, we believe that Ball and Mankiw offer a theoretical justification for this very same misconception, and that it is not supported by the facts.