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THE PHILLIPS CURVE AND INFLATION FORECASTING: THE CASE OF THE PHILIPPINES

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The Phillips curve depicts the tradeoff between inflation and unemployment rate. Studies have shown its usefulness in policymaking and most importantly in forecasting inflation. This paper tests the Phillips curve for the Philippines and calculates the non-accelerating inflation rate of unemployment (NAIRU) using the regression results. Robust results are obtained validating the inflation-unemployment tradeoff. From this relationship, a Philippine NAIRU of 10-11 percent is estimated. Results likewise bear out that inflation forecasts using the Phillips curve have good tracking power and that using the skewness of the cross-sectional inflation distribution as the supply shock proxy improves the out-of-sample forecasting power of the Phillips curve.

I. INTRODUCTION

The Phillips curve depicts the tradeoff between inflation and unemployment rate. Studies have shown its usefulness in policymaking and most importantly in forecasting inflation.

"Belief that monetary policy has employment effects is inextricably tied to belief in the inflation-unemployment tradeoff" (Ball and Mankiw, 2002). Labor market conditions (through wage) affect consumer price inflation, while monetary policy can affect unemployment rate via the inflation channel. It is only through this channel that monetary policy affects unemployment rate. Meanwhile, fiscal policy tools to affect unemployment rate abound. Thus, on the part of the policymakers and analysts, a better understanding of the relationship between inflation and unemployment rate is desirable for better coordination of fiscal and monetary policies. Knowledge of what level of unemployment rate will trigger high inflation which can then in turn be harmful to the investment climate is desirable to both policymakers and capital investors. Thus, this relationship is more than academic interest and can be useful to investors in forecasting future inflation.

A number of studies have inferred the inflation forecasting power and advantage of the Phillips curve (see Mio (2001), Blinder (1997), and Stock and Watson (1999), Fisher et al. (2002)). More importantly, studies show that the price Phillips curve tracks inflation path turning points, and, consequently, monetary policy direction quite well.

The objectives of this paper are: (a) to test the Phillips Curve model using Philippine quarterly data from 1981 to 2002; (b) to determine whether the Phillips Curve model, if it holds for the Philippines, is a good forecasting tool; and (c) to calculate the non-accelerating inflation rate of unemployment (NAIRU) from the Phillips curve relationship obtained.

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Robust results are obtained which show that the Phillips curve model holds for Philippine data and that the Philippine NAIRU is about 10-11 percent. Results also show that inflation forecasts using the Phillips curve have good tracking power, particularly if the skewness of the cross-sectional distribution of inflation is used to proxy for supply shocks.

The organization of this paper is as follows: Section II presents a review of related literature and shows a brief picture of how the Phillips curve has fared and been augmented to reflect evolving economic thinking and changing conditions. Section III describes the framework and methodology used. Section IV explains the estimation procedure and interprets estimation results. Section V concludes. A data appendix at the end gives brief descriptions of the data used.

II. REVIEW OF LITERATURE

"It is easy to trace the money in its progress through the whole commonwealth; where we shall find that it must first quicken the diligence of every individual, before it increases the price of labor."[1] David Hume thus posit more than two and a half centuries ago when explaining consequences of increases in money supply with respect to unemployment and inflation. To this day, and even though various schools of thought have differing explanations on the origin of the inflation-unemployment tradeoff, it remains a macroeconomic orthodoxy – at least in the short run – that the variability in money supply moves inflation and unemployment rate towards opposite directions (Ball and Mankiw, 2002).

Blanchard and Katz (1996) cite a 1991 study done by Lawrence Ball where Ball "presented evidence that those OECD countries which experienced larger or longer disinflations in the 1980s, especially those with both large disinflation and generous unemployment benefits, have also experience larger increases in the natural rate of unemployment from 1980 to 1990" (Blanchard & Katz, 1996, p.27).

On the other hand, because of the low inflation-low unemployment environment seen in the 1990s, the Phillips curve has been declared inutile in some quarters. However, Staiger, et al. (2001) in their investigation of the low inflation-low unemployment rate regime in the U.S. in the late 1990s concluded that "the Phillips curve is alive" but that the Phillips curve for the US has shifted inward.

Lansing (2002) concludes that although the inverse relationship between unemployment and inflation in the short-run remains true, the magnitude of the trade-off is not static over time. In addition, the curve may shift inward or outward. Thus, the relationship has to be re-estimated periodically if one wants to use the Phillips curve in forecasting inflation. Nonetheless, he acknowledges in the same study the research done by Fisher, et al. (2002) which shows that the Phillips curve model forecasts the actual direction of changes of future inflation 6 to 7 times out of 10.

The Phillips curve

The short-run tradeoff between inflation (π) and unemployment rate (UR) – or the Phillips curve in its 1958 version – can be shown as follows:

$$\pi = \alpha_0 - \alpha_1 UR \qquad (1)$$

where α_0 and α_1 are parameters, and $\alpha_1 > 0$.

Intuitively, the parameters cannot be expected to be stable over time. And in fact, as early as 1960, Samuelson and Solow

(1960) argue that the parameters will vary over time. Empirical evidence bears out the instability of this specification when inflation and unemployment rates both shot up in the 1970s (oil price "shocks").

In the late 1960s, Friedman (1968) and Phelps (1967) pioneered the view that changes in inflationary expectations influence the tradeoff relationship. It is a common view that the reason for the change in the tradeoff in the 1970s is due to a rise in inflationary expectations.

Likewise, Friedman (1976), while confirming the short-run tradeoff, made a case for the absence of a trade off between inflation rate and unemployment in the long term giving birth to the concept of the natural rate of unemployment. "The natural rate is the rate of unemployment that prevails when inflationary expectations are confirmed" (p.5). Thus, it is the long-run unemployment rate because over time the difference between expected inflation and actual inflation should average to zero (Ball and Mankiw (2002).

Hence, the expectation-augmented Phillips curve is specified as:

$$\pi_t = \pi^e - \gamma(UR - UR^*) \qquad (2)$$

where π^e is expected inflation and UR^* is the natural rate of unemployment, and γ a parameter. Ball and Mankiw (2002) explains that UR^* "imbeds all the shifts in the inflation-unemployment tradeoff previously represented by the parameter [α_0], other than shifts arising from expected inflation." (pp. 5-6)

Inflationary expectations and the natural rate of unemployment determine the location of the Phillips curve, where inflation is in the y-axis and unemployment rate is in the x-axis. The Phillips curve shifts inward or outward depending on the natural unemployment rate, while it moves up or down depending on expectations of inflation.

The present-day version of the tradeoff relationship further revises the expectation-augmented specification by adding a supply shock variable, v.

$$\pi_t = \pi^e - \gamma(UR - UR^*) + v \qquad (3)$$

Inflationary expectations

The π^e part of the previous two relationships depends on how expectations are formed. Some economists assume backward looking, or adaptive expectations, while others, most notably Lucas (1972) and Sargent (1971), argue for a forward-looking approach, i.e., rational expectations.

Adaptive expectation simply says that π^e for period *t* is the inflation in the previous period. This assumption may seem suspect at first blush. However, Ball and Mankiw (2002)[2] argues that since "inflation has been close to random walk...[the adaptive approach to forming expectation] is not far from rational" (pp. 7-8). Further, the appropriateness of using π_{t-1} as proxy for expected inflation presupposes a monetary regime where there is high inflation inertia.

Thus, the Phillips curve is

$$\pi_t = \pi_{t-1} - \gamma(UR - UR^*) + v \qquad (4)$$

where UR^* in this case is interpreted as the non-accelerating inflation rate of unemployment (NAIRU) (Ball & Mankiw, 2002).

Economists have operationalized the specification in Equation (4) by including more lags for both inflation and unemployment rate.

Supply shocks

The relative price changes of a fixed commodity basket that generally contains imported goods, foods and energy-related goods vis-à-vis the all-items inflation has been a popular proxy for supply shocks. Mio (2001) cites two foundations for the use of the relative price. One is that certain commodities are highly price inelastic and highly prone to supply shocks. The other is that "the exogenous relative price changes of intermediate commodities (crude oil, for example) can be regarded as aggregate supply shocks" (Mio, 2001, p.88). Mio calls this the Gordon method.

In the same paper, Mio also discusses an alternative method – which he calls the Ball-Mankiw method – to account for supply shocks in the Phillips curve specification. He estimated a Phillips curve for Japan using the skewness of the cross-sectional inflation distribution as the supply shock proxy. He concludes that this method "outperforms the [Gordon] method in terms of the robustness to the various lag specifications, predictive power, and the parameter stability for changes in the estimation period, which are the essential properties for the practical use of the Phillips curve. These results suggest that (1) because supply shocks hit broad sectors, it is not appropriate to restrict the proxy for the supply shock to the relative price changes of a fixed commodity basket; and (2) the inflation inertia corresponds to the underlying inflation rate from which the supply shock effect has been eliminated" (Mio, 2001, p.86).

III. EMPIRICAL FRAMEWORK AND METHODOLOGY

Adapting the notation used by Mio (2001), the expectation-augmented Phillips curve may be specified as:

$$\pi_t = \alpha + \sum_{i=1}^{l} \beta_i \pi_{t-i} + \sum_{j=1}^{m} \gamma_j UR_{t-j} + \sum_{k=0}^{n} \theta_k SupSHOCK_{t-k} + \varepsilon_t \tag{5}$$

where SupSHOCK is any supply shock variable.

This paper tests the Phillips curve for the headline CPI measure of inflation. The basic specification, adapted from Brayton, et al. (1999), are as follows:

$$\begin{aligned} d(\log(CPI94))_t &= \alpha + PDL(d(\log(CPI94)), \\ &\quad lags, order, constraint) \\ &\quad + \gamma UR_t + \theta FEP_{t-1} + \varepsilon_t \end{aligned} \tag{6}$$

where, FEP is the relative price of food and petroleum which is measured as the difference between headline CPI inflation and core inflation using the exclusion method[3], CPI94 is the headline consumer price index with 1994 as the base year, and PDL stands for polynomially distributed lag. The specification PDL(variable name, lags, order, constraint) follows the syntax of Eviews®. Note that in equation 6, FEP is the supply shock variable.

Meanwhile, adapting the work of Mio (2001), the supply shocks – SupSHOCK – will also alternatively be "controlled" using the Ball and Mankiw method:

$$\begin{aligned} d(\log(CPI94))_t &= \alpha + PDL(d(\log(CPI94)), \\ &\quad lags, order, constraint) \\ &\quad + \gamma UR_t + \kappa SKEW_{t-1} + \varepsilon \end{aligned} \tag{7}$$

where,

$$SKEW_{t-1} = d(\log(CPI))_{t-1} - d(\log(CORCPI))_{t-1}$$

and CORCPI is 30% trimmed CPI94[4].

If we assume that UR^* in the expectation-augmented Phillips curve in the previous section is constant over time and is "not correlated with v", the non-time-varying (NTV) NAIRU can be estimated by regression of the following equation:

$$\pi_t - \pi_{t-1} = \gamma UR^* - \gamma UR$$
$$\Delta\pi_t = \gamma UR^* - \gamma UR \qquad (8)$$

where γUR^* is constant; hence, change in inflation is regressed against contemporaneous unemployment rate. Since by definition of NAIRU the term $\Delta\pi = 0$, UR^* is extracted from the intercept, c (= γUR^*), by dividing it by the absolute value of γ (Ball and Mankiw, 2002, p14).

$$UR^* = \frac{\gamma UR}{|\gamma|} = \frac{c}{|\gamma|} \qquad (9)$$

On the other hand, there is skepticism as to the consistency or "stability" of NAIRU over time. As shown previously, the shifts in Phillips curve has two components - the UR^* component and the v component. UR^* reflects long-term change in the inflation-unemployment tradeoff, while the short-term volatilities are reflected by the supply shocks. Therefore, to accurately measure the NAIRU, the effects of the two components must be separated. In general, to extract the time-varying (TV) UR^* from equations 6 and 7, rearrange the equations to get:

$$\frac{\gamma UR^* + v}{\gamma} = \frac{\gamma UR + (\pi_t - \pi_{t-1})}{\gamma} \qquad (10)$$

where v is either the FEP or SKEW (depending on whether one is calculating TV NAIRU associated with equations 6 or 7), and π is d(log(cpi94)). The UR and π are observable and the γ from the results of equations 6 and 7 can be used to estimate a time series for the RHS. This paper uses the Hodrick-Prescott (H-P) filter[5] smoothing parameter to extract the UR^*. Other studies have used the Kalman filter and the cubic spline (Brayton, et al., 1999).

IV. DATA AND EMPIRICAL RESULTS

a. Data

The dependent variable (inflation rate) is generated by getting the first difference of the log of 1994-based CPI series (CPI94).

Inflation expectation is calculated using polynomially distributed lags of the inflation rate [PDL(log(CPI94)].

The supply shocks (SupSHOCK) are measured in two alternative ways: either by getting the relative price of food and energy or by calculating the skewness of the cross-sectional inflation distribution. To get the relative price of food and energy (FEP), the index for rice, fruits and vegetables, fuel and transportation and communication are excluded from the headline CPI, and then the new weights for the remaining commodities are calculated to arrive at the new price index. The first difference of the log of this new price index is deducted from the first difference of the log of headline CPI.

Due to unavailability of data of higher disaggegation, the FEP used for Regression 2 (estimation period 1981-2002) was calculated using headline CPI less food, beverage and tobacco (FBT) and fuel light and water (FLW).

On the other hand, to compute for the skewness of the cross-sectional inflation distribution as the supply shock proxy (SKEW), the monthly inflation rates of the commodities in the headline are ranked in an ascending order. Then, 15 percent of the basket from each tail is excluded. New weights for the remaining commodities are calculated for use in the calculation of the new price index, CORCPI. The first difference of the log of CORPCPI is deducted from d(log(CPI94)) to arrive at SKEW.

Using data for 1990 – 2002, equation 6 is regressed. The same equation is also run for a longer estimation period to check for stability, i.e., 1981-2002.

Due to unavailability of data, equation 7 is estimated only for the period 1990-2002.

The static NAIRU is estimated using equation 9. Meantime, the time-varying (TV) NAIRU is estimated by first generating a time series using the RHS of equation 10, then using the Hodrick-Prescott filter to get the long-term trend.

b. Results

Regression results demonstrate a fairly robust Phillips curve relationship using Philippine data.

Equation 6 is estimated for two estimation periods: 1981-2002 and 1990-2002. The magnitude of the coefficients estimated from these regressions (Regression 1 and Regression 2) are not widely different although the constant and the coefficient of unemployment rate for Regression 2 are – unlike for Regression 1 – not significant at 5 percent. Regression 2 also has lower adjusted R^2 and higher Akaike and Schwarz criteria. This is not surprising given the many structural changes and shocks that have taken place since 1981. Nevertheless, dummy variables for various shocks and crises tried for Regression 2 are highly insignificant and cause estimated coefficients for other variables in the regression to become insignificant and/or have the "wrong" sign.

The results of Regression 1 and 3 are very close. It seems that results are not significantly different whether the Gordon method or the Ball and Mankiw method is used to control for supply shocks. This however does not necessarily contradict Mio's findings since scrutiny of the CPI items excluded in computing for FEP reveal that their inflation rates have historically been high and volatile. Thus, these same items are also the same ones most likely to be trimmed off when computing for CORCPI to calculate SKEW.

When PDL is not used to account for inflationary expectations, the estimated coefficients for some variables are of the wrong sign and become insignificant, including the constant.

Lastly, results from regression of the difference between current period's inflation rate and last period's against current period unemployment rate for two different estimation periods – Regression 4 and 5 – further confirm the robust negative relationship between the two.

<u>NAIRU</u>

The estimated NTV NAIRU are 9.8 percent (using estimation period 1990-2002) and 10.1 percent (for estimation period 1981-2002). This shows that the NTV NAIRU has been fairly stable in the last two and a half decades; although it has been lower since the 1990s.

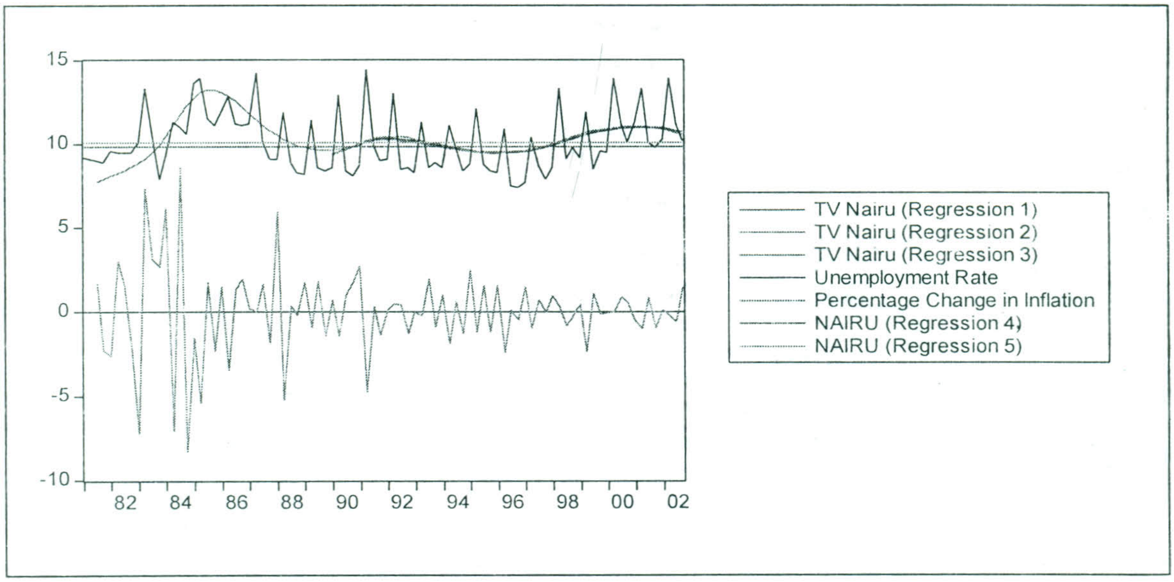
The results also show that the TV NAIRUs estimated from the results of the three regressions are fairly clustered together. TV NAIRU went as low as 9.5 percent in 1995:4 to 1996:1 and crept up again peaking in 2001 at about 11 percent. It has since slipped to approximately 10.6 - 10.8 percent. It should also be noted that during periods of high and unstable TV NAIRU, inflation is also highly variable.

Table 1
Regression Results

Estimated Coefficients	**Regression 1**	**Regression 2**	**Regression 3**	**Regression 4**	**Regression 5**
Dependent variable	d(log(CPI94)) $= \pi_t$	d(log(CPI94)) $= \pi_t$	d(log(CPI94)) $= \pi_t$	d(d(log(CPI94))) $= \Delta\pi_t$	d(d(log(CPI94))) $= \Delta\pi_t$
	Equation 6		Equation 7	Equation 8	
constant	0.012	0.010	0.011	0.033	0.035
t-stat	4.884	1.873	4.727	3.617	2.119
prob	0.000	0.065	0.000	0.001	0.037
inflation lags (PDL, 3 lags, degree 2)	0.911	0.936	0.914		
t-stat	23.181	20.480	23.180		
prob	0.000	0.000	0.000		
unemployment rate	-0.001	-0.001	-0.001	-0.003	-0.003
t-stat	-4.534	-1.645	-4.348	-3.707	-2.162
prob	0.000	0.104	0.000	0.001	0.034
FEP (-1)	-0.166	-0.223			
t-stat	-2.501	-2.267			
prob	0.016	0.026			
SKEW (-1)			-0.125		
t-stat			-3.154		
prob			0.003		
Sample	1990:1 2002:4	1981:1 2002:4	1990:1 2002:4	1990:1 2002:4	1981:1 2002:4
Adjusted R-squared	0.958	0.914	0.960	0.200	0.041
S.E. of regression	0.003	0.008	0.003	0.012	0.026
Sum squared resid	0.000	0.005	0.000	0.007	0.059
Akaike info criterion	-8.975	-6.720	-9.012	-5.976	-4.407
Schwarz criterion	-8.787	-6.574	-8.821	-5.901	-4.350
Durbin-Watson stat	2.199	2.507	2.660	2.587	2.877
Non-TV NAIRU				9.842	10.099

On the other hand, actual unemployment rate has been hugging the NAIRU, particularly since the second half of the 1990s. Consequently, this period exhibits less volatility in inflation rates as evidenced by tighter swings around zero by the percentage change in inflation rate (the difference between inflation this period and inflation rate last quarter) in Figure 1.

Figure 1
Estimated NAIRUs, and Actual Unemployment Rate and Rate of Change in Inflation



Predictive Power

Figure 2 illustrates how well the NAIRU foretells the behavior of headline inflation. Essentially, the estimation results confirm the expected theoretical relationship. A tradeoff between inflation and unemployment does exist in the Philippine case and such relationship may be used to predict the behavior of inflation. When unemployment is higher than the NAIRU, inflation rate may be expected to decelerate, and vise versa.

The solid vertical lines help show that during periods when unemployment rate is above the NAIRU – either accelerating or at a peak – the inflation rate is either decelerating or at a trough. On the other hand, the broken lines highlight periods of rising or accelerating inflation coupled with unemployment rates below the NAIRU.

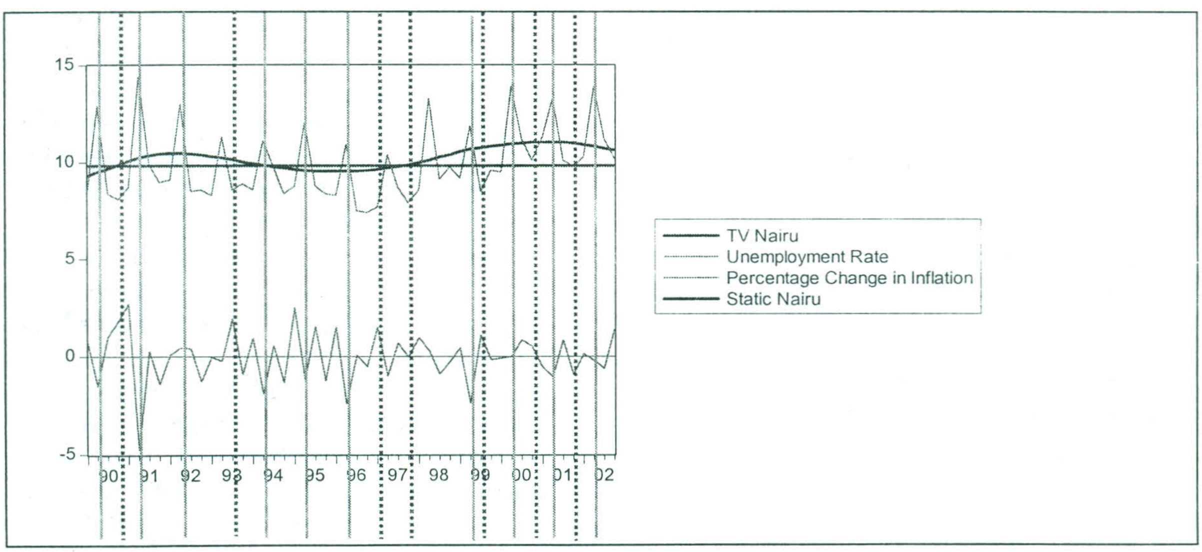
Peaks in unemployment generally coincide with troughs in inflation rate. On the other hand, during 1992:3 to 1993:2, unemployment and inflation rate did not follow the usual tradeoff relationship as they both trended down during this period. This may likely be due to the resolution of the power crisis.

Also, the regular pattern in unemployment rate suggests possible seasonality of unemployment data. Later research may explore the appropriateness of using deseasonalized unemployment rate data in estimating the Phillips curve for the Philippines.

Table 2
Descriptive Statistics of the Estimated TV NAIRUs

	TV NAIRU (associated with Regression 1)	TV NAIRU (associated with Regression 2)	TV NAIRU (associated with Regression 3)	Actual UR	Percentage Change in Inflation
Mean	10.1761	10.3409	10.2203	10.1783	-0.0205
Median	10.1504	10.1363	10.2292	9.8000	0.0720
Maximum	11.0378	13.2026	11.0484	14.4000	8.6610
Minimum	9.4222	7.7553	9.3083	7.4000	-8.3837
Std. Dev.	0.5339	1.1525	0.5272	1.7779	2.6819
Skewness	0.2460	0.5821	0.1031	0.6771	-0.1127
Kurtosis	1.7045	3.6308	1.6943	2.5092	5.5642
Jarque-Bera	4.1609	6.2829	3.7861	7.9537	24.0182
Probability	0.1249	0.0432	0.1506	0.0187	0.0000
Sum	529.1585	889.3167	531.4542	936.4000	-1.7847
Sum Sq. Dev.	14.5397	112.9096	14.1748	287.6565	618.5753
Observations	52	86	52	92	87

Figure 2
Inflation-Unemployment Tradeoff and Turning Points



In-sample Forecast

More formally, Figures 3 and 4 summarize the forecasting performance of equations 6 and 7. Since early 1992, inflation forecasts of both equations (estimated using 1990-2002 data) deviated less than 0.5 percentage point from actual inflation. Nevertheless, among the three regressions, Regression 1 proved best – although only marginally better than Regression 3 – in terms of lowest RMSE (0.002294) and consequently has lowest MAPE (12.33%).

Figure 3
Deviation of Forecast Inflation from Actual (in percentage point)

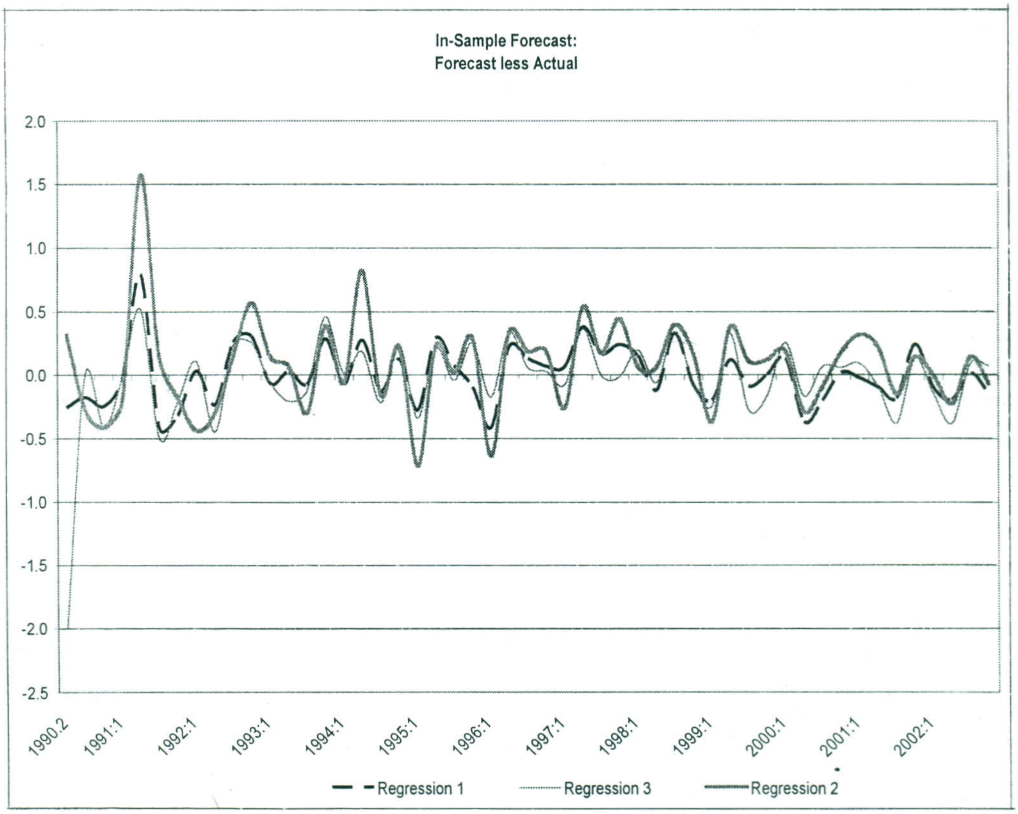
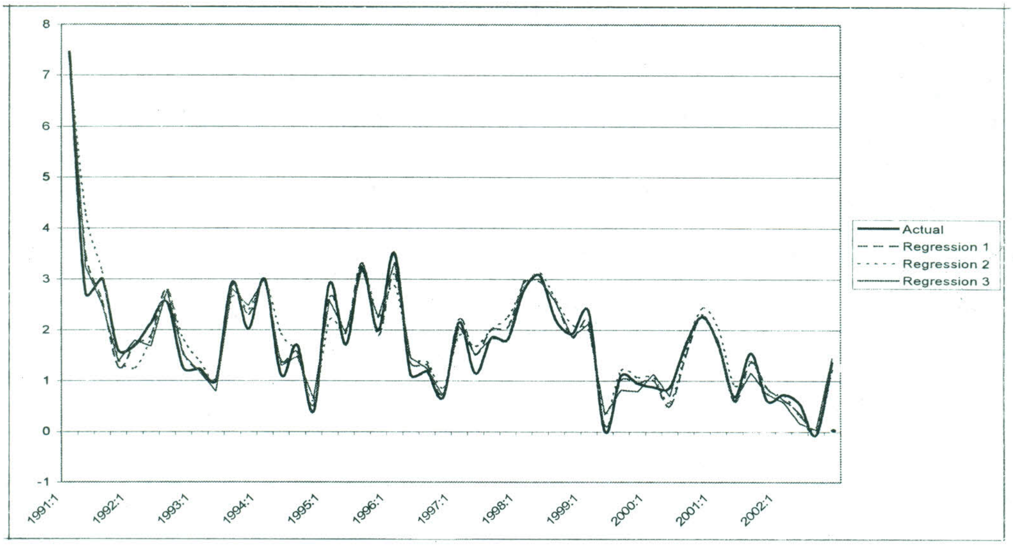


Figure 4
Actual Inflation versus Forecasts



Out-of-sample Forecast

Regression 1 still has the lowest RMSE and MAPE for out-of-sample forecasting among the three regressions. Nevertheless, Regression 3 – which uses the Ball and Mankiw method in controlling for supply shocks – gives the closest forecasts out-of-sample vis-à-vis actual.

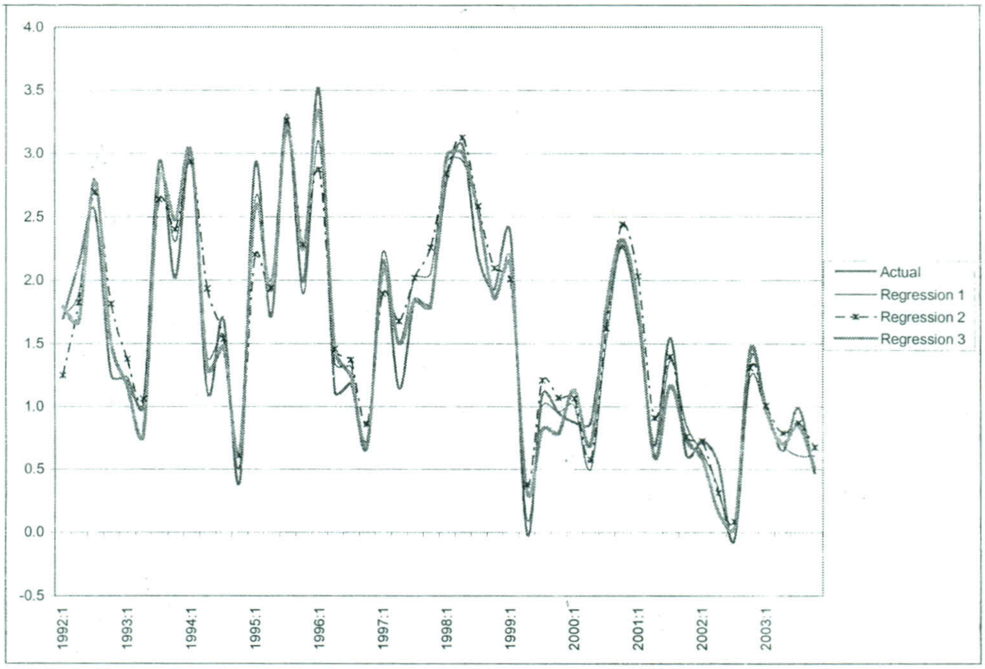
Table 3

	In sample		Out-of-sample	
	RMSE	**MAPE**	**RMSE**	**MAPE**
Regression 1	0.00229	12.33	0.00228	12.92
Regression 2	0.00792	27.27	0.00774	26.94
Regression 3	0.00242	16.62	0.00234	16.09

Table 4

		Forecasts			**% difference** =((forecast-actual)/actual)*100		
	Actual	Regression 1	Regression 2	Regression 3	Regression` 1	Regression 2	Regression 3
2003:1	1.01	0.96	1.01	0.96	-4.77	0.21	-4.47
2003:2	0.65	0.69	0.79	0.70	7.53	21.99	8.68
2003:3	0.99	0.61	0.87	0.85	-38.60	-11.96	-14.29
2003:4	0.46	0.61	0.68	0.51	31.39	46.11	10.34

Figure 5
Out-of-Sample Forecasts versus Actual Inflation



V. CONCLUSION

The regression results confirm the expected theoretical tradeoff between inflation and unemployment for the Philippines. In addition, coefficients of the variables exhibited stability across estimation periods. Likewise, coefficients have been fairly stable whether the Gordon method or the Ball and Mankiw method is used to account for supply shocks contrary to the expected improvement in fit and predictive power found by Mio (2002). This may be due to the fact that items excluded (Gordon method) have historically exhibited variable inflation, thus, they are also most likely to be trimmed off (Ball and Mankiw method).

The two equations – equations 6 and 7 – prove to have a satisfactory predictive power and more importantly track turning points of actual data well. However, the Phillips curve model, which employs the Ball and Mankiw method in controlling for the supply shocks, predicts out-of-sample best.

The NTV NAIRU is estimated to be 9.8-10.1 percent, while the TV NAIRU in 2002 is about 10.6-10.8 percent. These results imply that actual unemployment rates significantly above (below) the NAIRU are expected to herald decelerating (accelerating) inflation rates.

This relationship is useful not only to investors when predicting inflation rates and hence, other macroeconomic variables as well like output and interest rates, for use in investment decisions, but also to policymakers. A good picture of how the tradeoff works is essential for better coordination of policies between the monetary and fiscal authorities.

DATA APPENDIX

This describes the data used in Section V. The CPI and unemployment data are from the National Statistics Office. The abbreviations used in the regressions and in the tables and graphs are also indicated.

Price Series:

CPI94: CPI inflation: quarterly averages of monthly CPIs were taken to get quarterly CPIs.

Real Activity Variable:

UR: Unemployment rate: from the Labor Force Survey. Note that the series used do not reflect the new unemployment definition which only took effect starting the April 2005 LFS release. For more details on the new unemployment definition, please refer to www.census.gov.ph, or to NCSB Resolution No. 15, dated October 14, 2004.

Constructed Variables:

CORCPI: Core inflation: monthly core CPIs were calculated using 30% trimmed mean method, i.e., items in the basket are ranked according to their monthly inflation rates and 15% of the basket is trimmed from each tail; then, the new weights of the remaining items are calculated. These new weights are multiplied to the corresponding price indices of the remaining items to get the new overall CPI. Then, quarterly averages are taken.

CPIX: For estimation period 1990-2002: All-items headline CPI excluding rice, corn, fruits and vegetables, fuel, and transportation and communications.

For estimation period 1980-2002: All-items headline CPI less food (food and beverage since food cannot be extracted from old data) and energy (fuel, light and water since fuel cannot be extracted from FLW for old data).

FEP: Relative price of food and energy: $(\ln(cpi_t \div cpi_{t-1})) - (\ln(cpix_t \div cpix_{t-1}))$

SKEW: $d(\ln(CPI94_t)) - d(\ln(CORCPI_t))$

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NOTES

[1] David Hume in his 1752 essay "Of Money", as cited by Ball and Mankiw (2002), p.2.

[2] Citing also studies done by Barsky (1987) and Ball (2000).

[3] Rice, corn, fruits and vegetables, fuel and transportation and communication lines of the headline inflation series are excluded. Higher level of disaggregation for fuel and transportation and communication is desired but is hampered by lack of available time series for components of fuel and transportation that are directly linked to petroleum.

[4] This method ranks the components of the headline CPI series according to inflation rates. The highest and lowest 15 percent, in terms of the weight of the commodities in the CPI basket, are excluded and new weights are then computed to arrive at the new aggregate price index, CORCPI.

[5] The HP filter "obtain[s] a smooth estimate of the long-term trend component of a series" (Eviews® User Guide).