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Interest Rate Setting Behavior in the Philippines

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By

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While writing this thesis, I have not witnessed any wrongdoing, nor have I personally violated any conditions of the Skidmore College Honor Code.

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Abstract

This paper examines the recent conduct of monetary policy in the Philippines and the Bangko Sentral ng Pilipinas' (BSP) interest rate setting behavior. In this paper, I use a standard open economy reaction function to see whether the BSP reacts more to changes in the inflation rate, exchange rate, and or the output gap. I find that in the Philippines, the interest rate responds strongly to exchange rates. Furthermore, interest rates are less consistently explained by inflation and more accurately explained by exchange rates. This tends to suggest that the BSP goes against its inflation targeting strategy and supports a stable exchange rate system. Evidence also suggests that the BSP's response to core inflation is higher and more accurately explains the interest rate setting behavior. However, the relationship does not exceed that of changes in the exchange rate.

1 Introduction

Many emerging market economies around the world have started to adopt inflation targeting (IT) policies to actively conduct monetary policy. This is the latest and most progressive method of conducting monetary policy today. Inflation Targeting is when a central bank picks an inflation target, usually a range, and tries to meet the expectations by ending the year within the targeted range. IT and commitment to low inflation was established in the 1980s to help ease economic stagflation that had occurred in the United States. The adoption of this strategy was proven to be effective. Targeting inflation created stable employment which meant that there was less economic uncertainty and increased welfare. In other words, low inflation policies helped economic volatility in industrialized economies (Bernanke 1997, Blanchard and Simmons, 2001). Emerging market economies started to adopt IT policies after the United States implemented the strategy. Since then, many countries and central banks have followed suit. In the Philippines, the central bank is transparent in stating their commitment to low inflation. Moreover, the country prides itself on its free-floating Peso exchange rate. Many countries are similar and have the same characteristics of IT policies and a free-floating exchange rate. However, it is evident that emerging economies do not solely respond to inflation but exchange rates volatility as well.

There are two ways countries react and respond to exchange rates. Countries can change the interest rate or expand and contract foreign reserves. When countries print money or use reserves to stabilize the exchange rate convertibility, they are not truly allowing their currency to float freely. Kaminsky and Reinhart (1999) showed that countries officially floating in 1970 to 1999 did not allow their exchange rates to fluctuate. Evidence has shown that there were high fluctuations in foreign reserves to offset exchange rate volatility. Central banks still manipulate foreign exchange (FX) market to manage the exchange rate. Emerging market economies need to

manage exchange rates to provide stability and convertibility to ensure capital flows are attractive to foreign investors. However, by doing so emerging market economies become more likely to experience a sudden stop of capital inflows an example being the 1997-98 East Asian financial crisis (Calvo and Mishkin, 2003). Although it is important to adjust policy to encompass exchange rates, central banks should not react to changes in exchange rate more than changes in inflation and output.

If emerging market economies central banks were solely functioning and reacting to exchange rates, then they should not have stated or followed an IT strategy in the first place. Rather, central banks should have stayed with the monetary policy strategy of the Bretton Woods system. The system naturally made countries enact monetary policy in a way that guaranteed exchange rate stability and full employment. This system may have proved to be inefficient for developed countries post 1980s but arguably could still be applied to emerging market economies if central banks respond more to exchange rates rather than inflation rates.

In this paper I argue that the central bank in the Philippines, the Banko Sentral ng Pilipinas (BSP), does not solely respond to inflation, but to exchange rate fluctuation. To some extent it should adjust for fluctuations and macro shocks to ensure stability in the financial system. However, if interest rates are responding more to exchange rate fluctuations than to local changes in the consumer price index calculations then the goals and execution of policy are not in line. Moreover, definitions and characteristics should be restated and examined such as the fundamental free-floating peso and the IT strategy.[1]

[1] The Philippines peso officially became a free-floating currency after the 1993 New Central Bank Act.

2 Literature Review

Mohanty and Klau (2004) test whether emerging market economies follow an IT policy and set interest rate according to changes in inflation, output gap, and the exchange rates. They found, after testing 13 countries in South America, Asia, and Central Europe, that central banks' interest rates respond strongly to the exchange rate. The findings reject their hypothesis that central banks do not react to exchange rate volatility. Furthermore, in all countries except for Chile, exchange rates have uniformly negative signs which suggests that central banks "lean against the wind" by raising rates when the exchange rate depreciates. In some countries the response to exchange rate is much higher than to changes in inflation or the output gap. According to their findings on the Philippines, Mohanty and Klau (2004) illustrate that the long-run inflation coefficient is low indicating that the BSP allows for inflationary pressures to climb. However, for countries like Korea, Taiwan, Thailand, Chile, Mexico, Peru, and South Africa, the interest rate reaction to inflation exceeds by one, suggesting a non-accommodating stance of monetary policy towards price pressure. Thus, these central banks adapt to external shocks with regards to exchange rate however the relationship is stronger towards inflation. Two important factors were realized in this study, first exchange rate shocks appeared to be more persistent in developing economies; and second, central banks' preference for stabilizing the exchange rate is through interest rate setting. This study compared and contrasted developing countries that follow an IT strategy. The monetary policy regimes in many of these countries had only begun implementing an IT strategy since the inception of this paper.

Ameht Benlialper et al (2017), used a similar method to see if IT developing countries were more inclined to react to appreciation and depreciation pressures. In their findings they found that central banks favored appreciation. This meant that as the currency appreciated policies would

react more favorably. Evidence suggest that IT countries are inclined to use the exchange rates to gauge and make decisions about policies. Ameht Benlialper et al states, “This practice is in stark contrast with the main tenants of IT and also with official declarations of central banks.” In other words, the way central banks reach their inflation target could be done in a different way from what they say they are doing. It is a characteristic in developing countries that appreciation in the currency is unwanted as it leads to exports becoming less competitive which will ultimately decrease the output. Therefore, it is increasingly important to understand if the country in subject is a commodity exporter is or not (Noy, 2011). As for the tools available, to deal with exchange rate directly, many people have studied the changes in the reserve of different IT policy countries.

A reason why emerging market economies actively pursue exchange rate stability, is because a highly volatile exchange rate can increase output volatility which can become a source of vulnerability (Mohanty, 2014). Central banks need to play a part in managing the exchange rate and FX market not only for credibility and convertibility but for output stabilization. The most direct way of managing this, as mentioned earlier, is to intervene in the FX market by printing and buying reserves when demand for the currency is high (or appreciating). Likewise, central banks can intervene by also buying back their own currency with their stocked reserves. Still, central banks in emerging market economies should be cautious when intervening in the FX market. An adverse effect could take place when too much intervention can turn into a source for volatility instead of a remedy.

Keefe and Shadmani (2018) investigated 24 emerging economies central banks to see if they are “leaning against the wind” and if it is part of their monetary policy strategy. Moreover, like Ameht Benlialper et al, they tested whether there is an asymmetric response towards depreciation and appreciation of the currency using most recent data. The findings proved that central banks

prefer to dampen appreciation pressures more so than depreciation. The major reason for central banks intervening using the reserves is to adjust for shocks that cause short run crisis and financial distress. Moreover, shocks are more prominent in countries that have debts denominated in foreign currencies. This means a country that has debt denominated in US dollars is more likely to follow monetary policy that favors appreciation and intervenes to make sure that the currency does not depreciate and cause a banking crisis (Kaminsky and Reinhart, 1999). In this scenario, Keefe and Shadmani (2018) state, sharp depreciations are avoided as they may trigger financial crisis in the short run.

Conversely, central banks fear of appreciation can stem from being unable to compete as an export economy. An example of this being China, the demand for the renminbi (RMB) has been strong since the 90s and the country has been printing and actively increasing its dollar reserves to keep its currency artificially low—even though the currency is free floating. Thereby, central banks have a tendency to fight against appreciation of the local currency to ensure exports remain competitive.

Keefe and Shadmani (2018) conclude that there is a preference to intervene during periods of appreciation and this has been constant before and after the 2008 great recession. Thereby, policy makers are more concerned about the effects of competitiveness in relation to exports and international trade. Central banks know if they keep the currency undervalued, this would promote long run economic growth and stimulate the overall economy.

So far, I have written about emerging market economies being transparent and progressing to an inflation targeting strategy. However, it is evident that inflation is not the only target, likewise the interest rate is not the only tool. Developing economies are more exposed to shocks such as capital inflow and outflow, currency crisis, and financial instability and local bank failures.

Therefore, central banks in developing countries need to implement a more diverse strategy to overcome the differences in characteristics.

Ghosh et al (2012) examines the case of using both instruments or tools—interest rate setting policy and foreign exchange market intervention. Meanwhile Ghosh et al (2016) identify that the overall goal of a developing countries central banks is to stabilize inflation and output while keeping exchange rate volatility low. Since monetary authorities in emerging market economies lack the credibility coming from consistent price stability, they need to implement an IT strategy or framework together with discretionary policies. The IT framework can help keep inflation expectations low when credibility is imperfect while discretionary policies can be a viable option when credibility is high. The conclusion that Ghosh et al (2016) provides is when emerging market economies have the ability to use both tools, interest rate setting and foreign exchange market intervention, then they should be used at the same time to achieve both price-stability and exchange-rate goals.

The literature has provided cross country and cross regional regional analysis and comparisons of monetary policy in emerging market economies. It is evident that the Philippines, follows an IT strategy and also participates in the foreign exchange market. Thereby, the monetary policy target is twofold; Inflation targeting and exchange rate stability. However, the Banko Sentral ng Pilipinas (BSP) needs to be cautious when conducting foreign exchange market interventions since not only do policy makers need to be cautious about capital flows, financial health, but exchange rate fluctuations from money remittance and flows from business process outsourcing (BPOs) need to be assessed. The Philippines is the third largest remitting country in the world behind India and China. With that said demand for the Philippine Peso in the international foreign exchange market must also be factored into the policy decision.

Inflation targeting in emerging markets have proven to be relatively easy task during the great moderation period of the 90s. That does not mean IT is the best solution and that all emerging market economies should follow suite. The advantage of an IT regime in developing countries is stabilization. Monetary systems in emerging markets tend to be faulty and subject to high inflation. Therefore, the IMF and developed countries persuade and strongly recommend emerging market economies to target inflation which will ensure the stability of the financial monetary system. The downside to inflation targeting is that developing countries cannot grow at its fastest growth rate trajectory. The reason is because the monetary policy enacted concentrates and puts inflation targeting ahead on its mandate list. Thus, growth and unemployment are second in line when it comes to importance.

Jose Antonio Cordero (2008) states that once inflation targeting is adopted everything in the economy will be tied to the inflation target. Which results in great success in bringing down inflation but effects the performance in terms of output and growth. A characteristic of this monetary policy regime is that the currency appreciates, and the competitiveness of the developing countries export with decrease. Other countries will be able to produce the good at a relatively cheaper price. Demand for goods of the country with the appreciated currency, trade and exports will decrease, which ultimately stunts growth and employment.

An example of an economy that suffered this fate is Mexico, according to Galindo and Ros (2008), an IT strategy led to an appreciation of the peso which had a negative impact on the overall gross domestic product growth rate. The IT strategy proved to control inflation in the local economy, however the appreciated currency made Mexico susceptible to external shocks like investment outflow, since industries were going to be less competitive to other developing countries.

When considering a small and open economy that tracts and adjusts to stabilize exchange rates, it becomes apparent that the advantages and disadvantages will mirror the advantages and disadvantages of the inflation targeting regime. To some extent when monetary policy is sound, and the economy is growing, harsh inflation targeting can and will damage the local economic growth and employment as mentioned above. Thus, there is a trade of when choosing to control for inflation.

When developing economies target exchange rate and stabilize the currency value, they allow for two things to occur. First, by making sure the exchange rate is stable and will not fluctuate this provides confidence to stakeholders outside the country like international investors. By doing so the central bank will ensure that capital inflows are stable and positive. Second, exchange rate targeting enables central banks to respond to appreciation of the currency. Through keeping the currency undervalued, or simply not allowing the currency to appreciate, the central bank makes sure the prices of exports are relatively cheap compared to other nations. The more exports, the greater the growth and the less unemployment there will be which will prop up the GDP for the country.

According to Jose Antonio Cordero (2008), it is important to recognize real exchange rate has the ability to determine the growth rate and the accumulation of employment. The price to pay however, for the advantages of exchange rate targeting regimes, is inflation. In order for emerging countries to benefit from the high growth and low unemployment they must sacrifice the tight control of inflation targeting. This inadvertently causes the money supply to increase since the central bank will be printing money to keep the currency from appreciating or since the interest rates will be lower and thus banking institutions will be in a position to lend out loans and create new deposits—both ways are how the money supply is increased. Once the money supple increases

and capital inflows are growing consistently it is only natural that the inflation rate will increase as well.

Emerging market economies that experience rapid growth and a low level of unemployment are usually the countries that are also experiencing high single digit inflation rates, typically 7 per cent to 9 per cent. Inflation is the price to pay for a booming economy and a favorable trade balance. Therefore, a clear trade off exists between choosing the strategy to implement for an emerging market central bank. First central banks can follow an IT strategy wherein inflation is the main goal, but unemployment and growth are not in its full potential or central banks can follow an exchange rate targeting regime and experience high growth, low unemployment, but a relatively high inflation rate. One might be curious to suggest that central banks should lie about being an IT regime and simultaneously control for exchange rate volatility. However, an "Impossible Trinity" occurs when trying to control for all three macroeconomic variables (Grenville 2011). The dilemma expresses that inflation and exchange rate stability cannot be jointly targeted under an open capital account. In other words, policy makers cannot have stable (fixed) exchange rates, low inflation, and free flowing capital markets.

According to Volz U. (2015), many countries in East Asia, including the Philippines, adopted inflation targeting regimes and were able to manage inflation well during the great moderation era from 1970s to early 2000s. Even though the region was considered a free-floating exchange rate system underneath it all the East Asian countries were tied to the dollar and keeping the exchange rate stable by actively managing the currency in the open market—to make sure growth and employment were high. This was possible because the great moderation allowed the emerging economies to manage their exchange rates without the need to worry about global low inflation. Therefore, Volz says, low inflation rates made inflation targeting a relatively easy job

and gave central banks freedom to manage exchange rates without compromising the inflation target.

After the great moderation, 2005 onwards, managing the exchange rate and inflation target at the same time became too hard of a task. Inflation and capital inflow shocks in East Asia made central banks have to choose whether to adjust for inflation or the exchange rate (Volz, 2015). The inflation shock gave central banks a single option of appreciating their currency to control for high inflation levels. This meant that the currency was priced higher and that the exports would take a hit which would result to higher unemployment and low output growth. Or, if the central bank responded by printing more money, or lowering interest rates, and managing the exchange rate the opposite would happen. Inflation would become rampant while unemployment would be low, and growth high. However, to a certain point inflation could get out of control while growth and unemployment could become hurt by extremely high levels of inflation—worst case scenario hyperinflation.

Another dilemma that occurs is the relationship between inflation targeting and financial stability. Financial stability and price stability, for the most part, have been complements. However, during the latest financial crisis it turned out that financial risk may accumulate even if price stability is under control (Volz, 2015). In other words, although general consumer good and service prices were steady and controlled, asset prices can rise and becoming inflated. This topic is beyond the scope of this paper; however, it is currently being argued if central banks should update their policies to include financial stability as another supplementary goal.

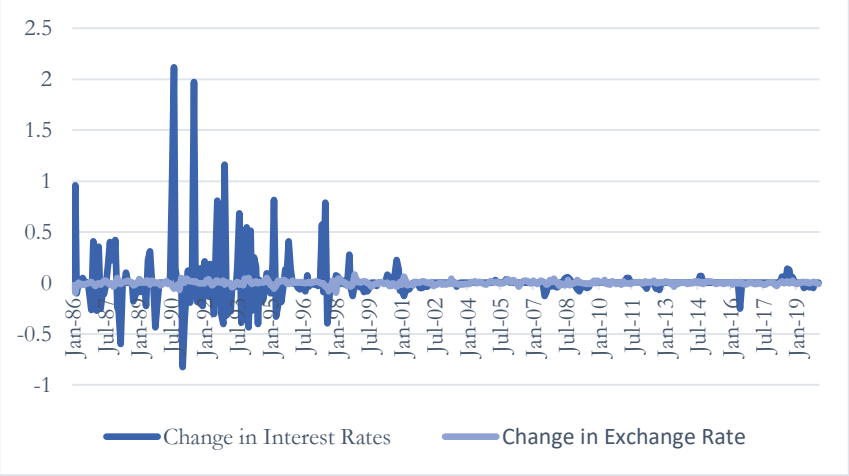
This paper acknowledges the advantages and disadvantages of various monetary policies, but it does not aim to recognize a suitable policy to enact. Rather, the purpose of this paper is to determine the policies being enacted today and discover whether central banks currently react more

to inflationary pressures or exchange rate stability. Implication and policy recommendations are included but are not studied in excessive detail.

3 Analytical Framework

The Banko Sentral ng Pilipinas (BSP) officially adopted inflation targeting in January 2002. Before its adoption changes in interest rates were extremely volatile in relation to the exchange rate. This is consistent with the idea of monetary policy being a tool for managing exchange rates. However, after 2002 the interest rates became stable and predictable (see Figure 1). This suggests that an IT policy has might help in calming the interest rate volatility. Furthermore, transparency was also adopted by the BSP to make sure that inflation expectations were anchored. Since the BSP has made it a priority to communicate objectives and decisions inflation expectations have become more stable and predictable. When inflation expectations are stabilized inflation rates usually become more stable as well. If inflation is not rising there will be no need for the central bank, and in this case the BSP, to raise of lower interest rates drastically.

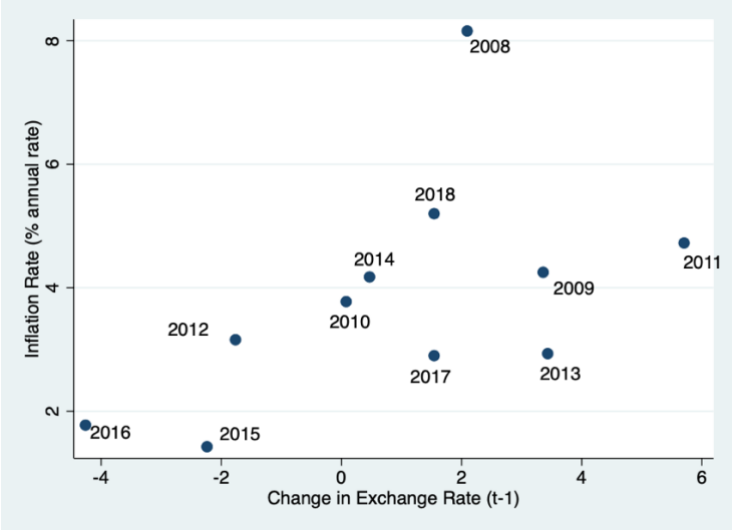
Figure 1: Historical Pattern in Interest Rate Movement in Comparison with Exchange Rate



Monthly data change in Interest rates (RRP) vs Change in REER (data source: BSP, IMF IFS)

To better grasp the BSPs behavior and how interest rates are set in the Philippines it is necessary to understand the relationship between inflation and exchange rates. Inflation and exchange rates are slightly related with one another because of the way trade and capital flows work. Figure 2 shows the average annual inflation rate and the annual average change in exchange rate lag in a ten-year period, from 2008 to 2018.[2] When demand for the peso increases the currency (peso) appreciates it is likely that more capital is flowing into the Philippine peso or there is more demand for Philippine goods and services. Likewise, if rates or yields are more attractive in the Philippines capital can flow in from other around the world causing the currency to appreciate.

Figure 2: Philippine Inflation and Changes in the Exchange Rate by Year, 2008-2018



Monthly average inflation and change in exchange rate lag (data source: BSP)

The central banks role will be to make sure that the currency does not appreciate by too much which makes exports unfavorable. As a result, reserves will tend to increase in the BSP due to the accumulation of foreign currencies in exchange for printed pesos. In other words, the BSP

[2] The change in exchange rate lag was multiplied by one thousand to magnify and show the relationship

will need to supply the FX market with more pesos. With the supply of pesos in the economy inflation levels will be higher. Therefore, the time lag represents the time it takes after the appreciation for the fed to respond and print more money which will lead to an increase in the supply of pesos and ultimately to higher inflation levels. In other words, an increase in foreign direct investments (capital inflows), and eventually the money supply (to offset exchange rate) will cause inflation in the future. Thus, in figure 2, one can see an appreciation leads to inflation in the future due to the increase in the supply of pesos.

Simultaneously, when there is a depreciation in the currency, capital is flowing out of the economy and the demand for pesos is decreasing. To offset this, the BSP buys pesos back from the FX market which lowers the supply of pesos. As the BSP holds pesos in its reserves it takes the money away from the economy. This leads to the lower inflation levels, since there is less supply of Philippine pesos in the economy after a one-year period. The relationship between exchange rates and inflation is subtle but important. When conducting monetary policy, the BSP decides on the appropriate level and exchange rate volatility it can withstand to attain an appropriate level of inflation.

4 Regression Analysis

To determine if the BSP responds more to inflationary pressures or exchange rate volatility, I gathered macro data from the official BSP metadata set, Philippine Statistics Authority (PSA) reports, and the International Financial Statistics database. The model used to analyze the data is an open economy reaction function. When it comes to estimating interest rates many central banks around the world consider, but do not rigidly follow, the Taylor Rule. The Taylor Rule is an estimation model created by John B. Taylor in 1993. The rule is a reduced form approximation of

the responsiveness of nominal interest rates to economic conditions. In other words, it helps informs central banks on how much or little interest rates should move in response to economic data from inflation and GDP.

Although the BSP uses the Taylor rule as a general guide it also has a suite of other models that it takes into account. The BSP produce inflation forecasts and policy simulations by also looking at large-scale micro-funded macroeconomic—they also look at private forecast and high frequency financial market data. Moreover, the BSP follows a "thick" economic modeling philosophy which means that they believe that there is no superior model that can accurately forecast the path of inflation (Dacio and Cruz, 2012). Since the Taylor Rule taken into consideration when conducting monetary policy decisions, it makes sense to use the reaction function as it can be suited for the Philippine economy. Mohanty and Klau (2004) use an open economy Taylor Rule which follows the classical Taylor Rule but incorporates the exchange rates functions and time lag variables.

$$(1) \qquad i_t = \delta_0 + \delta_1 \pi_t + \delta_2 y_t + \delta_3 \Delta x r_t + \delta_4 \Delta x r_{t-1} + \delta_5 i_{t-1}$$

This study aims to replicate the findings from Mohanty and Klau's (2004) Monetary Policy Rules in Emerging Market Economies study. In the study they used the open economy Taylor Rule function (1) to determine whether emerging market economies and their central banks around the world respond more to inflationary pressures or exchange rate fluctuations. Moreover, Mohanty and Klau used the data to compare cross country and cross regions. This paper aims to explore the Philippines monetary authority and uses recent data to see if the trends in today's economic

environment still apply. Furthermore, the paper will use monthly data in comparison to the earlier paper that uses yearly data.

i. The dependent variable in equation (1) is the *interest rate*. The BSP follows an IT strategy, however, it also considers other factors such as exchange rate volatility, output, and employment. The main tool the central bank uses to determine or set short term interest rates is the reverse repurchase agreement (RRP). Whenever the central bank wants to change the market interest rate, they do so by increasing or decreasing the reverse repurchase agreement interest rate.

The RRP, also known as a reverse repo, is an open market operation tool that the BSP uses to set short term interest rates that sets up the market interest rate that financial institutions use as a benchmark. When the BSP wants to lower or raise interest rates it engages in an RRP agreement. It works like this; the central bank goes out into the open market and sells securities with a contract that requires that the buyer of the security sell back the asset to the BSP in a future predetermined date. The difference in the price of the security from the initial sale to the future sale which is the interest rate. Usually, it is conducted overnight, meaning that the BSP sells a security and the next day it buys the said security back for a slightly higher price (interest rate). The price being the overnight lending rate. Therefore, the BSP controls the price (interest rate) when it sells and buys the security in the open market the next day.

The RRP has been the main policy tool of the BSP since it has control over the securities (usually bonds) in the market and the price (interest rate) at which to sell and buy back the securities. The RRP enables the BSP to set short-term rate which ultimately dictates the market interest rates that lenders and depository institutions charge businesses and consumers. Therefore, it is crucial that we use this rate, the main policy tool, to represent the interest rate variable in our regression model.

π. This variable, delta one in equation (1), is the *inflation rate*. The inflation rate used in the study is the change in consumer price index (CPI) for all goods in the Philippines. The inflation rate is arguably one of the most important data that is collected by countries around the world. Since most economies are following an IT strategy many central banks collect data and monitor CPI. The CPI is an index of the variation of prices paid for a typical basket of goods (household items). It is calculated by setting a base year level price of goods and following the changes in the relative prices of the basket of goods for the following years. The data set used in this study was taken from the BSP dataset and tracks all items in the Philippines while using 2006 as the base year. It is important to note that there are many variations to this calculation which will be considered in a later part of this paper.

y. This variable, delta two in equation (1), is the *output gap*. The output gap is the difference between potential GDP and actual output in the economy. Potential output is the maximum amount of goods and service an economy can produce when it is most efficient. In other words, when the economy is effectively using maximum labor and capital it can produce its potential output. A positive output gap means that the economy is producing beyond its capacity while a negative output gap means that the economy is less productive and not using its resources efficiently. The central bank of the Philippines uses several approaches in estimating potential output. The three main methods used in estimating potential output are through statistical filters, production function, and a semi-structural model (Mariano et al., 2018). The results from these three methods are averaged to come up with an estimated of potential output.

Statistic filters such as the Hodrick Prescott (H-P) filter are used to determine the potential output and output gap. This filter uses output (Y) as its only data series. The H-P filter removes the short-term fluctuations associated with the business cycle and predicts a steady trend to come

up with the potential GDP or potential output. The BSP uses samples from 2000 up to the last quarter available and they also use a truncated data series from 2009 onwards. This paper also considers Baxter-King Band Frequency Filter, Hamilton Filter, and Christiano Fitzgerald Frequency Filter as the BSP considers all these filters when forecasting the potential output.

The production function approach consists of two main methods, the Cobb-Douglas production function and the Constant Elasticity of Substitution (CES) production function. The Cobb-Douglas production function estimates the output gap by discovering the relationship between inputs which were classified by Cobb and Douglas (1928) as capital and labor. These inputs then can produce a given output given the available technology and productivity.

The CES production function is an alternative to the Cobb Douglas production function. The production function has three characteristics that separate it from the basic Cobb Douglas production function: (1) homogeneity, (2) constant elasticity of substitution, and (3) the possibility of different elasticities for different industries. Likewise, Kmenta built upon the CES production function to transform the function into a linearized form. Potential output is estimated as the calculated value of GDP assuming that potential labor and capital are equal to the H-P filtered values of labor employed and capital from the whole sample. Likewise, structural breaks are incorporated to change the figures for capital and labor. The BSP estimates use quarterly deseasonalized Philippine capital and labor data wherein the capital stock is derived from a function that includes, total capital being depreciated at 10% per year, and breeding stock. Labor is derived from the labor quality index and classifies level of education from no high school diploma to college degree or higher.

The semi-structural Macroeconomic Model for the Philippines (MMPH) is also used in today's studies. However, it was recently developed in with the International Monetary Fund

(IMF) and has been implemented in 2012. Thus, for this study I will leave this model out as it does not correspond with the data's time frame. Moreover, the filter and production function estimates are similar and behavior in the same manner.

Δxr. This variable, delta three in equation (1), is the *change in exchange rate*. Data for the exchange rate is rich and is normally expressed by relating the home country's currency to another foreign currency. However, since we are examining the exchange rate for the Philippines in relation to the rest of the world, we cannot simply use the Philippine peso in relation to, say, the United States dollar. Although different studies could theoretically use the Philippine peso to United States dollar as the exchange rate since the dollar is the world reserve currency--or the Chinese Renminbi since China is a major trading partner. Using these exchange rates could provide a sound overview; however, it would not accurately portray the exchange rate to its full potential. By using unilateral exchange rates, I would be misrepresenting other countries and trading partners that are essentially related to the Philippine economy.

A sound and more accurate way to represent the Philippine peso exchange rate relative to other global currencies would be to use a weighted average exchange rate mechanism. In which the Philippines currency exchanges for a basket of multiple foreign currencies. This way the Philippines exchange rate will relate to trading partners around the world and will incorporate the value of different currencies. There are two main types of weighted average rate, the nominal effective exchange rate (NEER) and the real effective exchange rate (REER). The differentiating factor between the two calculations is that the NEER is a nominal value whereas the REER adjusts for relative price differentials (purchasing power parity) between the domestic and foreign countries.

For this study I will be using the REER as the exchange rate variable in my dataset. The REER is the weighted average of a country's currency in relation to an index of other major currencies. The weights are determined by comparing the relative trade partners of the country, in our case the Philippines trading partners. This fits nicely when examining how the central bank will adjust exchange rates in relation to other countries' currencies. REER data was taken from the International Monetary Fund's metadata set.

Δxr_{t-1} and i_{t-1}. These variables, delta four and delta five, respectively, are the time lagged variables for change in exchange rate and the interest rate. As mentioned earlier exchange rate data comes from the REER while data for interest rate comes from the BSPs RRP rate. Time lagged variables help the regression model become more realistic. When central banks conduct monetary policy, or in this case change the interest rate, they are looking at all kinds of data. More importantly, they are looking and analyzing the past interest rate and the past changes in the exchange rate. This helps central bankers define what the future exchange rate and interest rate should be set to—the lag is by one year since central banks usually compare performance from to the previous year. By including the interest rate and exchange rate lagged variables the estimates become free from problems of autocorrelation.

5 Results

Table 1 presents the results of the baseline model for the Philippines. The results suggest that simple inputs such as inflation, exchange rate, output gap, and past interest rates fit the interest-rate setting behavior of the Philippines very well. The model explains upwards of 90 per cent of the actual movement of short-term interest rates—the reverse repo agreement interest rate which is considered the main monetary tool at the BSP.

As shown by the coefficient of inflation the monetary policy response to be seems to low. Take for example the average interest rate in the Philippines, from 2010 to 2020, was 3.81 per cent when inflation increases by 1 per cent one could expect the BSP to raise rates by only just 0.10 percentage points. This change is relatively low when considering that the stated goals and mission for the BSP is to fight inflation. Meanwhile, the main policy tool to control inflation is open market operations more specifically the RRP interest rate. However, as shown in the coefficient the increase in the interest rate is small relative to the increase in inflation rate.

The relationship between inflation and interest rates is positive, as expected, because when inflation increases it is generally accepted practice that the central banks will increase interest rates to counter against inflation. However, response to inflation is not that strong which explains why inflation rates in the Philippines are relatively higher in comparison to other major economies—certainly higher in comparison to developed economies such as the United States.[3] This tends to suggest that other goals like exchange rate stability are more important measures than controlling for inflation.

Another noticeable factor of interest rate response to inflation is that the significance is not as robust as predicted in the hypothesis. The hypothesis being that since the central bank is following an IT strategy the response to inflation rates should be significant. Although inflation is significant at the 10 per cent level, the inflation is not statistically significant at the 1 per cent nor the 5 per cent level (see Table 1). In other words, the variance interest rate is less consistently explained by the inflation rate when compared to other variables in the model—more on this later.

When it comes to output stabilization (output gap) the data shows that it is not significant. The short-term interest rates set by the BSP does not heavily rely on output gap data and trends

[3] The Philippines inflation rate in 2018 was 5.2% in comparison to the United States 1.9%.

like the H-P filter or other output gap models mentioned earlier. However, the coefficients in the model may suffer some biases, since our estimates of the output gap may not adequately measure the output gap predicted by the BSP during specific time periods. Furthermore, estimating output gaps are more difficult for emerging market economies. Although output gaps are important for central banks internal studies this model shows that output gaps are not a contributing factor to short term interest rate setting.

Table 1: Taylor Reaction Function (Baseline Model)

i	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
π_t	0.106	0.055	1.92	0.056	-0.003	0.215	*
y_t	0.055	0.053	1.03	0.305	-0.050	0.160	
Δxr_t	-0.061	0.015	-4.15	0.000	-0.090	-0.032	***
Δxr_{t-1}	-0.061	0.015	-4.19	0.000	-0.090	-0.032	***
i_{t-1}	0.975	0.010	95.79	0.000	0.955	0.995	***
Constant	0.043	0.091	0.47	0.636	-0.136	0.222	

Mean dependent var	5.833	SD dependent var	2.395
R-squared	0.983	Number of obs	231.000
F-test	2666.095	Prob > F	0.000
Akaike crit. (AIC)	123.262	Bayesian crit. (BIC)	143.917

*** p<0.01, ** p<0.05, * p<0.1

The results also imply that the BSP strongly reacts to the changes in the exchange rates when setting interest rates. The negative relation suggests that an increase in the change in exchange rate will lead to a decrease in interest rates. This means that as the currency appreciates the BSP will lower the price and cost of borrowing money which will make yields less attractive. Ultimately, this drives capital flows out of the country which implies that the BSP does not freely float its currency (Klau and Mohanty, 2004). Rather, the BSP raises rates when the exchange rate depreciates and will not allow the market to set the exchange rate. Equally, when the exchange

rate appreciates, we can expect short term interest rates to fall. This is consistent with the need for emerging market economies to uphold and keep their currencies stable for trade.

The coefficient for the exchange rate indicates that an increase of 1 percentage point in the percentage change in exchange rate from one month to the other will decrease the interest rate by .06 percentage points. While this may not seem so large at first glance, we need to remember that currencies are volatile and subject to changes on a day to day basis. Take for example, when the average peso per US dollar rate, from May to June in 2019, depreciated from PHP 52.26 to PHP 51.80. Although the value changed by only PHP-0.46 (cents), the percentage change was equal to -0.9%. The month after that, from June to July, the rate further decreased from PHP 51.80 to PHP 51.14, again this might seem like a tiny change, however, the percentage change was equal go -1.3%. Once these exchange rates are compounded (from month to month) it is easy to see how these small-scale changes can lead to big bigger movements in the interest rate.

The negative relationship in the coefficient on the lagged exchange rate term conveys persistent and high levels of exchange rate shocks. Additionally, it explains how the BSP responds and reacts to the shocks. The negative in both change in exchange rate and lagged exchange rate term suggest a high degree of interest rate response to the exchange rate. Moreover, the data suggests that the variance in interest rates is less consistently explained by inflation and is more accurately explained by exchange rates. Thus, we can conclude that the BSP sets the short-term interest rate (RRP) to manage the exchange rate rather than control for inflation conditions.

6 Robustness Check

In this section I will conduct a robustness check on the baseline results to test whether the estimates will change or hold true given slightly different conditions. Unlike the major drawback in the Mohanty and Klau (2002) paper of having a short sample size given that most countries at the time had just started to emphasize and implement inflation targeting policies. This study is able to overcome the short data set, and even go beyond, by including monthly data—the previous study included yearly data. Likewise, the BSP since the turn of the century has been keen on keeping inflation low and using interest rates as its main policy tool. Thereby, the data in this study is rich in comparison to when the study was done in the early 2000s.

There is one major drawback which could make the estimates in the study unreliable. The dependent variable in the result section used headline inflation which is sometimes referred to as the raw inflation figures. Raw inflation data is monthly CPI calculations from the Philippine Statistics Authority (PSA). This inflation measure includes all aspects within the Philippine economy. Included are highly volatile components such as food and energy prices. The alternative measure to use would be core inflation.

Core inflation removes the elements that can exhibit large amounts of volatility from month to month. The most common aspects that are removed are those relating to food and energy. Both, food and energy prices, can influence the inflation data even when the inflation is not coming from within the economy. For example, when the price of crude oil drops or increases on a day to day basis this can affect the inflation statistic in the Philippines. Core inflation is a more reliable source of information when conducting monetary policy because it does not consider goods that are vulnerable to short term fluctuations.

The BSP is more likely to use core inflation as a gauge when setting interest rates due to the fact that monetary policy takes time to influence future inflation. In other words, when the BSP changes interest rates they want to make sure that the inflation is following a trend and will not reverse quickly. For example, it will be useless to lower rates and adjust for headline inflation when oil prices are rising because in the near future the prices for oil can revert back to normal. Therefore, core inflation is a better monitor of inflation when it comes to setting monetary policy as it filters the prices that are unstable and coming from international markets.

Table 2 shows that core inflation is a more accurate gauge for conducting monetary policy. While conducting a significance threshold set at .05, the data confirm that interest rates respond more to core inflation data and are significant at the 95 per cent level. In comparison to the baseline model which did not pass the threshold. With core inflation data, the relationship between inflation and interest rates became stronger and is statistically significant.

Table 2: Taylor Reaction Function (Core Inflation)

i	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
π_t	0.145	0.063	2.30	0.022	0.021	0.269	**
y_t	0.042	0.052	0.80	0.422	-0.061	0.145	
Δxr_t	-0.063	0.015	-4.28	0.000	-0.092	-0.034	***
Δxr_{t-1}	-0.063	0.015	-4.32	0.000	-0.092	-0.034	***
i_{t-1}	0.972	0.010	94.94	0.000	0.952	0.992	***
Constant	0.055	0.089	0.62	0.536	-0.120	0.230	

Mean dependent var	5.833	SD dependent var	2.395
R-squared	0.984	Number of obs	231.000
F-test	2685.168	Prob > F	0.000
Akaike crit. (AIC)	121.643	Bayesian crit. (BIC)	142.298

*** p<0.01, ** p<0.05, * p<0.1

The inflation variable has not only increased in significance but also by a magnitude of 0.039 which implies that the BSP stance against core inflation is tougher than headline inflation.

For every 1 percentage point increase in core inflation, the BSP tend to raise interest rates by 0.145 percentage points. A reason for this non accommodating stance against core inflation is that, as mentioned earlier, core inflation is a better gauge of actual inflation in the local economy. Inflation that originates from the Philippine's economic growth and the high unemployment levels rather than from international commodity market shocks—such as volatile oil prices.

The output gap results are similar to the baseline model, it is not significant. Which means that when the BSP determines the interest rate it does not, in a consistent pattern or manner, take into account the output and growth of the economy. With that said, Table 2, does not accurately portray the exact output gap estimations that the BSP uses to make decisions as those are internal studies and debates—biases may occur that do not accurately represent the significance of the output gap.

The exchange rate results are similar to the baseline model. The data confirm that interest rates respond more to changes in the exchange rate and are significant at the 99 per cent level. Although core inflation is significant in the policy process of setting interest rates, the changes in exchange rate are still a better indicator and consistently explain the changes in interest rates more accurately. For both the lagged and unlagged change in exchange rate the significance is strong.

The estimates of the change in exchange rate and the lagged exchange rate decreased further to -0.063. Suggesting that an increase of 1 percentage point in the change of the change in exchange rates the interest rate will from one month to the other will decrease by 0.063. In other words, an appreciation in the exchange rate will decrease the interest rate. While a depreciation in the peso will lead to the BSP raising short term interest rates. This small decrease in the coefficient is large when considering how exchange rate movements work. Therefore, when the BSP conducts

open market operations, RRP, to change the interest rate, exchange rates are a crucial and important part of the decision-making process.

7 Discussion of Results

There are two main implications of focusing on the changes in exchange rate. First, when the BSP conducts monetary policy and decides to control for exchange rates it shows that the Philippines values trade. A stable peso means that import and export industries are able to conduct business more effectively and efficiently without the need to hedge or use derivative instruments. To some extent, inflation from trade also becomes controlled. This is important when considering that the Philippines is a small and open economy. In addition, the Philippines is a major service exporter and has one of the largest business process outsourcing (BPO) industries in the world. Furthermore, travel and tourism are a major component of GDP. When the currency appreciates rapidly the export and tourism industries could get hit from such a change in the exchange rate. Therefore, it is important that the BSP protect these industries from volatile shifts in exchange rates.

Money remittance also plays a huge roll since there are many overseas foreign workers (OFW) who send money back into the country to support families. Another, situation the BSP has to deal with is a devalued peso. When the currency depreciates it takes more pesos to buy a certain amount of foreign goods, this can cause direct inflation when final goods are imported. Likewise, it may also cause indirect inflation when value added goods are imported. When the BSP stabilizes exchange rate they are controlling for inflation that may occur from trade. Therefore, trade is an important component for the local economy and keeping the exchange rate stable helps the Philippine economy.

Second, the need for a stable peso stems from the fact that capital is free to flow in and out of the Philippines. With a stable peso international investor are more inclined to invest in the Philippines which will spur growth. On the other hand, a stable peso is crucial to the government budget and current infrastructure proposal. The Philippine government, under president Duterte has planned to increase growth by building roads, railways, airports, and bridges. This huge program has been funded by foreign countries like China, Japan, and other nations and global institutions. The capital used are denominated in US dollars, Chinese renminbi, and Japanese yen. A stable peso will help the government facilitate the repayment of the loans with ease. If the peso were to depreciate then the amount needed to pay back the foreign lenders would drastically increase. Therefore, it is beneficial to the economy that the peso be stable and controlled. Overall, the BSP focusing on exchange rate volatile provides stability and maximizes growth in the Philippines. However, it goes against their mandate of controlling prices and having a freely floating currency in the foreign exchange market.

The BSP states that, "the country's exchange rate policy supports a freely floating exchange rate system whereby the BSP leaves the determination of exchange rate to market forces…the value of the peso is determined by the supply and demand for foreign exchange." The results section shows that the BSP manipulates and does not freely float the peso. In fact, they lean against the wind and control the exchange rate by increasing the interest rate when the currency is depreciating and lowering the interest rate when the currency is appreciating. There are three main reasons as to why the BSP is does not freely float the peso.

The first reason as to why the Philippines (and other countries) have to misrepresent supporting a freely floating exchange rate is because it is aligned with international trade policies. The Washington consensus obliged many countries to follow a set of rules that adhere to market forces

such as trade liberalization, free capital movement across borders, and more importantly a free-floating exchange rate. By following the recommended structural reforms many of these countries were able to join international institutional like the IMF and WTO which helped jumpstart their economies in the late 80s.

Another reason for the BSP to be misleading about its policy is to keep inflation expectations anchored. When a currency is trailing and following another currency it becomes vulnerable to the foreign currencies monetary policy and inflation rates. Moreover, if the BSP can convince the general public that its main mission is to keep inflation and prices low the inflation expectations in the local economy can be managed (more on this later). In a similar manner, the BSP can prevent inflation by pegging to a currency that is experiencing stable inflation. Thus, by being untruthful about managing a freely floating currency the BSP can get credit for keeping inflation at bay when in reality the low inflation rates can come from pegging the currency to a more stable economy—this is beyond the scope of this study but something to consider.

Finally, the last reason to be untruthful about trailing (pegging or fixing) another currency is for national pride and for a facade of independence. If the peso closely follows, say for example the dollar, then the economy is not truly independent in conducting monetary policy and are vulnerable to the US financial and economic system. Local officials do not want to be associated to another country for reasons such as national pride, but it is clear that there are many benefits to being linked to a stable economy.

In reality, the BSP does not peg or fix the peso to another currency, but it does manage the currencies float. The BSP allows the peso to fluctuate and follow a narrow band. As it stands now, there is no need for the BSP to peg to another currency. The only reason to do so would be if inflation or deflation is spiraling out of control, or if the government is not responsible with its

debt obligations and is fully in control of the monetary system (in other words printing money). If the BSP were to change its mandate and become an exchange rate targeting regime there would be a balance of positive and negative effects.

Some of the positive effects would be a more favorable outlook on trade. As mentioned earlier a stable currency has many benefits with regards to trade. More importantly, inflation can be managed simultaneously if the peg is tied to a stable economy (Obstfeld et al., 1995). This enables the BSP to keep growth outlooks favorable and keep inflation low. In a sense, pegging to a strong currency like the dollar will have these effects since the dollar is a reserve currency and is the main currency used by most countries when it comes to trade. Simultaneously the economy in the United States and the dollar is seen as being able to one of, if not the most stable economy and currency. Thus, a peg to the dollar will be advantageous to the BSP in the sense that inflation will be low, and trade will be favorable.

The downside of the peso being pegged is that the BSP will have little to no control over monetary policy and reserves. Additionally, the BSP will not be able conduct policies that relate to the local economy efficiently since they will be occupied with their goal of keeping the peso interchangeable with the dollar. Therefore, with all its benefits it does not prove to be the most efficient mode of conducting monetary policy. The Philippines, although they are aware of the need to keep exchange rates stable, the economy also need the freedom to conduct monetary policy.

At the end of the day, the BSP has three monetary policy tools it can execute to influence the exchange rate to make it stable for the foreign exchange market. First the BSP can set the reserve requirement, however, due to retail sweeping programs this monetary policy tool does not provide much control over interest rates. Second, the BSP can shift the discount rate. Nevertheless, this

tool is better suited for the lender of last resort function. For example, when banks need to approach the discount window in times of dire situations. Therefore, this tool would not be effective at managing the exchange rate. This study looks at the open market operation tool, RRP, which is the most important tool that influences the interest rates and eventually the monetary base and the money supply. Thus, this tool gives the BSP the most control to manage the exchange rate. Open market operation is the optimal tool as it allows the central bank to enter the market itself without directly influencing the local banks and the local economy.

8 Conclusion

The objective of this paper was to review the Banko Sentral ng Pilipinas' (central bank of the Philippines) interest rate setting behavior and to collect evidence on the consistency of its monetary policy. In the turn of the century, the BSP has outspokenly adopted an inflation targeting regime. While monetary policy has been outwardly focused on price stability, the objectives of exchange rate stabilization have remained significant as well. Experiences of exchange rate pressures have revealed that the BSP intervenes to stabilize the exchange rate more often, and at a more consistent pattern. The results presented in this paper confirm that the interest rate response to exchange rate movements is strong, with exchange rate volatility significantly contributing to the changes in interest rate. This goes to show that the BSP still places a high importance on managing the exchange rate and the currency value. This raises issues and skepticism on whether the BSP allows the peso to freely float in the foreign exchange market.

Although, inflation is an important economic gauge and plays a key role in the BSP's interest rate setting decision it is not the main factor for shifts in the interest rate at least in the short-term overnight lending rate (RRP). Furthermore, the results show that core inflation is a more

accurate measure for interest rate setting behavior in the Philippines. The BSP is more careful and aware of goods and prices that are stable in the long-run and do not consider volatile commodities when deciding to increase or decrease rates. Other important factors that are considered in the interest rate setting decision are previous exchange rate movements and previous interest rates. These two factors, past exchange rate movements and past interest rates, prove to be important when making a clear decision on the future position. It is clear that being an outspoken advocate for an inflation targeting regime has many benefits like keeping inflation expectations low. However, the unknown social cost of well-intentioned untruth may lead to unfortunate consequences in the future. Nonetheless, for now, following an inflation targeting regime, while setting interest rates to accommodate for a stable exchange rate prove to be effective.

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