



# Does wage-inflation targeting complement foreign exchange intervention? An evaluation of a multi-target, two-instrument monetary policy framework<sup>☆</sup>



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## ABSTRACT

We assess the inclusion of wage inflation as an intermediate target of an emerging central bank using a dynamic stochastic general equilibrium model with sticky wages and prices calibrated for the South Korean economy. The model includes wage inflation as an additional target jointly with domestic price inflation and the output gap in a Taylor-type interest rate rule operating with a sterilized foreign exchange (FX) intervention rule. Our results show a complementary relationship between wage inflation targeting and price inflation targeting. That is, by supplementing price inflation targeting with wage inflation targeting, welfare improves for cases with and without sterilized FX intervention. When intervention is in place, wage inflation targeting has the added advantage of reducing the volatilities of nominal exchange rate and foreign exchange reserves thereby promoting a more sustainable conduct of FX intervention.

## 1. Introduction

In the aftermath of the global financial crisis that began in 2008, central banks of major industrial and emerging-market economy (EME) countries have continued their accommodative policies despite historically low interest rates because of the sluggish economic recovery. However, early signs of declines in unemployment rates and/or of the rise in inflationary expectations in some countries have raised concerns that central banks will prematurely raise the interest rates and stall the fragile economic recovery. In fact, the European Central Bank (ECB) raised interest rates in July 2011 and the Federal Reserve Bank raised interest rates in December 2015 while the central banks of Brazil, Chile, Mexico and South Africa increased interest rates in early 2016.<sup>1</sup> The ECB decision in July 2011 is believed to have caused a double dip recession in the eurozone countries, so in November 2011; it reversed its decision and

reduced interest rates.<sup>2</sup> Wren-Lewis (2014) argues that the ECB would not have raised interest rates had it used wage inflation as an intermediate target. He advocates wage inflation targeting (WIT) for the ECB since wage inflation changes infrequently and is less subject to inflation temporarily driven by increases of sales taxes and prices of commodities. Blanchflower and Posen (2014) also advocate wage inflation as an additional intermediate target of the Federal Reserve Bank. They show a significant negative relationship in the United States between wage rates and labor market slack - defined either as one minus the labor force participation rate or underemployment measured as part-time workers over total employment.<sup>3</sup> Therefore, a rise in labor market slack indicates a weak labor market and would be associated with lower wage growth and yet, unemployment rate would also be lower. Hence, Blanchflower and Posen argue that wage inflation would be a better intermediate target of monetary policy because, unlike the unemployment rate, it would be less

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<sup>1</sup> The European Central Bank raised interest rates in 2011 due to concerns on inflation despite the worsening GDP growth data in the EU (Atkins, 2011). The Federal Reserves raised the federal funds rates by 0.25 percentage points in December 2015 (<http://www.bbc.com/news/business-35117405>) with US unemployment rate at 4.9% (OECD, 2010). The Federal Reserve is also expected to increase interest rate in the last quarter of 2016 (Hilsenrath and Torry, 2016). As of July 2016, the central bank interest rates in Brazil, Chile, Mexico and South Africa are 14.25%, 3.5%, 4.25% and 7%, respectively (<http://www.globalrates.com/interestrates/centralbanks.a.spx>). The four emerging countries have adopted inflation targeting as monetary policies (Alba et al., 2015). Mallick and Sousa (2012) empirically investigate the monetary transmission mechanism in Brazil and South Africa.

<sup>2</sup> See Wall Street Journal (2015).

<sup>3</sup> Bell and Blanchflower (2016) also find that labor market slack is associated with lower wages in the United Kingdom during the global financial crisis.

distorted by labor market slack and would require less judgement.<sup>4</sup>

The rationale of Blanchflower and Posen (2014) and Wren-Lewis (2014) for central banks to target wage inflation could apply to inflation-targeting EME countries as well. For example, a cursory examination of South Korea's part-time employment rate (as percentage of total employment), unemployment rate and annual real wage growth from 2007 to 2013 may suggest that the rationale to target wage inflation could apply to South Korea. From 2007 to 2011, part-time employment rate rose steadily from 8.7% to 13.3% before dropping to 10% and 10.9% in 2012 and 2013, respectively. Part-time employment rate moved in the opposite direction to the annual real wage growth which was 3% in 2007 but became negative from 2008 through 2011 except for positive wage growth in 2010. As part-time employment rate dropped in 2012 and 2013, annual real wage growth became positive. In contrast, the unemployment rates were 3.2% in 2007 and 2008; it rose to 3.6% and 3.7% in 2009 and 2010, respectively, and then dropped to 3.45%, 3.2% and 3.1% from 2011 to 2013.<sup>5</sup> Hence, annual wage growth seems to be a better indicator of labor market slack than the unemployment rate.

Other than using inflation as a target, central banks of EME countries may also target the exchange rates and intervene in the foreign exchange (FX) markets.<sup>6</sup> For the case of South Korea, we examine possible indications of FX intervention by estimating a simple bivariate vector autoregressive (VAR) model that includes the log of the nominal effective exchange rate (NEER) and the FX reserve-to-GDP ratio using quarterly data from 1999Q1 to 2015Q4.<sup>7</sup> The bivariate VAR model's lag length is set at two periods and its variables are ordered assuming adjustments in reserves have no contemporary effects on the exchange rate. The impulse responses are shown in Fig. 1. The lower left panel of Fig. 1 shows that a rise in the NEER (appreciation) leads to a positive jump in the FX reserve-to-GDP ratio. This could indicate FX intervention of the Bank of Korea in which it purchases of foreign assets which temper the appreciation of the Korea's NEER. Furthermore, we interpret the top right panel of Fig. 1, which shows the smooth rise in NEER (appreciation) in response to a rise in FX reserves-to-GDP ratio, as the tempering effect of the rise of FX reserves (FX intervention) on the rise of NEER. Other than Korea, FX interventions are prevalent among EME and developing countries' central banks. Calvo and Reinhart (2002) examine 39 countries from January 1970 to November 1999 and find evidence of FX intervention in EME and developing countries. Aizenman et al. (2010) and Steiner (2015) examine 50 or more developed and developing countries from the 1970s to mid- to late- 2000 and find empirical evidence that EME countries' central banks, especially those with high-levels of FX reserves, not only intervened in the FX markets but also sterilized their interventions to pursue independent domestic monetary policies.<sup>8</sup>

<sup>4</sup> Sven Jari Stehn and Jan Hatzius, economists at Goldman Sachs, recommend a wage growth target for the Fed (Boesler, 2014). Marzo (2009) reviews the literature on wage inflation targeting. Canzoneri et al. (2005) note that wage inflation targeting would have been an obvious alternative to price inflation targeting but it has "received almost no attention" in the literature.

<sup>5</sup> Limited data on wages of EMEs prevent us from undertaking a more formal analysis of the relationship between labor market slack and wage growth. Data on part-time employment rate (percentage of employment) and the unemployment rate (percentage of labor force) of South Korea are from the World Development Indicators online (<http://data.worldbank.org/data-catalog/world-development-indicators>). Data on the annual real wage growth, defined as mean annual growth of real monthly earnings of employees, are available from 2006 to 2013 from the International Labor Organization, Global Wage Report Collection Dataset.

<sup>6</sup> Empirical evidence of such practice can be found in Suardi (2008) and Kasman and Ayhan (2008) among others.

<sup>7</sup> Data are retrieved from CEIC Macroeconomic Databases for Emerging and Developing Countries. The nominal effective exchange rate (NEER) is defined by the International Monetary Fund as the value of a currency versus the weighted average of several foreign currencies. A rise in NEER is an appreciation of the domestic currency against a basket of foreign currencies. South Korea's data series of FX reserve-to-GDP ratio is one of the longest among the 13 inflation-targeting EMEs.

<sup>8</sup> Benes et al. (2015) review the literature on the effectiveness of sterilized FX interventions in EMEs

There may be compelling reasons central banks of EMEs intervene in the FX markets. Among other reasons, Calvo and Reinhart (2000) find that compared to developed countries, in EMEs, large depreciations are contractionary, current account adjustments are sudden and severe, currency crisis often becomes credit crisis, exchange rate volatility have negative impact on trade, and pass-through is high from changes in exchange rates to inflation. Since low exchange rate volatility is positively related to trade, EMEs that are highly reliant on trade manage their exchange rates and intervene in the FX markets. These EMEs are usually faced with the trilemma constraint of being able to pursue independent monetary policy only by implementing capital controls.<sup>9</sup> However, Steiner (2015) finds that the trilemma constraints can be relaxed in EMEs with large FX reserves as changes in the FX reserves could substitute for capital controls. This implies the EMEs with high levels of FX reserves and small open economies have sets of policy options with price inflation targeting and wage inflation targeting through Taylor-type interest rate rule, and exchange rate stabilization through sterilized FX intervention. The wider sets of policy options come at the costs of highly volatile FX reserves and distortions in the financial markets when the exchange rate is rigidly fixed or revaluation losses and sterilization costs when the exchange rates are adjusted (Loeffler et al., 2012). Thus it would be interesting to study the interactions among these policy tools and evaluate their effects on welfare in a small open economy.

In this paper, we study optimal monetary policy rules in a simple dynamic stochastic general equilibrium (DSGE) model of a small open economy with wage and price rigidities. The model has two types of firms in the home economy: non-tradable goods producers and tradable (exportable) goods producers. Households provide labor services to firms in both sectors. In the benchmark setting, the central bank implements a Taylor-type interest rate rule together with a sterilized FX intervention rule. We augment the conventional Taylor-type interest rate rule such that it reacts not only to deviations of domestic price inflation from its target and to output gaps but also to wage inflation.<sup>10</sup> The sterilized FX intervention rule is as in Benes et al. (2015) in which the central bank purchases (sells) FX reserves in response to appreciation (depreciation) of the nominal exchange rate. Central bank purchases of FX reserves are funded by central bank securities sold to commercial banks. Benes et al. (2015) assume that commercial banks fund the purchases of central bank securities (and loans to households) with foreign borrowings. Hence, a rise in FX reserves increases the commercial banks' foreign-currency denominated liabilities and exposure to exchange rate risk, which in turn increases the risk premium of commercial-bank held domestic assets. The higher risk premium depreciates the nominal exchange rate since the interest rate, which is defined by the Taylor rule, does not respond to the higher risk premium. This setting allows the central bank to have a wider set of policy options with multiple instruments and transmission channels.

Specifically, we evaluate in a small open economy DSGE model, in which the central bank has multiple instruments and channels, the welfare effects of WIT with sterilized FX interventions. The goals here are to examine: 1) whether the inclusion of WIT is welfare-improving in a small open economy; 2) whether the improvement in welfare is sensitive to sterilized FX interventions of the central bank; and 3) whether WIT and sterilized FX interventions, as tools of price stabilization, complement each other.<sup>11</sup>

<sup>9</sup> Calvo and Reinhart (2000) list studies that find positive links between stable exchange rate and trade. Steiner (2015) reviews the literature on the trilemma constraints in EMEs.

<sup>10</sup> The conventional interest rate rule is of the type proposed by Taylor (1999) and Woodford (2003) among others.

<sup>11</sup> Ghosh et al. (2016) also evaluate interest rate policy with inflation and output as targets when EMEs' central banks undertake FX intervention. In addition, they consider discretionary monetary policy vis-à-vis inflation targeting. However, they use a partial equilibrium model in which welfare is derived from the central bank's objective function.

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