



# Cyclical wage movements in emerging markets compared to developed economies: The role of interest rates

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## ABSTRACT

This paper documents that, at the aggregate level, (i) real wages are positively correlated with output and, on average, lag output by about one quarter in emerging markets, while there are no systematic patterns in developed economies, and (ii) real wage volatility (relative to output volatility) is about twice as high in emerging markets compared with developed economies. We then present a small open economy model with productivity shocks and countercyclical interest rates. The model incorporates a working capital requirement and the Jaimovich and Rebelo (2009) preference that allows for flexible parameterization of the strength of income effects on labor supply. The model can account for the high volatility of wage and consumption relative to output and countercyclical trade balances that characterize emerging-market economies. During economic downturns, rising interest rates in emerging markets induce relatively large income effects on labor supply, so households would not reduce their labor input as much even though wages drop significantly.

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## 1. Introduction

Real wage rigidity has been one of the essential characteristics of many modern macroeconomic models, especially those used for evaluating macroeconomic policy. The class of sticky wage models, originally tailored to mature industrial countries, has been adopted to study a variety of optimal policy rules in the developing world.<sup>2</sup> In contrast to developed economies, emerging economies have lower but faster growing per capita income, higher aggregate uncertainty, less developed financial sectors and countercyclical interest rates. Given these economic differences and the importance of wage stickiness in monetary policy evaluation, a natural question to ask is whether emerging markets also have rigid wages.

This paper has two objectives. The first objective is to systematically document the cyclical behavior of real wages in a sample of emerging economies and contrast it with the wage behavior in developed economies using aggregate data. The second is to study whether the well-documented observations of countercyclical interest rates in emerging markets can help to quantitatively explain the different wage behavior in emerging markets relative to the advanced economies in a small open economy model, as well as generating other robust and distinguishing features of business cycles in emerging markets

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<sup>2</sup> For example, the literature discussing the optimal exchange rate regime often follows Mundell (1961) by assuming sticky wages for non-advanced economies as well. As illustrated in Mundell (1961), under the conditions of sticky wages and limited labor mobility, countries with a fixed exchange rate would find it harder to adjust to demand shocks than countries that can revalue their currencies more freely. However, if the real wage is relatively flexible, the optimal solution can be quite different.

such as volatile consumption relative to output and the countercyclical trade-balance-to-GDP ratio (Neumeyer and Perri, 2005; Aguiar and Gopinath, 2007; Garcia-Cicco et al., 2006).

Using a sample of fifteen emerging markets and fifteen developed economies for the period 1985Q1 to 2005Q4, we document novel facts suggesting that, at the aggregate level, rigid real wages seem to be confined to high income economies. In contrast to developed economies, where real wages are on average 30 percent less volatile than output, they are on average 70 percent more volatile than output in emerging markets. The ratio of average real wage volatility to output volatility in emerging economies is about twice that of developed economies. In addition, in emerging markets, real wages are positively correlated with output fluctuations with an average lag of one quarter. The average contemporaneous correlation between the real wage and output is around 0.4 in these countries, while real wages display no systematic cyclical pattern in developed countries. Existing data also show that relative to developed economies, the volatility of labor input relative to output and the correlation between labor and output are lower in emerging markets, which suggests room for a stronger income effect on labor supply over the business cycle.

Meanwhile, another striking feature of emerging-market economies documented recently is that during economic expansions real interest rates appear to be low, while periods of economic stresses are often accompanied by high real interest rates that they face in international financial markets. Neumeyer and Perri (2005) report an average cyclical correlation between the real interest rates on external bonds and output of  $-0.55$  in five emerging economies, and Uribe and Yue (2006) find it to be  $-0.42$  in their sample of seven emerging economies.<sup>3</sup> Moreover, the swings in these interest rates are frequent and dramatic. In contrast, real interest rates are acyclical or procyclical in developed economies, most likely reflecting the endogenous monetary policy decisions of central bankers. These observations, together with the aforementioned relationship between financial development and wage stability, serve as this paper's motivation for linking real wage fluctuations with the cyclical behavior of real interest rates.

To understand how different interest rate fluctuations account for the contrasting wage movements, following Mendoza (1991) we construct and calibrate a small open economy business cycle model (RBC-SOE) that incorporates two departures from the basic models. First, similar to Neumeyer and Perri (2005), firms have to finance their production input (i.e. labor) before sales are cashed out due to the lack of synchronization between receipts and payments (e.g. "pay-as-you-go" wage schedules, trade credit). Therefore, interest expenses directly add to labor costs.

In a small open economy, in which not only productivity shocks but also interest rate shocks are driving the business cycle, interest rates rise when output falls because of the increasing default risk. The increase in interest rates acts as a negative labor demand shock, amplifies productivity shocks, and at the same time depresses equilibrium consumption through the intertemporal substitution effect, as workers would like to save more by working harder. Consequently, workers do not cut back their labor supply by much in order to meet their consumption needs even though labor productivity declines and the wage falls significantly. As the labor input is not very responsive and the interest rate introduces a direct wedge between wage and labor productivity via the working capital channel, the wage becomes more responsive to shocks, displaying high volatility and large positive correlation with output.

However, the technical difficulty is to generate predictions that are not only consistent with labor market phenomena but also with other previously documented evidence, such as countercyclical trade balances. In order to account for high consumption volatility and countercyclical trade balances, a common practice in the RBC-SOE literature is to consider preferences in which the labor supply is independent of consumption (i.e. Greenwood et al., 1988, type of preferences). With this type of preferences, the income effect is absent and volatile labor input is translated into volatile output. As shown in our calibration, however, even with working capital requirements, wage volatility is less than output volatility.

Therefore, our second modification of the basic RBC-SOE models is to consider a preference specification that allows for flexible parameterization of income effects. We use the utility function proposed by Jaimovich and Rebelo (2009), in which the disutility of work depends on consumption habit in addition to current consumption and leisure. In response to interest rate shocks, the value of current consumption relative to consumption habit drops significantly, implying a decline in the disutility of work. The strength of this income effect on labor supply depends on the parameter that governs the sluggishness of the formation of the consumption stock. Since the current interest rate affects the financial cost of hiring labor only in the next period, the labor input initially increases, followed by a large decrease in the subsequent period when the impact of a higher interest rate on the financial cost of hiring labor is materialized. This leads to an initial decline in equilibrium wage and a larger decline in the next period. In both periods, an interest rate shock causes a larger decline in the wage than in output, which is the opposite of the reaction in response to a productivity shock. While the income effect on labor supply is preserved with this preference, the choice of the parameter of consumption stock formation ensures that the income effect does not limit output volatility too much or lead to unrealistic cyclicalities of trade balances.

We then use the model to quantitatively assess the role of interest rates in accounting for the aforementioned business cycle characteristics in emerging markets. We use data from a representative emerging market, Mexico, to provide guidance on the parameters of the VAR(1) stochastic process of the productivity shocks and interest rate shocks. Following Neumeyer and Perri (2005), we also consider an alternative shock structure in which interest rate shocks are induced by the fundamental shocks to the economy. We find that (i) the baseline model generates procyclical and more volatile wages for

<sup>3</sup> Kaminsky et al. (2004) and Compton and da Costa e Silva (2006) show that domestic short-term treasury rates deflated by consumer price inflation in those countries are also countercyclical.

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