



Cyclicity of labor wedge and informal sector



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HIGHLIGHTS

- The 'labor wedge' is defined as the gap between the household's marginal rate of substitution and the firm's marginal product of labor.
- Empirical evidence suggests that the labor wedge is quite volatile and countercyclical.
- We argue that the presence of an 'informal sector' can provide a key for understanding the observed labor wedge dynamics.

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ABSTRACT

Empirical evidence suggests that the labor wedge, defined as the gap between the firm's marginal product of labor and the household's marginal rate of substitution, is quite volatile and countercyclical. This article argues that the presence of an 'informal sector' can provide a key for understanding the observed countercyclical behavior of the labor wedge.

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1. Introduction

The business cycle literature defines the 'labor wedge' as the gap between the marginal rate of substitution of consumption with leisure (MRS) and the marginal product of labor (MPL). In particular, the literature measures the labor wedge as the residual that ensures that the intra-temporal condition of a one-sector model holds with equality when evaluated using data. Based on this, empirical evidence suggests that the US labor wedge – measured using time series data on consumption, hours worked and output – is countercyclical and slightly more volatile than US GDP (see Fig. 1).²

The labor wedge typically captures labor market distortions. Accordingly, a factor that has not been studied in the literature is the distortions arising due to the presence of an 'informal sector'. In this paper, we argue that, in an economy with informal sector, the theory can capture the observed counter-cyclical behavior of the labor wedge. Specifically, we build a two-sector general equilibrium model calibrated to the US economy and show that the labor wedge is counter-cyclical and volatile in an economy with informal sector. More in details, when the formal sector experiences a negative productivity shock, the demand for formal labor falls, which leads to an increase in informal sector employment. We argue that (i) this counter-cyclical behavior of informal sector, and (ii) the fact that the informal activity cannot be identified from data are the two key features for understanding the observed labor wedge dynamics.

The intuition is as follows. In the presence of informal sector, production is subject to a serious measurement problem: the informal activity in the US economy cannot be identified from data. Accordingly, the total labor input measurements for the US economy does include only the formal sector labor. Therefore, the actual MRS measured from data do not take into account the labor supplied to informal sector. However, our **'model implied'**

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² Fig. 1 displays the cyclical components of the labor wedge, GDP and hours worked in the US. Two patterns stand out: the labor wedge is volatile and strongly counter-cyclical to GDP and hours worked. Sections 3 and 4 provides a detailed description of the construction of the US labor wedge series.

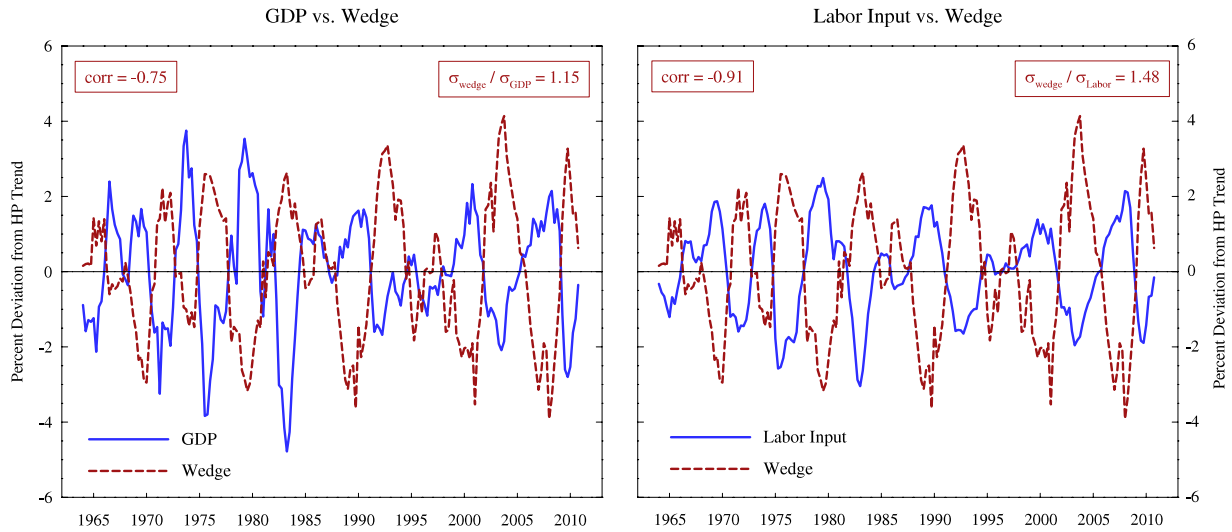


Fig. 1. Cyclical components of labor wedge, output and labor input in the United States. Frisch elasticity of labor supply = $\xi = 1$.

MRS takes into account the labor supplied to informal sector when calculating the total labor supply. Therefore, to be consistent with the US data measurements, if we (i) simulate our model as usual to generate series on formal and informal sector, (ii) treat data generated by the model as data for the US, but (iii) ignore the informal sector—construct the labor wedge as if data on informal sector is not available (do not consider informal labor as a part of total labor), then the labor wedge in our model is countercyclical! Moreover, since the informal sector exhibits countercyclical behavior, the measured labor wedge exhibits countercyclical behavior as well. Based on these findings, we argue that the presence of informal sector affects the measured cyclicity of labor wedge, both in the data and in our model.

To sum up, the lesson from this exercise is as follows: When measuring the labor wedge using a one-sector model, we abstract from the informal sector. Accordingly, we show that in the presence of an informal sector, the neoclassical framework can capture the observed countercyclical behavior of labor wedge and our benchmark model can account for 68% of the observed volatility in the US labor wedge.

The literature on the cyclicity of labor wedge is rich, albeit still far from being complete. Chari et al. (2007), Shimer (2009), Shimer (2010), Gourio and Rudanko (2014) and Karabarbounis (2014) provide a non-exhaustive list of papers looking at this issue. Accordingly, multiple factors, such as distortionary taxes, presence of rigidities, intangible capital, social safety nets, home production and search frictions have been highlighted behind the cyclical behavior of the labor wedge.

Even though the literature lacks comprehensive empirical studies using high-frequency datasets with large time series dimension, few existing studies show that the size of the informal sector is counter-cyclical. While Busato and Chiarini (2004), Conesa et al. (2001) and Elgin (2012) indicate that the informal sector exhibits a counter-cyclical behavior in the US economy, Loayza and Rigolini (2006) documents this fact for selected developed and developing economies. Accordingly, the informal sector employment, being counter-cyclical, offers insurance against poor formal labor market conditions in recessions.

The rest of the paper is organized as follows. Section 2 presents the model and characterize the competitive equilibrium. Section 3 discusses the calibration. Section 4 presents the quantitative implications of the model. Section 5 summarizes and concludes.

2. The model

Time is discrete and indexed by $t = 0, 1, 2, \dots$. The model economy is populated with a continuum of households with the following preferences:

$$E_0 \sum_{t=0}^{\infty} \beta^t U(c_t, n_{ft}, n_{it}) \\ = E_0 \sum_{t=0}^{\infty} \beta^t \left(\ln(c_t) - m \frac{\xi}{1+\xi} (n_{ft} + n_{it})^{\frac{1+\xi}{\xi}} \right), \quad (1)$$

where $\beta \in (0, 1)$ is the subjective discount factor, c_t denotes consumption, n_{ft} denotes the labor supplied to the formal sector, n_{it} denotes the labor supplied to the informal sector, $m > 0$ measures the disutility from working and the term E_0 represents the expectations of households conditional on information at date $t = 0$. The utility function follows Shimer (2009), which is the most common form of preferences used in the literature to measure the labor wedge. The parameter $\xi > 0$ is equal to the Frisch elasticity of labor supply, a key parameter for determining the magnitude of fluctuations in the labor wedge.

The formal sector produces output y_{ft} using a constant returns to scale production function of the following form:

$$y_{ft} = e^{z_t} (k_{ft} h_{ft})^\alpha (l_{ft})^{1-\alpha}, \quad (2)$$

where k_{ft} and l_{ft} denote, respectively, the capital and labor inputs in the formal sector and h_{ft} represents the utilization rate of formal capital stock. The production of formal output is subject to a technology shock z_t which follows an AR(1) process of the form $z_t = \rho_z z_{t-1} + \varepsilon_t$, where innovations are distributed normally with $\varepsilon_t \sim N(0, \sigma_z^2)$.

The informal sector is viewed as a low productivity sector that operates on a smaller scale. Based on this view, we assume that the informal sector uses capital k_{it} and labor l_{it} to produce output y_{it} according to the following decreasing returns to scale technology:

$$y_{it} = A_i (k_{it} h_{it})^{\alpha_i} (l_{it})^{\beta_i}, \quad (3)$$

where h_{it} and A_i denote, respectively, the utilization rate of informal capital stock and the productivity level of the sector. Following Conesa et al. (2001), we assume that technology shocks do not affect the informal sector.

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