The Effect of Labour Share on the Natural Rate of Interest: Some Empirical Evidence

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Abstract

Standard estimations of Taylor.s (1993) monetary policy rule assume that the natural real rate of interest can be regarded as constant. By contrast, based on Mankiew (2000) theory of Savers and Spenders, we argue that the natural rate is related to the distribution of income between the two types of agents. We show evidence from the U.S., based on a re-specification of the Taylor rule proposed by Clarida et. al. (2000), that the natural rate of is positively influenced by the long-run movements of the labour share in the national income. As the labour share has been falling since 1980s, our results indicate that the natural real interest rate fell from around 6% to around 2% in the beginnings of our decade.

Estimações da regra proposta por Taylor (1993) assumem que a taxa de juro real natural pode ser considerada como constante. Nós defendemos, baseando-nos na teoria de "Savers" e "Spenders" de Mankiew (2000) que a taxa de juro natural está relacionada com a distribuição de rendimento entre os dois tipos de agentes. Mostramos evidência para os Estados Unidos, baseada numa re-especificação da regra de política monetária proposta por Clarida et. al. (2000), que a taxa de juro natural é positivamente influênciada por movimentos de longo-prazo na "labour share" no rendimento nacional. Como a "labour share" tem vindo a cair desde os anos 80, os nossos resultados indicam que a taxa de juro natural nos Estados Unidos caiu, de 6% nos anos 80, para perto de 2% no início da nossa década.

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1 Introduction

Conventional wisdom holds that the joint forces of productivity and thrift determine a unique level of the interest rate consistent with full employment and a constant rate of inflation – the so-called equilibrium or ´natural´ rate of interest[1]. In this spirit, Taylor's 1993 monetary policy rule suggested that - when both inflation and output are at their target levels - central banks should set the real rate of interest equal to the equilibrium or natural rate. Taylor assumed this natural rate to be constant – and his assumption has since become a standard practice in econometric estimations of the Taylor rule [for notable examples, see Taylor (1999) and Clarida et. al. (2000)].

However, there is no *a priori* reason to see the natural rate of interest as an inherently constant value. ´[The natural rate] is essentially variable. If the prospects of the employment of capital become more promising, demand will increase and will at first exceed supply; interest rates will then rise and stimulate further saving at the same time as the demand from entrepreneurs contracts, until a new equilibrium is reached at a higher rate of interest. And at the same time equilibrium must *ipso facto* obtain ... in the market for goods and services.´ (Wicksell, 1935, p. 193)

In this paper, we investigate another reason why the natural rate of interest may be variable. In line with the modern theory of consumption (see Mankiw, 2000), we start with the assumption that the long-run propensity to spend out of wages is higher than the corresponding propensity to spend out of non-wage income. In this setting, if the economy is initially at full employment and there is (say) a permanent increase of the labour share in the national income, aggregate demand will rise. As a result, the level of interest consistent with

[1] The concept can be traced back to Wicksell (1935, p. 193): ´The rate of interest at which the *demand for loan capital and the supply of [full-employment] savings exactly agree* ... [is] the natural real rate.´ (italics in the original).

full-employment and a constant inflation rate will become higher. Hence, there will be a positive association in the long run between the labour share and the natural rate of interest.

In order to test this hypothesis, we estimate a policy rule which relaxes the standard assumption of a constant natural rate of interest, and instead allows for the idea that it may be related with the labour share in the national income. The main result is that the natural rate of interest is positively and significantly influenced by long run movements in the labour share in the national income.

The paper is organized as follows. Section 2 discusses why should labour share be a important determinant of natural rate of interest. Section 3 sets up a policy rule specification which will allow us to test our hypothesis. In section 4 we present empirical evidence. Section 4 concludes.

2 Labour share on the natural rate of interest

Empirical evidence suggests that there are many households - belonging to the working class - for which saving is not a normal activity. First, consider the following comparison between income distribution and the wealth distribution. According to the U. S. Census Bureau, the lowest two quintiles of the income distribution earn about 15 percent of income. But the lowest two quintiles of the wealth distribution own only 0.2 percent of household wealth.

A related fact is the low absolute level of wealth of many households (see, Wolff, 1998). The mean net worth of the lowest two quintiles is only $900 and – if we exclude home equity – the mean falls to a negative $ 10,600, indicating that credit-card and other debts exceed financial assets. Excluding home equity, net worth – i.e., accumulated savings - is negative for 28.7% of households.

Second, empirical evidence suggests that those households who do not save belong to the working class. For example, Shea (1995) examined microeconomic data and concluded that an increase in wages resulting from union contracts of 1 percent leads to an increase of consumption of 0.89 percent.

While many households have almost no wealth, a few much. According to the U.S. Census Bureau, the top 5 percent of the income distribution has typically earned 15-20 percent of all income. By contrast, the top 5 percent of the wealth distribution owns 60 percent of the household wealth, a number that rises to 72% if we exclude home equity. This suggests that some households are "net savers" – they save not only to smooth their life-time consumption but also to leave bequests to their descendants. Kottiof and Summers (1981) estimate that 70 percent of the accumulated wealth in the US is due to the bequest motive, and not to life-cycle savings.

In short, the economy can be usefully divided into two types of consumers, "the savers" and "the spenders" (Mankiw, 2000). The savers are high-wealth households who smooth consumption not only from year to year, but also from generation to generation. The spenders are low-wealth working class households who fail to smooth consumption over time, and instead live from paycheck to paycheck, i.e., follow the simple rule of thumb of consuming their current income. We can confidently assume that the labour and capital share are a good measure of the distribution of income between the two consume types.

In this setting, we consider again the central question of the paper: what might be the effect of a change in the labour share on the natural rate of interest? The answer is as follows. If the economy is initially at full employment and there is (say) an increase of the labour share in the national income, there will be a shift of income from savers to spenders and therefore aggregate demand will rise. As a result, the level of interest consistent with full-employment and a constant inflation rate will become higher. Hence, there will be a positive association in the long run between the labour share and the natural rate of interest.

3 The Policy Reaction Function

To test our hypothesis we face a big problem – the natural rate of interest is not observable. We have, therefore to find a indirect way to test it. We do it by estimating an interest rate policy rule but allowing the natural rate of interest to vary with the labour share. We use a re-specification of the monetary policy function proposed by Clarida et. al (2000).

3.1 Clarida et al.' s monetary policy rule

Clarida et. al (2000) start by postulating the following forward-looking version of Taylor's rule:

$$r_t^* = r^* + \beta(E[\pi_{t,k}|\Omega_t] - \pi^*) + \gamma E[x_{t,k}|\Omega_t] \tag{1}$$

where r_t^* is the target for the nominal Federal Funds rate; $\pi_{t,k}$ is the percentage change in the price level between periods t and t+k; π^* is the target for inflation; $x_{t,k}$ is a measure of the average output gap between period t and t+q; E is the expectations operator and Ω_t is the information set at the time the interest rate is set; and r^* is, by construction, the desired nominal rate when both inflation and output are at their target levels.

As is well known, in equation (1) β and γ measure the desired interest rate responses of the central bank to deviations of the expected inflation and output from their target levels, respectively. However, that equation is too restrictive to describe actual changes in the Funds rate, because it assumes an immediate adjustment of the actual Funds rate to its target level, and thus ignores the Federal Reserve's tendency to smooth changes in interest rates. Therefore, Clarida et. al (2000) relax that assumption and specify the following equation for the actual Funds rate, r_t:

$$r_t = \rho r_{t-1} + (1-\rho) r_t^* \tag{2}$$

where r*t is the target Funds rate. Equation (2) says that in each period the Federal Reserve adjusts the Funds rate to eliminate a fraction (1-ρ) of the gap between its current target level and last period interest rate; ρ is thus an indicator of the degree of smoothing of interest rate changes.

Combining the partial adjustment equation (2) with the target interest rate equation (1) yields the following policy reaction function:

$$r_t = (1-\rho)[rr^* - (\beta - 1)\pi^* + \beta \pi_{t,k} + \gamma x_{t,k}] + \rho r_{t-1} + \epsilon_t \tag{3}$$

where $\epsilon_t = -(1-\rho)\{\beta(\pi_{t,k} - E[\pi_{t,k}|\Omega_t]) + \gamma(x_{t,k} - E[x_{t,k}|\Omega_t])\}$ and $rr^* = r^* - \pi^*$ is the natural *real* rate, assumed to be stationary and determined by non-monetary factors in the long-run consistent with conventional wisdom. (Clarida et. al., 2000, pp. 152-3).Equation (3) provides the basis for the indirect estimation of the parameter vector of equations (1) and (2) - (Constant, β, γ and ρ), where $Constant = rr^* - (\beta - 1)\pi^*$[2]

3.2 A policy rule including a natural rate of interest dependent on the labour share

In order to test our hypothesis, we relax the assumption of a constant natural rate of interest (rr^*), and specify a monetary policy function that allows the natural rate to depend on the labour share in national income. This policy

[2]From the estimated constant term, we can identify either rr^*(assuming a value for π^*) or π^*(by assuming a value for rr^*).

reaction curve is express in the following way:

$$r_t^* = \theta + \alpha LS_t + \pi^* + \beta(E[\pi_{t,k}|\Omega_t] - \pi^*) + \gamma E[x_{t,k}|\Omega_t] \qquad (1a)$$

where LS_t is a moving average of the labour share, and $(\theta + \alpha LS_t)$ is the natural rate of interest, variable with changes in the labour share. Notice that we won't consider the labour share itself but a moving average. It is one way to eliminate business cycles fluctuations and better capture its long-run evolution.

Combining this new target interest rate equation (1A) with the partial adjustment equation (2) yields the following policy reaction function:

$$r_t = (1 - \rho)[\theta + \alpha LS_t - (\beta - 1)\pi^* + \beta\pi_{t,k} + \gamma x_{t,k}] + \rho r_{t-1} + \epsilon_t \qquad (3a)$$

which provides the basis for the estimation of the parameter vector (Constant,β,γ,ρ,α), where $Constant = \theta - (\beta - 1)\pi^*$[3]

[3] Again, the identification of θ requires an assumption on the values of π^*.

4 Empirical evidence

In this section we report the estimates of the policy reaction function, with and without the inclusion of the labour share as an explanatory variable. We use two different estimation methods suitable for the forward looking nature of our reaction function: Generalized Method of Moments[4] and (Non-Linear) Two-Stage-Least Squares[5].

We use quarterly data spanning the period 1979:3-2005:1, taken from the FRED II database. We use as interest rate the quarterly average Federal Funds rate (FEDFUNDS), expressed in annual rates. The baseline inflation measure is the rate of change of the GDP deflator (GDPDEF) between a quarter and the same quarter of the previous year. The baseline measure of the output gap is the difference between the logarithmized series of the real potential GDP (GDPPOT - U.S. Congress CBO) and of the real GDP (GDPC96). We calculated the Labour Share as the ratio of the compensation of employees paid (COE) over the national income (NICUR), although to capture the long run evolution by using a 30 quarters moving average (variable shown in Figure 1), subtracted by its mean[6]. Further ahead we test the robustness of our results considering different lengths for the labour share moving average.

The instrument set includes four lags of the output gap, the Fed Funds rate, inflation, and the spread between the 10-Year Treasury Constant Maturity Rate (GS10) and the Federal Funds rate. In the regression that included the Labour

[4] Since the residual term is a linear combination of forecast errors, it must be orthogonal to any variable in the information set Ω_t. Choosing a set of instruments z_t so that $z_t \subset \Omega_t$, it follows that, for both cases:
$E\{[r_t - (1-\rho)(rr^* - (\beta - 1)\pi^* + \beta\pi_{t,k} + \gamma x_{t,q}) - \rho r_{t-1}]z_t\} = 0$ (4) which summarizes the set of orthogonality conditions that must hold. Notice also that if the number of instruments (dimension of zt) is greater than the number of parameters to be estimated, some overidentifying conditions must be tested in order to validate both the specification and the set of instruments used.

[5] In both cases the standard error where computed by employing the Newey-West covariance matrix using 4 lags to adjust for potential autocorrelation.

[6] We do this in order not to influence the analysis of the constant term. Subtracting the mean of moving average of the labour share allows us to compare θ with rr^*.

Share we used it as self instrument as no endogeneity problem is expected to arise.

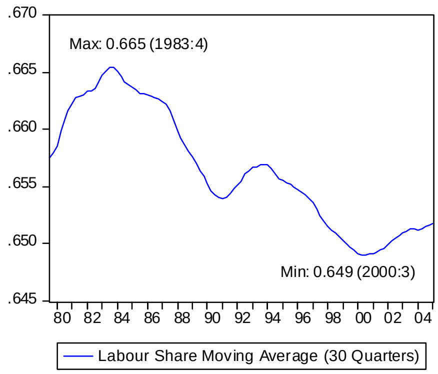

Figure 1

4.1 Baseline Estimate

Figure 2 reports the estimates of the parameters of both interest rate rules (3 and 3a) – the constant, β, γ, ρ and α - using the baseline variables for inflation and the output gap. The target horizon is assumed to be one quarter for both inflation and the output gap (i.e. k = q = 1 in equations 3 and 3A).

		Constant	β	γ	ρ	α
GMM	*Without LS (3)*	**-0.021**	**3.23**	**1.17**	**0.86**	-
	(p = *0.765)*	*(0.009)*	*(0.29)*	*(0.232)*	*(0.024)*	-
	With LS (3a)	**0.017**	**1.68**	**1.21**	**0.83**	**1.94**
	(p= 0.767)	*(0.005)*	*(0.169)*	*(0.187)*	*(0.023)*	*(0.577)*
TSLS	*Without LS (3)*	**0.003**	**2.32**	**1.01**	**0.82**	-
		(0.008)	*(0.269)*	*(0.287)*	*(0.049)*	-
	With LS (3a)	**0.018**	**1.84**	**0.91**	**0.75**	**2.7**
		(0.008)	*(0.229)*	*(0.205)*	*(0.054)*	*(0.732)*

Figure 2 : Baseline Estimates

The coefficient of the labour share is positive and highly significant: as expected, a permanent increase in the labour share of national income leads to an increase in the equilibrium interest rate. But the most interesting feature is its magnitude. From both methods the estimated coefficient is around 2, which means that the decrease of 1.5 percentage points in the labour share moving average, from 1983 until 2000 (see figure 1), implied a change of the real natural rate of around 3 to 4 percent. Considering that the natural interest rate is usually treated as constant, this result gives some food for thought.

4.1.1 Estimated Natural Real Interest Rate

We now consider a series of exercises to construct the estimated series of the natural real interest rate. It is clear that our estimate must track the labour share moving average depicted in figure 1, since it is its only determinant. We must, nevertheless, make one assumption in order to identify θ - the fixed component. We can see in figure 3 our estimates under 4 different assumptions. In the first graph we assume that θ is simply the sample average of the real interest rate (as we subtracted the labour share moving average mean) and then add the labour share effect. In the other three graphs we identified θ by using the estimated constant term and assuming a given value for the inflation target. We plot the results for an inflation target of 1%, 2% and 3%.

As the only variable term is the labour share, the sample negative trend is similar in all cases. The natural interest rate is above the sample average in the 1980s and much below by the end of the 1990s.

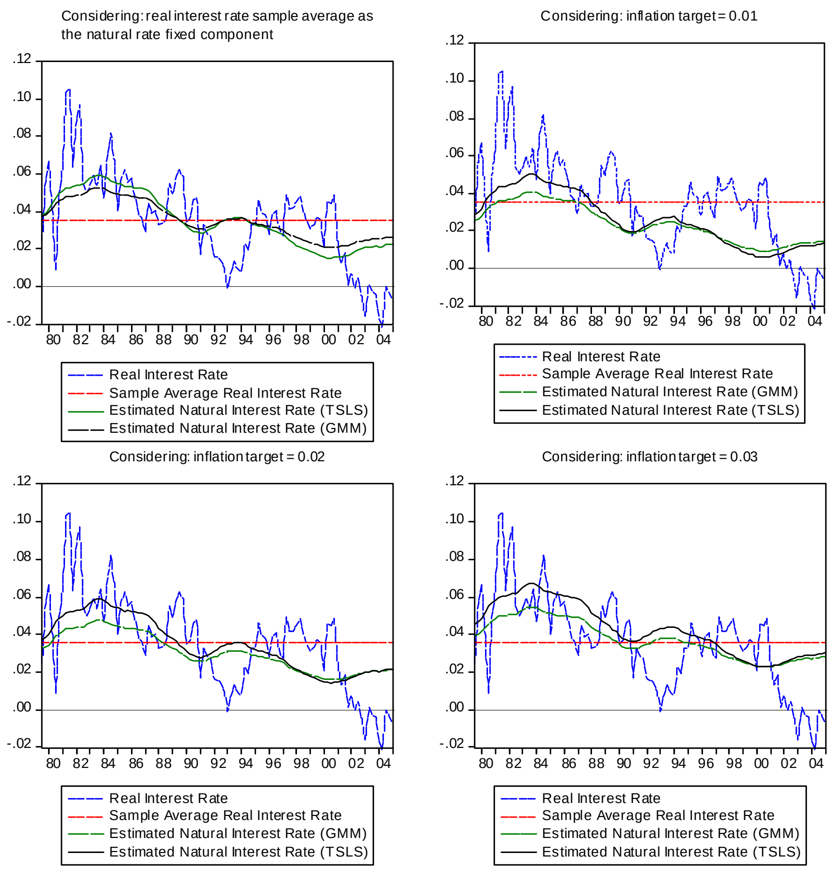

Figure 3 : Estimated Natural Rate of Interest under 4 assumptions

4.2 Robustness Analysis

We now investigate the robustness of our results along several dimensions. We consider (1) alternative measures of inflation and the output gap, (2) alternative target horizons for each variable, (3) parameter stability across sub-samples, (4) a backward-looking version of our monetary policy reaction function, and (5) alternative lengths for the moving average of the labour share. As we will see, the basic conclusion from the baseline case remains essentially intact.

4.2.1 Alternative Measures

We start by re-estimating the policy reaction function using different measures of inflation (the rate of change of the consumer price index) and of the output gap (the detrended log of output[7]). Figure 4 presents the estimates.

		Constant	β	γ	ρ	α
Detrended Output						
GMM	*Without LS (3)*	**-0.051**	**4.22**	**4.03**	**0.93**	**-**
	(p = *0.702)*	*(0.029)*	*(1.066)*	*(1.748)*	*(0.027)*	-
	With LS (3a)	**-0.028**	**3.42**	**3.77**	**0.92**	**2.72**
	(p= *0.700*)	*(0.022)*	*(0.853)*	*(1.518)*	*(0.031)*	*(1.501)*
TSLS	*Without LS (3)*	**0.001**	**2.01**	**2.2**	**0.84**	**-**
		(0.01)	*(0.277)*	*(0.797)*	*(0.05)*	-
	With LS (3a)	**0.014**	**1.63**	**1.79**	**0.79**	**2.17**
		(0.009)	*(0.009)*	*(0.597)*	*(0.058)*	*(0.84)*
CPI Inflation						
GMM	*Without LS (3)*	**-0.037**	**3.09**	**1.13**	**0.91**	**-**
	(p = *0.736)*	*(0.013)*	*(0.407)*	*(0.396)*	*(0.019)*	-
	With LS (3a)	**-0.011**	**2.28**	**0.97**	**0.88**	**2.04**
	(p= *0.759*)	*(0.01)*	*(0.29)*	*(0.287)*	*(0.026)*	*(0.852)*
TSLS	*Without LS (3)*	**0.002**	**1.81**	**0.84**	**0.87**	**-**
		(0.012)	*(0.322)*	*(0.395)*	*(0.04)*	-
	With LS (3a)	**0.022**	**1.32**	**0.73**	**0.78**	**3.59**
		(0.010)	*(0.246)*	*(0.246)*	*(0.049)*	*(0.793)*

Figure 4 : Estimation Under Alternative Measures For Output and Inflation

As can be seen, the key results from the baseline case are robust to the use of alternative output gap and inflation measures. In fact, the slope coefficients remain statistically significant and have similar magnitudes of those found in the base line estimation.

[7] The log of output was detrended applying the HP-Filter.

4.2.2 Alternative Horizons

The baseline case assumes that the Federal Reserve reacts to changes in both inflation and the output gap looking one quarter ahead (i.e. k = 1 and q = 1 in equations 3 and 3a). We now relax this assumption by analysing two alternative target horizons: (i) one year for inflation and one quarter for the output gap (i.e. k = 4 and q = 1); and (ii) one year for inflation and two quarters for the output gap (i.e. k = 4 and q = 2). The rationale for this procedure is that these horizons are more in line with the current consensus regarding the lag with which monetary policy affects either variable (see, for example, Bernanke and Mihov, 1998). The results are reported in Figure 5. As can be seen, the estimated reaction functions are again very similar under these two alternative target horizons, and very close to the baseline case.

		Constant	β	γ	ρ	α
k = 4, q = 1						
GMM	*Without LS (3)*	**-0.032**	**3.71**	**1.1**	**0.86**	**-**
	(p = 0.788)	*(0.012)*	*(0.43)*	*(0.264)*	*(0.029)*	-
	With LS (3a)	**0.02**	**1.52**	**1.19**	**0.85**	**2.2**
	(p= 0.828)	*(0.007)*	*(0.225)*	*(0.215)*	*(0.024)*	*(0.671)*
TSLS	*Without LS (3)*	**-0.012**	**2.91**	**0.98**	**0.85**	**-**
		(0.019)	*(0.726)*	*(0.471)*	*(0.041)*	-
	With LS (3a)	**0.016**	**1.9**	**0.91**	**0.78**	**2.84**
		(0.01)	*(0.311)*	*(0.23)*	*(0.05)*	*(0.832)*
k = 4, q = 2						
GMM	*Without LS (3)*	**-0.046**	**4.03**	**1.19**	**0.87**	**-**
	(p = 0.866)	*(0.015)*	*(0.503)*	*(0.35)*	*(0.029)*	-
	With LS (3a)	**0.02**	**1.52**	**1.19**	**0.85**	**2.04**
	(p= 0.829)	*(0.007)*	*(0.225)*	*(0.214)*	*(0.024)*	*(0.852)*
TSLS	*Without LS (3)*	**-0.012**	**2.91**	**0.98**	**0.85**	**-**
		(0.019)	*(0.726)*	*(0.471)*	*(0.041)*	-
	With LS (3a)	**0.004**	**2.33**	**0.84**	**0.82**	**2.29**
		(0.018)	*(0.679)*	*(0.367)*	*(0.046)*	*(1.03)*

Figure 5 : Alternative Horizons Estimates

4.2.3 Subsample Stability

We now ask whether the estimated parameters are stable along the full sample, or instead differ according to the Fed's chairman. Thus, we split the sample into the Volcker period (79:3 – 87:2) and the Greenspan period (87:3 – 05:1). We also consider a third sub-sample (Post-82) that excludes the first three years of the entire sample[8]. The results are reported in figure 6.

		Constant	β	γ	ρ	α
Volcker						
GMM	*Without LS (3)*	**-0.005**	**2.87**	**0.46**	**0.77**	**-**
	(p = *0.958*)	*(0.013)*	*(0.449)*	*(0.19)*	*(0.058)*	-
	With LS (3a)	**0.018**	**2.11**	**0.73**	**0.43**	**13.48**
	(p= *0.970*)	*(0.003)*	*(0.087)*	*(0.086)*	*(0.031)*	*(0.946)*
TSLS	*Without LS (3)*	**0.041**	**1.39**	**0.22**	**0.59**	**-**
		(0.011)	*(0.265)*	*(0.237)*	*(0.091)*	-
	With LS (3a)	**0.025**	**1.84**	**0.46**	**0.51**	**9.38**
		(0.008)	*(0.209)*	*(0.209)*	*(0.067)*	*(2.548)*
Greenspan						
GMM	*Without LS (3)*	**0.013**	**1.85**	**1.46**	**0.82**	**-**
	(p = *0.923*)	*(0.01*	*(0.351)*	*(0.201)*	*(0.037)*	-
	With LS (3a)	**0.01**	**1.89**	**1.52**	**0.8**	**1.35**
	(p= *0.883*)	*(0.008)*	*(0.31)*	*(0.167)*	*(0.027)*	*(0.56)*
TSLS	*Without LS (3)*	**0.008**	**2.01**	**1.41**	**0.81**	**-**
		(0.009)	*(0.342)*	*(0.204)*	*(0.042)*	-
	With LS (3a)	**0.026**	**1.21**	**1.43**	**0.82**	**3.1**
		(0.011)	*(0.449)*	*(0.179)*	*(0.026)*	*(1.33)*
Post-82						
GMM	*Without LS (3)*	**0.008**	**2.32**	**1.25**	**0.89**	**-**
	(p = 0.860)	*(0.021)*	*(0.871)*	*(0.291)*	*(0.033)*	-
	With LS (3a)	**0.044**	**0.95**	**1.37**	**0.88**	**4.43**
	(p= 0.917)	*(0.022)*	*(0.791)*	*(0.271)*	*(0.032)*	*(1.878)*
TSLS	*Without LS (3)*	**-0.015**	**3.01**	**1.32**	**0.89**	**-**
		(0.022)	*(0.966)*	*(0.381)*	*(0.043)*	-
	With LS (3a)	**0.018**	**1.75**	**1.14**	**0.83**	**2.95**
		(0.013)	*(0.511)*	*(0.232)*	*(0.045)*	*(1.207)*

Figure 5 : Subsample Stability

[8] Two reasons justify this procedure: (i) this period was characterized by a sharp disinflation policy, and (ii) during this period the Federal Reserve decided to target the nonborrowed reserves rather than the Federal Funds rate.

It is interesting to notice that the estimated coefficient of the output gap is much lower for the Volcker period than it is for the entire sample, reflecting the fact that inflation rather than the output gap was the main goal of Volcker's policy. But notice, as well, that α is much bigger in the Volcker period. This might indicate that there was a big rise in the natural real rate in the 1980s and that the very high interest rates in this period reflected not only the fight against inflation but also a higher natural rate. This analysis is consistent with the estimated natural rate from the previous section.

4.2.4 Backward-Looking Estimates

All specifications have so far assumed a forward-looking behaviour on the part of the Central Bank. We now ask whether the results already obtained continue to hold under the assumption of a backward-looking behaviour, in line with Taylor (1993). Figure 7 presents the results for both k and q equal to -1. We use the variables as their own instruments (as there is no endogeneity problem), which means that the results of both estimations are numerically the same and equal to the non-linear least squares estimates. As can be seen, the baseline results are largely validated under this new hypothesis as well.

	Constant	β	γ	ρ	α
Without LS (3)	**-0.012**	**1.81**	**0.62**	**0.8**	**-**
	(0.009)	*(0.248)*	*(0.256)*	*(0.052)*	-
With LS (3a)	**0.034**	**1.35**	**1.08**	**0.73**	**3.32**
	(0.01)	*(0.248)*	*(0.320)*	*(0.080)*	*(1.341)*

Figure 6 : Backward Looking Estimates

We can take one additional conclusion from all the analysis so far. It seems that the coefficients from the policy rule tend to suffer from an omitted variable bias. Although the sign of the effect is not very clear for γ,both β and ρ tends to persistently overestimated when labour share is not included. This suggests that standard econometric studies of the Taylor rule have incorrectly estimated the responses of the interest rate to changes in inflation.

4.2.5 Alternative Lengths for the Moving Average of the Labour Share

The baseline case assumes a moving-average length of 30 quarters for the labour share. This might seem a bit arbitrary in the first place and therefore we complete our robustness analysis by estimating the equation with different moving average lengths. The following graph plots the value of the labour share coefficient in the right hand side scale and its p-value on the left hand side, for moving averages from 10 to 40 quarters.

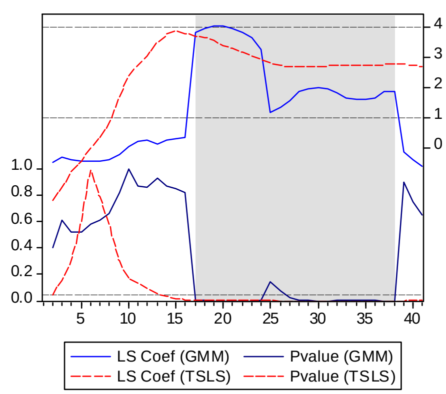

Figure 7 : Labour Share Coefficient and P-Value

The coeficient is only strongly and unambiguosly significant for lengths over 4 years and its very stable with values ranging from 1 to 4. This is well in accordance with our hypothesis since, only structural shifts in income should affect the natural rate and not short-run shifts due to business cycle dynamics.

We used the estimations to calculate the implicit change in the natural real interest rate since the 1980s till 2000, by multiplying the labour share by the sample difference between maximum and minimum. We plot its value for the lengths that are actual significant (from 17 to 38 quarters).

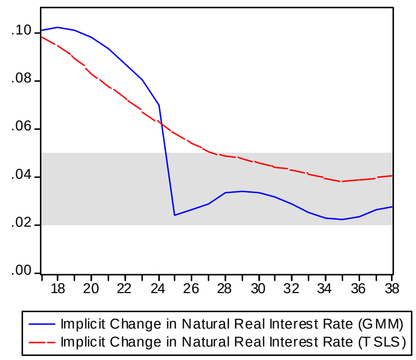

Figure 8: Implied Change in Natural Interest Rate

If we consider a length of around 5 years (20 quarters) the implied change in the natural interest rate is of around 9%, which intuitively seems very high. If we use lengths of more than 24 quarters the implied change ranges, rather steadily, between 2 to 5 percent. It is clear that the key results of our baseline investigation still hold when we consider any moving averages lengths greater than three years.

5 Conclusion

Standard estimations of the Taylor rule assume that the natural rate of interest - the level of interest consistent with full-employment and a constant inflation rate - can be regarded as constant. By contrast, this paper presented evidence, based on a re-specification of the Taylor rule proposed by Clarida et. al (2000), that the natural rate is positively influenced by the long-run movements of the labour share in the national income – a result which follows from the fact that the propensity to spend out of wages is higher than the propensity to spend out of non-wage income. The estimations show that the magnitude is quite considerable and that since the 1980s the natural real interest rate fell by around 3-4 percentage points.

Implications for monetary policy? Here is an example. In the last few years the labour share in the US has been at its lowest levels for decades. This means, according to our results, that, as labour share as been falling, the natural rate may have also fallen to unusual low levels. Hence, the Fed's record-low interest rates (1-1.25% between November 2002 and July 2004) may have not been, after all, too much below the natural rate - and the fact that inflation did not rise in those circumstances is therefore less surprising than is usually thought.

Our results also help to explain the inflationary process in the 1980s. Figure 9 shows the labour share moving average and the real interest rates, extending the sample period to start in 1960s. We can see that in the 1970s there was a big increase in the labour share from around 0.62 to 0.66 and therefore the natural interest rate must have increased. We believe that during this period there was a misperception from the monetary authority regarding its increase. By keeping real interest rate more or less constant, gradually became to low relative to the (growing) natural rate, exacerbating the inflationary trend started with the oil shock.

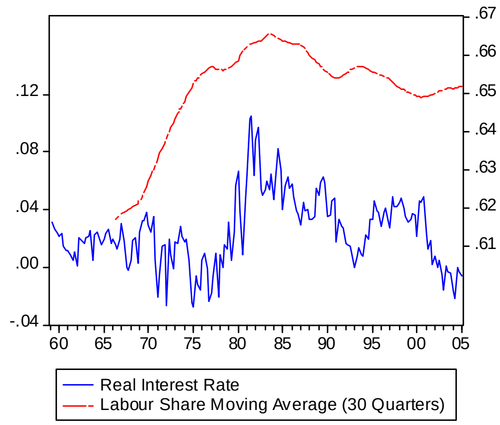

Figure 9

More generally, our results suggest that the labour share should be included among the large set of information (behaviour of the money supply, movements of the exchange rate, etc.) that central banks take into account in order to make their interest rate decisions.

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