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**Keeping Up with the Joneses
and the Welfare Effects of
Monetary Policy**

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ABSTRACT

This paper examines the implications of "keeping up with the Joneses" preferences (jealousy) for the welfare effects of monetary policy. I develop a New Keynesian model, where households are jealous and the central bank follows the Taylor rule. I show that the welfare effects of monetary policy over time depend significantly on the relative strength of the consumption externality caused by jealousy and the monopolistic distortion. If jealousy (the monopolistic distortion) dominates, then a decrease in the interest rate reduces (increases) welfare in the short run, but increases (reduces) welfare in the medium run.

JEL Classification: E40, E50, E52

Keywords: Monetary policy, jealousy, consumption externality

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1   Introduction

There is substantial evidence that individuals derive utility not only from the level of their own consumption, but also from the consumption of the people around them, as emphasised by Ravina (2007). Using micro level data, Ravina finds that relative consumption or the so-called "keeping up with the Joneses" is an important determinant of household decision making. In addition, her findings support the theories that explain macroeconomic phenomena by introducing habit formation in the utility function.

The implications of habit formation for monetary policy have been analysed e.g. by Fuhrer (2000) and Amato and Laubach (2004). Fuhrer (2000) shows that habit formation, where utility depends on the consumer's own past consumption, can enhance the ability of monetary policy models to account for the hump-shaped response of consumption to monetary shocks. Amato and Laubach (2004) study the implications of habit formation for optimal monetary policy.

Although the keeping up with the Joneses effect might be an important factor to explain macroeconomic phenomena, Ryff (2010) points out that in the field of monetary economics, its impact has not been studied widely.[1] Pierdzioch (2003), Pierdzioch and Yener (2004) and Tervala (2007) have analysed the implications of keeping up with the Joneses preferences for the welfare effects of monetary policy. These studies, however, have abstracted from much that the field of monetary economics has learned about monetary policy modeling by analysing the effects of a simple shock to the money supply. In more sophisticated analyses of monetary policy, policy is described in terms of rules setting the nominal interest rate.

One purpose of this study is to examine whether the welfare results of Pierdzioch (2003), Pierdzioch and Yener (2004) and Tervala (2007) are valid in a more sophisticated framework, where monetary policy is described in terms of a rule setting the nominal interest rate. In addition, the previous studies have been missing a thorough analysis of the evolution of welfare over time. The main contribution of this paper is to go beyond the previous studies, which employ simultaneous one-step-ahead pricing, and to analyse the welfare effects of monetary policy over time. To do this, I use a New Keynesian model with the Calvo-pricing mechanism.

The above-mentioned studies have shown the dependence of the overall welfare effect of monetary policy on the interplay between the consumption

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[1]The literature that addresses the relationship between economic policy and relative consumption has dealt with a variety of topics, such as taxation in stabilisation policy (Ljungqvist and Uhlig 2000), environmental externalities (Howarth 2006), social insurance (Abel 2005) and income tax policy (Ireland 2001).

externality caused by keeping up with the Joneses preferences and the monopolistic distortion. In these papers, expansionary monetary policy can be welfare-reducing, if households are sufficiently jealous and the economy suffers from overemployment. The reason is that in such a case, expansionary monetary policy increases employment that is already higher than the social optimum.

The findings of this paper generalise the results of the earlier studies: If the keeping up with the Joneses effect is sufficiently strong, then expansionary monetary policy can reduce overall welfare (the discounted present value of welfare) also in the framework where monetary policy is modelled in terms of an interest rate rule (the Taylor rule). More importantly, this present paper shows that keeping up with the Joneses preferences can reverse the welfare effects of monetary policy both in the short and medium run. If the keeping up with the Joneses effect is sufficiently strong (weak), then expansionary monetary policy decreases (increases) welfare in the short run. On the other hand, if the keeping up with the Joneses effect is sufficiently strong (weak), then policy increases (decreases) welfare in the medium run. Thus, keeping up with the Joneses preferences have important implications for the evolution of welfare over time.

The rest of the paper is organised as follows: In Section 2, I lay out the model. In Section 3, I study the implications of keeping up with the Joneses preferences for the welfare effects of monetary policy. Section 4 concludes the paper.

2   Model

2.1   Demand Side: Households

2.1.1   Preferences

To study the implications of jealousy for the welfare effects of monetary policy, this paper introduces keeping up with the Joneses preferences into a New Keynesian monetary policy model (see Gali 2008, chapter 3). The economy is populated by a continuum of households, indexed by $z \in [0,1]$.

The utility function of the representative household is given by

$$U_t(z) = E_t \sum_{s=t}^{\infty} \beta^{s-t} \left[\log(C_s - \alpha C_s^A) - \frac{\kappa (\ell_s(z))^2}{2} \right], \qquad (1)$$

where E_t is the expectation operator, β $(0 < \beta < 1)$ is the discount factor, C is a CES basket of all varieties consumed by the household (defined below),

C^A is average consumption goods across all households, the parameter α captures the desire to keep up with the Joneses (as explained below), $\kappa \, (> 0)$ is a parameter and ℓ stands for labour supply. The overall consumption index is

$$C = \left[\int_0^1 c(z)^{\frac{\theta-1}{\theta}} dz \right]^{\frac{\theta}{\theta-1}},$$

where $c\,(z)$ is consumption of commodity z by the household and $\theta \, (> 1)$ is the elasticity of substitution between differentiated goods. The consumption-based price index is

$$P = \left[\int_0^1 p\,(z)^{1-\theta} dz \right]^{\frac{1}{1-\theta}},$$

where the price of commodity z is denoted by $p\,(z)$.

To capture the idea of jealousy, parameter α is restricted to $0 < \alpha < 1$. The utility function implies that

$$\frac{\partial U_t}{\partial C_t^A} = \frac{-\alpha}{C_t - \alpha C_t^A} < 0.$$

The above equation shows that an increase in average consumption lowers the representative household's utility. In the terminology of Gali (1994) and Dupor and Liu (2003), this property is referred as to "jealousy."

The marginal rate of substitution between leisure and consumption can be defined as

$$MRS_{LC} = \frac{\partial U_t / \partial \ell_t\,(z)}{\partial U_t / \partial C_t^i}.$$

In this model,

$$\frac{\partial MRS_{LC}}{\partial C_t^A} = \alpha \ell_t\,(z) > 0.$$

This is a property that I dub "keeping up with the Joneses," following the terminology followed by Gali (1994) and Dupor and Liu (2003). It implies that the marginal utility of the representative household's consumption relative to leisure increases in the case where average consumption increases. As further emphasised by Dupor and Liu (2003), if preferences reflect a desire to keep up with the Joneses, the representative household derives greater utility from extra consumption relative to leisure in the case where other households increase their consumption. Therefore, the household who does not take into account the effect of its behaviour on others induces an externality.

2.1.2 Budget Constraints and Optimal Behaviour

In every period, the representative household is subject to the budget constraint

$$D_t = (1 + i_t)D_{t-1} + w_t \ell_t(z) - P_t C_t + \pi_t. \qquad (2)$$

Here, D_t denotes one-period bonds (that pay one unit of currency in period $t + 1$) held at the beginning of period t, i_t is the nominal interest rate on bonds between $t - 1$ and t, w_t is the nominal wage paid to the household in a competitive labour market and π_t denotes the household's share of the nominal profits (dividends) of all firms. All households own an equal share of all firms.

The representative household maximises the utility function (1) subject to the budget constraint (2). The optimal consumption/savings and labour supply decisions are governed by the following equations:

$$E_t P_{t+1} E_t C_{t+1} = \beta E_t (1 + i_{t+1}) P_t C_t, \qquad (3)$$

$$\ell_t(z) = \frac{w_t}{\kappa P_t (C_t - \alpha C_t^A)}, \qquad (4)$$

Equation (3) is the standard Euler equation: The representative household tends to smooth consumption. Equation (4) shows that the labour supply is a positive function of the real wage, a negative function of the household's own consumption but a positive function of average consumption. In addition, the higher the parameter that captures the disutility of labour (κ), the lower the labour supply.

2.2 Monetary Policy

The Taylor rule (Taylor 1993) implies that the central bank raises the nominal interest rate if inflation rises above the inflation target or if the output gap becomes positive. In this paper, the inflation target is zero. As standard in the New Keynesian literature, the output gap is defined as the deviation of output from the equilibrium level that would prevail in the absence of nominal rigidities. Therefore, in this model, the central bank responds directly to the deviation of output from the initial steady state level.

Estimates of Taylor-type monetary policy rules typically find a high degree of interest rate smoothing. Therefore I assume that the central bank follows the log-linear Taylor rule with interest rate smoothing

$$\hat{\imath}_t = (1 - \mu_1)(\mu_2 \Delta P_t + \mu_3 \hat{y}_t) + \mu_1 i_{t-1} + \epsilon_{i,t}.$$

In this equation, the coefficients μ_1, μ_2 and μ_3 are non-negative and chosen by the central banks, Δ denotes the first difference operator and $\epsilon_{i,t}$ is an unpredictable shift in the monetary policy rule.

2.3 Supply Side: Firms

Let us assume a continuum of firms, indexed by $z \in [0, 1]$. Each firm produces a differentiated good with a production technology

$$y_t(z) = \ell_t(z),\tag{5}$$

where $y_t(z)$ is the output of firm z and $\ell_t(z)$ denotes labour input used by firm z.

Firms maximise profits taking into account the downwards-sloping demand for their products. Profits are given by

$$\pi_t(z) = p_t(z) y_t(z) - w_t \ell_t(z).$$

The demands for their products is given by

$$y_t(z) = \left(\frac{p_t(z)}{P_t}\right)^{-\theta} C_t.$$

In the absence of nominal rigidities, firms maximise $\pi_t(z)$ with respect to $p_t(z)$. This implies that

$$p_t(z) = \frac{\theta}{\theta - 1} w_t.\tag{6}$$

An isoelastic demand function implies that the price of good z is a constant markup over the marginal cost.

To model price rigidities, I follow the formulation of Calvo (1983). This implies that each firm may reset its price in any given period with a probability $1 - \gamma$, independently of other firms and the amount of time since the last adjustment. Therefore, in setting its price, each firm has to take into account that there is a probability $0 < \gamma < 1$ in every subsequent period that it will not be able to revise its price setting decision. When setting a new price in period t, each firm maximises the present value of profits, weighting future profits by the probability that the price will still be effective in that period. Therefore, the representative firm seeks to maximise

$$\max_{p_t(z)} V_t(z) = E_t \sum_{s=t}^{\infty} \gamma^{s-t} Q_{t,s} \pi_t(z),$$

where $Q_{t,s}$ is a stochastic discount factor between period t and period s. The pricing rule can be written as

$$p_t(z) = \left(\frac{\theta}{\theta - 1}\right) \frac{E_t \sum_{s=t}^{\infty} \gamma^{s-t} Q_{t,s} C_s \left(\frac{1}{P_s}\right)^{-\theta} w_s}{E_t \sum_{s=t}^{\infty} \gamma^{s-t} Q_{t,s} C_s \left(\frac{1}{P_s}\right)^{-\theta}}.\tag{7}$$

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The log-linear version of equation (7) can be written as

$$\hat{p}_t(z) = \beta\gamma E_t \hat{p}_{t+1}(z) + (1 - \beta\gamma)\hat{w}_t, \tag{8}$$

where percentage changes from the initial steady state (denoted by the subscript zero) are denoted by hats; therefore, for any variable, $\hat{x}_t = dx_t/x_0$. Equation (8) shows that the optimal price is the weighted average of the current and future marginal costs.

2.4 Symmetric Steady State

The model is log-linearised around the flexible price steady state, in which all exogenous variables are constant. The model abstracts from investment and government spending. Therefore, consumption equals output in every period. In addition, for simplicity, consider a symmetric equilibrium in which the representative household consumption is average. Then, in a symmetric equilibrium,

$$y_0(z) = C_0 = C_0^A.$$

Equations (4), (5) and (6) imply that the initial level of employment and output is

$$y_0(z) = \ell_t(z) = \left[\frac{(\theta - 1)}{\kappa\theta(1 - \alpha)}\right]^{\frac{1}{2}}. \tag{9}$$

As each firm has monopoly power over the commodity it produces, and household preferences feature a keeping up with the Joneses effect, the level of employment (and output) may be suboptimally low or high in the decentralised competitive equilibrium. To see this, assume a social planner (SP) internalises the consumption externality by setting $C = C^A$ and maximises the utility of consumption net of the costs of the foregone leisure

$$\max_{\ell}\left[\log(1 - \alpha)\ell - \frac{\kappa}{2}\ell^2\right].$$

The solution is

$$\ell_0^{SP} = \left(\frac{1}{\kappa}\right)^{\frac{1}{2}}. \tag{10}$$

Equations (9) and (10) demonstrate that the employment level in the decentralised equilibrium can differ from the social optimum. The comparison between these equations reveals that

$$\ell_0^{SP} < \ell_0(z), \text{ if } \alpha > \frac{1}{\theta}, \text{and} \tag{11}$$

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$$\ell_0^{SP} > \ell_0(z), \text{ if } \alpha < \frac{1}{\theta}. \tag{12}$$

On one hand, the term $(\theta - 1)/\theta$ shows a distortion caused by monopolistic competition. On the other hand, the keeping up with the Joneses effect increases employment (output), as a household derives greater utility from extra consumption relative to leisure if other households increase their consumotion. The relative strength of these distortions determine the level of employment which may exceed or fall below the social optimum. Therefore, monetary policy that increases employment may bring it closer to the social optimum or move it even farther away from its socially optimal level.

2.5   Choice of Parameter Values

Periods are defined as quarters. Therefore, the discount factor β is set to 0.99, which implies about 4 percent annual real interest rate. The price adjustment parameter (γ) is set to 0.5, implying an average delay between price adjustments of six months. This is in line with the empirical findings of Bils and Klenow (2004). The elasticity of substitution between differentiated goods (θ) is set equal to 6, implying a 20 percent mark-up of prices over the marginal cost in the steady state. This value is commonly used in the business cycle literature. The parameter that captures the disutility of labour (κ) is set to 1.

The interest rate smoothing parameter in the Taylor rule (μ_1) is set to 0.8. This is consistent with the empirical findings of Clarida et al. (2000). In addition, μ_2 is set to 1.5 and μ_3 is set to 0.25.

I analyse the dependence of the welfare results on the parameter (α), which captures the desire to keep up with the Joneses by considering alternative values for it. I consider two basic values in our experiments: $\alpha = 0.1$ and $\alpha = 0.2$. These values are chosen because in the first (second) case, the employment level in the decentralised equilibrium is below (exceeds) the social optimum (recall equations (11) and (12)).[2]

3   Equilibrium Dynamics

In this section, I analyse the effects of an expansionary monetary policy shock, using a log-linear version of the model. It is worth emphasising that the parameter α does not affect the log-linear version of the model. Therefore, the keeping up with the Joneses effect does not affect the response of the economy to an interest rate shock. Nevertheless, the effect has significant implications

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[2]I solve the model using the algorithm developed by Klein (2000) and McCallum (2001).

for welfare, as discussed below. Figure 1, on page 13, illustrates the dynamic effects of a 1 percent negative shock to the Taylor rule ($\epsilon_{i,1} = -1$). In the figure, the horizontal axes show time and the vertical axes show the variables' percentage deviations from the initial steady state.

3.1   Method of Welfare Analysis

In previous studies that have analysed the welfare effects of external habit formation – Pierdzioch (2003), Pierdzioch and Yener (2004) and Tervala (2007) – all prices are fixed for one period and the economy reaches the new steady state after that period. Thus, the welfare effect is the short-run change in utility plus the discounted present value of the change in steady-state utility. Since the present model uses staggered price setting, I use a different method to analyse welfare changes. First, I study the change in period-by-period utility. Then, I calculate the discounted present value (DPV) of the change in utility, using a large number of periods.[3]

The change in utility in period t is given by

$$dU_t(z) = \hat{C}_t(z) - \ell_0^2 \hat{\ell}_t(z).$$

The DPV of these changes is

$$dU_{DPV}(z) = \sum_{s=t}^{\infty} \beta^{s-t} dU_s(z).$$

Panel (d) of Figure 1 illustrates the changes in the period's utility, in the cases of $\alpha = 0.1$ and $\alpha = 0.2$. Table 1 shows the sign of the change in the period's utility in the 1st and 5th period and the DPV of the change in utility for the same parameterisation considered in Figure 1. The DPV of change in utility and the overall welfare effect are used as synonymous in the text below.

Table 1: Sign of the Welfare Effect of Expansionary Monetary Policy

	$dU_1(z)$	$dU_5(z)$	$dU_{DPV}(z)$
$\alpha = 0.1$	+	-	+
$\alpha = 0.2$	-	+	-

3.2   Welfare Effects of Monetary Policy

In the short run, the presence of staggered price setting implies that the central bank's decision to lower the nominal interest rate is not matched

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[3]The same method is used in the open-economy model of Tervala (2010).

by a one-for-one change in expected inflation. Therefore, it lowers the real interest rate and consumption increases in the short run. This results in a demand-driven increase in output and employment in the short run. In the medium run, inflation has decreased the real wage below the steady state level and output falls relative to the initial steady state. In the long run, prices adjust and output reverts back to the original level.

Panel (d) of Figure 1 shows that a decrease in the interest rate increases welfare in the short run, if $\alpha = 0.1$. In this case, the level of employment is lower than its socially optimal level because $\alpha < 1/\theta$. A monetary shock brings the level of consumption and employment temporarily closer to the social optimum, increasing welfare.

In the case of $\alpha = 0.1$, welfare decreases in the medium run. The reason is that expansionary monetary policy decreases employment and consumption that are already inefficiently low. However, the DPV of change in welfare is positive (0.002). Therefore, the short-run welfare effect of monetary policy dominates the medium-run welfare effect.

Panel (d) illustrates that a high value of α reverses the welfare effects of monetary policy. In this case, the consumption externality caused by the keeping up with the Joneses effect dominates the monopolistic competition distortion. Therefore, the initial level of employment is higher than its socially optimal level. Monetary policy that causes an increase in employment does not bring employment closer to the social optimum, but moves it farther away from it. Therefore, policy lowers welfare in the short run. In the medium run, a decrease in employment is welfare-improving. The reason is that a fall in employment temporarily mitigates the overemployment problem. However, in the case of $\alpha = 0.2$, the DPV of change in welfare is negative (-0.001).

The findings of this paper, regarding the overall welfare effect of monetary policy, are consistent with the earlier literature. Pierdzioch (2003), Pierdzioch and Yener (2004) and Tervala (2007) have shown the dependence of the overall welfare effect of monetary policy on the interplay between the consumption externality caused by the keeping up with the Joneses effect and the monopolistic distortion. In these papers, an exogenous rise in the money supply can be welfare-reducing if the keeping up with the Joneses effect is sufficiently strong. The findings of this paper generalise the results of the earlier studies: If the keeping up with the Joneses effect is sufficiently strong, then expansionary monetary policy can reduce welfare also in the framework where monetary policy is modelled in terms of an interest rate rule.

Moreover, this paper shows that keeping up with the Joneses preferences have different effects on welfare in the short run than in the medium run. If the keeping up with the Joneses effect is sufficiently strong (weak), then

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expansionary monetary policy decreases (increases) welfare in the short run. On the other hand, if the effect is sufficiently strong (weak), then policy increases (decreases) welfare in the medium run. Therefore keeping up with the Joneses preferences can reverse the welfare effects of monetary policy both in the short and medium run.

4   Conclusions

This paper analyses the welfare effects of monetary policy over time, using a simple New Keynesian model in which the central bank follows the Taylor rule and households have the desire to keep up with the Joneses. Previous studies have shed light only on the overall welfare, an approach that misses the evolution of welfare over time. The results demonstrate that the interplay between the keeping up with the Joneses effect and the monopolistic competition distortion determines the sign of the welfare effect of monetary policy. If the keeping up with the Joneses effect dominates (is dominated by) the monopolistic competition distortion, then monetary policy expansion causes an increase (decrease) in welfare in the short run but a decrease (increase) in welfare in the medium run. The overall welfare effects are consistent with previous studies that have analysed the welfare effects of money supply shocks – Pierdzioch (2003), Pierdzioch and Yener (2004) and Tervala (2007) – reaffirming the claim that the interplay between these two factors determines the overall welfare effects of monetary policy.

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Figure 1: Dynamic Effects of a Decrease in the Interest Rate

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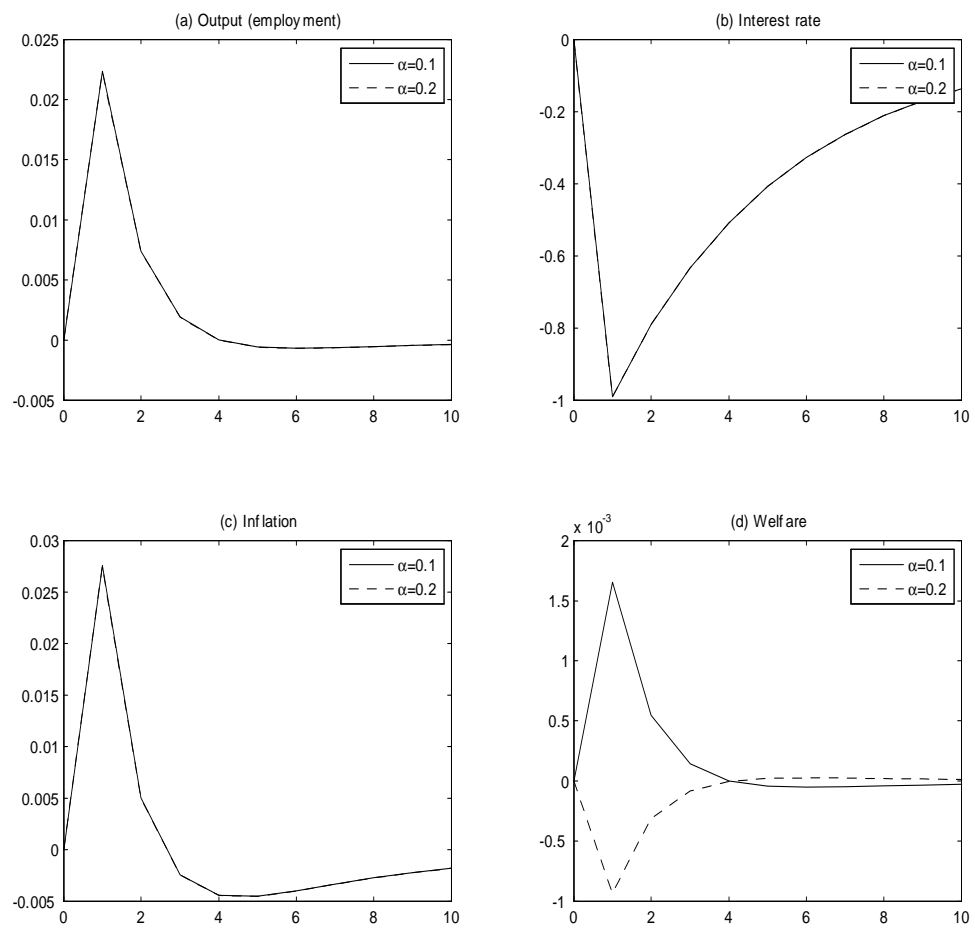
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Aboa Centre for Economics (ACE) on Turun kolmen yliopiston vuonna 1998 perustama yhteistyöelin. Sen osapuolet ovat Turun kauppakorkeakoulun kansantaloustieteen oppiaine, Åbo Akademin nationalekonomi-oppiaine ja Turun yliopiston taloustieteen laitos. ACEn toiminta-ajatuksena on koordinoida kansantaloustieteen tutkimusta ja opetusta Turun kolmessa yliopistossa.

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