

Models of price and wage rigidities economics essay



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Rigidity in general terms occurs when an object or state is constant for a certain period of time. From an economics point of view, rigidity can take the form of money wages, product price and even production functions (Corden 1978) just to name a few. In this paper, I will be focusing more on price and wage rigidities as they are the most common and have had varying amounts of information collected from numerous dates ranging from 1970s to the current day. This paper is more of a descriptive paper as it uses the theories and models from other papers to provide an overview of the topic.

Rigidity is an important concept as the mere use of it can add complexity to any model and thus, serve a greater purpose. It can explain reasons for why data sets may contain slow responses compared to the method used in the model in addition to providing explanations regarding trends in data which cannot have been explained by other factors (Faccini et al 2010).

The structure of this paper is as follows, firstly I will explain what price rigidities are and the importance it has in an economic environment. Then I will explain the two models commonly used and end the section with an insight into how price rigidity affects inflation. Secondly, I will explain wage rigidities and their importance in an economic environment. To follow, I will briefly review how it can be modelled. The next subsection of wage rigidity explains how wages are determined and the causes of wage rigidity.

Reasoning of why Walrasian views are not included in most literature will be explained, followed by the effects of wage rigidity on macroeconomic variables such as employment and inflation. The third section ends the paper with concluding comments summarising the paper in addition to

recommendations for how this paper can be developed and how the information can be utilised.

Price Rigidity

Prices can be seen as the cost of a good or service that a buyer has to pay to a given supplier at any point in time. These prices are set by the firms supplying the good (Rebelo 2005). Many economists feel that prices are important as they act as a mechanism in the efficient allocation of resources (Carlton 1986). For example, prices can act as a signalling mechanism demonstrating the degree of quality a good or service has to its customers.

Price rigidity occurs when the price of a good or service remains constant for a certain period of time in response to a shock in aggregate output. Romer defines (price) rigidity as:

“ forces that reduce the responsiveness of firms’ profit-maximising prices to variations in aggregate output resulting from variations in aggregate demand”. Romer (unknown date) pp2.

Price rigidity is important as it can be the link between nominal and real activities (Faccini et al 2010). It is also seen as a major factor in the determination of inflation persistence and therefore, can have a significant impact on macroeconomic variables. On the other hand, according to Carlton (1986), prices should not be rigid as that could lead to the allocation of resources being inefficient. Although, price is not the only factor that creates an efficient allocation of resources so the significance of prices in comparison to the other factors needs to be accounted for.

Price Stickiness

In general terms, price stickiness is apparent and dependent on certain types of good as it varies on length of time. It is stated in the new Keynesian business cycle that prices adjust infrequently (Christoffel and Linzert 2005) however upcoming research into this field suggests otherwise. Carlton (1986) suggests prices can be maintained for over one year whereas Bils and Klenow (2004) have found that for certain goods such as newspapers or men's haircuts, prices rarely change although prices do change very frequently with goods such as gasoline and tomatoes (more than 70% of a month). They also found durable goods displaying the most price changes out of the whole consumer bundle in addition to the goods sold in competitive markets (with the exceptions of fresh food and energy).

In a study conducted by Carlton (1986) which compares the prices of production materials such as steel, glass, chemicals (to name a few), he has found that the average price rigidity lasts 1.8 months. However, 92% of the product price rigidity lasts one month and the other 8% lasts one whole year. This shows that price rigidity is very dependent on the product and gives an example of why averages should only be fully utilised when there are small differences in the data between each data point - as a skewed average will occur due to anomalies in the dataset.

According to Stiglitz (1984), price stickiness can be explained by three concepts. Firstly, the use of long-term contracts enables price to remain constant for the period agreed on in the contract. Secondly, as a firm grows (in physical and monetary terms), they benefit from the experience that they

have gained during the years. It is through these experiences that they ‘learn by doing’ and so eventually are able to decrease their marginal costs of production and therefore, keep prices constant and thus sticky for a more lengthier time period. Thirdly, by increasing the elasticity of demand for the goods, firms are less likely to change prices as a change in price creates a greater responsiveness in terms of quantity demanded compared to a less elastic good.

The Models of Price Rigidity

Price rigidity models can be classified in two ways; the time-dependent model (TDM) and the state-dependent model (SDM). Klenow and Kryvstov (2008) differentiate the two in terms of the TDM encompassing the decision to change prices according to exogenous factors and the SDM including the decision to change price according to ‘menu costs’. Menu Cost is “a small fixed cost of changing a nominal price” (Romer 2006 pp. 285). In the TDM, firms can set prices every n th period (according to Taylor’s Model) or randomly (according to Calvo’s Model), however, there is no selection as to which firm can change their price at any given period (Klenow and Kryvstov, 2008).

Time-Dependent Model

More specifically for TDM, only a fraction of firms adjust their prices in each period where new information is available and these prices are then fixed for the following periods (Bils and Klenow 2004).

Whelan (2009) shows the Calvo model of price rigidity incorporates firms operating in an imperfect market where prices would be set as a fixed mark-
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up above marginal costs if no frictions were included. Only a random fractions of firms $(1-\hat{\lambda})$ in each period are able to reset their price and the price may be fixed for many periods (as mentioned earlier). In this basic model, all goods are comprised strictly of consumer goods and not capital goods. Optimal pricing in this model can be assumed when firms change their price to an optimal reset price in order to maximise the expected present discounted values of real profits during the price contract. After numerous derivations, the model reaches a conclusion that implies “inflation being a function of expected inflation and marginal cost” and thus resulting in an equation (1) called the ‘New Keynesian Phillips Curve’. (Whelan 2009).

(1)

Where π is inflation, β is the discount rate, E is the expected inflation, p is the price contract and mc is marginal cost.

State-Dependent Model

In the SDM, menu costs are used to generate the new price of firms’ goods. The term ‘menu cost’ was derived from the original meaning which was the costs to restaurants of changing their menus when price changes occurred. This term was then generalised to firms changing their prices after fluctuations in aggregate output. Therefore, menu costs can be defined as costs that a firm pays in order to set its price at the new profit-maximising level after aggregate demand and price have been set (Romer 2006).

The following example taken from Romer (2006) shows the decisions firms take when aggregate demand has fallen and other prices are fixed and is shown in Figure 1 in the Appendix. As you can see, the fall in aggregate
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demand and hence, aggregate output affects the function in two ways: in terms of the profit function and in terms of the profit-maximising price. Firstly, as a result of the fall in aggregate demand and hence, aggregate output, the profit function shifts vertically downwards and this cannot be altered by the firm. Secondly, the profit-maximising price has also fallen but the firm can alter this by paying the menu costs and thus, return to the peak of the profit function. The distance AB can be seen as an incentive for the firm to change its price but this is dependent on two factors: the curvature of the profit function and the differences between the two profit-maximising prices (distance CD). The distance CD is determined by the degree of incentive a firm has to adjust its price in accordance with the change in aggregate output. A small incentive for a firm to adjust its price occurs when the profit-maximising price of the firm is less responsive to aggregate output (which is also known as real rigidity). The curvature of the profit function exhibits the responsiveness of profits to the price as it leaves to profit-maximising level. The price adjustment incentive is smaller when the sensitivity of profits towards the departure from the price-maximum is small.

Therefore, the diagram shows that a shift in the profit function, due to a negative change in aggregate demand creates a new price for the firm (BD). However, the price is not the profit maximising price as it is not on the peak of the function (AC). Therefore, firms would need pay a menu cost in order to change their price. On the other hand, if the profit-maximising price of the firm is less responsive to aggregate output and the profits of the firm are less sensitive towards the change in price then firms would have less incentive to use the menu cost to change their prices.

Compared to the seven to twenty four month stickiness we see in the retail or service sector, Eife (2008) finds that price stickiness due to menu costs only account for approximately thirty days. This implies that firms who are hesitant in terms of changing their prices for longer periods are so due to other factors than menu costs. Eife also shows one argument based on his findings; the larger the menu cost, the more firms are reluctant to change prices and will postpone this decision for a period depending on the need of change and the size of the menu cost.

Figure 2 (in the Appendix) demonstrates the inflation rate during the period of the changeover of German currency to Euros. The vertical line shows when the changeover occurred, the dashed line denotes the inflation trend for the period and the dotted line shows the actual inflation for the period. As you can see, in the final months of the year 2001, inflation remains constant which demonstrate firms postponing their price changes. The steep increase in inflation at the beginning of the year 2002 shows the extent of the menu costs that firms had to pay. This figure shows that menu costs can contribute to a stickiness of one-to-two months in the restaurant sector. This simplistic diagram however, does not pin-point menu costs to the jump in price and compared with evidence found in other industries, menu costs do not seem to be significant for firms in their price-setting decisions. Eife (2008).

Effects of Price Rigidity on Inflation

According to Bils and Klenow (2004), price stickiness has the ability to dampen inflation movements in response to a shock as prices remain constant which leads to inflation demonstrating a less volatile reaction. Price

rigidity can be seen to have a significant influence of inflation dynamics as, to put it simply; inflation is an average of prices changes occurring during the year. Therefore, if prices are constant, then the change in prices is less frequent which can result in higher inflation persistence. There is much evidence to support the hypothesis that price adjustments are slow, however, the degree of persistence in inflation is hard to replicate in majority of price-setting models and therefore, the reliability of the evidence presented is seen to be hindered (Christoffel and Linzert, 2005). On the other hand, Bils and Klenow (2004) also demonstrate that inflation can also be more volatile than expected in the predictions of most models. This shows uncertainty in terms of the data regarding whether inflation is actually persistent or volatile.

Christoffel and Linzert (2005) shows the rigidities demonstrate the traditional Phillips curve as a monetary shock causing inflation and unemployment to react negatively. Therefore, price rigidities can affect these macroeconomic variables and provide evidence for economic models.

Wage Rigidity

According to Rebelo (2005), “wages are set by workers who commit to supplying labour at the posted wages”. Wage rigidity relates to the persistence of these wages in terms to aggregate demand shocks.

Rebelo (2005) argues that sticky wages are important as they are used to maintain a high elasticity of labour supply which, in the short run, can enable firms to pay the same amount of wages for more hours employed – although in the long run this will not benefit workers as they will not be on their labour

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supply schedule. High labour supply elasticities are important as they enable marginal costs to stay constant and decrease the responsiveness of the firm's ability to change prices towards a monetary shock.

Rigid wages are also important for firms to help generate higher returns on investment as they are able to hire additional workers without significantly increasing real wage rates (Rebelo 2005) and thus, minimising their marginal costs. In addition to this, it has been found that the degree of wage rigidity has a large influence to the responsiveness of inflation and unemployment to interest rates (Christoffel and Linzert 2005) and therefore, the utilisation of wage rigidities can help control (to a certain extent) macroeconomic variables in times of economics shocks.

The Models of Wage Rigidity

The modelling of wage rigidity is similar to that of price rigidity. In both cases, prices and wages can only be changed at a cost or periodically (Rebelo 2005). As there is more detail on the models in the previous section, here, the paper will focus more on what causes wage rigidity and how wages are determined.

Wage Determination

Christoffel and Linzert (2005) suggest that the determination of wages is heavily influenced by the strength of unions and the bargaining power of workers. The effectiveness of the bargaining power of workers can be determined through labour market institutions such as employment

protection legislation, unemployment insurance and collective wage bargaining.

There are two main bargaining processes[1] which can determine the impact of wage rigidity. The first process is called the 'Efficient Bargaining Set-up' – also the 'Efficient Nash Bargaining' – and this is where the introduction of wage rigidity does not have that strong an influence on inflation dynamics however, the second process, named 'the Right-to-Manage Bargaining Set-up' does. In addition to collective wage bargaining, staggered wage bargaining occurs where the number of hours an employee works is negotiated between employers and workers or unions every period (De Walque et al 2009).

Employment protection legislation stems from firms behaving in a cautious manner when they need to hire employees. Here, the relationship between job flows and job destruction rate is mutual which implies that "lower job flows corresponds to lower job destruction rate" Christoffel and Linzert (2005).

Causes of Wage Rigidity

According to Christoffel and Linzert (2005), the strength of unions, generous benefits for unemployment and high firing costs all lead to a rigid labour market as they contribute to the slow labour market adjustments. If the unions implement a strong collective wage bargaining process then this will decrease the volatility of wages as they will remain relatively constant for longer periods of time. Therefore, the cause of wage rigidity can mainly be explained in terms of two concepts. The first being the role of unions and the

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effectiveness of their bargaining (regardless of which type of bargaining) and the second is the costs involved in losing or gaining workers.

The Walrasian View

The Walrasian view can be explained in the following manner:

“wages adjust rapidly to economic events because they are competitive spot market prices; households are always on their labour supply schedules; and unemployment is absent.” (Danthine and Kurmann 2003 pp. 108).

It is not used as a basis for many of the wage rigidity models as most literature has shown that the addition of wage rigidities does have an impact on employment which is otherwise stated here. In addition to this, wages can be seen as rigid as firms do not want to affect workers' moral and efforts by constantly changing wages. Therefore, wages can be seen as rigid due to their sluggishness in terms of their adjustments to economic activities and also in 'preventing labour market clearance' as firms would prefer to employ more workers than hire workers at a higher wage in response to external shocks.

The effects of Wage Rigidity on Employment and Inflation

Many researchers, such as Christoffel and Linzert (2005) argue that in an imperfect market, a firm's marginal costs can lead to the determination of inflation dynamics of the economy. One key component of marginal cost is labour costs which are comprised of, for example, wages and hiring/firing costs. It is also stated that the rigidity of wages can be translated into more persistent inflation movements as the marginal costs of the firm (which

adjusts slowly) can help establish prices through the new Keynesian Phillips
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Curve. On the other hand, it can be argued that the modelling of wage rigidity is not sufficient to comprehend the reasons towards sluggish marginal costs.

The labour market is important in determining the effects of wage rigidity on inflation and employment as it is “ the gap between most dynamic models of the business cycle and economic reality” Danthine and Kurmann (2003). Labour market fundamentals such as the levels of bargaining process and flows of employment can be seen to affect the monetary policy shocks on inflation, unemployment and other macroeconomic variables (Christoffel and Linzert 2005).

Figure 3 (in the Appendix) shows a graphical representation of wages against inflation. It supports the argument that as wage rigidity increases, inflation persistence increases as inflation and wage persistence are positively correlated. Christoffel and Linzert (2005).

Figure 4 (in the Appendix) shows a graphical representation of inflation persistence against natural unemployment. It shows a positive correlation between the two variables which can be explained through the following example: if unemployment is high then inflation would become more persistent as the labour market would not be able to significantly change wages and prices (Christoffel and Linzert, 2005). This shows that unemployment can have a direct influence on inflation via the causes of wage rigidities and wage rigidities help provide evidence for the original Phillips Curve inflation trade-off.

The question now evolves on whether the degree of wage rigidity and the different forms of bargaining power can have a significant effect on monetary policy shocks causing inflation dynamics. It is argued that the introduction of wage rigidities in 'Right to Manage Process' induces persistent wages and decreases its volatility. As a result of this, marginal costs and inflation become more persistent (via the New Keynesian Phillips Curve) in terms of their responses to monetary shocks. Therefore, as wage rigidity is introduced, aggregate inflation dynamics are more constant. On the other hand, it can be seen that the passage from wages to inflation has not been determined in an efficient bargaining model as marginal costs are dependent on hours worked and not wages. Therefore, the reliability of inflation being persistent is questionable depending on whether marginal costs are relying on hours worked or wages.

Employment and inflation can also be determined by the institutional factors mentioned earlier; bargaining power of workers and employment protection. If the bargaining power of workers is high due to union membership increasing, this creates pressure on wages as workers feel more confident to demand higher wages. This can cause higher levels of unemployment as firms' profits decline due to higher wages which results in the number of available jobs demanded by the firm to fall, thus, establishing an increase in unemployment due to higher bargaining power. With regard to inflation, when higher wages are demanded, the marginal costs of firms rise which relates to more inflationary movements. Therefore, larger fluctuations in wages (caused by higher bargaining power of workers) results in higher

fluctuations in marginal costs and consequently, larger reactions in inflation. Christoffel and Linzert (2005).

Christoffel and Linzert also demonstrate the effects of employment protection; the larger the extent of employment protection and firing costs, the lower the rate of unemployment. This shows that employment protection, which influences the determination of wages, has a positive impact on unemployment and therefore, could be utilised to a greater extent in the economy.

de Walque et al states that the bargaining power in staggered wage bargaining (depending on the hours which are negotiated every period) is a factor that affects inflation dynamics and the volatility of unemployment. On the other hand, Faccini et al (2010) argue that staggered wages are actually irrelevant in terms of inflation but it does help certain models fit the data. However, de Walque et al (2009) counter acts this argument by stating the following:

“ The closer to zero this parameter, (i) the more firms adjust on the intensive margin, reducing employment volatility, (ii) the lower the effective workers’ bargaining power for wages and (iii) the more important the hourly wage in the marginal cost determination” (de Walque et al 2009 pp4).

Therefore, the degree of staggered wage bargaining is important in determining its effects on employment.

In Dutt’s (1987) paper, two scenarios are discussed. The first scenario states that wage rigidity causes unemployment and the contrasting scenario states

that involuntary unemployment is caused by wage rigidity. The paper concludes by stating that the answer between the two scenarios depends on the shape of the aggregate demand curve as by adjusting the degree of curvature, the two contrasting scenarios can be established.

According to Danthine and Kurmann (2003), their 'Fair Wage model' can explain why structural employment exists when wage rigidity is present. In order to increase the productiveness of workers, firms need to offer a real wage that exists beyond the market clearing level and thus, stimulating structural unemployment. Different theories such as Danthine and Kurmann is useful in providing alternative suggestions which have not been dwelled upon.

Conclusion

It can be seen in this paper that much research has been undertaken in regards to price and wage rigidity by many researchers. A main concept which arises for both rigidities concerns the degree of stickiness prices and wages have in order to demonstrate more accurate effects on inflation and employment. A main similarity concerning the two types of rigidities is that they are modelled in similar methods, however, in regards to wage rigidities, a main difference can be seen in the way wages and prices are determined. For example, wages have a strong influence by third parties (the unions) and the degree of the bargaining can have different inferences on inflation and employment.

Price stickiness occurs for every product but the degree of price stickiness is different for each type of good or service. Research on different sector wages <https://assignbuster.com/models-of-price-and-wage-rigidities-economics-essay/>

can be conducted in order to gain an insight into whether the degree of wage rigidity differs across sectors and if this has any influence on inflation and employment.

If this paper were to be developed, an explanation regarding the differences between the 'Phillips curve' and the 'New Keynesian Phillips curve' would be provided in order for the reader to gain a deeper insight how the relationship between inflation and unemployment is portrayed. Further research in terms of price rigidity can involve discovering the reasons behind firms being reluctant to change their prices as we have found out that there are other factors than menu costs that can account for this. In addition to this, more research into the effects of price rigidity on macroeconomic variables should be made (and not simply inflation) in order to be able to make comparisons with wage rigidity and its effects. In terms of wage rigidity, research can be carried out for the different wage bargaining schemes available and how they affect the rigidity of wages. In addition to this, research should also be conducted on the introduction of the 'Minimum Wage' (in some countries) and whether this has a significant impact on wage rigidity. The paper written by Christoffel and Linzert (2005) has provided a large amount of useful information which questions whether the degree of wage rigidity or the type of wage bargaining process leads to better inflation persistence. This is a good basis for further research to be conducted.

Another way to enhance the significance of this paper is to introduce a model and create empirical evidence with our own hypothesis and findings.

An interesting topic to undertake involves whether the wage bargaining process differs between sectors and whether this has a major impact of the <https://assignbuster.com/models-of-price-and-wage-rigidities-economics-essay/>

degree of rigidity in that industry. A comparison can then be made in terms of the degree of price rigidity for goods and services in those industries.

Recommendations for this type of information can be made for one main institute, the Central Bank and is taken by Christoffel and Linzert's paper (2005). It can be recommended that the monitoring of labour markets is crucial for the Central Bank for three primary reasons. Firstly, the flexibility of wages and labour flows have a great impact on inflationary pressures and thus, inflation dynamics, which helps decipher monetary policy in response to inflationary changes. Secondly, labour market changes should be observed in order to reduce uncertainty of how inflation reacts to monetary policy. Thirdly, inferences regarding the dynamics and degree of inflation persistence can be made on the basis on real wage movements and other labour market factors. Therefore, the labour market and its flows are fundamental to the decisions the Central Bank takes concerning its monetary policies.

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