1 Price/Wage Staggering

The first staggered wage models appeared in the literature at the end of the '70's and they immediately occupied the front stage of the macroeconomic debate of the time. The so-called New Classical Macroeconomics had just demonstrated, through the famous *Lucas aggregate supply curve*, that systematic demand-management policies are of no use to stabilise output, since only unanticipated policies could have an effect (and only a temporary one) on output levels - the so called "policy ineffectiveness proposition" of Sargent and Wallace (1975). This critique of the Keynesian theory of active stabilisation policies was based on two main cornerstones: market clearing and rational expectations. The first reaction of the Keynesian school to this attack rests on the sticky wage models of Fischer (1977) and Gray (1976). One cornerstone of the New Classical theory, i.e., market clearing, was removed by recognising that workers engage in long-term labour contracts leading to sticky wages. The purpose was to demonstrate that the "policy ineffectiveness proposition" was due to the flexible price assumption rather than to the rational expectations one. Fischer (1977) and Gray (1976) assumed that wages were set one (or more than one) period in advance, such that the labour market *cleared in expectations,* in the sense that the expected quantity of labour supplied equalled the expected quantity of labour demanded. In the case when a shock occurred, then supply and demand would have differed from what was expected and it was assumed that demand determined employment in this case. Fischer (1977) then showed that in a model with rational expectations and sticky wages, monetary policy can play a role in stabilising the economy. The focus on sticky wages was quite a natural one, deriving from simple casual observation. In the US, formal labour contracts prevail in heavily unionised industries like steel, automobiles, rubber, etc.. Many of these contracts extend for more than one year (most for three years). Moreover, wage contract negotiations in unionised industries are likely to influence the level of wages in all industries, since they tend to be imitated elsewhere, and even in the non-unionised industries nominal wages are mostly fixed for one year.

However, these first sticky wage models provided no explanations of the persistence of the real effects of monetary shocks. In particular, the persistence could not last longer than the duration of the nominal wage contracts. Taylor (1979, 1980a), in trying to build an empirical model which could mimic the fluctuations in U.S. time series, overcame this problem by removing the assumption of synchronisation of wage setting decisions. Taylor observed not only that wages are negotiated discretely in time, but also that contracts are not renewed all at the same time, that is, contract negotiations are staggered. The staggering of wage decisions creates a rational expectations nominal propagation mechanism which propagates shocks over time. In such a set up, Tay-

lor (1980) demonstrated that, following supply shocks, systematic demand-management policies could help in stabilising output. In particular, in a staggered wage economy policymakers face a trade-off between the variance of prices and that of output, a so-called second-order Phillips curve. While Taylor's original article focused on the optimal response of monetary policy to supply shocks, most of the followers (e.g., Taylor (1983), Blanchard (1983), Blanchard (1986), West (1988), Phaneuf (1990)) focused on the effects of monetary disturbances. They showed that the nominal propagation mechanism generated by staggered wage models could be particularly appealing for the study of the role of monetary disturbances in the business cycle. In fact, it can help explain how monetary shocks could generate the type of output fluctuations observed in actual data, particularly the persistence of the real effects of money shocks, or, more generally, of demand-management policies. As a proof of how much these early staggered wage models have been influential in the literature, it is probably enough to say that nowadays every textbook presents or, at least, mentions them.

Apart from synchronisation vs. staggering, there is another important difference between the type of wage contracts in Fischer (1977), Gray (1976) and Taylor (1979, 1980a). Fischer (1977) studied the implication of *predetermined* multi-period wage contracts for the efficacy of stabilisation policies. The Fischer-type wage contracts are called predetermined (see Blanchard and Fischer (1989)) because they allow agents to set different wage rates in the different future periods of the contract, even if all the wages specified in the contract have been negotiated in the period of renewal of the contract (and cannot be renegotiated in the future periods for which the wage contract will last). This contract structure should correspond in practice to multi-year labour contracts. For example, if unions sign today contracts for more than one year, say three, then they would probably call for predetermined wage rate increases each year (for example, to take into account the expected inflation). Gray (1976) explicitly considered the question of the optimal degree of indexation of multi-period nominal wage contracts. However, multi-year wage contracts are not the general rule outside heavily unionised industries. Taylor (1979, 1980a) instead analysed the implications of a different kind of contracts, called *fixed* staggered wage contracts. In this case, the wage rate is not allowed to vary in the different periods of the contract. Workers sign a contract that specifies a fixed wage rate for each period for which the contract will last, that is, the wage rate has to be the same in each period of the contract. This contract structure should correspond in practice to one year labour contracts, where the periods can be interpreted as semesters, quarters or months.[1]

[1] Another very popular staggered wage/price model in the literature is the model by Calvo (1983a,b). This is a continuous time model where the duration of the contract is stochastic and governed by a

Actually, most of the wage contracts in the economy are generally renewed every year and fixed within the year. Moreover, obviously different workers negotiate the contracts in different periods of the year. After the '80's, especially in the US and UK, the activity of the unions, both in terms of number of members and of the amount of coverage, has been progressively narrowed. This diminished the importance of multi-year labour contracts in the whole economy. Indeed: *"... wages [are almost always fixed between adjustments] outside the North American union sector. More than 80 percent of US wages are set for one year or less with no time-variation; [...] in many countries, such as the United Kingdom, virtually* ***all*** *wages are set for one year or less with no time-variation"* (Ball (1994), p. 288, emphasis as in the original). Taylor (1998) reviews price and wage setting behaviour in market economies based on direct and indirect evidence. He concludes that: (1) since not everyone sets prices or wages at the same time, wage and price setting appears to be staggered, such that contract periods overlap with each other; (2) wages and prices are set at fixed values for fairly long periods of time and are frequently, though not always, non-contingent on events that occur during the contract period; (3) most of the wages, though not all of them, are negotiated annually. This suggests that Taylor-type of contract structure is the most relevant in economies nowadays and quantitatively it seems a good approximation to take one year as the duration of the contract. For this reason, we will focus on this type of contract structure in this thesis.

Even if the first generation of staggered wage models were consistent with certain observed features of wage setting behaviour, they have been seriously criticised for being *ad hoc* because of lacking rigorous theoretical foundations. Particularly, they left open three key questions: (i) why we observe wage contracts fixed for so long; (ii) why we observe staggering of wage setting decisions; (iii) why, given the constraint due to the staggering structure, the wage was not chosen optimally. From the mid '80's a huge literature, the so-called New Keynesian literature, has been devoted to these issues, which are however still somewhat unsettled. Good surveys and discussions of these points are provided by Blanchard and Fischer (1989), Romer (1996), and, more recently, by Taylor (1998), and here we sum up very briefly some results from those references.[2]

With respect to (i) a first major puzzle is why contracts are not indexed to all relevant information. Gray (1976) provides part of the answer, showing that full indexation

---

Poisson process. Even if very elegant from a formal point of view, its empirical relevance seems doubtful (see Taylor (1998)). Calvo's model will be analysed in Chapter 2 and 3.

[2]Most of the New Keynesian literature actually focused on sticky prices rather than on sticky wages for reasons summarised, for example in Mankiw (1990). However, *"Economists differ about whether they view these criticisms* [of nominal wage contracting models] *as serious"* (Mankiw (1990), p. 1657). For a survey of theories of price rigidities see Andersen (1994).

with regard to a single variable such as the price level is not optimal in the presence both of demand and supply shocks. In a real word with many types of different shocks, the practical answer probably rests on complexity, asymmetric information and measurement problems. A second major issue concerns the distinction between *time-dependent* and *state-dependent rules*. While the first type of rule (as in the models discussed above) takes the time interval between subsequent wage/price adjustments as exogenous and the size of the adjustment as endogenous, the latter does vice versa. That is, the difference between the actual and the desired level of wage/price triggers the adjustment after a certain level. Sheshinski and Weiss (1977), Sheshinski and Weiss (1983), and Benabou (1989) investigate the optimal *(S,s)* rule for a firm under different conditions.[3] In the aggregate not every firm will change its price every period and therefore we have a sort of state-dependent staggering. Caplin and Spulber (1987) demonstrate the surprising, and much discussed, result that if firms follow *(S,s)* rules, money can be completely neutral in the aggregate. However, Caplin and Spulber's (1987) result seems not to be robust, as shown by Benabou (1988), Caplin and Leahy (1991), Caballero and Engel (1991, 1993a,b), Tsiddon (1991, 1993), and Conlon and Liu (1997). The fact is that the aggregation over the whole economy of *(S,s)* rules is particularly difficult, and not always possible; thus these models are not very tractable and need to rest on special assumptions to be solved. Hence, they have not been used so far in quantitative models or in dynamic general equilibrium models (a notable exception as a first attempt in this direction is Dotsey, King, and Wolman (1996)). In reality, probably both time-dependent and state-dependent elements are present in wage and price contracts. Which are the most important will depend on the kind of contract. There are two main costs in adjusting prices: the first is to understand the state of the economy (and then calculate the optimal price or negotiate a wage contract, i.e., negotiation costs) and the second one is to physically change the price in accordance with the state of the economy (printing new catalogue, the so-called "menu costs"). If the first one is the higher, than a time-dependent rule would probably be optimal, while if the second one is higher then a state-dependent rule would probably be optimal. It follows that time-dependent rules *à la* Taylor are probably a very good approximation for wage contracts (as in this thesis), while for final good prices, a state-dependent rule would presumably be a better

[3]Such rules are called *(S,s)* rules, because they take the following form: when the difference between the actual and the desired optimal price exceeds an upper bound $S > 0$ or become less than a lower bound $s < 0$, the actual price is changed and set equal to the optimal one. *(S,s)* models are the dynamic versions of the first static menu costs models of Akerlof and Yellen (1985a,b) and Mankiw (1985). They assume a cost of physically changing the price (printing new catalogue or menu in a restaurant, from which the name "menu cost" models). Hence the price would be changed only if the benefit exceeds the (menu) cost.

approximation.

Several papers have been devoted to the second question, (ii), that is, why we observe staggering in wage/price decisions. Fethke and Policano (1984, 1986) demonstrate that staggering can arise as a stable equilibrium when there are sector specific shocks, while Ball and Romer (1989) do the same assuming asymmetric seasonal shocks. Ball and Cecchetti (1988) show that a staggering equilibrium can be supported as an equilibrium because it allows price-setter agents to obtain information about the prices of the others, before choosing their own prices. Maskin and Tirole (1988), Lau (1996), Fraja (1993) show that staggering can arise endogenously in oligopoly models because of strategic considerations. Very recently, Bhaskar (1998) proves that staggering can be an equilibrium in a model with many heterogeneous firms, which have stronger strategic complementarity within-industry than across-industry. This result is particularly important since it does not rest on strategic considerations between 'few large' price-setters, but it arise in a model with 'many small' firms, as in the usual monopolistic competition macromodels.

This last point brings us to (iii) and specifically to the role of monopolistic competition. First, nominal rigidities logically require price-setting agents and hence imperfect competition. If agents are price setters, then they would fix the price optimally. Imperfect competition then delivers an optimal wage/price setting rule, in contrast to the *ad hoc* expected-market-clearing approach of the first generation of sticky wage/price models, where we were left with the question of who was actually setting the wage/price. Second, among the different types of imperfect competition market structures, monopolistic competition is usually employed in macromodels, because it avoids strategic interactions between different price-setting agents. Third, monopolistic competition provides theoretical foundations for a demand-determined output. Given the monopolistic distortion, firms are pricing above marginal costs and hence are willing to satisfy the extra demand at given prices (at least up to a point), following a shock. Monopolistic competition thus solves some inconsistencies of the early expected-market-clearing nominal rigidity models. The pioneering works investigating the macroeconomic consequences of sticky prices and monopolistic competition in a general equilibrium model are Svensson (1986) and Blanchard and Kiyotaki (1987). A first attempt to introduce dynamics and staggering in these models is Blanchard and Fischer (1989), but the model is not intrinsically dynamic, because dynamics is actually superimposed *ad hoc* on a simplified version of the static model of Blanchard and Kiyotaki (1987).

In the '80's, another school of thought antithetical to the New Keynesian started to develop a different approach to the study of business cycle fluctuations, following the work of the Nobel prize winner Robert E. Lucas. According to this approach,

modern macroeconomics, and particularly business cycle research, requires us to build explicitly dynamic models, with full microfoundations and intertemporally optimising agents in a dynamic general equilibrium context. Obviously such models are much more complicated than *ad hoc* models and early attempts at building them were bound to be stylised. The pioneering works in this area are Kydland and Prescott (1982) and Long and Plosser (1983). From then onwards, the title of this latter work has been used to indicate a new branch of the literature: the Real Business Cycle literature.

Early real business cycle models tried to reproduce actual business cycle features as the response of optimising agents to exogenous real shocks in a purely real economy and under Walrasian market clearing. Macroeconomic fluctuations were explained only with technological shocks, while demand and nominal shocks were absent from these purely real models. During the '80's the Real Business Cycle and the New Keynesian practitioners did not talk constructively to each other, and instead engaged in a fierce debate (see e.g., Prescott (1986) and Summers (1986) or Plosser (1989) and Mankiw (1989)). However, during the '90's convergence between the two approaches starts to develop. Clearly early Real Business Cycle models were too stylised and their restrictions could not last for long. Researchers of both approaches began to introduce different features in the benchmark Real Business Cycle model, such as imperfectly competitive markets (e.g., Rotemberg and Woodford (1993, 1995)), money (e.g., Cooley and Hansen (1989), Christiano and Eichenbaum (1992)) and nominal rigidities (e.g., Hairault and Portier (1993), Kimball (1995)). As Bénassy (1995, p. 304) noted: *"... a number of researchers [...] have convincingly argued that the consideration of price, and especially wage rigidities, in monetary economies subject to real and monetary shocks allowed to substantially improve the capacity of these business cycle models to match a number of stylized facts in actual economies."* Particularly important works are the ones by Hairault and Portier (1993) and Bénassy (1995). Hairault and Portier (1993), following Kydland and Prescott (1982), is the among the first works that numerically simulates and evaluates a dynamic general equilibrium model with money and nominal rigidity, in the form of adjustment costs in price changes. Bénassy (1995), instead, following the analytical approach of Long and Plosser (1983), inspects the analytical mechanism of a dynamic general equilibrium model with preset wages. In the recent years an increasing number of papers have been devoted to enlarging the stylised framework of the early real business cycle models and a good early survey of this literature is provided by Cooley (1995).[4] It seems that a new 'hybrid' paradigm for macroeconomic

[4]Given the rapid development of this literature, especially with respect to money, nominal rigidities and the monetary transmission mechanism, the several works of Christiano, Eichenbaum and Evans are a more up-to-date reference (see, as a late references, Christiano, Eichenbaum, and Evans (1997)

modelling has emerged combining the elegant methodology of the Real Business Cycle paradigm with the elements of realism of the New Keynesian paradigm. In particular, these hybrid models introduce money, sticky prices and monopolistic competition in an otherwise standard Real Business Cycle framework. In order to do that, they necessarily leave aside more fundamental questions about the microfoundations of money and sticky prices/wages to concentrate on their macroeconomic implications.

A very small sample of early dynamic general equilibrium models with staggered prices focusing on various issues and problems are: Ireland (1995), Woodford (1996), Yun (1996), Chari et al. (1996). The issue is at the heart of the attempt to build a quantitative macroeconomic model describing the monetary policy transmission mechanism which could be used to analyse the effects of monetary policy changes and to design optimal monetary policy rules (e.g., Rotemberg and Woodford (1997)). Main contributors to this debate are: Erceg (1997), Kiley (1997), Rotemberg and Woodford (1997), Andersen (1998a,b), Bergin and Feenstra (1998), Jeanne (1998).

References

Akerlof, G. A. and J. L. Yellen (1985a). Can small deviations from rationality make significant differences to economic equilibria? *American Economic Review 75*, 708–721.

Akerlof, G. A. and J. L. Yellen (1985b). A near-rational model of the business cycle, with wage and price inertia. *Quarterly Journal of Economics 100*, 823–838.

Andersen, T. M. (1994). *Price Rigidity. Causes and Macroeconomic Implications.* Oxford, Clarendon Press.

Ball, L. and S. Cecchetti (1988). Imperfect information and staggered pricing. *American Economic Review 78*, 999–1018.

Ball, L. and D. Romer (1989). The equilibrium and optimal tiiming of price changes. *Review of Economic Studies 56*, 179–198.

Benabou, R. (1988). Search, price setting and inflation. *Review of Economic Studies 55*, 353–376.

Benabou, R. (1989). Optimal price dynamics and speculation with a storable good. *Econometrica 57*, 41–80.

Bénassy, J. P. (1995). Money and wage contracts in an optimizing model of the business cycle. *Journal of Monetary Economics 35*, 303–315.

and Christiano, Eichenbaum, and Evans (1998))

Bergin, P. R. and R. C. Feenstra (1998). Staggered price setting and endogenous persistence. NBER Working Paper no. 6492.

Bhaskar, V. (1998). On endogenously staggered prices. University of St. Andrews Discussion Paper Series No. 9806.

Blanchard, O. J. (1983). Price asynchronization and price level inertia. In R. Dornbush and M. H. Simonsen (Eds.), *Inflation, Debt and Indexation*, pp. 3–24. Cambridge, MA, The MIT Press.

Blanchard, O. J. (1986). The wage price spiral. *Quarterly Journal of Economics 101*, 543–565.

Blanchard, O. J. and S. Fischer (1989). *Lectures on Macroeconomics*. Cambridge, MA, The MIT Press.

Blanchard, O. J. and N. Kiyotaki (1987). Monopolistic competition and the effects of aggregate demand. *American Economic Review 77*, 647–666.

Caballero, R. J. and E. M. R. A. Engel (1991). Dynamic (S,s) economies. *Econometrica 59*, 1659–1686.

Caballero, R. J. and E. M. R. A. Engel (1993a). Heterogeneity and output fluctuations in a dynamic menu-cost economy. *Review of Economic Studies 60*, 95–119.

Caballero, R. J. and E. M. R. A. Engel (1993b). Microeconomic rigidities and aggregate price dynamics. *European Economic Review 37*, 691–711.

Caplin, A. S. and J. Leahy (1991). State-dependent pricing and the dynamics of money and output. *Quarterly Journal of Economics 106*, 683–708.

Caplin, A. S. and D. F. Spulber (1987). Menu costs and the neutrality of money. *Quarterly Journal of Economics 102*, 703–725.

Chari, V. V., P. J. Kehoe, and E. R. McGrattan (1996). Sticky prices models of the business cycle: Can the contract multiplier solve the persistence problem? NBER Working Paper no. 5809.

Christiano, L. J. and M. Eichenbaum (1992). Liquidity effects and the monetary transmission mechanism. *American Economic Review 82*, 346–353.

Christiano, L. J., M. Eichenbaum, and C. L. Evans (1997). Sticky price and limited partecipation models of money: A comparison. *European Economic Review 41*, 1201–1249.

Christiano, L. J., M. Eichenbaum, and C. L. Evans (1998). Monetary policy shocks: What have we learned and to what end? In J. B. Taylor and M. Woodford (Eds.), *Handbook of Macroeconomics*. Amsterdam, North-Holland.

Conlon, J. R. and C. Y. Liu (1997). Can more frequent price changes lead to price inertia? Nonneutralities in a state-dependent pricing context. *International Economic Review 38*, 893–914.

Cooley, T. F. (1995). *Frontiers of Business Cycle Research*. Princeton, New Jersey, Princeton University Press.

Cooley, T. F. and G. D. Hansen (1989). The inflation tax in a real business cycle model. *American Economic Review 79*, 733–748.

Dotsey, M., R. G. King, and A. L. Wolman (1996). State dependent pricing and the dynamics of the business cycle. Mimeo.

Erceg, C. (1997). Nominal wage rigidities and the propagation of monetary disturbances. Mimeo, Board of Governors of the Federal Reserve System.

Fethke, G. and A. Policano (1984). Wage contingencies, the patterns of negotiation and aggregate implications of alternative contract structures. *Journal of Monetary Economics 14*, 151–170.

Fethke, G. and A. Policano (1986). Will wage setters ever stagger decisions? *Quarterly Journal of Economics 101*, 867–877.

Fischer, S. (1977). Long-term contracts, rational expectations, and the optimal money supply rule. *Journal of Political Economy 85*, 191–205.

Fraja, G. D. (1993). Staggered versus synchronised wage setting in oligopoly. *European Economic Review 37*, 1507–1522.

Gray, J. A. (1976). Wage indexation: a macroeconomic approach. *Journal of Monetary Economics 2*, 221–235.

Hairault, J.-O. and F. Portier (1993). Money, new keynesian macroeconomics and the business cycle. *European Economic Review 37*, 1533–1568.

Ireland, P. N. (1995). Optimal disinflationary paths. *Journal of Economic Dynamics and Control 19*, 1429–1448.

Jeanne, O. (1998). Generating real persistent effects of monetary shocks: How much nominal rigidity do we really need? *European Economic Review 42*, 1009–1032.

Kiley, M. T. (1997). Staggered price setting and real rigidities. Mimeo, Board of Governors of the Federal Reserve System.

Kimball, M. S. (1995). The quantitative analytics of the basic neomonetarist model. *Journal of Money, Credit and Banking 27*, 1241–1277.

Kydland, F. E. and E. C. Prescott (1982). Time to build and aggregate fluctuations. *Econometrica 50*, 1345–1370.

Lau, S.-H. P. (1996). Aggregate pattern of time-dependent adjustment rules, I: Game theoretic analysis of staggered versus synchronized wage setting. *Economic Journal 106*, 1645–1658.

Long, J. B. and C. I. Plosser (1983). Real business cycle. *Journal of Political Economy 91*, 39–69.

Mankiw, G. N. (1985). Small menu costs and large business cycles: A macroeconomic model of monopoly. *Quarterly Journal of Economics 100*, 529–539.

Mankiw, G. N. (1989). Real business cycle: A new keynesian perspective. *Journal of Economic Perspectives 3*, 79–90.

Mankiw, G. N. (1990). A quick refresher course in macroeconomics. *Journal of Economic Literature 28*, 1645–1660.

Maskin, E. and J. Tirole (1988). A theory of dynamic oligopoly, II: Price competition, kinked demand curves and edgeworth cycles. *Econometrica 56*, 571–599.

Phaneuf, L. (1990). Wage contracts and the unit root hypothesis. *Canadian Journal of Economics 23*, 580–592.

Plosser, C. I. (1989). Understanding real business cycles. *Journal of Economic Persepctives 3*, 51–77.

Prescott, E. (1986). Theory ahead of business cycle measurement. *Federal Reserve Bank of Minneapolis Quarterly Review (Fall)*, 9–22.

Romer, D. (1996). *Advanced Macroeconomics*. New York, McGraw-Hill.

Rotemberg, J. J. and M. Woodford (1993). Dynamic general equilibrium models with imperfectly competitive product markets. NBER Working Paper no. 4502.

Rotemberg, J. J. and M. Woodford (1995). Dynamic general equilibrium models with imperfectly competitive product markets. In T. F. Cooley (Ed.), *Frontiers of Business Cycle Research*, pp. 243–293. Princeton, New Jersey, Princeton University Press.

Rotemberg, J. J. and M. Woodford (1997). An optimization-based econometric framework for the evaluation of monetary policy. In J. J. Rotemberg and B. S. Bernanke (Eds.), *NBER Macroeconomics Annual 1997*, pp. 297–346. Cambridge, MA, The MIT Press.

Sargent, T. J. and N. Wallace (1975). Rational expectations, the optimal monetary instrument, and the optimal money supply rule. *Journal of Political Economy 83*, 241–254.

Sheshinski, E. and Y. Weiss (1977). Inflation and costs of price adjustment. *Review of Economic Studies 44*, 287–303.

Sheshinski, E. and Y. Weiss (1983). Optimum pricing policies under stochastic inflation. *Review of Economic Studies 50*, 513–529.

Summers, L. (1986). Some skeptical observations on real business cycle theory. *Federal Reserve Bank of Minneapolis Quarterly Review (Fall)*, 23–27.

Svensson, L. E. O. (1986). Sticky goods prices, flexible asset prices, monopolistic competition, and monetary policy. *Review of Economic Studies 52*, 385–405.

Taylor, J. B. (1980). Aggregate dynamics and staggered contracts. *Journal of Political Economy 88*, 1–23.

Taylor, J. B. (1983). Union wage settlement during a disinflation. *American Economic Review 73*, 981–993.

Taylor, J. B. (1998). Staggered price and wage setting in macroeconomics. In J. B. Taylor and M. Woodford (Eds.), *Handbook of Macroeconomics*. Amsterdam, North-Holland.

Tsiddon, D. (1991). On the stubborness of sticky prices. *International Economic Review 32*, 69–75.

Tsiddon, D. (1993). The (mis)behavior of the aggregate price level. *Review of Economic Studies 60*, 889–902.

West, K. D. (1988). On the interpretation of near random walk behavior in GNP. *American Economic Review 78*, 202–209.

Woodford, M. (1996). Control of the public debt: A requirement for price stability? NBER Working Paper no. 5684.

Yun, T. (1996). Nominal price rigidity, money supply endogeneity and business cycle. *Journal of Monetary Economics 37*, 345–370.