RECENT DEVELOPMENTS IN THE MACRO-ECONOMICS OF IMPERFECT COMPETITION

Foreword

The idea that markets are perfect and guarantee the optimality of the economy has only ever been accepted by a minority of macro-economists, and this is particularly so in Europe. However, by developing the new classical approach of the sixties and the real business cycle models of the eighties, this minority have increased the degree of thoroughness demanded by macro-economics. It has thus become clear that market imperfections should become the object of far-reaching research, if they are to be introduced into a credible macro-economic construction. Although the seventies saw significant contributions in this domain, it is only recently that there has been a real research effort on this subject.

The following articles are a good representation of this research trend. We have been able to divide the recent developments of the macro-economics of imperfect competition and the contributions to this volume into five main topics. The first deals with *the Origins and the Effects of Real Wage Rigidity*. This is important because it can explain unemployment, and originates in real imperfections, especially in the existence of market power. The second topic is *the Origins and Effects of Nominal Rigidities*. These are essential for obtaining Keynesian type multiplier effects and the results in fixed price equilibrium models can be found by using them. The third topic deals with *Coordination Failure and Strategic Complementarities*. The former enables macro-economic equilibria in terms of a non cooperative game to be re-interpreted, whereas strategic complementarities are a rewarding means of studying the problem of the existence of Pareto ranked multiple equilibria. The fourth topic deals with *Static General Equilibrium Models*. Their aim is to show the comparative static properties of a general equilibrium of imperfect competition. This enables the analysis of the specific problems of economic policy in a framework which allows for the diversity of macro-economic interactions.

Dynamic General Equilibrium Models are the final topic. The strictly real business cycle approach has proved methodologically fruitful, but too restrictive to be able to represent vital aspects of macro- economic fluctuations. Imperfect competition dynamic models can combine a thorough micro-economic foundation with the explanation of a greater number of stylised facts concerning the cyclical characteristics of reality.

We have also included, as a preface to the articles of this volume, the reflections of **Edmond Malinvaud** on the scope of macro-economic theories, in particular those dealing with imperfect competition, and the role of real rigidities.

1 Origins and Effects of Real Wage Rigidity

The fact that real wages do not adapt themselves instantly to economic perturbations can be explained in different ways: hiring and firing costs, efficiency wage, implicit contracts or firm-union bargaining. This rigidity has effects on the economic fluctuations, in particular those of employment and investment.

a) *Hiring and Firing Costs, Efficiency Wage*. **Bentley MacLeod** and **James Malcomson** study the effect of two imperfections of the job market on the degree of wage rigidity. Their contribution is original in that it adopts a dynamic framework with renegotiation. This enables them to examine the consequences of this rigidity on economic fluctuations. The authors' analysis deals firstly with the existence of hiring and firing costs for the firm. To limit labour turnover and hence costs, the firm must fix wages sufficiently high. MacLeod and Malcomson show that the usual practice of hiring at a potentially renegotiable wage but which is not indexed on the firm's results, is efficient. This wage is not changed in response to environmental perturbations as long as it remains higher than the reservation wage and reaps a positive rent for the firm.

The second imperfection analysed is to do with the efficiency wage theory. This assumes that the worker's effort is an increasing function of his wage. The nature of this dependence can be rationalised by the fear of laying-off, which is all the greater when the difference between the wage earned and available income in the event of a loss of job (unemployment compensation) is large. If it is further assumed that the worker's effort is not observable or is costly to measure in an impartial way, the conclusion is a contract by the terms of which it is in the firm's interest to offer a wage which is higher than the marginal productivity of labour. The authors' dynamic approach shows that the threat of laying-off can be replaced by the introduction of a productivity bonus.

Gilles Saint-Paul's contribution is a dynamic extension of the shirking model, which justifies the efficiency wage. Here the aim is to show that,

as in insider-outsider models, the efficiency wage theory is compatible with a certain persistence of the effects of temporary shocks on employment. The idea developed is that too great a flexibility of employment can incite workers to cheat if the probability of loss of jobs is high in the event of an unfavourable shock. This implies a high level of equilibrium wages. It can be more profitable for the firm to try and guarantee jobs, in which case the wage paid will be lower. Saint-Paul thus shows that the firm has an optimal employment policy, with the undertaking to maintain employment as long as shocks are reasonably small (corridor effect). Finally, he studies the practical ways of ensuring the credibility of this type of promise, which amounts to making laying-off costly for the firm.

b) *Implicit Contracts*. **Hans-Jörgen Jacobsen** and **Christian Schultz** develop the theory of implicit contracts to justify a partial rigidity of the real wage, which enables it to fluctuate according to the business cycle. They consider a risk-neutral firm whose profit depends on the labour employed and a random shock which can take on two values. This firm has a hiring monopoly on a labour pool whose workers have an aversion to risk and a reservation wage R. The firm chooses the work contract which is most profitable with the constraint that it must be attractive enough to be an incentive for workers to accept it. This contract fixes the wage and the job in the firm for both states of the random variable.

A well-known result of the theory of implicit contracts is that the wage offered by the firm is the same in both states and equal to the reservation wage R. Full employment is only attained in the most favourable state. This gives an explanation for wage rigidity. The intuition of this result is that a wage contract has an insurance function.

The authors then assume that two types of worker exist, who only differ by their reservation wage R_1 and R_2, with $R_1 < R_2$. Then, according to the values of the parameters of the model, the contract offered by the firm is one of the two following types: either it provides in all states of nature a wage equal to R_1 and the full employment of workers with a low reservation wage, the others being unemployed; or it offers whatever the case a wage equal to R_2, full employment of all in a favourable state, and the unemployment of some of the workers with a high reservation wage in the other state. This model again reaches the conclusion of a total wage rigidity.

With the aim of obtaining a less extreme result, Jacobsen and Schultz then have the wages vary according to the different states. Their firm then proposes two contracts which enable the discrimination of workers. The first offers a wage independent of the state of nature: $w_1^* > R_1$, and job security. The second contract offers a higher wage, which varies with the state of nature and only ensures full employment of the contractors in a favourable state. In the event of an unfavourable shock employment *and* wages are lower. The authors assume that the risk aversion of low reservation wage workers is sufficiently high compared to that of the other workers. The latter prefer the second type of contract whose high profit expectation compensates for the risk. For the first type of worker however, with reservation wage R_1, the possibility of job loss makes this contract unattractive; they prefer the other which guarantees a wage w_1^* under all circumstances.

c) *Firm-Union Bargaining*. The most traditional model of the relationship between a firm with a monopoly power and its union considers that firstly the union and the firm bargain wages and secondly the firm decides the employment level, production and price. Bargaining in stage one is carried out by accurately forecasting the behaviour of the firm in stage two. This gives a non cooperative game solution which is not efficient if the utility function of the union depends on the wage *and* employment rate: *one* efficient solution would be to guarantee the same profit to the firm, but a greater satisfaction to the union who would find it more profitable to accept a lower wage in return for a higher employment level.

Curtis Eberwein and **Tryphon Kollintzas** complete this model on three levels. Firstly, they consider that the game repeats itself from period to period. As wage and employment are perfectly flexible, profit and union satisfaction for each period only depend on usual decisions. Non cooperative and efficient solutions are the same as before, but the latter can be sustained as dynamic equilibria. The authors take the following solution: the union accepts a moderate wage and the firm then chooses a job which guarantees a profit which is slightly higher than the non cooperative solution but lower that the one which would maximise current profit. If it chooses the latter employment level the union would penalise it by henceforth always imposing the highest wage of the non cooperative solution. The equilibrium chosen by the authors is that for which it is indifferent for the firm whether it remains in the efficient dynamic equilibrium or moves away from it into the non cooperative solution.

Then the firm fixes, at the same time as employment, its investment which will be productive for the following period. It cannot be negative: investment is irreversible. The authors show that the non cooperative solution can no longer be considered as a result of a classical dynamic programme, because of the irreversibility constraint. They develop an original approach to this problem which enables them to prove the existence and the uniqueness of equilibrium as well as establishing an iterative procedure for calculating it.

The final improvement introduced by the authors is to expose their economy to somewhat permanent shocks, so as to be able to generate cycles. The model is calculated from American data, then simulated. The properties of the efficient dynamic equilibrium are particularly interesting and realistic: investment is the variable which fluctuates most and the wage rate that which fluctuates least; the wage difference between union members and non-members has anticyclical evolution.

2 Origins and Effects
of Nominal Rigidities

Numerous reasons have been suggested to explain wage and price nominal rigidities. The two most common ones are the imperfection of information, and the presence of menu costs. In the presence of such rigidities money

ceases to be neutral. Moreover, moderate inflation can affect the response of the real economy to the perturbations of its environment.

a) *Imperfect information, Nominal Rigidities and the Non Neutrality of Money*. **Torben Andersen** considers a continuum of firms indexed by j, in monopolistic competition, paying its workers wages W^j. P is the general level of prices and M the supply of money. Firm j fixes its sale price P^j (and consequently its output and employment) by considering W^j, P and M as given. Thus a first log-linear approximation equation is obtained:

$$\ln P^j = \pi_0 + \pi_1 \ln W^j + \pi_2 \ln P + \pi_3 \ln M.$$

Before choosing P^j and by forecasting it correctly, the union of firm j fixes the nominal wage which prevails in function of P, M and the average wage in the economy W. A second equation is thus obtained:

$$\ln W^j = \delta_0 + \delta_1 \ln P + \delta_2 \ln W + \delta_3 \ln M.$$

The parameters δ_i (π_i) are positive and their sums are equal to 1. Thus this system of two equations with two unknowns presents four strategic complementarities, of wages and prices to prices on the one hand and of prices and wages to wages on the other. These imply that in symmetrical equilibrium: $\partial \ln P/\partial \pi_0$, $\partial \ln W/\partial \pi_0 > 1$. This equilibrium also has money neutrality: $\partial \ln P/\partial \ln M = \partial \ln W/\partial \ln M = 1$: a monetary shock does not affect the real cost of labour nor therefore the real economy.

Now let us suppose that M is observed with an error. More precisely the firm and the union j no longer observe M but s^j with: $s^j = \ln M + v^j$. The observation errors are not correlated between agents and their mean is zero, which means that private information is imperfect, but pooling it would make it complete. The best forecast that agent j could make for $\ln M$ would be: $h\, s^j$, with $h < 1$. Under adequate risk neutrality hypotheses this forecast would replace $\ln M$ in the two previous equations. P and W are replaced by expectations which are consistent with symmetrical equilibrium and the forecast of $\ln M$ by the agents.

It is then possible to recompute symmetrical equilibrium. For this, money is no longer neutral: price and nominal wage elasticities compared to the money supply are smaller than 1 and differ. Thus a justification of short term wage and price nominal rigidity and the sensitivity of the real cost of labour to a monetary shock on this horizon. These results depend on strategic complementarities: Andersen shows that the higher the crossed complementarities are, direct complementarities being kept constant, the stronger the nominal rigidities. He also discusses the reasons which lead to the conclusion of a greater rigidity of wages than of prices.

b) *Downward Price Rigidities, Menu Costs and Transmission of Shocks to Real Variables in Presence of Inflation*. Does moderate inflation have beneficial effects on output and stabilising effects on the business cycle in the presence of nominal rigidity? **Ramon Caminal** gives a few elements which encourage a certain degree of scepticism on this question. He reasons

over two periods and considers a product which is produced by a firm in a monopolistic situation. The real profit function for each period depends on *real* prices p_1 and p_2 (output and demand costs are assumed to be indexed on inflation). At the beginning of the second period, before p_2 is fixed, the firm is subjected to a random shock. Finally the author assumes that the *nominal* sale price of the monopoly is downward rigid, in other words by calling the inflation rate g so that: $p_2 \geq p_1 - g$.

The price for the second period is on average higher when this rigidity exists than when it does not. But the price for the first period is lower and this leaves greater flexibility for the second period. As a conclusion, the mean real price over both periods and therefore mean output are the same as when there is no rigidity and does not depend on inflation. Should the economy be composed of several monopolies producing different goods and where macro-economic shocks and shocks specific to each firm coexist, inflation limits the extent of real fluctuations.

The analysis is then extended by replacing the hypothesis of nominal downward rigidity by that of a fixed cost to change the price one way or another (menu costs), then by introducing a strategic aspect: output is made by an oligopoly of two firms producing two goods which are gross substitutes. The previous conclusion is then reversed: output fluctuations increase with inflation.

3 Coordination Failure and Strategic Complementarities

Coordination failure means the existence of a multiplicity of Pareto ranked non cooperative equilibria. The possibility of multiple equilibria is a particularly appealing aspect for the economist. Thus a coordination failure can explain, for example, that one economy gets stuck in a situation of poverty while another, which was not initially much different, experiences rapid growth. It can also explain the coexistence of an equilibrium where a firm is rationed on the credit market with another, more preferable, where it has no constraint.

It is said that there are strategic complementarities when the optimal reaction function of an agent increases in relation to aggregated measures of the same behaviour. Such complementarities are frequently encountered in imperfect competition models and have the particular consequence of amplifying and diffusing specific shocks (for an example, see Anderson above). These complementarities can lead to coordination failure.

a) *Strategic Complementarities*: *Empirical Verification and Theory*. Strategic complementarities can be of a very varied nature. For example, the output of a sector can depend on aggregated economic activity (production externality). In matching models if everyone takes part in the job market, it is easier for everyone to find a partner. The demand to a firm depends on total output in imperfect competition models. **Russell Cooper** and **John**

Haltiwanger notice that in the presence of strategic complementarities the four following properties hold:

1) Agents' choices in response to shocks are correlated.

2) The agents synchronise their discrete choices, for example the replacement of used machinery and the installation of new technology.

3) Shocks are amplified and propagated over time.

4) Pareto rankable multiple equilibria appear.

The authors review the empirical verifications of each of these properties. The correlation of employment or output of the different sectors is a well-known fact; If it can exist because of strategic complementarities, in can also result from the importance of macro-economic shocks which affect all sectors in the same way. It is not easy to test one of these explanations against the other. A multisectorial VAR model cannot unambiguously identify sectorial and aggregated shocks. A strong correlation of VAR residuals can either result from the presence of aggregated shocks or from instant strategic complementarities. Different identification hypotheses do however reveal the presence of appreciable strategic complementarities.

The authors give proof of the pertinence of an approach integrating macro-economic complementarities, by examining an episode in the history of the American automobile industry. Before 1935, new car models all came out simultaneously before the January show. The fact that these were the latest designs plus the arrival of better weather encouraged high sales during the first six months of the year, followed by sluggish sales afterwards. This variability obviously had repercussions on output and employment in the sector. It would have been possible to smooth production by introducing new models at the beginning of the autumn, but that would have meant the manufacturers coordinating to change the date of the motor show. This was imposed by the National Industrial Recovery Act, and although the law was declared unconstitutional, the result was that the entire industry brought out its new models in October, as from 1935.

To measure amplification effects and propagation over time of strategic complementarities, the authors consider the neoclassical growth model. They complete it by introducing total output into the output function of the representative firm. Estimates are made of elasticity to aggregated output and these raise difficult econometric problems. The model is simulated and the role of output externality on the amplification and propagation of technological shocks then appears.

b) *Poverty Trap and Rapid Development*. **Jordi Gali** and **Fabrizio Zilibotti** introduce aspects of imperfect competition into an endogenous growth model. They consider a large number of sectors producing imperfectly substitutable goods. Each sector consists of N firms in Cournot equilibrium. It is known that the elasticity of the demand each firm faces increases with N, that is to say the degree of competition in the sector. Eventually, when N is infinite, Cournot equilibrium becomes the same as perfect competition equilibrium. The only input is capital and the output techniques of each firm are the same: marginal productivity of capital is fixed beyond a minimum required to produce. Zero profit determines the

number of firms N. It is easy to establish that N increases with available capital in the sector. This increases demand elasticity and lowers the margin on capital return. The real interest rate therefore increases with K.

The coexistence of two economic equilibrium paths is then possible. In the first, the agents expect indefinite growth, with an increase of capital return over time. This favourable expectation leads them to accumulate immediately and this validates the forecast. In the second path, households expect the economic trend to be towards a state without capital or growth. They then foresee decreasing capital return over time and this leads them to unload savings at once and justifies their view of the future.

This multiplicity of equilibrium paths reveals the necessity for optimistic growth expectations, and suggests an explanation for the very contrasted performances of economies such as those of South Korea and the Philippines, which started from very similar positions. The idea that the real interest rate would increase with capital, would explain the Lucas paradox which is that contrary to what is forecast by the neoclassical paradigm, massive amounts of capital do not leave industrialised countries to be invested in LDCs.

c) *The Multiplicity of Equilibria and Rationing on the Credit Market*. Credit rationing is a source of inefficiency whose implications in general equilibrium have not been studied a lot. **John Fender** shows with a simple example that this phenomenon can lead to the appearence of a multiplicity of equilibria. He considers a two-period model. The firm, whose increasing return technology is situated in a monopolistic competition environment, uses its profit from the first period to increase labour productivity by investment. It tries to reach the optimal investment amount by borrowing if necessary. The investment risks failure however, and this may lead the credit supplier to ration the firm. The author shows that the variables that the investment depends on are quite different according to whether the firm is rationed or not. Equilibria with or without credit rationing can then coexist. An interesting result is that for certain levels of current income high sensitivity of investment to demand can be observed, which leads to a marginal propensity to spend greater than 1, and therefore to an explosive multiplier effect.

4 Static General Equilibrium Models

One of the aims of static general equilibrium models is to analyse transmission channels of economic policy in the presence of complex interdependences resulting from the fact that realistic characteristics are taken into account. The ambition of these models can also be to explain certain facts well-known to business forecasters. Therefore the first article tries to explain the coexistence of firms faced with insufficient demand and others unable to satisfy the integrality of their customers because they do not dispose of enough labour. The second article looks at the inequality of unemployment rates between skilled and unskilled jobs that can be found

in France. The third considers interaction between two sectors, respectively producing traded and non traded goods.

a) *Closed Economy Models*. **Omar Licandro** considers a family of firms each producing a specific commodity in monopolistic competition. Each firm has its own labour pool, and its workers are represented by a union. The union and the firm determine the sale price and the nominal wage rate in a cooperative way.

The specificity of the model is that although aggregate demand is known to all, its distribution between different goods is not known to the firms when prices and wages are set. They do however know the probability distribution of market shares at given prices. These hypotheses can be the result of the random aspect of household preferences, the probability law of which would remain stable over time. Each firm-union unit is thus faced with random demand. Once prices are fixed, households express their demand for the various goods. The firms meet this by hiring up to the limit of full employment of their labour pools. Beyond that, demand is rationed.

Henri Sneessens and **Fatemeh Shadman-Mehta** address the question of the persistence of unemployment. Their precise aim is to explain the movements of the Beveridge curve, particularly in France, by using econometric and theoretical analysis. These movements result from the modification of two parameters which mesure friction on the skilled labour market and the structural disadjustment between skilled and unskilled labour respectively. In particular the scarcity of skilled labour and the rigidity of unskilled real wage constrains the output level and limits the employment of unskilled workers because there is an excess of supply. The commodity market is in monopolistic competition and wages and prices are set before the idiosyncratic shocks affecting the different micro-markets are known. These micro-markets can thus be rationed by a demand which is too low or by insufficient availability of skilled labour or capital. The skilled labour supply and demand aggregation on these micro-markets bring about the Beveridge curve. The model is estimated for French data, then respecified to obtain a WS-PS type computed modelisation of the employment market with two qualification levels. Thus the authors can examine the long term effect of permanent shocks on exogenous variables and measure their respective contributions to the evolution of unemployment in France over the last thirty years.

b) *An Open Economy Model*. **Huw Dixon** considers a model with an output factor, labour and two sectors. The first is composed of n firms in monopolistic competition manufacturing as many imperfectly substitutable goods using common technology. This technology is characterised by a fixed cost and constant marginal productivity of labour. The second sector, which is in free competition, produces a sole commodity with decreasing return technology.

Each firm considers the nominal wage rate as given. In the competitive sector, the fact that the real cost of labour equals marginal productivity determines employment and the supply of the commodity. In the

monopolistic sector each firm fixes its sale price by applying a mark-up to the wage, which depends on demand elasticity for its product. Before the firms fix prices and employment, the union of each firm chooses the nominal wage unilaterally. All this determines the structure of prices and relative wages, as well as the supply of the commodity produced in free competition.

Dixon assumes that the economy is open but that only the competitive commodity is exchanged internationally and that its price is fixed by the foreign market. It characterises the short term by the fact that the initial money balance of the agents is given. The trade balance is thus in disequilibrium which varies the final money balance. In the long term though, the money balance of the agents can be fixed at a level which is compatible with foreign equilibrium.

It is assumed that the Government only consumes monopolistic goods and in the same proportions as the households. In this case an increase in public spending, financed by an issue of money, increases the demand and output of these goods and thus the income of households. This is the starting point for a multiplier mechanism which increases the consumption of households of monopolistic goods (and their output), of goods produced in free competition (and therefore the disequilibrium of the trade balance) and of money. The foreign disequilibrium decreases progressively the money balance held by households until their consumption of the commodity produced in free competition regains its previous level of equilibrium, and at the same time that of the monopolistic goods and the money. Thus the public spending multiplier is greater than 1 in the short term and equal to 1 in the long term.

5 Dynamic General Equilibrium Models

These models have the same aims as those of section 4 but the dynamic aspect introduces a new complication and dimension. They are of two fairly contrasting types. The first considers that the representative household has an infinite lifespan. The models obtained are then calibrated on real data then simulated. When the sole aim of these simulations is to calculate the dynamic multipliers of economic policy or technological shocks, they are deterministic. But the author of the model may wish to check whether it generates cycles with properties similar to those observed in reality. The technique employed in this case is stochastic simulation with adequate hypotheses on the sources of shocks. This gives an extension of the real business cycle model approach.

The second type are overlapping generation models. This approach attaches particular importance to redistributive effects, over generations, of economic policy. The first article examined in this section is a very complete review of literature. The others deal with one of the methods just described.

a) *A Review of Literature*. In 1993, **Joaquim Silvestre** published in the *Journal of Economic Literature,* an extremely clear review of literature on the implications for macro-economic policy of the imperfect competition hypothesis. He paid particular attention to the efficiency of budgetary policy (the existence and extent of a public spending multiplier) and monetary policy (nominal rigidity must be introduced or a multiplicity of equilibria must exist so that there is no neutrality). Silvestre's reasoning was essentially at a static level. In his article for this volume, he adopts a dynamic perspective and shows the contribution of recent work which can usually be placed in an intertemporal general equilibrium framework. The author first shows that if involuntary unemployment is to be explained, much more complex models must be used in a dynamic framework than in a static framework. The efficiency of monetary and budgetary policy still requires price rigidities. Moreover, imperfect competition leads to the possibility of a multiplicity of equilibria, most of which are inefficient. In the event of their being Pareto rankable, economic policy solves the problem of coordination by making the economy "jump" from an inefficient to another, better equilibrium. Silvestre also describes how it is possible to obtain an infinity of equilibrium paths, which allow the appearance of sunspot equilibrium cycles which depend on the evolution of a variable having no fundamental reason to affect the economy but where prophecies prove to be self-fulfilling.

b) *Models with Infinite Lifespan Agents*. **Julio Rotemberg** and **Michael Woodford** study very thoroughly the advantages of introducing imperfect competition of the commodities market into a standard real business cycle model. The representative firm has increasing return technology. The authors take into account in an original way the materials inputs of the firm by showing that this amplifies the economic consequences of the presence of a mark-up behaviour. Moreover, fixing prices by applying a mark-up rate on marginal costs leads to positive profit as long as output capacity is not too high. The model is completed by leisure/consumption intertemporal arbitrage behaviour of the consumers, and by the presence of public spending which does not appear in the household utility function. This model is then given the usual real business cycle treatment: calibration, log-linearisation around the steady state of the model written in reduced variables, deterministic simulations and computation of the covariance and autocorrelations. The authors then study the consequences of a positive public spending shock and show that it leads to an increase in output and employment, but also in the Solow residual which thus ceases to reflect only technological shocks. They also study the possibility of a multiplicity of equilibria, in particular of the sunspot type, but note that this possibility only appears for very high values of the equilibrium mark-up rate. They finally go over a variety of models in which the mark-up rates are endogenised. They particularly establish the necessity of disposing of a theory in which mark-up rates are anticyclical, in order to explain the effects of aggregated demand on the economy, especially real wage rises following a public spending shock.

Rotemberg and Woodford's contribution shows that the evolution of mark-ups can help to explain macro-economic fluctuations. **Franck Portier** develops this research theme and studies, with an intertemporal general

equilibrium model, the relationship between mark-ups and the number of firms which develop with their entry to and exit from the market. He first establishes, from French data, the existence of a negative correlation between mark-ups and activity levels, and a positive one between the number of firms and activity. The econometric relationship between mark-ups and the number of firms is less clear, however. He then builds a real business cycle dynamic model to link comings and goings of firms to their mark-up rate. The description of the economy is on two levels. The first is composed of sectors in monopolistic competition. They themselves are composed of identical firms with increasing returns producing the same commodity in a Cournot type competitive regime. The hypothesis of free entrance implies that the number of firms is fixed so as to assure zero profit. Symmetrical equilibrium leads to a decreasing relationship between mark-up rate and number of firms. The model is computed from French data and the reaction to demand shocks is studied by simulation. It generates anticyclical mark-up fluctuations.

A common characteristic of contemporary industrial economies is the simultaneous presence of a high unemployment rate, unused output capacities and a significant fraction of firms who say their outlets are constrained. A fair number of disequilibrium models have been built to explain these empirical observations. Among these, the most interesting rely on micro-market aggregation diagrams (for examples see above Licandro, or Sneessens and Shadman-Mehta). In their contribution, **David de la Croix** and **Jean-François Fagnart** make a dynamic extension of these ideas. The model has the following ingredients: putty-clay production technology, the investment maturing time is one period, the firms in monopolistic competition fix their prices before the occurence of various shocks (assumed to be independent of each other and not autocorrelated) which affect supply and demand on a micro-economic level. The job market is a result of firm-union bargaining. This model is calibrated according to Belgian data and various responses to unexpected shocks are simulated with rational expectations. The interpretation of the simulations leads to the conclusion of the non-Keynesian nature of multiplier effects, and thus clearly illustrates that these results cannot merely come about by only taking real rigidities into account.

Jean-Pierre Laffargue's model, calibrated from French data, integrates the main elements of imperfect competition: the firms are in monopolistic competition on the commodities market, wages are negotiated between each firm and its union and fixed a period in advance without knowledge of the shocks which may occur during this period, and some of the consumers are rationed on the credit market. As the aim of this article is to estimate the effects of economic policy, its main instruments are taken into account: public consumption, the rate of social contribution for employers and employed, income tax rate, VAT rate, and the jobless replacement rate. The economy is open and the necessity for discounted public and foreign debts not diverging is taken into account. It is then possible to compute the dynamic effects of economic policy, in particular on employment. This contribution, like de la Croix and Fagnart's uses a new and highly efficient deterministic simulation method of the relaxation and Newton-Raphson type

for a non-linear finite difference equation system with initial and terminal conditions.

c) *An Overlapping Generations Model*. This type of model gives an idea of the role of budgetary policy to ensure the distribution of welfare between the old and young generations. The behaviour modifications which result from this can have important consequences on employment. In **Claude d'Aspremont**, **Rodolphe Dos Santos Ferreira** and **Louis-André Gérard-Varet**'s models, the Government levies taxes on the young to finance public consumption which all agents benefit from. The older generation spends all its wealth and its demand price-elasticity is therefore equal to 1. The younger generation only spends part of its wealth and saves the rest, its demand price-elasticity being equal to the intertemporal substitution elasticity σ. If this is assumed to be greater than 1, that means that there is intemporal substitution for the young. Total demand price-elasticity is then all the greater if the income share allocated to the young is large. As public spending is financed by the young, global demand price-elasticity decreases and the mark-up rate of firms grows with public consumption.

The second ingredient of the model is that the wage is fixed by households at its reservation level, whereas firms adopt a mark-up behaviour on their marginal costs. In the case of decreasing returns the marginal productivity of labour decreases when output increases. To raise this and employment, the mark-up rate must be reduced which necessitates lowering public consumption. In the event of increasing returns the marginal productivity of labour increases with output. To raise output and employment the mark-up rate must be raised, which means increasing public consumption. The authors obtain opposite results when σ is smaller than 1, in other words when there is intertemporal complementarity for the young.

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