

# A BRIEF HISTORY OF IMPERFECT COMPETITION



BY HUW DIXON<sup>1</sup>



<sup>1</sup> Professor Huw Dixon, Cardiff Business School. Research lead on Economic Measurement, National Institute of Economic and Social research (London), Research Fellow, CESifo (Munich). Huw Dixon completed his PhD at Oxford University in 1984 under the supervision of Sir James Mirrlees, on Bertrand-Edgeworth oligopoly. He went on to apply imperfect competition in a macroeconomic general equilibrium framework, being one of the first new Keynesian economists. Later in his career he started to delve into the empirical and theoretical aspects of price data for modelling nominal rigidity, working with the ECB, the Banque de France and Bank of England. He has always been an advocate of the need for using models of imperfect competition.

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## A Brief History of Imperfect Competition

By *Huw Dixon*

I explore the history of the idea of imperfect competition in economics. Its foundations were in the Nineteenth Century, but largely outside the Anglo-sphere. It was only in the 1930s that the idea took off in the U.S. and Britain with Chamberlin and Robinson developing a coherent and well worked out alternative in the form of monopolistic competition, which made it into Samuelson's iconic textbook *Economics* in 1948. In the second half of the twentieth century, the idea gradually caught on in different fields of economics, from industrial organisation to international trade, growth and macroeconomics. Here, it replaced the previous orthodoxy of perfect competition as economists realised that in real life firms had market power and that the theory of competitive markets was unable to capture the features of many important real-world markets. When markets are imperfect, it means that they do not deliver an "optimal" outcome and so there is more scope for government intervention and regulation. However, there are different ways of understanding imperfect competition which do not always give the same answer and mean that it is difficult to provide general lessons about market outcomes and the sort of policies required.

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# I. THE EARLY YEARS

The model of Perfect Competition has formed the historical framework for economics and how most economists think about markets. As the old quip goes: “Teach a parrot to say “supply and demand” and there, you have an economist.” Traditional economics textbooks use several criteria for markets to be perfectly competitive. You need a lot of firms, firms treat the market price as given (that is, their actions have no effect on the price), the products produced by firms are the same (homogeneous), there is free entry and exit and so on. The roots of alternative, non-perfectly competitive models go back a long time. Perhaps the most important was Augustin Cournot’s 1838 book *Researches into the Mathematical Principles of Wealth* (published in French, translated and published in English only in 1897).<sup>2</sup> There is also Francis Edgeworth’s “Pure theory of monopoly,” (published in Italian in 1897 and in English in 1925).<sup>3</sup> The important point to note is that these were not widely read until long after they were written. Both of them looked primarily at the case where there are two firms competing and selling a homogeneous product: for Cournot output was the variable chosen, for Edgeworth the Price. Marshall’s *Principles of Economics* (1890) only had one chapter on imperfect competition, chapter 14 of Book 5 entitled “On Monopoly” and looked at what happened when there was just one firm selling the output.

The 1930’s showed a pick-up in developments in imperfect competition. In 1934 Heinrich von Stackelberg published his “Market Structure and Equilibrium” which developed Cournot’s model (and was published in German).<sup>4</sup> However, most significantly, in 1933 Edward Chamberlin and Joan Robinson both published books which developed the theory of imperfect competition by introducing the concept of monopolistic competition, where there are many firms (as in perfect competition), but they sell different products.<sup>5</sup> The firms are “small” in that they treat the aggregate (industry) price as given but can influence the price of their own output. This theory was a generalization of perfect competition in that as the products of firms become closer and closer substitutes, the equilibrium become closer to the perfectly competitive outcome. In the same year of 1933, Michael Kalecki wrote *An Attempt at the Theory of the Business Cycle* (published in Polish and a later updated version published in English in 1937)<sup>6</sup> which introduced the theory of imperfect competition into the macroeconomic framework for explaining income distribution (imperfect competition in the product market lowers real wages and tends to reduce the share of labor in total income).

One of the mysteries of the history of economic thought is why John Maynard Keynes did not look to imperfect competition when formulating his *General Theory* in the 1930s. He was a colleague of Joan Robinson and so was aware of her work on imperfect competition. However, his theory had perfect competition as a special case when prices were at their competitive level and Keynes sought to develop his theory of effective demand when trades took place at price that did not equate supply and demand. For him it was enough to observe that prices did not in general adjust in the short-run to explain the mass unemployment he observed in the 1930s. He did not see it as necessary to explain why the prices did not adjust, but simply took it as a fact. Once all price and wages had adjusted, he was happy to stick with the notion of the perfectly competitive equilibrium.

In the first half of the twentieth century, most people studying economics at university would have spent most or all of their time looking at perfectly competitive models, with a brief aside to consider monopoly. Most economists would have adopted the framework of perfect competition in their research and to frame their advice to governments. The contributions to imperfect competition remained outside of the main textbooks and unknown to all but a few specialist academics. There were a few reasons for this. First, the early contributions were from outside the “Anglo-sphere”: although Edgeworth was British, he was driven to publish in an Italian journal because the English journals did not publish “mathematical economics” at that time – there was more mathematical economics in France and Italy. Second, there were huge developments going on in the theory of perfect competition, most notably in the realm of general equilibrium (for example Hick’s monumental *Value and Capital* published in 1939) and macroeconomics (Keynes *General Theory* of 1936).

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<sup>2</sup> Augustin Cournot, *Researches into the Mathematical Principles of Wealth*, Translated by Nathaniel T Bacon with Mathematical Appendix by Irving Fischer, New York, Macmillan, 1897.

<sup>3</sup> Francis Ysidro Edgeworth, *Papers Relating to Political Economy*, Volume 1, section 2 part E (pages 111-142), London, Macmillan 1925.

<sup>4</sup> Heinrich von Stackelberg, *Marktform und Gleichgewicht*, Vienna 1934.

<sup>5</sup> Edward Chamberlin “The Theory of Monopolistic Competition: A Re-orientation of the Theory of Value, Harvard University Press, 1933. Joan Robinson *The Economics of Imperfect Competition*, London, Macmillan 1933.

<sup>6</sup> Michal Kalecki, *A Theory of the Business Cycle*, *Review of Economic Studies*, volume 4, 1937, Pages 77–97.

## II. INTO THE MAINSTREAM

The theory of imperfect competition did not enter mainstream economics until the second half of the century. The theory of monopolistic competition featured as part of a chapter in Paul Samuelson's *Economics: An Introductory Analysis* in 1948<sup>7</sup>. However, a key publication was Martin Shubik's *Strategy and Market Structure: Competition, Oligopoly, and the Theory of Games*, published in 1959. Shubik's work combined the older tradition of Cournot and Edgeworth with the new ideas of Game Theory that were developing rapidly (his PhD supervisor was Oskar Morgenstern who had written *Theory of games and economic Behaviour* with John Von Neumann, published in 1944). Cournot's 1838 model of duopoly was developed to a more general setting with more than two firms and general cost structures: the firm's power to influence prices depended on its market share. Perfect competition represented a limiting case of Cournot oligopoly when the market share of all firms tended to zero. The emphasis on market share had a major influence on the formulation of competition law in many countries with a large market share being an indicator of excessive market power.

However, there was an alternative approach. In 1883 Joseph Bertrand had reviewed Cournot's book and argued that if firms set prices, you could get the perfectly competitive outcome. This relied on the assumption that consumers purchased from the cheapest producer and so if a firm priced above the cost of production, a competitor could undercut it and capture all of the market. Edgeworth's model of duopoly showed that this result was not general: if firms had a limited capacity to supply the market, then a firm might choose a price above its competitor and supply the residual demand not served by its lower price competitor. Edgeworth formulated the idea of his "Edgeworth cycle," based on the idea that firms took turns to set prices. Starting from a high price, firms each firm would undercut the other leading to a fall in prices, until at a bottom price one of the firms would choose to raise its price above the other and start the whole process again. In modern game-theoretic terms, there was no "pure strategy" equilibrium in the Edgeworth game if there were binding capacity constraints on how much an individual firm could produce. In *Strategy and Market structure* Martin Shubik showed that when one allowed for general cost structures, the only possible pure-strategy equilibrium to exist was the perfectly competitive price. If that was not an equilibrium, none other could exist. This led to the application of the idea of a mixed-strategy Nash equilibrium to the "Bertrand-Edgeworth" model. However, the difficulty in saying much concrete about the mixed-strategy equilibrium in the Bertrand-Edgeworth model led to its neglect relative to what became the standard workhorse models of Cournot and monopolistic competition.

Things changed in 1982 with the publication of *The Theory of Contestable Markets* written by William Baumol, John Panzar & Robert Willig. This kept the idea of Bertrand & Edgeworth of firms setting prices and consumers buying from the lowest priced firm, but had a crucial difference. Rather than assuming a fixed set of "incumbents" operating in the market, it focused instead on the potential competition from potential entrants not yet in the market. Incumbents were unable to set prices above costs because otherwise a new entrant could come in and undercut them (this was rather colorfully called "hit and run entry"). The timing of the book was perfect: Ronald Reagan and Margaret Thatcher had just started their incumbency as President and Prime Minister respectively and both wanted to de-regulate markets. Attention shifted from looking primarily at market shares to making entry barriers as small as possible to facilitate "hit and run" entry. For example, for airline travel, access to landing slots could be opened up to the highest bidder allowing new entrants to undercut the existing incumbents. In Britain, this idea was applied to the Thatcher privatization program including long-distance buses, energy suppliers and telephony and later to railways. One implication of the theory was that an incumbent could claim that despite a large market share, its price was still not excessive due to the threat of potential entry.

Another strand of imperfect competition shifted focus from "static models" in which there was a one-off game to repeated games: firms would face each other over many periods. In the mid 1970s onwards, many models were developed to examine the effect of competition over time on both competition between incumbents and between incumbents and new or potential entrants. The models became ever more complex, but there was no general conclusion. Cooperation between incumbents could arise, whereby they maintained a high price by "punishing" firms who "defected" by starting a price war. More importantly, incumbent firms could threaten potential entrants with highly competitive behavior to deter entry and so maintain their high prices. This notion of "exclusionary pricing" formed a way of understanding the 1975 "Areeda-Turner test" which focused on the notion of the incumbent trading off the loss of short-term profits by pricing below cost with the maintenance of monopoly profits later on. There were some very high-profile cases of "predatory pricing" in the airline industry that ended up in court in the 1980s (notably cases brought as a result of the Laker Airway's "no frills" transatlantic flights being driven out of business by the established airlines and a later case between Virgin Atlantic and British Airways).

Whilst the theory of imperfect competition was developing in some parts of economics, progress in others was slower. This was for a variety of reasons. Not least, the model of perfect competition was much easier to model due to its assumption that all agents are "price takers."

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<sup>7</sup> It occurs in the brief Chapter 21, amongst a total of 26 chapters.

However, these technical difficulties were gradually overcome and imperfect competition began to be applied in more and more fields of economics. Paul Krugman and others developed the “new international economics” and “new economic geography” in the 1980s, part of the “newness” in both cases being the use of imperfectly competitive models. Similarly, the “new” theories of economic growth and new Keynesian economics also started at this time.<sup>8</sup>

### III. THE DECLINE AND FALL OF PERFECT COMPETITION

However, there was a backlash. In the realm of macroeconomics, the model of perfect competition was revived in the form of Real Business Cycle Theory (associated with Robert Lucas and Ed Prescott). This largely reflected ideological factors. Perfect competition is associated with a Pareto optimal outcome (under certain assumptions) and so is attractive to *laissez faire* economists who see the “invisible hand” guiding markets. Imperfect competition will in general lead to a sub-optimal outcome that leaves a space for possible improvement through regulation or some other form of government action.

Perfect competition, however, has a logical flaw. This was pointed out long ago by Kenneth Arrow in his 1959 article *Toward a theory of price adjustment*.<sup>9</sup> In a perfectly competitive model, all agents are price takers, no one can influence market prices. However, the model assumes that prices adjust to equate supply and demand. Who adjusts the prices in an economy where no one sets the price? Leon Walras had famously addressed this issue in his *Elements of Pure Economics* (written in French in 1877 and published in English in 1954).<sup>10</sup> His solution was to invent the fictitious “auctioneer” who altered prices in response to excess demands and supplies, his “tâtonnement” process. Walras’ auctioneer was based on his observations of the market traders in the Paris Bourse (Stock exchange). Many of the greatest minds of the 1960s tried to resolve this logical flaw, but with little success.<sup>11</sup>

However, it was not this logical flaw that killed off real business cycle theory. The final nail in the coffin of Real Business cycle theory was the need to explain nominal price rigidity. In perfectly competitive markets, prices can adjust all of the time. Whilst we do observe some markets where prices are very flexible (for example airline tickets, car rentals, gas prices), for many goods and especially services we see the money prices remain fixed for long periods of time: weeks, months and even years. The price of a bottle of Coke is the most famous example: between 1886 to 1959, the price of a regular bottle of coke remained at 5 cents, or one “nickel.” Whilst there had been some empirical studies of actual prices prior to 2000, these were often restricted to specific markets. However, in the first decade of the new millennium, a huge amount of price-data became available from the millions of price quotes collected to produce the Consumer Price Inflation measure. In addition, with the growth of online shopping it was possible to collect large amounts of data online, and in 2008 Alberto Carvalho & Roberto Rigobon set up the Billion Prices Project. This data showed that there was great heterogeneity in the way prices behaved across the economy, and in many markets prices persisted for long periods.

It is not possible to explain why money prices might remain fixed over time unless you have agents who set the prices. You need to explain why the agent setting the price might find it as an optimal policy to leave the price unchanged even when costs and demand change. The model of monopolistic competition was extended into a dynamic setting and lump-sum costs of price change were introduced to explain why the monopolist might keep prices constant even when cost or demand changed. Although the theory had been developed in the 1970s and 80s, it became the standard theory in macroeconomics in the 1990s, replacing perfect competition with imperfect competition.

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<sup>8</sup> Huw Dixon, *New Keynesian Economics*, New Palgrave Dictionary of Economics, 2nd Edition. (2008).

<sup>9</sup> Kenneth Arrow “Toward a theory of price adjustment,” in Abramovitz, Moses; et al. (eds.), *The allocation of economic resources: essays in honor of Bernard Francis Haley*, Stanford, California: Stanford University Press (1959)

<sup>10</sup> Léon Walras *Elements of Pure Economics: Or the Theory of Social Wealth*, translated by William Jaffe, London: George Allen and Unwin Ltd (1954).

<sup>11</sup> The alternatives developed by Takashi Negishi and Frank Hahn and others were called “Non- tâtonnement” processes which allowed for trading at prices before the competitive equilibrium price had been reached.

## IV. THE MANY WAYS TO BE IMPERFECT

I have focused on the areas of economics with which I am most familiar from my own research and teaching. As a general point, we can see that although the great minds of Augustin Cournot and Francis Edgeworth developed early theories of imperfect competition in the Nineteenth Century, it was not until much later that it spread across most fields of economics. Economists needed to develop the mathematical and theoretical tools to model imperfect competition and apply it to particular fields of economics. The main driver was the science, the need to explain real world phenomena. Perfect competition relies on some very special assumptions. Whilst it may be a good model for commodity markets such as oil and wheat, or financial markets, it was clearly not good model for many other markets where firms (or unions) had market power and could even deter entry.

However, once one departs from the simple world of perfect competition, one has a range of imperfectly competitive models to choose from and they might have different implications for welfare and the behavior of markets. There are many ways to be imperfect. It is often hard to formulate general principles which hold across a range of imperfectly competitive models. One good example of this is whether you have too many firms or too few firms in equilibrium. This question was posed by Avinash Dixit & Joseph Stiglitz in their 1987 model of “optimal variety” in monopolistic competition.<sup>12</sup> In general, we can observe that consumers like variety, they like to have a range of options to choose from, from what sort of bread they buy to the design of their sofa or car. If we assume that each firm is a monopolistic competitor supplying its own brand, will we end up with too many varieties or too few? Each new monopolistic firm brings with it a fixed set up cost (overhead). If we allow firms to enter freely the monopolistic equilibrium will involve zero profits. If there is little or no love of variety by consumers, it can be shown that there will be too many firms and too much variety. Welfare could be improved by restricting the entry of firms. If there is a great love of variety, we can get the opposite result that the market equilibrium delivers too little variety. In this case, we can see that the removal of barriers to entry can lead to a decrease in welfare (when there is little love of variety) or an increase (when there is a great love of variety). So, although we can say that reducing barriers to entry might increase competition, we cannot say in a monopolistic model that it will increase welfare.

The rise of imperfect competition has been driven partly by logic, the need to explain how economic agents set prices. It has also been driven by the empirical need to explain why we observe nominal prices persisting through time. Perfect competition is at best a short-cut or approximation, which provides a simple model which is intuitive. The world, however, is often not at all like the competitive model and behaves in a very different manner. Whilst imperfect competition is now an integral part of economics, it raises many challenges and does not necessarily give us easy answers. However, in my experience, even though the answers may not be simple, imperfect competition gives us a much richer insight into the complexities of how real-world markets work. It can therefore provide a much better foundation for guiding competition policy.

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<sup>12</sup> Avinash Dixit & Joseph Stiglitz (1977), Monopolistic Competition and Optimum Product Diversity, American Economic Review, Vol. 67, No. 3, pp. 297-308.

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