

Unemployment and Search – The Contributions of Christopher Pissarides
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Thomas Carlyle famously said “Teach a parrot the terms ‘supply and demand’ and you’ve got an economist.” In the classical model of supply and demand, price adjusts to clear the market. Of course, economics has progressed since Carlyle’s time, and most economists recognize that while the supply-demand paradigm sometimes works well, it misses important aspects of some markets. In these markets, buyers and sellers have to search for suitable trading partners, and this process can take considerable time and effort. These “search frictions” are particularly important in the labor market. Unemployed workers are looking for jobs at the same time that firms are looking for workers to fill their vacancies. Sometimes a worker applies for a job that would have been a good match had the firm not hired another worker in the meantime. Similarly, sometimes a firm finds a good worker for the vacancy it wants to fill only to find that he or she has been hired elsewhere. “Excess supply” (unemployment) and “excess demand” (job vacancies) coexist in markets with search frictions, even in normal times.

Christopher Pissarides, together with Peter Diamond and Dale Mortensen, was awarded the 2010 Nobel Memorial Prize in Economic Sciences for his work on markets with search frictions. This work has its origins in a consensus that was reached in the late 1960’s that macroeconomics – the part of economics that tries to understand the behavior of the aggregate economy – was in need of a solid microfoundation. That is, to understand how the economy as a whole behaves, we need to understand how the decisions that individuals and firms make combine to generate the overall patterns that we see in the economy. “Search theory” initially focused on the decisions that individuals make while they are looking for work; namely, when a job offer comes along, should the worker accept the offer or should he reject it to wait for something better? Which jobs are acceptable and which are not depends, among other factors, on what financial support a worker has, if any, while he is unemployed, and the earliest contribution of search theory was to clarify how unemployment insurance can increase the unemployment rate by making job seekers “pickier.” With the appropriate bow to Carlyle, this is a “labor supply” theory of unemployment in the sense that the unemployment rate is determined by which job offers individuals are willing to accept.

As we noted above, search theory was first analyzed as an individual decision problem. It was only later that the equilibrium nature of the problem was treated explicitly. That is, it was recognized that the environment faced by each job seeker is not simply given externally but rather is determined by the decisions made by other job seekers and the firms in the market. The equilibrium analysis of markets with search frictions has two important branches. In the first, the main question is what wages firms choose to offer. The contribution of this literature has been to help us understand why equally productive workers can – by the luck of the draw – be paid quite different wages.

The other branch of the equilibrium search literature is now known as the Diamond-Mortensen-Pissarides (DMP) model. Rather than addressing the question of why equally productive workers are paid different wages, the DMP model instead asks what determines how quickly the unemployed receive job offers. All else equal, the faster the unemployed receive job offers, the lower will be the unemployment rate. The laureates' model offers a framework that helps us understand how the state of the economy interacts with labor market policy to determine the job offer arrival rate.

Here is how the simplest version of their model works. First, the number of new hires per unit of time depends on how many unemployed workers and vacancies are looking for a match. The more unemployed workers and vacancies, the greater the number of matches per unit of time. The DMP model assumes a matching function, which maps the number of unemployed and the number of vacancies into the rate at which matches are formed. This matching function is a "black box" in that the numbers of unemployed and vacant jobs are fed in and the matching rate results without specifying the details of the matching process. The matching function is assumed to be such that the rate at which the unemployed receive job offers depends only on the ratio of vacancies to unemployment, that is, on "labor market tightness." Second, labor market tightness is determined by a "free-entry" condition, namely, that firms post vacancies so long as the expected profit from doing so is positive. Finally, the expected profit associated with posting a vacancy depends on the wage to be paid once the vacancy is filled. Because of the search frictions required to match job seekers with vacancies, when a worker and firm get together, there is a surplus to be split relative to the alternative of continuing to search. The standard approach is to split the surplus between the worker and the firm according to a "Nash bargaining rule." In the simplest version of the model, all workers are paid the same

wage. The basic model thus focuses on explaining the rate at which the unemployed receive job offers while downplaying the possibility that similar workers might be paid different wages. The DMP model is an equilibrium model in the sense that it incorporates both labor demand – labor market tightness is determined by the willingness of firms to post new vacancies – and labor supply – the wage that an unemployed worker requires to take a particular job depends on labor market tightness and the wage that is available elsewhere. The model gives an equilibrium wage rate, level of labor market tightness and unemployment rate. This equilibrium or “natural” rate of unemployment is important for labor market policy analysis, and the clean structure of the DMP model has made it possible to incorporate labor market search frictions into macroeconomic analysis.

The history of the Diamond-Mortensen-Pissarides model is difficult to sort out in the sense that it is not easy to say who came up with which idea first, but it is certainly the case that the general label is justified. Although the matching function idea was first suggested in the late 1960’s, Pissarides and Diamond (together with Eric Maskin) developed the idea more or less in the way that it is used in the DMP model in separate papers, both published in 1979. The key idea of closing the model with a simple free entry condition can also be traced to Pissarides’s 1979 paper. The idea of applying the Nash bargaining solution to determine the division of surplus in a match between a worker and a firm seems to have first been made explicit in a paper by Diamond from the early 1980’s, although related surplus-sharing ideas are present in earlier work by Mortensen and in the 1979 Diamond and Maskin paper. These ideas were explicitly combined in a series of papers by Pissarides in the mid-1980’s, and the influence of the DMP model is in large part due to the elegant and clear exposition in his book, *Equilibrium Unemployment Theory* (1990, 2000).

Many extensions of the basic Diamond-Mortensen-Pissarides model are also due to Pissarides. For example, the simplest version of DMP is designed to explain the average time that it takes an unemployed worker to find a job (how quickly do workers *exit* unemployment?), but unemployment also depends on the rate at which the employed lose their jobs (how quickly do workers *enter* unemployment?). In an important 1994 paper, Mortensen and Pissarides extended the basic model to allow the rates of job creation and job destruction to be determined simultaneously. This extension is particularly important for labor market policy analysis. Consider, for example, the impact of severance costs. Such costs lower the rate of job destruction because

firms are loath to terminate matches that have become less productive since to do so would require paying the severance cost, but they also lower the rate of job creation because firms, knowing that they will likely have to pay a severance cost in the future, are less willing to post vacancies today.

The DMP model and its extensions do a good job of explaining the wide variety of long-run labor market outcomes experienced across the OECD countries. Why is the unemployment rate in Denmark consistently so much lower than it is in Spain (or in Greece!)? Can the model also suggest policies to ameliorate the current “out-of-equilibrium” crisis in the labor market? Here the evidence is more mixed. There is considerable debate over how well the DMP model explains developments in the labor market over the business cycle. This is currently a very active area of research, and Pissarides has made significant contributions to this discussion.

In this brief review, we hope we have made clear that Christopher Pissarides has been a major figure in developing a model that is invaluable for understanding the unemployment that results from search frictions in the labor market.