The UV or Beveridge curve

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51. The UV or Beveridge curve

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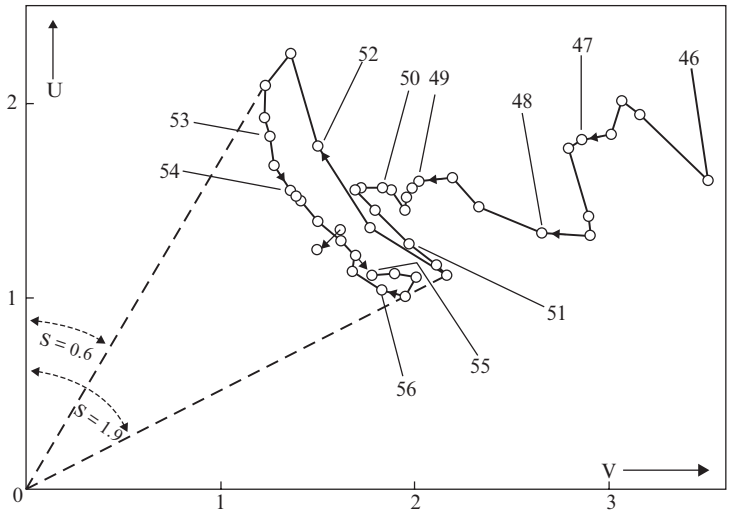
1. DOW AND DICKS-MIREAUX'S UV CURVE

The UV curve originates from the work of two British economists, Dow and Dicks-Mireaux (hereafter DDM). In their seminal 1958 paper they were interested in measuring excess demand in the goods market for the guidance of Keynesian fiscal policies. Since excess demand is unobservable, they suggested using data on vacancies and unemployment in the labour market as a proxy. The application of this simple idea was possible for Britain since the British Government had started collecting data on unfilled vacancies from notification at labour exchanges in 1946. DDM argue that, though the recording of vacancies at labour exchanges might be incomplete or faulty, the behaviour of vacancies relative to unemployment shows that vacancy statistics can be considered as rather reliable indicators. DDM presented the unemployment and vacancy data in an unemployment-vacancy (UV) space and connected successive observations (Figure 51.1).

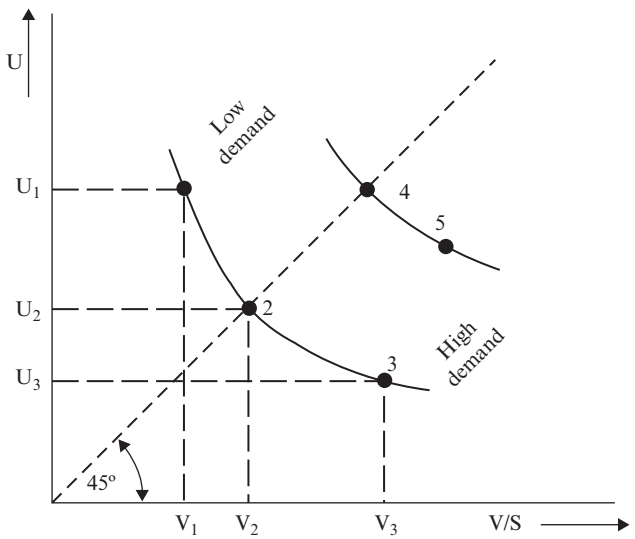
An important feature that DDM assumed about the behaviour of unemployment is that unemployment below a certain level would be decreasingly sensitive to demand. That is, a further increase in demand should lead to a disproportionately small decline in unemployment rates (and vice versa for vacancies). Following this rationale and based on the observations of Figure 51.1, (particularly the years 1951–56), DDM derive an idealized UV curve as a rectangular hyperbola (Figure 51.2).

The idealized UV curve has the following features. Firstly, an inverse relation between vacancy and unemployment rates. When the economy is in recession (point 1), it experiences high unemployment rates and low vacancies rates; and vice versa in an upswing (point 3). Each point on the UV curve represents a different degree of aggregate demand, and, across the various stages of the business cycle, the economy moves along the idealized UV curve. Secondly, the hyperbolic and convex shape of the UV curve represents the feature that a further increase in demand leads to a disproportionately small decline in unemployment rates. This 'increasing



Source: DDM, 1958: 4

Figure 51.1 Relation between unemployment and vacancy rates in a UV space for Great Britain, 1946–1956



Source: DDM, 1958: 4

Figure 51.2 Idealized UV relations (with v/s = adjusted vacancy rate)

insensitivity of unemployment', as DDM called it, clearly resembles the neoclassical idea of decreasing returns to input factors as found in production and utility functions. Later empirical studies estimate this hyperbolic UV relation as $\log v = \beta_0 + \beta_1 \log(1/u) + \varepsilon$. Thirdly, different degrees of maladjustment (structural unemployment) correspond to different idealized UV curves, further or closer to the origin. And fourthly, a 45 degree auxiliary line can be constructed to represent zero excess demand.

2. THE UV CURVE STABILITY DEBATE

The work of DDM, as well as theoretical work by Holt and David (1966) and Gordon (1966), inspired a series of empirical studies in the late 1960s and throughout the 1970s, estimating the relation between unemployment and vacancies.[1] Cohen and Solow, in 1967, found a stable relationship between unemployment and vacancies, but almost immediately after publication, other empirical studies found supposed 'breakpoints' in the UV curve, suggesting shifts of the curve further or closer to the origin, corresponding to higher or lower levels of structural unemployment. This obviously raised questions about the stability of the UV relation and the usefulness of the UV curve as a structural relation for economic analysis and measurement, and resulted in a vast number of empirical studies since the 1970s with an abundance of specifications of the UV curves, all of which incorporate additional variables, dummy variables or lagged variables. Econometric analysis usually provided no or only very little evidence for the alternative hypotheses tested, and after three decades of testing and specifying the UV curve, economists remain agnostic as to the exact causes of the changes.

3. THE IMPACT OF THE UV CURVE ON ECONOMIC THEORY

The UV curve was put forward by DDM as a practical measurement device to guide economic policy. Its place in economic theory was therefore not immediately clear. The UV curve obviously had some attractive features, in the sense that it provides a macro-framework that shows that unemployment and vacancies coexist simultaneously in the absence of excess demand, or the novel insight that some unemployment will exist even at very high levels of demand, but its explanatory power was low. And more importantly, although the UV curve was empirically supported, there was no theoretical foundation for it.

The introduction of the UV curve had several effects on macroeconomics, the most important ones being the following. Firstly, it introduced a method, which later became known as UV analysis, for the decomposition of unemployment into different types: deficient-demand (or cyclical) unemployment and structural unemployment. This was clearly consistent with DDM's purpose of doing measurement for guiding Keynesian policies. Later, in the first half of the 1970s, economists of the National Institute of Economic and Social Research (NIESR) in London developed the UV analysis further so that they could decompose the non-deficient demand component of unemployment into a structural and a frictional component of unemployment, so that a classification arises that corresponds to the 'traditional' classification: a division of unemployment into frictional, structural and deficient demand unemployment (Brown, 1976). Secondly, both the UV curve and the Phillips-curve (see Chapter 50) were used to clarify the post-war policy debate on 'full employment' that was instigated by Keynes' *General Theory* and Beveridge' *Full Employment in a Free Society* (1944), as both curves provided macroeconomic notions of equilibrium in markets, though these notions were inconsistent and conflicting (Rodenburg, 2011). The equilibrium implied by the UV curve is in terms of equilibrium between vacancies and unemployment rather than the neoclassical equilibrium notion in terms of prices (wages), and is therefore more akin to Beveridge's definition of full employment, which he phrased as 'having always more vacant jobs than unemployed men, not slightly fewer jobs' (1944: 18). Most likely for this reason, the UV curve also became known in the 1980s as the Beveridge curve; other factor included the fact that the UV curve enabled economists to analyse many of the problems Beveridge addressed, such as the mismatch between unemployment and vacancies, both at aggregate and industry levels, trend versus cyclical changes and measurement problems of vacancies. Beveridge, however, never drew the curve and the exact origin of the term remains obscure.

Thirdly, the simultaneous coexistence of unemployment and vacancies was at odds with neoclassical notions of market clearing. It was, for example, unclear how the UV curve should be explained in a simple Marshallian supply and demand analysis (see: Chapter 1). The growing awareness that labour markets may perhaps not clear as instantaneously as other markets necessitated a theory of simultaneous coexistence of unemployment and vacancies in equilibrium. This was solved by, among others, Hansen (1970), who incorporated the UV curve in a Marshallian supply and demand framework by integrating elements of Gordon (1966) and Holt and David (1966). In this way, he provided a comprehensive, neoclassical theory of friction within a Marshallian supply and demand

framework, and showed that unemployment and vacancies can coexist theoretically. Finally, in the 1980s, the UV curve gave a strong conceptual impetus and empirical support to new equilibrium theories of labour markets, such as search theory and matching models of unemployment, which currently dominate contemporary economic thought on unemployment. Important contributions were made at the London School of Economics by Pissarides, Layard, Nickell and Jackman, currently at the LSE Centre of Economic Performance, and Mortensen, Blanchard and Diamond in the USA. Whereas the contributions of NIESR were empirical and concerned with the decomposition of unemployment changes, especially at the regional level, the LSE contribution to search and matching theory was more theoretical. As a consequence of the shift to the search theory paradigm, studies using UV analysis became rare in the 1980s.

4. THE ROLE OF THE UV CURVE IN CONTEMPORARY ECONOMICS

The role of the UV curve in search theory is different from its role in 1960s and 1970s macroeconomic theories. The key idea of matching models is that the complicated and stochastic process of job search is captured in one single, well-behaved, aggregate mathematical function, called the matching function.[2] The idea of a labour market divided into frictionless submarkets is abandoned and replaced by one mathematical function accounting for flows in the labour market in equilibrium. Without explicit reference to the source of friction, the equilibrium outcome is defined in a small set of variables. In its most elementary form, the matching function is: $M = m\,(U, V)$. In a UV space, the matching function is stable and convex to the origin, and exhibits diminishing returns to input factors; that is, it corresponds with the empirically found UV curve. The matching function framework enables economists to analyse the effect of heterogeneous groups of workers with different characteristics in terms of probabilities of in- or outflow. Workers with a higher rate of job finding experience shorter periods of unemployment and lower rates of structural unemployment. Workers and job vacancies are no longer considered as homogeneous and both therefore have to spend time and resources in order to find a good match. Even in the absence of deficient demand for labour, unemployment and vacancies coexist as a consequence of this time-consuming search process. After unemployed workers and vacancies are brought together by this stochastic matching technology, matching models focus consequently on the division of the outcome of this productive match, often as a bargaining

process, where the surplus is divided according to a surplus-sharing rule. Two equilibrium-generating mechanisms are usually explored: the effects of wage adjustments and the effects of labour market tightness adjustment. The equilibrium outcome, that is, when the values of the variables U, V and W (wage) are determined by equilibrium conditions, is at the intersection of the stable UV curve and the job creation curve, a straight line with slope θ, the labour market tightness (see, for example, Pissarides, 1999). The UV curve is thus nowadays used as an analytical device to derive the consequences of, for example, labour market tightness, or differences in skills or productivity of workers. The correlation between U and V data is thus still valid today, but economists are no longer seeking causal structure at the macro-level. In fact, the UV curve is nowadays used in a very similar way to production and utility functions. And, for the same reason as for production or utility functions, a Cobb-Douglas type of matching function is often assumed.[3]

The UV curve is currently, however, also treated in another, more empirical and applied way, namely as a diagnostic tool for the labour market. Soon after the introduction of search theory in the early 1980s, a debate broke loose in modern macroeconomics – particularly in the USA – on 'sectoral shifts' or 'reallocation shocks' versus 'aggregate disturbances' as unemployment rose rapidly at that time, both in Europe and the USA. The debate started with Lilien's sectoral shift hypothesis: the idea that intersectoral (and intrasectoral) labour reallocations affect unemployment at an aggregate level. Idiosyncratic shocks will cause flows of labour from declining sectors to booming sectors. In fact, the debate was, once again, about the nature of unemployment and was in some ways a renewed version of the structuralist versus deficient demand debate of the 1960s in the USA. The issue became how to identify the effects of aggregate demand changes from structural changes (at the level of sectors) and the UV curve soon acquired a dominant place in the analysis and empirical tests of the sectoral shift hypothesis. If a sectoral shock hits the economy and structural unemployment rises, the UV curve will shift outward, resulting in a positive U-V co-movement and a positive correlation between vacancies V and the variance of the reallocation shocks. Similarly, an aggregate shock will result in a movement along the UV curve: a negative co-movement of U and V, and a negative correlation between V and the variance of the reallocation shocks. In this way, contemporary applied labour economists take the UV curve as an important diagnostic device for the analysis of shocks, and more generally, as an indictor of the state, performance and efficiency of the labour market, even though the causes of shifts of the UV curve are not fully understood, and even though interpretations of shifts are hindered by changes in in- or outflows.

5. CONCLUSIONS

In retrospect, it can be concluded that the paradigmatic change in unemployment theory from Keynesianism to neoclassical search theory also shaped the role and use of the UV curve. It came into being at a time when economists had a strong belief in the effectiveness of Keynesian, aggregate demand management and the main concepts that UV analysis aimed to measure, such as excess demand and cyclical unemployment, are important Keynesian concepts. Their measurement, however, became more-or-less superfluous with the fall of Keynesianism. Shifts of the UV curve were not considered by advocates to be a serious threat to UV analysis mainly because of the optimistic belief in the 1970s and 1980s that the underlying cause or causes of the shift of the UV curve could be identified and could be accounted for in the specification of the UV curve. The inability to do so rendered the UV curve underdetermined. It became impossible to distinguish between different movements of the UV curve: movement along the UV curve necessary for measurement; deliberate attempts by economic policy to move the UV curve inwards in order to reduce structural unemployment; and unintended structural shocks of the UV curve for reasons yet unknown. Search theory circumvents the problems inherent to UV analysis by analysing flows and overcomes the identification problem by assuming Cobb-Douglas type of UV curves. In this way the apparently inductively established empirical UV curve changed into a deductively derived UV curve which is firmly rooted in and reinforces neoclassical economics. The paradigmatic change from Keynesianism to neoclassical search theory changed the role and interpretations of the UV curve from a measurement device of aggregate demand for Keynesians and an interpretation of full employment, to an equilibrium condition for neoclassical search theorists and an important diagnostic tool for the labour market.

Labour economic research of the last decades has given much emphasis to the Phillips curve and the UV curve as macroeconomic structural relations. Though the UV curve has played second fiddle for a long time due to the dominant place of the Phillips curve in economic analysis, the renewed interest in the UV curve is growing and it will undoubtedly serve an important function as one of our prime 'looking glasses' into the labour market for the time to come.

NOTES

1. See for reference, Rodenburg, 2011.
2. For a survey of the matching function see, for example, Petrongolo and Pissarides (2001).

3. Petrongolo and Pissarides (2001) show that the Cobb-Douglas specification of the matching function commands a fair amount of empirical support. There are however no compelling theoretical reasons why the matching function should be of the Cobb-Douglas form.

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