inflows and outflows, as stressed in Chapter 4 (Section 4.4). The enormous turnover of workers and jobs despite large, stable stocks of unemployment signals that the uniqueness of each worker and job—and the uniqueness of their coming together, or matching—makes search worthwhile. Reshuffling the personnel deck can actually be productive for an economy. Research shows that even people who have jobs are often on the lookout, even if they are choosier or even deny it entirely. In addition to the fundamental insight that workers and employers search purposefully, Peter Diamond of MIT also recognized that searchers who do 'find one another' in such markets have something special—an economic rent or surplus—that cannot be costlessly recreated without renewed time-intensive search. As a result of this rent, wage determination takes on the role of allocator of surplus, and has no obvious value as it does in neoclassical economic theory, except that it must leave the match at least as attractive to both parties as the option of abandoning the match and resuming search.

Since workers and firms are constantly on the lookout, it is of great importance to understand their behaviour. Offers usually come randomly, but not all at once. The longer and more intensively we search, the more likely we are to receive offers. Dale Mortensen (along with John McCall, a pioneer in operations research) stressed that optimal search behaviour of workers and firms under such conditions generally takes the form of a stopping rule or *reservation wage*—a critical value of the offered wage (or more generally, a critical level of satisfactory workplace attributes) below which the offer is rejected as unsatisfactory. This reservation wage will depend on many factors, including unemployment benefits, impatience, and the shape of the distribution of wage offers.

If all that were not complex enough, markets with search frictions are fraught with externalities. Students looking for an apartment in Berlin often have to wait for hours in line for a chance to inspect the premises and compete with hundreds of other candidates. Residents of Paris who work a little late have great difficulty finding a parking space, if only because many people have the same work habits. Clubs in London often organize 'ladies' nights' to make their premises more attractive to certain male visitors (and also to female ones!). Christopher Pissarides of the London School of Economics was interested in the implications of the fact that the probability of an unemployed person making contact with *any* job offer depends crucially on the number of unemployed already in the market relative to available open positions. *Ceteris paribus*, every newly unemployed person depresses the chances for success of all those already in the unemployed pool, and increases the probability that a vacancy already posted will be filled. This fact, combined with wage determination as a surplus allocation device, can explain why wages depend on 'labour market tightness', yet may not decline automatically in the presence of high unemployment.

The deep insights of markets with search and matching frictions are not limited to the study of unemployment. Markets for financial intermediation (especially banking), for lawyers and architects, for marriage or partners, for apartments and houses, and even the 'market' for parking spaces can be thought of as matching markets—even if the price of a parking space is zero! A serious branch of monetary economics considers the use of money as a solution to a matching problem. Combined with powerful mathematical methods to study optimal dynamic decisions under uncertainty, search and matching theory has contributed to the design and implementation of labour market reforms in modern developed economies.

20.9 Growth and Development

Robert Solow, 1924–

Source: The Nobel Foundation.

Paul Romer, 1955–

Source: Hoover Institution.

Robert Barro, 1944–

Source: Hoover Institution.

Much as our understanding of labour markets has greatly benefited from institutional economics, one of the most important—and more vexing—issues involving the wealth and poverty of nations has also been profoundly rethought. As explained in Chapter 3, research on the neoclassical growth model[13] conducted at MIT by Nobel Prize laureate Robert Solow, had two key implications: (1) capital is more productive where it is scarce, and (2) the key source of sustained growth is unexplained—or exogenous—technological progress. Both implications were deeply unsatisfactory, and both have motivated important innovations to conventional growth theory.

As noted in Chapter 3, Robert E. Lucas Jr challenged economists to explain why capital doesn't flow from rich to poor countries. Poor countries are characterized by low capital intensity and, in theory, must have a much higher marginal productivity of capital than rich countries. One important solution to his puzzle is that high productivity may be high in theory, but in fact is significantly reduced by the prevalence of poor institutions that allow corruption, instability, and war to discourage investment.

However, if technological change is exogenous, it is not possible to explain why institutions matter. In the mid-1980s, Paul Romer (1955–) from Stanford University showed how technological progress could be treated as endogenous. The crucial step was to recognize that knowledge does not suffer from decreasing returns. This established a link with Lucas' question: education is an investment in human capital, and it is deterred by poor institutions in exactly the same way as investment in physical capital. This discovery allowed many others to explore the process of growth and economic development. Much empirical evidence has since been produced by Robert Barro (1944–) at Harvard University, in collaboration with Catalan Spaniard Xavier Sala-i-Martin (1963–) from Columbia University, with important contributions by many others, including French-born Philippe Aghion (1956–) from Harvard University.

The result of this research has been a thorough reappraisal of underdevelopment and of policies that try to deal with extreme poverty in many parts of the world. The emphasis has shifted from earlier recommendations by the rich countries to 'do as we do' to try to encourage the establishment of better institutions that would provide political leaders in the poor countries with the incentives to adopt pro-growth policies. This literature has also profoundly affected the international financial institutions, in particular the World Bank and the regional development banks. The results are slow in coming but some important successes have been achieved. The same message also concerns the rich countries, especially Europe, which stopped catching up with the USA in the mid-1980s. The message is that reforms are needed to make the political system interested in supporting agents of change rather than established economic interests.

[13] This theory is called neoclassical because it relies on standard microeconomic principles, much like neoclassical macroeconomics. But Bob Solow, as he is generally called, has been a leading and enthusiastic proponent of Keynesian economics.