

11 October 2004

The Prize in Economic Sciences 2004

The Royal Swedish Academy of Sciences has decided to award the Bank of Sweden Prize in Economic Sciences in Memory of Alfred Nobel, 2004, jointly to

FINN E. KYDLAND

Carnegie Mellon University, Pittsburgh and University of California, Santa Barbara, USA, and

EDWARD C. PRESCOTT

Arizona State University, Tempe, and Federal Reserve Bank of Minneapolis, USA

"for their contributions to dynamic macroeconomics: the time consistency of economic policy and the driving forces behind business cycles".

New theory on business cycles and economic policy

The driving forces behind business cycle fluctuations and the design of economic policy are key areas in macroeconomic research. Finn Kydland and Edward Prescott have made fundamental contributions to these areas of great significance, not only for macroeconomic analysis, but also for the practice of monetary and fiscal policy in many countries.

Time Consistency of Economic Policy

The higher taxation of capital households expect in the future, the less they save; the more expansive monetary policy and the higher inflation firms expect, the higher prices and wages they set, etc. The Laureates showed how such effects of expectations about future economic policy can give rise to a *time consistency problem*. If economic policymakers lack the ability to commit in advance to a specific decision rule, they will often not implement the most desirable policy later on. Kydland and Prescott's results offered a common explanation for events that, until then, had been interpreted as separate policy failures, e.g., that economies become trapped in high inflation even though price stability is the stated objective of monetary policy. Their awarded work established the foundations for an extensive research program on the credibility and political feasibility of economic policy. This research shifted the practical discussion of economic policy away from isolated policy measures towards the institutions of policymaking, a shift that has largely influenced the reforms of central banks and the design of monetary policy in many countries over the last decade.

Driving Forces Behind Business Cycles

Research by the Laureates also transformed the theory of business cycles by integrating it with the theory of economic

growth. Whereas earlier research had emphasized macroeconomic shocks on the demand side of the economy, Kydland and Prescott demonstrated that shocks on the supply side may have far-reaching effects. In their business-cycle model, realistic fluctuations in the rate of technological development brought about a covariation between GDP, consumption, investments and hours worked close to that observed in actual data. Previous business-cycle models had typically been based on historical relations between key macroeconomic variables. But models that had functioned quite well during the 1960s began to break down under the more turbulent economic conditions of the 1970s, with oil-price shocks and concurrent inflation and unemployment. The Laureates laid the groundwork for more robust models by regarding business cycles as the collective outcome of countless forward-looking decisions made by individual households and firms regarding consumption, investments, labor supply, etc. Kydland and Prescott's methods have been widely adopted in modern macroeconomics.

*FINN E. KYDLAND, born 1943 (60 years) in Norway (Norwegian citizen). Ph.D. from Carnegie Mellon University, Pittsburgh in 1973. Professor at Carnegie Mellon University and University of California, Santa Barbara, USA.
http://web.gsia.cmu.edu/display_faculty.aspx?id=85*

*EDWARD C. PRESCOTT, born 1940 (63 years) in Glen Falls, NY, USA (US citizen). Ph.D. from Carnegie Mellon University, Pittsburgh in 1967. Professor at Arizona State University, Tempe and researcher at Federal Reserve Bank of Minneapolis, USA.
<http://minneapolisfed.org/research/prescott>*

The Prize amount: SEK 10 million, will be shared equally among the Laureates.

More information: www.kva.se och www.nobelprize.org

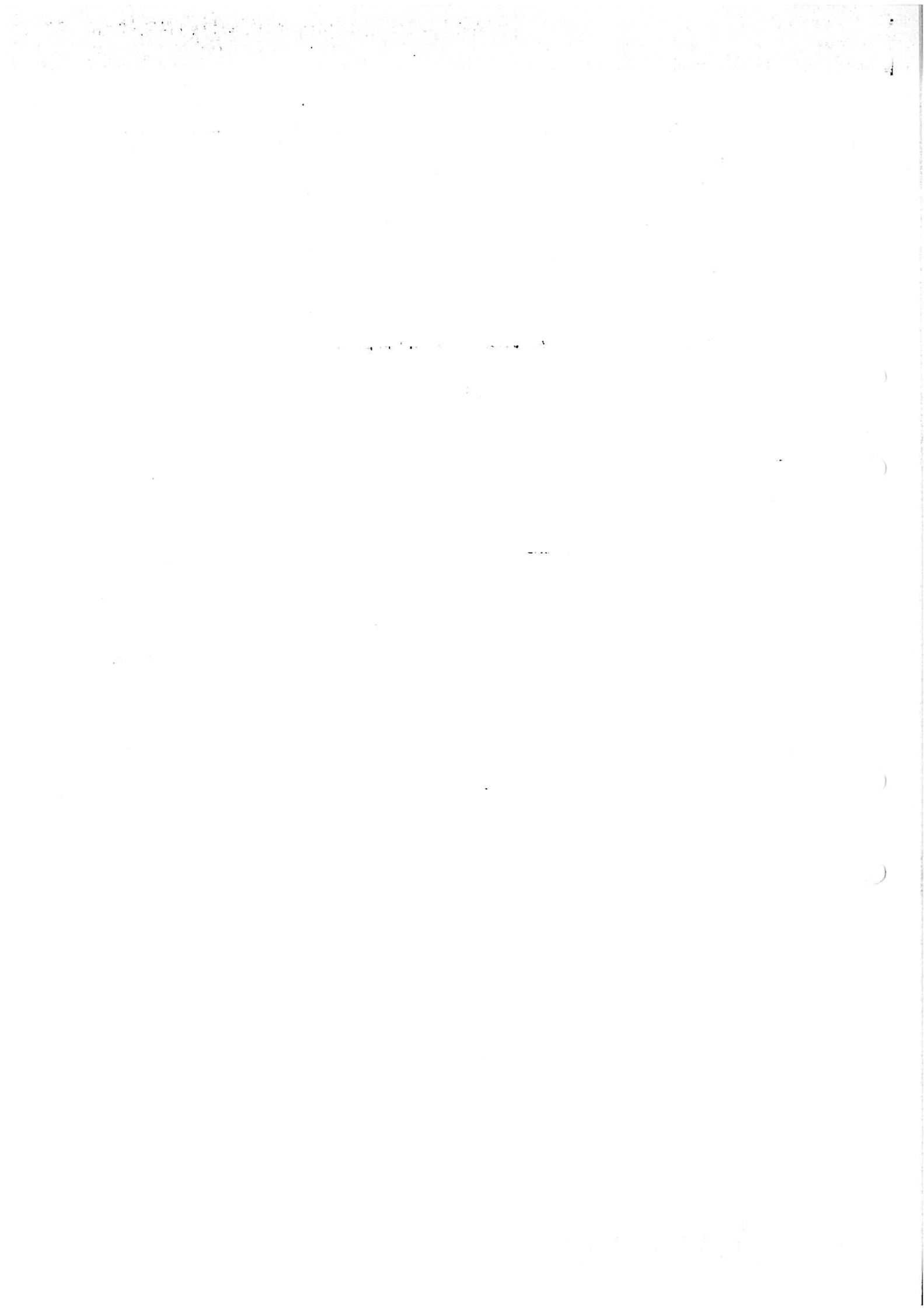
Contact persons: Fredrik All, Information Officer, phone +46 8 673 95 63, +46 70 673 95 63, fredrik@kva.se and Eva Krutmeijer, Head of Information, phone +46 8 673 95 95, +46 709 84 66 38, evak@kva.se



KUNGL.
 VETENSKAPSAKADEMIEN
 THE ROYAL SWEDISH ACADEMY OF SCIENCES

P.O. Box 50005, SE-104 05 Stockholm, Sweden
 Phone: +46 8 673 95 00, Fax: +46 8 15 56 70
 E-mail: info@kva.se, Web site: www.kva.se

Lilla Frescativägen 4A
 Underground: Universitetet
 Bus 40: Universitetet norra



The Prize in Economic Sciences 2004

FINN KYDLAND and **EDWARD PRESCOTT** have made fundamental contributions to the research area known as macroeconomics. In a highly innovative way, the Laureates have analyzed the design of economic policy and the driving forces behind business cycles. Their work has not only transformed economic research, but has also profoundly influenced the practice of economic policy in general, and monetary policy in particular.

Business Cycles and Time-consistent Economic Policy

Until the 1970s, the legacy of Keynes and the Great Depression dominated research on business cycles and stabilization policy. Economists regarded macroeconomic fluctuations as due primarily to variations in demand, for example in firms' investments and households' consumption. Analyses of economic policy focused on explaining what monetary and fiscal policy *should* be implemented to offset demand shocks. But hardly any effort was devoted to explaining the policy carried out *in practice*.

During the 1970s, the shortcomings of earlier analyses could no longer be ignored. It became obvious that stabilization policy based on existing theory failed to achieve the objectives of economic policy. Economies in the Western World were characterized by *stagflation* – concurrent unemployment and inflation – but prevailing theory was at a loss to explain it. At the same time, it became clear that macroeconomic fluctuations were driven not only by variations in demand. Shocks on the supply side, in the form of rising oil prices and declining productivity growth, also appeared crucial for the cycle. In two joint scientific papers, one published in 1977 and the other in 1982, Kydland and Prescott offered new approaches to the analysis of macroeconomic developments.

Macroeconomics

The research field in economics that studies aggregate economic phenomena, such as inflation, fluctuations in production and employment, and long-run growth.

TIME-CONSISTENT POLICY

In the late 1950s and early 1960s, the conventional wisdom, summarized in the so-called Phillips curve, was that economic policy could permanently reduce unemployment by allowing for high inflation. In the late 1960s and early 1970s, however, several researchers had begun to question this view. Milton Friedman (Laureate in 1976) and Edmund Phelps showed that there exists a long-run equilibrium level of unemployment independently of the rate of inflation. Unemployment can be reduced below this equilibrium level through higher inflation, but only in the short run. In the long run, inflationary expectations and wage increases adjust to actual inflation, which in turn brings unemployment back to its equilibrium level.

In the article from 1977, Kydland and Prescott extended the theory of economic policy. They showed that economic policymakers who cannot commit to a rule in advance often will conduct a policy that gives rise to high inflation, despite their stated objective of low inflation. The Laureates presented this as one of several examples of a general problem in economic policymaking: the *time consistency problem*. Since then, this concept has been at the forefront of research on – and the formulation of – economic policy.

Desireable Policies Often not Implemented

The essence of the time consistency problem is as follows: a policy which economic policymakers regard as the best option in advance, when it can influence households' and firms' expectations about policy, will often not be implemented later on, when these expectations have already been formed and shaped private behavior. Economic policymakers will therefore revise their decision, so that the policy they ultimately conduct will be worse than if they had had less discretion in policy choice. This result does not hinge on policymakers being guided by objectives different than those of citizens at large; rather, the difference appears in the constraints on the economic policy problem at different points in time.

A noteworthy example of the time consistency problem can be found in monetary policy. Assume that the objective of policymakers is low inflation and that they announce such a policy. Assume further that this results in low inflationary expectations and therefore small wage increases. In retrospect, it may be tempting to conduct a more inflationary monetary policy (through low interest rates), as this would reduce unemployment in the short run. Kydland and Prescott demonstrated that such temptations could result in the economy becoming trapped in high inflation without any effect on unemployment. If employers and wage-earners understand the policymakers' motives, the announcement of low inflation loses its credibility: high and self-fulfilling inflationary expectations give rise to large enough increases in wages that unemployment never declines.

Kydland and Prescott's analysis provided an explanation for the failure to combat inflation in the 1970s. But analogous time consistency problems arise in many areas of economic policy. For instance, in their article, the Laureates analyzed a similar problem in tax policy. A government can pledge tax cuts for certain kinds of activity (such as investments) – but once the investments have been made, it can nevertheless withdraw the tax cut in order to increase tax revenue. The time consistency problem has become a standard ingredient in subsequent research on economic policy.

Impact on the Institutions of Monetary Policy

The Laureates concluded that time inconsistency between decisions at different points in time can be highly disadvantageous for society. In their 1977 article, the Laureates considered the possibility of conducting fiscal and monetary policy on the basis of long-run rules, which are difficult to change. A drawback of such rules, however, is that they can restrict flexibility in economic policymaking when unexpected events (business-cycle shocks) occur. Later research, on monetary policy in particular, has therefore concentrated on reforms that change the institutions of policymaking rather than reforms that introduce binding rules. This work has had a far-reaching impact on reforms carried out in many places (such as New Zealand, Sweden, Great Britain, and in the Euro area), aimed at legislated delegation of monetary policy decisions to independent central bankers with different kinds of pre-specified price-stability objectives.

More generally, Kydland and Prescott's research has contributed to shifting the emphasis of economic policy design, in theory as well as in practice, away from isolated measures towards the institutional framework. The underlying insight is always the same: institutional design determines which measures are credible and therefore also feasible.

BUSINESS CYCLES

The second component of Kydland and Prescott's award-winning contribution is their analysis of the driving forces behind business cycles. This work has shifted the perspective on the causes of fluctuations in business cycles. But the main aspect is that the Laureates' methodology has provided the foundation for a new and extensive research program that has improved our understanding of business cycles.

Economic Growth and Business Cycles

Until the early 1980s, economists had studied long-run growth and short-run macroeconomic fluctuations – variations around long-run growth – as separate phenomena, and with separate methods. Long-run growth was regarded as governed by aggregate supply, with technological development as the driving force. But business-cycle fluctuations were regarded as driven by variations in aggregate demand around a long-run growth trend. There was no real connection between these two perspectives.

Earlier empirical business-cycle analysis had been based on rather broad generalizations regarding the relations between key quantities such as private consumption, investments, GDP and inflation. These relations were based on historical data, and appeared more or less robust in the stable macroeconomic environment of the 1950s and 1960s. The same statistical relationships turned out to be much less robust under the more turbulent macroeconomic conditions prevailing since the early 1970s. The basic reason is that these relationships did not depend on fundamental parameters that govern the behavior of individual households and firms. This made it nearly impossible to predict the effects of changes in underlying economic conditions (different levels of energy prices, changes in economic policy objectives, deregulation, etc.) and, as a result, to make reliable forecasts in such situations. In particular, Robert Lucas (Laureate in 1996) had expressed such criticism, but it was not until the publication of Kydland and Prescott's influential article in 1982 that the microeconomic foundations were established for macroeconomic business-cycle analysis.

Microeconomics

The research field in economics that studies the behaviour of, and interplay between individual economic actors, in particular consumers and producers.

In their article, Kydland and Prescott integrated the analyses of business cycles and growth by studying the transmission of short-run variations in the rate of productivity growth to different spheres of the economy. The Laureates based their model on the assumptions found in typical micromodels (utility-maximizing consumers and profit-maximizing firms) and focused on the implications of forward-looking expectations. They showed that investments and relative price movements transmit the effects of variations in the rate of technology growth to the economy, thereby giving rise to short-run fluctuations around the economy's long-run growth path. Since their model generated macroeconomic fluctuations remarkably similar to the actual development of consumption, investments and GDP, Kydland and Prescott had demonstrated that cyclical movements could well originate from fluctuations on the supply side of the economy.

Further Development in the Laureates Footsteps

Although Kydland and Prescott's first model was highly stylized, it laid the ground for a far-reaching research program. The mechanisms in subsequent analytical models have become increasingly more realistic. Today, the predominant view is that alongside shocks to the

demand side of the economy, different supply-side shocks (also encompassing variations in labor supply and wage-setting behavior) are important determinants of business-cycle fluctuations.

The so-called new-Keynesian business-cycle analysis emerging in the last few years is particularly relevant in that it synthesizes Kydland and Prescott's approach to business cycles and a more Keynesian approach. These models incorporate assumptions about sticky prices (wages) and imperfect competition on different markets into a framework which otherwise has many aspects in common with Kydland and Prescott's original setting, including an emphasis on forward-looking decisions. New-Keynesian models are used to examine supply and demand shocks, as well as monetary policy in general and its time consistency problem in particular.

Central banks, international organizations and others who make advanced business-cycle forecasts have begun to analyze cyclical phenomena using variants of the models initiated by Kydland and Prescott. These models are also applied to evaluate the effects of changes in economic policy regimes which may give rise to instability in historically observed relations among key macroeconomic variables.

In summary, Kydland and Prescott have provided the foundations for a highly improved theory of both macroeconomic policy design and business cycle fluctuations. In so doing, they have significantly increased our understanding of the macroeconomy. The Laureates' analysis of time consistency in economic policy has initiated a research program that has profoundly influenced the practice of policy design.

FURTHER READING

Original papers

Kydland, F. and E. Prescott (1977), "Rules rather than discretion: The inconsistency of optimal plans", *Journal of Political Economy* 85, 473-490.

Kydland, F. and E. Prescott (1982), "Time to build and aggregate fluctuations", *Econometrica* 50, 1345-1371.

More reading

Advanced information on the Prize in Economic Sciences 2004. The Royal Swedish Academy of Sciences: www.nobelprize.org/economics/laureates/2004/ecoadvo4.pdf

The time-consistency problem is by now a well established element of macroeconomic analysis. Good expositions can be found in any intermediate textbook, see e.g. O. Blanchard, *Macroeconomics*, Prentice-Hall, 2000, ch. 25.

A good presentation of the Laureates contribution to business cycle theory is given in C. Plosser, "Understanding Real Business Cycles", *Journal of Economic Perspectives* 1989, no. 3, pp. 51-77.

For a discussion emphasizing methodological aspects, see F. E. Kydland and E. C. Prescott, "The Computational Experiment: An Econometric Tool", *Journal of Economic Perspectives* 1996, no. 1, pp. 69-85.

Links:

www.kva.se/KVA_Root/swe/awards/nobel/economy/press/ecoreado4.asp

THE LAUREATES

FINN E. KYDLAND

GSIA
Carnegie Mellon University
Pittsburgh, PA 15213
USA

http://web.gsia.cmu.edu/display_faculty.aspx?id=85

Norwegian citizen. Born 1943 (60 years) in Norway. Ph.D. from Carnegie Mellon University in 1973. Professor at Carnegie Mellon University and University of California, Santa Barbara, USA.

EDWARD C. PRESCOTT

Research Department
Federal Reserve Bank of Minneapolis
P.O. Box 291
Minneapolis, MN 55480-0291
USA

<http://minneapolisfed.org/research/prescott>

American citizen. Born 1940 (63 years) in Glen Falls, NY, USA. Ph.D. from Carnegie Mellon University in 1967. Professor at Arizona State University and researcher at Federal Reserve Bank of Minneapolis, USA