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ROBERT J. GORDON AND THE INTRODUCTION OF THE NATURAL RATE HYPOTHESIS IN THE KEYNESIAN FRAMEWORK

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This article studies the dissemination of the Natural Rate of Unemployment Hypothesis (NRH) in macroeconomics during the 1970s, by studying the reaction of Robert J. Gordon to the argument of Friedman (1968). In the early 1970s, Gordon opposed the NRH, arguing that the estimated parameter on expected inflation was below one. Confronting to new data and to rising inflation, Gordon adopted the NRH after 1973. Nevertheless, the adoption anticipated any clear empirical proof. We explain that this conversion was due to Friedman's influence on Gordon, but also to the fact it did not prevent Gordon to support active stabilization policies.

JEL CODES: B22; E12; E31

KEYWORDS: Expectations; Natural Rate of Unemployment; Phillips Curve; Stagflation

INTRODUCTION

The recent meeting of the *American Economic Association* in Philadelphia testifies of the popularity of Milton Friedman's 1968 article: a special session was organized for the 50th birthday of the presidential address, with three articles by Olivier Blanchard (2018), Robert Hall and Thomas Sargent (2017) and Gregory Mankiw and Ricardo Reis (2018).[1] According to the latter, Friedman's article represents the third most cited *AEA* presidential address, and it "[marks] a turning point in the history of macroeconomic research" (Mankiw and Reis, 2018, 83). Friedman defended the existence of both a natural rate of interest and a natural rate of unemployment, which led him to claim that monetary policy is neutral in the long-run, due to the adjustment in expectations: if the rate

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[1]See https://www.aeaweb.org/conference/2018/preliminary/3035.

of unemployment decreases below its natural rate, inflation will accelerate until unemployment goes back to its natural level.[2] Consequently, he would have dismissed the contemporaneous belief in a stable trade-off between inflation and unemployment. This is what Robert Gordon, as others, called the Natural Rate Hypothesis (NRH). But Friedman's article also offered a clear policy conclusion: as the natural rate is impossible to measure precisely, and as monetary policy could consequently harm the real economy, the best policy is to follow a rule of constant monetary creation. About the same time, Edmund Phelps developed two formal models (1967, 1968) which likewise supported the idea of an "equilibrium" rate of unemployment and the long term neutrality of monetary policy. These two points are now part of the "core" of macroeconomics (Blinder 1997, De Long 2000, Taylor 1997) and used in major macroeconometric models, as in intermediate textbooks as Blanchard (2013). But even if policy rules have gained strong acceptance, although regularly contested, the stable rule of Friedman has fell into disuse.

James Forder (2014, chapter 4) shows that Friedman and Phelps were far from being the first to invoke the role played by expectations and the belief in a permanent trade-off between inflation and unemployment was not so well anchored in the discipline in the 1960s. Nevertheless, Friedman's contribution focused attention and aroused many debates on its consequences for the Phillips curve and for policymaking.[3] Robert Solow (1968, 1969) and James Tobin (1968) quickly proposed analytical and empirical arguments against Friedman's natural rate of unemployment and the long-run vertical Phillips curve. Two subsequent presidential addresses of the *AEA* directly focused on Friedman (1968) and raised arguments against it: Tobin (1972) and Franco Modigliani (1977).[4] But at the end of the 1970s, the concept of an equilibrium rate of unemployment and its accelerationist corollary had gained much popularity and were largely accepted. Two new textbooks by economists close to the Keynesian tradition, Rudiger Dornbusch and Stanley Fischer (1978) and Robert J. Gordon (1978), adopted the vertical long-run Phillips curve.

How did this change happen? How could we explain that most macroeconomists accepted so quickly the Natural Rate Hypothesis NRH? And to what extent does it represent a surrender of the Keynesian consensus of the 1960s to the policy conclusions of Friedman and the Monetarists?

This paper proposes some answers to these questions by looking at the works of Robert J. Gordon from 1969 to 1978. Gordon was trained at MIT where he obtained a PhD under the supervision of Robert Solow in 1967. From 1969 on, Gordon started to elaborate and test a wage-price model, for the Brookings Institution, to forecast inflation and to simulate the consequences of possible stabilization policies. Like Solow (1969) or George Perry (1973), he dismissed empirically the existence of the NRH in the early 1970s. He revised and discussed the implications of his model in the following years in the context of the debates triggered by Monetarist and New

[2]As it is a relation between *change* in inflation, and change in the rate of unemployment, it implies that if public authorities want to reduce inflation, they have to accept temporarily a rate of unemployment above the natural rate. Put another way, in current vocabulary, the long-run Phillips curve is vertical.

[3]Even if both Phelps' and Friedman's contributions were simultaneous, in 1978, Friedman's article counts twice more citations than Phelps (1968) according to Google Scholar.

[4]Dimand (this issue) exposes the two addresses and brings some intuitions on the reasons why Modigliani and Tobin did not encounter the same posterity as Friedman's presidential address.

Classical economists' criticisms of the Keynesian consensus and of active stabilization policies. Gordon constitutes a good case study because he began as an opponent of the NRH but finally accepted it and gave it a pivotal role in the macro textbook that he published in 1978.

The article documents the progressive change of Gordon from his opposition to the NRH to its acceptance. We first show that this path was not straightforward but developed in three stages. Gordon initially defended the existence of a long-run trade-off between inflation and unemployment and, for this reason, he rejected the stop-and-go policy of Nixon's administration. He then proposed an intermediary model incorporating the NRH above a certain level of inflation but claiming that the slope of the long run Phillips curve was variable below this threshold. Besides, he insisted on the fact that the "accelerationist" approach was not valid in the context of a deflation. This model was then put aside in favour of a simpler one. The motives of this evolution are examined in detail. We show that nothing in the writings of Gordon can explain clearly why he abandoned his intermediary model. The second aspect of Gordon's evolution that needs to be stressed is that although he accepted the NRH he continued to defend stabilization policies in opposition to Friedman and the New Classical economists.[5] This suggest that, in contrast to the standard narrative, his move could be seen as a simple sharpening of the definition of full employment in the Keynesian approach, a sharpening that entailed a more cautious defence of government intervention.

Section 1 presents the position of Gordon at the beginning of the 1970s, when he followed Solow's line. Section 2 shows how his beliefs crumbled off progressively as a result of new empirical results and a rising parameter on expected inflation. Section 3 explains why this reversal was not a plain surrender to Friedman's arguments.

1. Gordon in Defense of the Phillips curve and Full Employment Policies (1970-1972)

Gordon began to develop a "price and wage model" to forecast inflation in 1969. Economists were already confronted to the failure of their econometric models to predict the contemporary acceleration of inflation. Gordon's attempt to cope with this issue resulted in two BPEA papers (1970a, 1971a) showing what we might call a Keynesian stance (although Gordon himself did not use this adjective) close to the positions of Solow (1969, 1973), Modigliani and Lucas Papademos (1975), Perry (1973) and Tobin (1972). We consider three aspects of his initial understanding of the relation between inflation and unemployment: his defense of a long run trade-off between inflation and unemployment, his multi-factor explanation of inflation acceleration around 1970 and his support for a full employment policy.

[5]Gordon was mostly positioning himself against Friedman, rejecting his stance in terms of policy, though he displayed a real intellectual fascination for him. He opposed Phelps on the search theory, considering that it equals to draw unemployment as purely voluntary (Schwarzer, this issue, argues against that idea). But the opposition is less intense against Phelps because the latter also supports stabilization policies, although relying on a different framework (see Rivot, this issue).

1.1 THE LONG RUN TRADE-OFF BETWEEN INFLATION AND UNEMPLOYMENT

Gordon "wage-price model" assumes that the goods market is imperfect since firms indulge in mark-up pricing. The nature of competition on the labour market is less obvious: Gordon relates the rate of change of labour cost to the level of employment and refers to the "excess demand for labor" to explain the rise of wages. The first estimated version of the model in 1970 is the following:

(1) $$g_{pt} = 0{,}751 g_{\left(\frac{w}{q^T}\right)_L} + 0{,}1939 g_{\left(\frac{w}{q}\right)_t} + 0{,}0881 g_{\left(\frac{O}{S}\right)_t} + 0{,}1518 g_{mt}$$

(2) $$g_{\left(\frac{w}{q^T}\right)_t} = -0{,}4655 + 0{,}5025 m_t + 0{,}4531 g_{c*t} + 0{,}1726 g_{QL} + 0{,}4066 g_{TSt}$$ [6]

In the 1970 paper inflation depends on labour cost, productivity (with a distinction between change in productivity trend and temporary change), goods market tightness (proxy by the ratio of new orders to shipment) and labour market tightness, whereas the change in wages in comparison to productivity, relates to labour market tightness, the rate of growth of output and of social security tax, and of course to the expectations of inflation. Gordon notes that if the coefficient on the expected prices was "approximately 1, the equation would foretell an endless wage-price spiral whenever the employment rate exceeded some critical level" (1970b, 18). In other words, the combination of equations (1) and (2) defines a natural rate of unemployment under the assumption that price expectations are correct and if the coefficient on expected prices were 1 and not 0,45. But indeed, the value of the critical coefficient is far for unity in this estimation.

Gordon noted in the introduction of his 1970 paper that: "One major purpose of my research is to test the accelerationist hypothesis, associated in the professional economics literature with the names of Milton Friedman and Edmund Phelps" (Gordon, 1970b: 11). And he continued by claiming that:

[M]y equations do not validate the accelerationist hypothesis (…). Rather, they confirm the Phillips curve argument that a reduction in the unemployment rate can be traded off against a higher but ultimately stable rate of inflation. If high value is placed on a low unemployment rate like the 1966-69 average, the associated inflation will at least be steady rather than accelerating, even though it may be substantial. (ibid.)

How did he reach such a conclusion? The major issue was the estimation of price expectations. A convenient way to do it is to integrate past change of consumer prices, supposing that workers form their expectations by averaging the previous rates of inflation.[7] So Gordon estimated the weights of a distribution of lags on past

[6]Here is the list of variables: g_{pt}: rate of growth of non private farm deflator; $g_{\left(\frac{w}{q^T}\right)_L}$: rate of growth of standard unit labor cost or the rate of wage divided by productivity at full capacity; $g_{\left(\frac{w}{q}\right)_t}$: rate of growth of actual unit labor cost or wage divided by actual productivity; $g_{\left(\frac{O}{S}\right)_t}$: ratio of new orders to shipment; m_t and g_{mt}: total employment rate of hours per man and its rate of growth in the entire economy; g_{c*t}: the expected rate of change in the consumer price index; g_{QL}: rate of growth of output; g_{TSt}: rate of growth of social security tax rate

[7]The expected inflation could thus be formalized in the following way:

$$\pi_t^e = \sum_{i=1}^{m} v_i \pi_{t-i} \text{ with } v_i \geq 0 \text{ and } \sum_{i=1}^{m} v_i = 1$$

where π_t^e represents the expected inflation rate and the v_i 's are the different weights on past inflation. The fact that he summed the weights to one is crucial, because it is the feature that was attacked by Sargent (1971)

change of consumer prices, the weights summing to one, in order to obtain a proxy of expected inflation. Then he was able to estimate the whole wage equation, and he found an elasticity of wage change to past change of consumer prices of 0,45. He concluded:

Since it is 0.45, very substantially less than 1, each successive round of the wage-price spiral at a given employment rate will be smaller than the last, until both wages and prices stabilize at a steady rate of growth. (1971b, 18)

And he added that the slowdown in the rate of inflation in 1967 and early 1968 while the unemployment rate was maintained around 5 percent was a proof against the accelerationist hypothesis.[8] Gordon finally explained that with "the combinations of inflation forecasts and official unemployment rates", we are able to draw a Phillips curve and, if the unemployment rate is stable, the rate of inflation will be stable after a transition period – that is, the inflation rate will converge toward the (long run) curve.[9] Discussing Gordon's paper, Robert Solow, his former Ph.D. supervisor, noticed a result that confirmed his own earlier work:

My comment number zero is that the paper demonstrates that the accelerationist idea of inflation gets essentially nosupport from the data –confirming my own work and that of others. (Solow in Gordon, 1970b, 42)

Solow (1969: 14-15) himself had obtained a coefficient of 0,4 on price expectations while estimating a variant of Gordon's equation. He concluded that a long run trade-off existed (over 20 years of data) although it was less favourable than the short run one. This reference to a long-run trade-off can also be found in a paper by Perry (1973) and in the AEA presidential address of Tobin (1972). Modigliani and Papademos (1975: 142) referred to the "non vertical school" of the Phillips curve and also put forward a long run curve that was partly sloppy (it became vertical for a 4% rate of unemployment).

In the 1970b paper, Gordon did not distinguish explicitly between a short-run and a long-run trade-off.[10] The distinction appeared in the following article, "Inflation in Recession and Recovery" (1971b), in early 1971, when Gordon highlighted one of the major points of his paper:

In addition, the short- and long-run tradeoffs between inflation and unemployment are calculated. The results show that in the long run a given reduction in the unemployment rate causes a greater increase in the rate of inflation than most previous research has suggested; nevertheless, the data do not support the "accelerationist" hypothesis that there is no long-run tradeoff". (ibid.,106)

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to criticize the test of the NRH. The argument seems to have been pretty convincing according to Gordon (see below).

[8]However, Gordon is right only if we believe in a natural unemployment rate above 5 percent. But if it was below that level in 1967 and 1968, there was no basis for an accelerationist trend to appear.

[9]Gordon did not yet use the distinction between short-run and long-run Phillips curve.

[10]In the 1970s, Gordon talked about the "Phillips curve" for the wage equation, whereas for the price equation, he simply spoke of the "tradeoff between inflation and unemployment". From the 1980s, he used the term "Phillips curve" to name the price equation.

The long-run Phillips curve was obtained by assuming all factors except labour market tension factors and expected prices to be constant and by assuming that the expected rate of inflation was equal to the actual rate of inflation.

Gordon underlined that the coefficient on the rate of expected inflation was relatively high, 0,6, but remaining largely under unity. He decided to run several estimations by constraining the elasticity on price expectations to be 0.1, then 0.2, and so on until 1.2. Implementing a F-test, he explained that a 5% confidence interval contains the value between 0.3 and 0.9. He concluded that the value of 0.6 "cannot be regarded as precise, but it is significantly different from unity" (1971a, 126).

Even if he noticed the increase of the elasticity of wage change to price expectations, Gordon's position against the NRH was pretty clear and he defended a version of the Phillips curve close to the version that "Old Keynesian" leaders endorsed in the first half of the 1970s.

1.2A MULTI-FACTOR EXPLANATION OF INFLATION ACCELERATION

The papers published by Gordon in the early 1970s are fascinating because they document in live the failure of econometric models to predict the rise of inflation that occurred from 1969 on. This does not mean that Gordon and other policy activists were unable to explain the facts. A characteristic of Gordon's approach, reminiscent of Samuelson and Solow's 1960 defense of an eclectic view of inflation[11], is the plurality of factors he considered in contrast to the mono-causal approach of Friedman.

The message of Gordon's first model was that if, in 1969, inflation was high in spite of the declining rate of growth of output, it was mainly because of a surprise drop in productivity growth. The reduction of productivity increased labour costs hence prices. It also limited the impact of the growth slowdown on unemployment. The official unemployment statistic hid the actual tension on the labour market that Gordon's "total employment rate of manhours" revealed. Whereas the official rate of unemployment started the year at 3.3% and ended at 3.6% (the average for 1968), Gordon's modified total unemployment rate went markedly down from 5.19% in the last quarter of 1968 to 3.21 in the last quarter of 1969. So the overall explanation for the inflation of 1969 was one of labour market tension caused by an unexpected (and unexplained) reduction of labour productivity.

But for the second and third quarters of 1970, the previous explanation of stubborn inflation in the face of declining growth of output could no longer be successful. In the context of a recession, productivity rebounded and the "total employment rate of manhours" declined. Gordon's equation predicted a marked decline of the rate of growth of non-farm price deflator where there was none. He proposed a solution in his 1971a paper. Four factors explained the simultaneous surge of inflation and unemployment at the end of 1970. The slowdown of productivity and the tightness of the labour market in 1968 and 1969 were still causing inflation in 1970 because of lags in the response of wages and prices. Gordon paid particular attention to the modification in the structure

[11]Samuelson and Solow defended a pluralist approach of inflation recognizing the potential role of a variety of factors whether cost-push or demand-pull: "Dull as it is to have to embrace eclectic theories, scholars who wished to be realistic would have to steel themselves to doing so." (1960: 191)

of the labour market that modified the meaning of unemployment statistics. To the increase in hours on the job and the reduction of disguised unemployment, Gordon added the dispersion of unemployment analyzed by Perry (1970). Young workers and women, more numerous in the labour market in the 1960s than in the 1950s, suffered from a higher unemployment rates than "prime-age males". This means that the same average rate of unemployment implied a tighter labour market (regarding "prime-age males") than in the 1950s. In other words, the Phillips curve had shifted to the right. This also meant that the long run rate of inflation associated to a given rate of unemployment was higher in the 1970s than before:

A given official unemployment rate was associated with more inflation in the late 1960s than it was in the mid-1950s because of the increased dispersion of unemployment, so that in the long run even a 4.0 percent 'full employment' rate of unemployment causes a 5 percent rate of inflation now, as compared with only a 3 percent rate of inflation in the mid-1950s. (1970a, 144)

Gordon added the role of the tax surcharge decided in July 1968. His model showed that those tax increases had an inflationary effect lasting from two to four years. The last factor was the role of price expectations. "A growing body of evidence" showed "that price expectations, in so far as they are revealed in financial markets by the behavior of interest rates, are determined by a considerably longer history of past price changes." (1971a, 111). The increase in price expectations played an important role in the explanation of the increase of wages in 1970. This also means that his model combined the two possible explanations of inflation, as he put it "the pull of the labor market" and the "push of price expectations" (1971a, 108).[12] All these factors combined to shift the long run and so the short run Phillips curve upward.

1.3 Full employment policy

The last characteristic of Gordon's initial position in the debate over the Phillips curve is his defense of a full employment policy. The notion of "full employment" was still part of the discourse on stabilization policy of the Nixon administration in 1970. The official figure stated in "The Economic Report of the President" of February 1970 (p.84) was a rate of unemployment of 3,8%. But the "stabilization policy" presented by the report focused on the problem of inflation. The strategy was to slow down growth temporarily in order to reduce the rate of inflation durably. This "stop and go" policy was the target of Gordon's articles (1970a, 1971a).

Gordon's position was a direct consequence of his defense of the long run Phillips curve. Any given rate of unemployment implied a stable rate of inflation in the long run. This meant that a voluntary engineered deviation from full employment was useless. The rate of inflation could be reduced only temporarily if the unemployment target remained the same. This was the conclusion of the 1970a paper:

The stop-and-go policy of the Council of Economic Advisers, aimed at reducing or eliminating inflation by creating a temporary real output gap followed by a rapid output growth to close the gap, will yield a temporary

[12] It is clear here that it is possible to explain inflation by appealing to expectations (and past inflation) without assuming a natural rate and a vertical Phillips curve (which means a parameter on expected inflation equal to one).

reduction in the rate of inflation as long as the gap is maintained, but the rate of inflation will rise again when the output gap is eliminated. (1970a, 34)

In the 1971a paper, Gordon estimated and stressed the cost of the stop-and-go policy in terms of lost output by comparing various paths thanks to his model. In the short run, inflation had been reduced by 1% but at the cost of a loss of output of approximately $100 billion, what he considered as far too high. He proposed to pull down the long run Phillips curve by improving "the functioning of the labor market through higher skill levels, the upgrading of workers, and the encouragement of labor mobility" (1971b: 510) a policy that would work better if the economy was operating at a "low aggregate rate of unemployment". All this led Gordon to dismiss very explicitly Nixon's policy:

In short, whatever the target for the unemployment rate in the long run, the best short-run stabilization strategy is to guide the economy to it as rapidly as possible and remain there permanently. (1971a: 144)

In other words, Gordon defended a policy that would maintain a rate of unemployment of 4% accompanied by a structural action on the labour market in order to reduce as far as possible the related rate of inflation of 5%. This position was similar to the position defended by Solow (1973) who defended the long-run non-vertical Phillips curve, the 4% unemployment target, minimized the costs of inflation as compared to the loss of output implied by a 5% rate of unemployment and proposed "training programs to change workers in the secondary market" (1973: 19), a policy that would be easier to implement in a "booming" economy.[13]

Until 1971, Gordon clearly followed Solow's line. He defended an interventionist policy aiming at full-employment and considered as useless a stop-and-go policy that tried diminish temporarily inflation. What marked out this position was the belief in a long-run trade-off between inflation and unemployment combined to the belief that this long-run Phillips curve had shifted upward during the 1960s.

2. 1972-1978: THE ADOPTION OF THE NATURAL RATE HYPOTHESIS

Between 1972 and 1978, Gordon progressively abandoned the Keynesian model of his 1971a article. He admitted that the long-run vertical Phillips curve was vertical and adopted the concept of a natural rate of unemployment. He finally considered that the progressive adjustment of price expectations was the main cause of the stagflation observed in the early seventies. Gordon (2011) presents an oversimplified narrative of this conversion. According to him, econometric tests would have condemned the Keynesian approach as early as 1972 and "Sargent's simple but devastating econometric point" (*ibid.*, 19) showing the "logical failure" of the tests against the NRH would have settled the issue. As a matter of facts, if the conversion probably began around 1972, Gordon acknowledged it explicitly only in 1977 and in his 1978 textbook. The process was more progressive than Gordon (2011) suggests. Above all, he forgets to mention his elaboration in 1972 of a "variable coefficient" model allowing to reconcile parts of the Keynesian and Monetarists views, a model that was marginalized in his

[13]This position was already presented in the conclusion of Samuelson and Solow (1960) actually. See also Tobin (1972).

later writings. After documenting the progressive conversion with emphasis on the 1972 “variable coefficient” model, this section will discuss the reasons why Gordon abandoned the two key ingredients of his original stance: (1) the idea that the estimated coefficient on price expectation invalidates the NRH and (2) the idea that the structural transformation of the labour market represents an alternative to the monetarist explanation of stagflation. We will also analyse why the intermediary model of 1972 was put aside by Gordon despite the fact that it was not invalidated whether logically or empirically and assess his decision to embrace the simple framework of Friedman.

2.1 Gordon’s progressive change of mind: from the “variable coefficient hypothesis” to the “expectational Phillips curve”

1972-1973

In his second 1971 article published in the BPEA, “Steady Anticipated Inflation: Mirage or Oasis” (1971b), Gordon already attenuated his own results. However, in the conclusion, he maintained that there was "a plausible theoretical reason" to believe in a “negatively sloped long-run tradeoff”.[14] “Wage-Price Controls and the Shifting Phillips curve” (1972) marked a more important step. In this article, Gordon compared two models, his former model and a new one characterized by a variable coefficient on price expectations inspired by the work of Brinner and Eckstein (1972). The new model incorporated the NRH but only above a rate of inflation estimated to lie between 7,02% and 7,67%.

Perry and Eckstein were supporters of the Keynesian consensus. But in their paper, they leaned towards the adoption of the NRH and the accelerationist story in opposition to Perry and Gordon whose basic models favored an explanation of stagflation in terms of labour market transformation. For reasons that we will discuss below, Gordon (1972) developed a second model in which the elasticity of wage change to expected inflation was formalized as a positive function of the expected rate of inflation itself:

$$g_{w_t} = aX_t + b\left(g_{d_t^e}\right)g_{d_t^e}$$

with X_t representing labour market tightness variables and $b(.)$ representing the variable coefficient on expected inflation. Gordon assumed that b(.) was a linear function of the rate of inflation until the latter reached an estimated threshold value. Above the threshold the coefficient was constrained to unity. In other words, for low or even negative rates of inflation (below 7%) the long-run Phillips curve was sloppy and a trade-off existed between unemployment and inflation. But once the threshold was reached the long-run Phillips curve became vertical and inflation accelerated whenever unemployment fell below its natural rate. Gordon commented further on the asymmetry of this Phillips curve in a paper written in 1973 discussing the Lucas critique (Gordon, 1976b):

[14] Gordon's statement is paradoxical here, as his previous justifications for refusing the vertical Phillips curve relied mainly on empirical proofs, rather than on theoretical motivations.

Since Lucas' model is symmetrical, it yields the counter-factual implication that the long run Phillips curve is vertical throughout, and hence that a period when unemployment remains above its "natural rate" for a number of years will be characterized by an accelerating deflation. During the Great Depression the unemployment remained above 8,5 percent for twelve straight years (1930-1941), and yet there was not the slightest sign of accelerating deflation. (Gordon, 1976b, p. 56)

The new model was thus consistent with the NRH for high rates of inflation but consistent with the Keynesian view for low rates of inflation and in cases of recessions.

Gordon showed that his two models were equally significant in explaining the inflation of the late 1960s. However, even if it was not really better in econometric terms, the variable model had certain advantages:

[I]t reconciles (1) the partial adjustment observed in most postwar econometric studies of wage behaviour; (2) the steady increase in the size of the partial adjustment coefficient as the sample period is extended into the late 1960s; (3) the accelerationist hypothesis that the rate of inflation will steadily accelerate if the unemployment rate is permanently maintained below a certain "natural" rate; and (4) the relative flatness of the Phillips curve to the right of the natural rate evident in the absence of any apparent tendency to accelerating deflation during the last half of the Great Depression. (1972, p. 406)

Even if he refused to choose between the two models, Gordon seemed attracted by the new one. He also showed himself more cautious in his policy recommendations in 1972. Policymakers had to be careful concerning "the pace of the current economic recovery" (*ibid.*) if they did not want to push inflation on the accelerationist side. Facing the "gloomy" perspectives (*ibid.,* 417) implied by the variable parameter, Gordon explained that "society" should renounce to "have full employment and even a 4 percent rate of inflation, much less a 2.5 percent rate" except if controls were maintained indefinitely (what he considered as a mistake) or "manpower and social programs succeed in reversing the unfavourable shift in the structure of labor markets" (*ibid.,* 418).

Solow did not miss the evolution. In "Down the Phillips Curve with Gun and Camera" (1976), Gordon's former supervisor came back on the opposition between the labour market and expected inflation explanations. He favored Perry's analysis and criticized the method used by Gordon to estimate inflation expectations, claiming his preference for survey data that contradicted the adjustment of expectations story.

The two following papers in the BPEA, published in 1973 (Gordon 1973a, 1973b), brought no more tests or developments on the NRH issue. But Gordon claimed that "the empirical evidence supporting the natural-rate hypothesis for the United States was still sufficiently inconclusive", leading many economists to doubt whether it was relevant (Gordon 1973b, 135). At the end of 1973, we do not have a clear image of Gordon's stance concerning the NRH and the accelerationist story. His first model contradicted the NRH, but he proposed a second one compatible with it. Nevertheless, he did not claim that one of them was superior to the other and he did not admit the truth of the NRH.

1975-1977

A new step forward was made in 1975. In "The Impact of Aggregate Demand on Prices" (1975c), Gordon introduced a third model or what he now called an "expectational Phillips curve" of the form:

$$w_t = p_t^e + b(X_t)$$

With w_t the change in wages, p_t^e expected inflation, and X_t an indicator of the current excess demand for labour. This equation embraced the accelerationist point of view by postulating that the elasticity of wage change to expected inflation was equal to unity (1975c, 616). The other 1975a BPEA article and theoretical papers published outside the BPEA (Gordon 1975b, 1977b) displayed the same "expectational Phillips curve". What is striking in those articles is the absence of any justification for the abandonment of the "variable coefficient model" and the absence of any discussion of the value of the coefficient on price expectations.[15] Gordon endorsed the NRH as if he never opposed to it before. The long-run Phillips curve was now assumed to be vertical in any circumstance.

In a 1976 survey article in the *Journal of Monetary economics,* Gordon argued that macroeconomists predominantly accepted the argument at that time, claiming that:

The Council of Economic Advisers was now to be divided into two independent branches, one group of labor economists which would tally up the costs and benefits of manpower programs designed to shift the natural unemployment rate, on which monetary and fiscal policies by themselves had no effect, and a second group of monetary economists which determined the optimum rate of inflation as a function of the growth rate of real output and the interest rate paid on money, and the marginal costs of levying conventional taxes. (Gordon 1976c, 191-92)

Some lines below, he explained that there was a "continued conversion" (*ibid.* 197) to the NRH and that even the hardest non-monetarists like Modigliani had "implicitly adopted" it, with his concept of "noninflationary rate of unemployment", the NIRU (Modigliani and Papademos 1975).[16]

But only in his last BPEA article of the period did Gordon (1977a) estimate again the coefficient on expected prices. This re-estimation of the wage-price model with new data, taking into account the oil shock of 1973 and the wage-price controls, showed that the unemployment-dispersion variable of Perry was no longer significant (*ibid.* 380) whereas the estimated parameter on expected inflation was close to one. It was the first time that

[15]To our knowledge, Gordon never used again the model with a variable parameter even if his later works mention its existence (Gordon, 1976c, 193, 1990, 1134, fn.26, 2011, fn.6).

[16]Actually, the conversion of Modigliani in the 1975's paper is far from being obvious, considering his claimed preference for a decreasing long run Phillips curve in the paper (Modigliani and Papademos 1975, 146-47), but also, for instance, in a discussion of an article by Ray Fair in a 1978 conference (Modigliani in Fair 1978, 197-198). Besides, the general conversion did not appear obvious as some empirical results continued to reject the NRH (Cukierman 1974), or for the least to cast the doubt on its empirical validity (R.A. Gordon 1975).

Gordon clearly claimed that the data confirmed the NRH "is vindicated by the revisions in the official data" (*ibid.* 265). Following this first estimation, he decided to constrain the parameter to be one, and claimed that it improved the fit of the model (*ibid.* 276).

1978

Gordon's conversion to Friedman's version of the NRH became obvious in *Macroeconomics*, the first edition of his textbook, published in 1978. In the basic model of the book, the author assumed that the economic system always returned to its potential output or to its natural rate of unemployment due to the correction of expectations. What the textbook makes clear is that the natural unemployment perspective of Gordon's 1977 paper was not the adoption of a model fitted to the particular context of the 1970s. As a matter of fact, in the textbook, Gordon used his "simple model" to interpret facts ranging from the first World War to the 1970s. And Friedman, not Phelps, appeared as the major influence.

Part III of Gordon's textbook was dedicated to "Inflation and unemployment". Its first chapter (chapter 7), introduced the aggregate supply curve to complement the IS-LM (and aggregate demand curve) framework presented in the second part. Gordon distinguished a short run and a long run supply curve. The long run curve was vertical and corresponded to the equilibrium on the labour market when expectations were correct. The slope of the short run curve resulted from the fact that "firms and workers define the price level differently" (1978a, 178), the former being interested in the current price and the latter in the future expected price level corresponding to the moment they are paid. This opened the possibility that workers "do not realize that the price level has risen" (*ibid*. 179). A footnote indicated that "The simple model described in Figure 7.3 is precisely that of Milton Friedman's Presidential Address" (*ibid*. 179) and quoted the paragraph in which Friedman explained the mistake committed by "employees".[17] In chapter 7, a static expectations assumption ($P^e = P_{-1}$) was used to explain how the system always returned to its long run equilibrium. Chapter 8 translated the model in terms of inflation rates and unemployment rate and introduced the short run Phillips curve and the long run aka natural rate unemployment Phillips curves. The chapter also showed how an adaptive expectation hypothesis could explain an "inflation cycle" in which the rate of inflation and the rate of unemployment overshot their long run values.

All along the way, Gordon showed how his framework could explain the facts. He showed five historical episodes in which the rise of the price level is demand pulled. In each case, output increased beyond it potential for a time and then returned to it. This was illustrated by graphs showing how the ratio of output to its potential tended to return to the value of 1. The reader just had to trace the vertical supply curve to see it. For Gordon

[17] It is worth noting that the third edition of the textbook (Gordon, 1984) explains the same mechanism by substituting slow wage adjustment to misperceptions. In 1978, Stanley Fischer and Rudiger Dornbusch published an intermediate textbook too (Dornbusch and Fischer, 1978). However, they chose a different path by assuming monopolistic competition and price and wage rigidities, while clearly accepting the NRH. They nevertheless discussed the case of a long-run tradeoff even if they supported the vertical long-run Phillips curve, discussion which is absent in Gordon's textbook.

cost-push could only account for the 1973-1975 decline of the output ratio. The rise in food and imports prices had pushed the supply curve leftward. In chapter 8, Gordon examined the 1964-1971 case with more detail. The introduction of the case study pointed out the mistake of economists in the 1960s concerning the existence of a trade-off between inflation and unemployment. Then Gordon remarked:

The real world never precisely duplicates any simple textbook model, but the U.S. inflation and unemployment rates during the 1964-1971 period provide a classic example of the effects of accelerating demand growth. (1978a, 227)

Gordon estimated that the natural rate of unemployment was 4,7 percent in 1965 equal to the actual rate of unemployment. But the acceleration of the rate of growth of nominal income from 1965 to 1969, from 1,5 percent to 4,4 percent led the rate of unemployment to fall below this rate. An acceleration of the rate of inflation to about 5 percent in 1969 ensued. Inflation and the rate of unemployment then "'overshot' its long run equilibrium value" just like in the theoretical model presented two pages before.

The influence of Friedman is obvious in the textbook. He is the only economist to whom Gordon refers in relation to the assumption that the economic system automatically returns to the natural rate of unemployment or when he explains the notion of a natural rate. Phelps is referred to in chapter 9 only and in connection to his works on the theory of the job search (1978a, 262). The book contains four "biographies" on John Maynard Keynes, Friedman, Modigliani and Tobin. The one on Friedman is the longest and its tone betrays the admiration of its author.

The impression conveyed by this little comparison is reinforced by Gordon's insider's description of Friedman's Money and Banking workshop at the University of Chicago as a source of the "scholarship responsible for the renaissance of money":

The workshop was always stimulating, even if the paper was not, in which case Friedman would explain to confused participants what they had really meant to say, what the issues at dispute really were, and what he thought about aspects of present policy and past history. (1978a, 340-1)

In 1978, Gordon had thus abandoned the notion of a sloppy long run Phillips curve and embraced completely Friedman's natural rate hypothesis. This led him to take some distance with the Keynesian stance of Solow or Tobin. What had happened?[18]

2.2 How facts and the Sargent critique refuted the refutation of the NRH

The rising coefficient

[18] On the influence of Friedman and Gordon's change of mind see Nelson (2015).

The main reason why Gordon changed his mind concerning the NRH has to do with the estimated value and the interpretation of the elasticity of wages with respect to price expectations. The new data gathered in the 1970s resulted in a rising coefficient. This was enough to believe that the long-run Phillips curve had become vertical. Besides, Sargent showed that a coefficient below unity could not invalidate the NRH. Previous tests were inconclusive. But all this does not explain why the variable coefficient model was put aside.

Already in 1971, Gordon discussed the possibility that his estimates understate the actual value of the coefficient on price expectations. He noted that if some of the final variables in his wage equation were omitted, the "accelerationist value of unity" was no longer outside the statistical confidence limits (1971a, 508). In other words, if Perry's "dispersion unemployment" was removed, one had an elasticity of inflation expectations closer to unity. He also acknowledged the potential bias on the measure of the coefficient of expected inflation relying on a particular American institutional pattern: union wage contracts are negotiated for three years. Consequently, taking only into account the increase in current negotiated contracts might increase the coefficient. The unity of the parameter would be hidden behind the rigidities of contracting mechanisms.[19] Finally, the value below one could result from an adaptation of the economy to the low inflation of the 1950s and early 1960s:

The coefficient below unity on expected inflation may reflect in part a temporary situation and may not be suitable for extrapolation to situations of substantial steady inflation, which would be characterized by more generalized cost-of-living protection and more frequent wage agreements. (Ibid. 509)

In other words, low inflation encourages workers to overlook inflation when they negotiate their wages. Consequently, econometric estimations with a sample incorporating a long period of low inflation would display a low elasticity of wage increase to price expectations.[20] To Gordon, this possible underestimation of expected inflation in the current period should "[flash] a yellow light to policy makers who want to push unemployment below the natural rate" (*ibid.* 509-510).

Between 1970 and 1971, Gordon's mean estimate of the coefficient on price expectation rose from 0,45 to 0,6 as we saw in the first section. In 1972, he showed again with different methods that the coefficient on price expectations had increased: "the best-fitting coefficient sum rises from 0,4 in the early period to almost 0,8 in the last period." (1972, 403) A coefficient equal to one was now the upper bound of the confidence band. So if there was still "no evidence that the elasticity of wage change to expected inflation was a large as unity during the sample period" (*ibid*. 404), the new results opened the possibility that the coefficient was in the process of converging to unity and led Gordon to elaborate his variable coefficient model. Taking up arguments already

[19]This argument—as the following—symbolized the fact that expected inflation, measured by past inflation, gathers two types of mechanism: expectations, in the strict sense of the term, that is "a conscious cognition of the future" as Forder (2014) put it, and institutional patterns (in wage contracting processes for instance) or habits (see below).

[20]Solow (1969) himself also raised the possibility of such a rise of expected inflation, due to a period of higher inflation. But it implies that as inflation remains high, the behavior of wage inflation converges toward the accelerationist story.

considered in 1971b, Gordon argued that the economic system, through its institutions, was adjusting itself to a rising expected rate of inflation:

The steady and regular increase during the 1960s on the coefficient of past inflation in wage equations suggests the possibility of a disequilibrium adjustment process that had not been completed by the end of 1970. (…) the degree of consciousness of and adaptation to inflation depends on its expected future behaviour. Many wage agreements and other contracts, which are stated in nominal terms when the expected rate of inflation is low, gradually are converted to real terms through inflation escalators when the expected rate of inflation increases. (Ibid. 404)

Followed an argument on economic policy which clearly presaged the Lucas critique:

Simulations of alternative future economic policies may be too "optimistic" if they assume that the partial adjustment of wage change to inflation evident in most published estimates will persist indefinitely. (Ibid.)

The elaboration of the variable coefficient model shows that Gordon began to believe that the coefficient might be converging to a value of one. The NRH might become relevant. But it also shows that for him the behavior of wages and prices depended on the context. The NRH was *not* relevant to understand a low inflation regime like the one prevailing in the 1950s and early 1960s. The long-run Phillips curve might become vertical but Gordon still considered that it was not in the early 1960s. This can be explained by his emphasis on labour market institutions as opposed to expectations. The determination of wages was not related directly to price expectations. Price expectations had an impact on the labour market only if they modified its institutions (the nature of the contracts) and a certain level of inflation was required before institutions were modified.

The Sargent critique

In 1970 and 1971, Gordon argued that his wage-price model offered a test to the NRH and allowed to reject it. The rising value of the coefficient on expected price weakened this conclusion but as long as it remained below one, the NRH was considered as unsupported by the data. This part of the Keynesian argument crumbled after a critique formulated by Sargent (1971) and discussed by Gordon ([1973] 1976b, 54) who pointed out that the econometric tests themselves were doubtful: the rejection of the accelerationist case could be explained either by the falsity of the NRH, or by something being wrong with the estimates of expectations, "both explanations may be valid".

Sargent (1971) criticized the logic of the tests of the NRH based on estimations of the elasticity of wage change to expected inflation. Consider the following Phillips curve equation:

$$\pi_t = \theta\pi_t^e + f(U_t, \dots) + \varepsilon_t$$

with $f(U_t, \dots)$ a negative function of the unemployment rate, and a positive or negative function of other variables (undetermined here) and $\varepsilon_t$an unobservable random error variable. In order to test the accelerationist

hypothesis, you must estimate the value of θ. But before that you need to approximate what the expected inflation π_t^e is. You assume (as explained above), that it is a mean of different lags on past inflation:

$$\pi_t^e = \sum_{i=1}^{m} v_i \pi_{t-i} \text{with} v_i \geq 0$$

According to Sargent, it was common at the time to constrain the sum of the v_i's to be equal to unity (*ibid.* 722). However, this widespread practice had no theoretical or econometric justification. Moreover, it biased the estimation of θ. Imagine that in the "true" structure of the economy, the v_i's sums below unity. If one imposes the traditional constraint of summing to unity, one is overestimating expected inflation, and consequently one underestimates θ. And, if one wanted to correctly estimate the impact of past inflation in the early 1970s, the unity constraint was irrelevant, because it meant that the price time series displayed a strong serial correlation—as in a random walk. However, in the 1950s and the 1960s, it appeared that the inflation rate was not a "drifting" variable, and was more close to a "white noise", justifying a sum of the v_i's below unity and much closer to 0 (*ibid.* 724). Consequently, if one imposed such a constraint on past inflation, the estimation of the elasticity of wage inflation to expected inflation could not constitute a test of the theoretical proposition that there exists an equilibrium rate of unemployment. Sargent's argument implies that if the behavior of inflation changes—following shifts in policy, for instance—the way economic agents form their expectations will change too.

Sargent's argument convinced Gordon according to his 2011 testimony on the subject. But if previous tests did not reject the NRH, this argument did not prove its validity either. As long as θ remained below one the actual (empirical) long run Phillips curve of the economy remained sloppy. For this reason, the decisive proof must have been the first test showing in a conclusive manner that the coefficient on price expectations was equal to one. As we mentioned above, the first test of this nature appears only in 1977 in Gordon's published works. This implies that his adoption of simple NRH models in 1975 was not based on inescapable evidence or arguments. All the more so, since he still believed that the Perry explanation of stagflation was alternative to the Monetarist explanation (more on this below). What the evidence suggests is that Gordon was impressed by the fact that the coefficient on expected prices kept increasing. The curve was rotating. But the 1978 textbook also suggests that the ability of the theoretical argument of Friedman to explain the facts seduced him even though its empirical validity remained conjectural until 1977.

Finally, nothing explains why Gordon marginalized his variable coefficient model in his later writing. As he put it in Gordon (1976b) that model enabled to "[reconcile] the empirical data with Lucas's claim" (*ibid.* 56). The Sargent critique showed that the parameter θ said nothing about the nature of expectation behaviors. But its variation across time remained an empirical fact and with it the rotation of the empirical long-run Phillips curve. Actually, the rate of inflation only passed the threshold identified in the 1972 paper during the year 1973 in the United-States. So the two regimes of the model remained relevant to explain the evolution unemployment and inflation in the US from 1950 to 1978. Again, why did Gordon abandon this model? An Occam razor argument might do the job here. After 1973, the vertical Phillips curve model was the relevant one. Why use a more complex one? And before 1973, the explanation of facts in terms of a rotation of the long-run Phillips curve due

to the adaptation of expectations and institutions, could be replaced by an explanation in terms of shifts of the short-run Phillips curves. The latter was obviously more simple. One can easily see the pedagogical advantage in the context of the macroeconomic textbook. But in the process, the distinction between the slow adjustment of institutions and the adjustment of expectations was lost. And with it, the capacity to understand the facts faced in recent years when after a long period of low inflation, a rate of unemployment below the natural rate does not trigger an acceleration of inflation (Blanchard 2016).

The structural transformation of the labour market: from alternative to complement

We have seen how Gordon abandoned the long-run trade-off of his first BPEA articles. But what about the other pillar of his early stance, his explanation of stagflation as the result of a structural transformation of the labour market? In his 1971 paper, Gordon showed that if Perry's "dispersion unemployment" was removed from the wage equation, one had an elasticity of inflation expectations closer to unity. In his 1972 paper, Gordon presented explicitly the transformation of the structure of the labour market and the adjustment of price expectation as alternative explanations of stagflation. Actually, a major theme of the paper was the discussion of “the tradeoff” between these “alternative hypotheses” (Gordon 1972, 395 and 401). As we noticed above, in 1977a Gordon proposed a simple NRH wage-price model and concluded that Perry’s unemployment dispersion variable was no longer significant. But actually, this argument was not abandoned by Gordon. Rather, he realized that it was complementary. Once the natural rate of unemployment had been introduced in the model, Gordon’s former argument concerning the labour market could be interpreted as a modification of the natural rate. This idea appeared first in “Structural Unemployment and the Productivity of Women” (1977d). Gordon claimed that Perry’s “structural shift in unemployment” had been accepted by “most proponents of the NRH” (*ibid.* 181).

The point was developed in the 1978 textbook. Gordon calculated that the natural rate of unemployment had risen from 4,2 percent in 1953 to 5,6 percent in 1976. This was explained by a shift in the composition of the labour force (1978a, 250-1). A graph on page 249 made clear that this was not enough to explain the facts. During the 1965-1969 period, the actual rate of unemployment was below the initial value of its natural level in 1964. An excessive rise of public spending and the resulting adjustment of expectation was necessary to explain the acceleration of inflation and the rise of unemployment in the early 1970s.

Finally, Gordon’s conversion to the NRH was not straightforward. In the process, he proposed an intermediary model allowing the long-run Phillips curve to rotate and combining Keynesian and Monetarist ingredients. The abandonment of this model in favor of Friedman’s simpler version of the NRH was never discussed by Gordon himself. Occam’s razor was probably at work here but it was not without loss. The main explanation of Gordon’s shift as to do with the evolution of the estimates of the coefficient on expected prices in his wage or price equations. And the critique of Sargent killed the belief that earlier results invalidated the NRH. But since the shift was already made in 1975, we suggest that the larger intellectual context and the direct influence of Milton Friedman also played a role. Beside, Gordon reinterpreted Friedman’s model to preserve the defence of stabilization policies.

3. A "RECONSTRUCTED CASE FOR ACTIVISM"

But events in the 1970s support a reconstructed case for activism (…). (Gordon 1978b, 340)

Gordon's conversion to the natural rate hypothesis did not lead him to accept Friedman's conclusions concerning macroeconomic policies whether the "constant growth monetary rule" or his rejection of any unemployment target. In the second half of the 1970s, Gordon still defended stabilization policies and criticized the use of recession to stop inflation. His position was no longer based on the existence of a long run trade-off between inflation and unemployment. Stabilization policies could be vindicated by the inertia of inflation and of wage adjustments shown by econometric models. The target had changed. It was no longer the 3,8% full employment of 1970 but the 5,5% natural rate of unemployment below which inflation would accelerate. But all in all, what the work of Gordon showed was that absorbing Friedman's argument did not destroy the case for macroeconomic activism.

3.1 INERTIA AS AN EMPIRICAL TRUTH

The first thing to be noted is that Gordon's econometric works incorporated the NRH of Friedman in the context of his original model of price and wage setting (Gordon 1975b and 1977a). This model was at variance with the perfect competition and market clearing assumptions privileged by Chicago School economists. In other words, the Monetarist assumption was introduced in a non-Monetarist framework.[21] Gordon stressed the inertia and the lags affecting inflation and the adjustments of wages, inertia which was not an assumption in the context of his econometric models but the result of his estimations. In the context of a theoretical model, assumptions of wage or price rigidities might seem ad hoc, but when resulting from the estimation of lags they appeared as an economic fact, hence a powerful justification for stabilization policies.

In his 1975 paper on the impact of aggregate demand on inflation, Gordon stressed the inertia of that phenomenon. This was particularly obvious in the model relating the rate of inflation to the rate of money growth:

So the chain of influence from money to spending to unemployment to wages to prices is a lengthy one. Much of the inertia lies in the influence of unemployment on wages. (1975c, 647)

Gordon also remarked that this inertia was already apparent in preceding models:

The reduced-form regression of inflation on the rate of change in the money supply confirms the predominant influence of inertia on price-setting behaviour evident in previous structural wage-price models. (Ibid., 654)

He used this finding to reject the conclusions of the monetarists and of Sargent and Wallace (1975) concerning the monetary theory:

[21]Rivot (this issue) shows how Friedman (1975) clarified his position on the Phillips Curve, by claiming that the sense of the causality is the one of Fischer (1926), and not the one of Phillips (1958), that is to say that inflation is the independent variable, and unemployment and output are the dependent variables.

If the effect of monetary changes on price changes is delayed so long, then the policy recommendations of the monetarists, usually based on the assumption of much shorter lag, lose some of their appeal. And it is also hard to accept the conclusion of the rational-expectation theorists that the monetary authority in principle has no power to control real output. (1975c, 647-8)

The defence of monetary policy appeared as a major conclusion of the paper:

Neither policy makers nor their advisers should be intimidated by those who claim that an attempt to stimulate temporarily rapid growth in real output by a temporary acceleration in the money supply would simply raise price. (Ibid., 654)

An interesting aspect of the 1975c paper is the way Gordon tried to make sense of the observed inertia. He argued that rational agents "may be perfectly aware of what the Federal Reserve is doing, but they do not translate their knowledge into instantaneous changes in prices" simply because they are aware of the existing lags (*ibid*. 648 and 654). In other words, due to the observed lags, it is rational not to adjust price expectations immediately. Gordon is mixing here two mechanisms that he will distinguish more clearly later (2011). The expected inflation variable, when represented by an average on past rates of inflation, can represent either expectations or inflation "inertia"—or either "a conscious cognition of the future" or a mere "adaptation to the environment" as Forder (2014, chapter 4) puts it. This absence of distinction is widespread in the literature on the Phillips curve in the 1970s, but it conveys implicit consequences for policymaking. If the inertia part of inflation is strong, every disinflation policy, for instance, will be costly, because institutional patterns and habits will adjust slowly. But if expectations strictly speaking play a dominant role, we can hope a rapid disinflation if the policy is credible. It is the idea behind Fellner's (1979) defence of credibility for monetary policy, that we also find in Sargent's works in the early 1980s.[22] Consequently, the insistence of Gordon on rigidities and inflation inertia is a way to warn against the potential costs of disinflation policies. Besides, an activist case based on the slow adjustment of expectations would have been weak, for such an assumption would have implied persistent irrationality on the part of workers and firms. The reference to long term contracts or to the cost of adjustment of prices (as in the 1973 paper on the Lucas critique mentioned earlier) introduced institutional elements less easy to discard.

In his 1977 re-estimation of his wage-price model, Gordon examined the policy options opened to the government. He did not plead explicitly for a course of action. But the results of his simulations spoke for themselves. On the basis of the most convincing version of his model, one that incorporated the NRH, he considered three paths for the output gap and calculated the resulting path for inflation. A policy of maintaining the output gap at 6,2% would have reduced the rate of inflation in a "turtle-like" manner to two percent in 1986 only and that implied a loss of output "that would substantially exceed $1 trillions" (1977a, 277). A closing of the gap in three years, the option of the Carter administration at the time, would lead to a long run rate of inflation

[22] For Sargent's position on disinflation policies, see Goutsmedt (2017). Robert Gordon, in a paper with Stephen King (1982), dismissed empirically the argument of rational expectations models for costless disinflation policy, due to quick adjustment of expectations. See Goutsmedt *et al.* (2017) for the debates on credibility, the Lucas Critique and the cost of disinflation following Volcker's policy.

of 6% for a rate of unemployment of 5,5%. Gordon's insistence on the fact that a policy to "eliminate inflation through demand restraint would be exceedingly costly" in his conclusion suggests that his preferred option was the Carter path.

Gordon's position concerning policy after his adoption of the NRH was made totally clear in a paper in AER titled "What Can Stabilization Policy Achieve?" (Gordon 1978b). This little survey of the debates surrounding stabilization policies since de 1960s ended with a rejection of the "constant growth monetary rule" of Milton Friedman:

When output is well below target, rigid adherence to a CGRR [Constant Growth Rate Rule] monetary policy leads to permanent acceptance of high unemployment if there is no downward adjustment of prices, and to overshooting the target if prices do adjust. Deviations from any reasonable estimate of target output have been large enough to allow a sizeable temporary stimulus without need for excessive concern about multiplier uncertainty. (Ibid. 340)

Active monetary policy was still needed. Only the target had changed and the public authorities should try to avoid overshooting and the acceleration of inflation by aiming at closing only a fraction of the output gap (1978b, 339). Gordon also rejected the Keynesian fiscal policy of modifying income taxes used in the 1960s on the basis of the permanent income argument. But it could be replaced by cuts in sales or payroll taxes that would reduce unemployment and inflation at the same time.

3.2 The defence of stabilization policies in the 1978 textbook

Gordon's *Macroeconomics* (1978a) also hinges on the debate between "Monetarists" and "Nonmonetarists". This debate is the subject of chapter 12 of the textbook in which Gordon presented a "Monetarist Platform" and discussed the weaknesses of the activist case. But the following chapters offer a pedagogical and more detailed version of Gordon 1978b's case for a reconstructed activism. Since the spontaneous closing of an output gap is slow, a deviation from the natural rate of unemployment is costly contrary to the belief of Monetarists. Such deviations from the natural rate are the rule and not the exception because private spendings are naturally unstable.

The cost of "recession as a cure for inflation" is discussed in chapter 9 and 11. According to Gordon, an increase of the gap between the actual unemployment rate and the natural unemployment rate of one percentage point induces a rise of three percentage point of the output gap. This would represent "a $51 billion tax imposed on everyone". In chapter 11, Gordon emphasises the length of the adjustment that would be necessary to take the rate of inflation back to zero. The slowness of this process is explained by the slowness of the adjustment of expectations in line with the NRH framework. But this slow adjustment itself is now clearly justified by the existence of "long term contracts":

Thus since long term contracts prevent a decline in [the rate of growth of output] from cutting wages and material prices instantly, the prices of products such as automobiles will not fall instantly. And, since individuals

in the economy know this, they do not adjust their expectations downward completely by the full amount of the drop in the [rate of growth of output]. (Ibid. 309)

In chapter 12, Gordon notes that Monetarists consider that unemployment is "a much less serious problem than the rough numbers suggest" (*ibid.* 338) and dissociates himself clearly from this position. He refers here to a Newsweek column by Friedman on "Unemployment figures" (1969) and then to an "extended answer" by himself in the form of his 1973 BPEA article on "The Welfare Cost of Higher Unemployment". Prices rigidities or the slowness in the adjustment of expectations is not put at the center of the debate between Monetarists and "Non-monetarists" at this stage, the main issues being the stability of private spendings and the capacity of policy instruments to stabilize the economic system. Taking only the simple model presented by Gordon in chapter 8, long term contracts appeared as the main issue given the assumption that the system automatically returns to its natural rates of unemployment. But if the system never departed from it potential there would be no need to intervene.

Chapter 13 and chapter 14 on "Instability in the Private Economy" showed that consumption and investment were more unstable than monetarists thought. Gordon noted that durable consumption "constitutes a source of demand fluctuations in the private economy". But this source of fluctuation was consistent with Friedman's permanent income hypothesis. Durable consumption was a form of saving hence it decreased in case of recession and increased during a boom. Furthermore, those fluctuations were the consequence of income fluctuations and not its source. For Gordon, the main source of fluctuations in private spending and the basis of the "non-monetarist" case was the instability of private investment:

Left alone, the private economy is prone to long booms and slumps in private investment, leading either to accelerations of inflation (as in the mid-1950 s and mid-1960s) or to long periods of wasteful unemployment (as in the 1930s, early 1960s, and mid-1970s). (Ibid. 415)

To this Gordon adds in chapter 15 the instability of money demand based on the experience of it "mysterious decline" of 1974-1976. Those source of instabilities lead Gordon to conclude that, in principle, a countercyclical policy is necessary to achieve a "stable growth in aggregate demand." (*ibid.* 445)

Chapter 16 and 17 examine the performance of monetary and fiscal policy until the 1970's. Gordon shares the negative verdict of Monetarists. The monetary policy conducted by the Fed in particular has been procyclical hence destabilizing during the 1950s and the 1960s. Yet, Gordon argues that a contracyclical policy would be feasible in view of the capacity to predict the evolution of output of unemployment one year in advance and of the shorter lag necessary to influence aggregate demand:

A stabilizing policy which temporarily slows monetary growth when forecasters predict unemployment at or below the natural rate for next year, and which temporarily accelerates monetary growth when unemployment above natural rate is predicted, appears to be feasible with present knowledge. Lags in the effect of monetary changes appear to be less than a year in length, and forecasters in the 1970s have been able to predict accurately a year in advance the direction of most changes in unemployment (…). (Ibid., 476)

Gordon also argues that a monetary policy is preferable to a fiscal policy because the latter is constrained by longer and more uncertain lags (*ibid.* 537). So monetary policy is the main weapon to "keep the actual unemployment rate close to the natural rate" (*ibid.* 536). To reduce unemployment at the 4% level considered by Keynesians in the 1960s, the natural rate of unemployment would have to be reduced through training programs for low skill workers or a reform of the unemployment compensation system. The case for activism was reconstructed by taking account of the difficulties raised by Monetarists.

CONCLUSION

The article shows how Gordon was converted to the NRH. It contributes to the rewriting of the standard history of the Phillips curve. In 1970, Gordon defended the existence of a long-run trade-off between inflation and unemployment. But he did not believe that the Phillips curve was fixed. On the contrary, he was able to explain the stagflation of those years as the result of a rightward shift of the long-run curve. In 1978, he argued that the trade-off did not exist. Gordon's doubts are already visible in 1971 but his shift was not straightforward and immediate. What happened is that the econometric models used by Gordon and the Keynesians began to show results that shook their initial position. The slope of their empirical long-run Phillips curve changed from year to year approaching the vertical. This result seems to have had a great impact on Gordon. But only in 1977 did he claim that estimations of his econometric wage and price model implied a vertical long-run Phillips curve. Sargent's 1971 critique must also have played a role. But if this critique showed that the tests used by the Keynesian could not reject the NRH, it did not validate it either. All this means that when Gordon started to use a vertical Phillips curve model in 1975, his new faith was not based on inescapable evidence or logical argument. We suspect that his position at the University of Chicago and his interaction with Milton Friedman also played a role in his evolution. Gordon may have been seduced by the simplicity and explanatory power of the NRH.

Also contrary to the usual story this study shows that the rise of the Natural Rate Hypothesis in the 1970s did not represent a complete defeat for Keynesians. What the case of Gordon illustrates is how Friedman and Phelps's argument forced the Keynesians to sharpen their framework. In *Money, Interest and Prices* (1956, 1965) already, Don Patinkin argued that Keynesianism was compatible with the assumption of a self-adjusting market economy. The automatic return to full employment did not discard Keynesian policies as long as one admitted that it was slow. Gordon's general overview is not different. The market system always returns to the natural rate but the inertia of this process leaves enough room for stabilization policies. The concept of full employment has been replaced by the natural rate of unemployment introducing the danger of an accelerating inflation. The content of stabilization policies has also been modified and sharpened. Monetary and not fiscal policy has become the main weapon. Fiscal policy can be useful in case of supply shock insofar as it reduces inflation. The 1960s income tax manipulations are abandoned. Those policies must modestly aim at closing a fraction of the output gap to avoid overshooting. Besides, one can see in the works of Gordon, the beginnings of a discussion on the source of price and wage inertia. It is an empirical fact but it is also the result of institutions and transaction costs related to the economic context.

We also hope that this study shows a richness of the 1970s debates over the Phillips curve ignored by the standard narrative. What empirical works showed at the time was that the coefficient on price expectations was variable (in line with the Lucas critique). This meant that the shape of the empirical long run Phillips curve could vary according to the context. With a coefficient below one, a rate of unemployment inferior to its natural value would not accelerate inflation even if price expectations were perfect. This was understood as the result of labour market institutions like "long run contracts". This was the basis for Gordon's 1972 variable coefficient model. Its abandonment in the 1978 textbook in favor of a simpler model can be understood from a pedagogical perspective. Yet no clear argument invalidated it and this was not without cost. Would economists be so surprised by the "missing inflation" of recent years if they had retained this kind of model? Recent models estimate the parameter on price expectations, rather than fixing it to unity, and find a very low elasticity of past inflation to current inflation, what led Blanchard (2016) to wonder if the U.S. economy has encountered the end of the "accelerationist curse". Would we have understood the victory of Friedman and Phelps as so complete if Gordon and other authors of macroeconomic textbooks had insisted a little bit more on the asymmetry of the long-run Phillips curve? Deflation does not seem to accelerate in case of recession. The structural evolution of the American labour market is also a Keynesian argument that was not defeated and that is generally ignored. This argument was incorporated into the new framework. Still, it shows that what happened in the 1970s was a multifactor phenomenon.

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