

(In)Stability at the Cowles Commission (1939-1948)

14. 09. 2019

Michaël Assous (Lumière-Lyon 2 University, Triangle) and Vincent Carret
(Lumière-Lyon 2 University, Triangle)¹

Abstract:

Stability analysis touched off extensive discussions at the Cowles Commission between 1939 and 1948. Oskar Lange, later followed by Lawrence Klein and Don Patinkin, among others, advocated for a move from a static analysis aiming at proving the existence of a stationary equilibrium with unemployment toward a dynamic approach exploring stability properties of full employment equilibria. In presence of excess supply of goods and labour with flexible money wages and prices, the message was that macroeconomic pathologies are better regarded as disequilibrium dynamics when full employment equilibrium is unstable - Lange (1944) and Klein (1944, 1950) - or when it is stable - Patinkin. The objective of this paper is to examine this type of modelling and how it provided the basis of a specific political vision shared by most economists of the Cowles Commission in the 1940's.

Key words: instability, Cowles Commission, dynamics, Paul Samuelson, Oskar Lange, Lawrence Klein, Don Patinkin

JEL classification: B2 History of economic thought since 1925; B22 Macroeconomics; B23 Econometrics and Quantitative and Mathematical Studies; B41 Economic Methodology

¹ E-mail: Michael.assous@univ-lyon2.fr; vincent.carret@univ-lyon2.fr

1. Introduction

Dynamic analysis took an interesting turn at the end of the 1930's. Under the lead of Paul Samuelson (1941b, 1942, 1944, 1947), new tools were developed to address stability properties of dynamical systems. The role played by Samuelson in the stabilization of the discourse on dynamics and stability analysis has been scrutinized by Weintraub (1991). Samuelson was however far from being the only one to be involved in that "stabilizing" process. Cowles Commission economists between 1939 and 1948 made significant contributions and their impact remains to be assessed.

Samuelson (1941b) pleaded for the construction of "meaningful theorems" derived from static comparative analysis. This, he claimed, required to focus on stable states of dynamical systems subject to various shocks. Naturally, any static comparative exercise aiming at exploring the impact of a change in money wages would require to assume full employment equilibrium stability. But Samuelson, who took prices and wages as given felt no urgency to put the issue on the table. The same is not true of Alvin Hansen who claimed that prices and wages flexibility was no guarantee that full employment could be reached. His point was that there may be no positive rate of interest - for any positive level of prices and wages - equating savings and investment at full employment level. Pigou (1943) strongly opposed Hansen's claim and argued that lower prices and wages would necessarily increase the real value of the stock of money and restore full employment. Oskar Lange acknowledged that full employment equilibrium necessarily exists for any prices and wages level. But he still argued that if this equilibrium exists, it may be unstable. It is this view that Lange worked to develop by combining Samuelson's stability analysis and John Hicks's general equilibrium theory.

Lange was able to spread his ideas when he was appointed at the Cowles Commission after its move from Colorado Springs to Chicago. This line of research had a huge impact on later research activities of the Cowles Commission. It was in particular Lawrence Klein and Don Patinkin who developed Lange's arguments. The former, the author of a PhD thesis on the *Keynesian Revolution* (1944) supervised by Samuelson, extended the research on instability to empirical studies (1947, 1950). This has not always been noticed and Klein's debt towards Lange and his endorsement of his worldview still need to be addressed. Like Klein, Patinkin stressed the need to adopt Lange's disequilibrium approach. Though, his take was that disequilibrium dynamics should boil down to an analysis of the convergence toward a stable position, the only remaining factor to justify state intervention being the sluggishness of that adjustment. This opposition meant a shift in the political vision embedded in Lange's and Klein's works.

This narrative is thus one of a research group which consistency is assessed through the examination of the interactions of its members. Those interactions were largely the result of formal and informal meetings that started in the 1930's. They were organized by the Econometric Society, the Cowles Commission or by individuals like Jacob Marschak², who was "the soul of a seminar on econometric methods" (Koopmans, 1978), before he became research director at the Cowles Commission. Klein, while still a student at MIT, also organized a seminar that brought several leading economists and statisticians in the budding economic department of the school (Klein, 1991; Samuelson, 1991).

² Jakob Marschak changed his first name to Jacob while he was in the US between 1941 and 1942 (see Bjerkholt, 2015: 8). Since we are interested in developments that took place in the 1940's, we use here the anglicized version of his name.

These different meetings and seminars are particularly important to understand what happened from 1939 to 1943, and how issues surrounding the questions of dynamic and stability were addressed. In 1943, a decisive turn came from the appointment of Marschak as the head of the Cowles Commission in Chicago, where he joined Lange and Tjalling Koopmans, who was appointed as a research associate a few months earlier. From 1943 to 1947, Marschak brought together the different lines of research that were pursued at MIT (Klein was recruited in 1944), in New York (Trygve Haavelmo was appointed in 1943) and in Chicago. Finally, from 1947 those researches started to lose momentum, due to several attacks. It was from within their own walls that came the starkest critiques. Patinkin challenged the idea of instability supported by Lange and Klein. External attacks came from Milton Friedman, who denied any relevance to Lange's theoretical construction, as well as to Klein's empirical approach.

2. Paving the way to (in)-stability analysis: 1939-1943

Before 1943, three groups of research located in New York, Boston and Chicago developed tight connections. In New York, Marschak launched a new research project from the New School for Social Research, and held a research seminar on econometric methods and mathematical economics with the participation of Lange, Samuelson, Koopmans, Abraham Wald or Haavelmo among others. At Harvard and later MIT (hereafter Cambridge), Samuelson opened the way to new dynamical and stability analysis. Finally, from the Cowles Commission, Lange built a new vision of the employment problem based on disequilibrium and instability.

Marschak and the New York Seminar

Marschak settled in the US in 1938 thanks to a Rockefeller Scholarship³. He was appointed at the New School for Social Research in New York, where he found other european émigrés, and he was quickly able to organize a seminar under the aegis of the NBER⁴. This seminar drew the leading figures in those emerging fields, as reported by Arrow (1978; 1991) who was still a student at the time, and Koopmans (1978), who also took part in this seminar. Franco Modigliani, who was a student of Marschak at the New School, was also present and recollected that Lange was a major influence in its development (Modigliani, 1988)⁵. Indeed during the academic year 1942-1943 Lange was in New York working as visiting professor in Columbia alongside Hotelling and on official leave from the Cowles Commission and the University of Chicago (Cowles Commission Report, 1942).

Several papers⁶ have underlined the key role played by Marschak in the formation of the “Cowles group” and how he managed to bring together for the first time those who, like Haavelmo⁷, (Arrow, 1978: 71), Koopmans and others became big players of the Cowles

³ Born in Russia at the end of the 19th century, he had fled the Russian revolution and graduated from Heidelberg University in 1922. He then moved on to the UK in 1933 after the Nazis gained power. In 1937, Alfred Cowles had already tried to recruit him as the head of the Commission after he participated to the Cowles Commission annual summer meeting in Colorado Springs (Bjerkholt, 2015). At the time, Marschak was still committed to the Oxford Institute of Statistics, and Cowles did not manage to secure a funding for him.

⁴ The result of the discussions he created in his seminar were more transparent in a 1942 paper concerning “Economic interdependence and statistical analysis” (Marschak, 1942). Marschak acknowledges at the beginning that his paper was written in March 1940, as the results of talks with Haavelmo, Lange, Mosak and Wald. Its importance is underlined by Dimand (2019) who sees it as a turning point for the Cowles Commission approach to macroeconomic dynamics. We thank Harald Hagemann and Robert Dimand for having brought to our attention the importance of this seminar to the subsequent work of the Cowles Commission.

⁵ When Marschak died in 1978, Arrow and Koopmans both recollected how Marschak helped foster and animate research ideas during this period. Koopmans deemed that one of Marschak’s greatest contribution to economics was “through being a natural leader of others, and both an initiator and a catalyst of research discussions” (Koopmans, 1978).

⁶ Hagemann (2011; 2016), Hagemann and Dimand (2019) and Dimand (2019)

⁷ Archives materials from the New School reveal that he had already tried to recruit Haavelmo to work with him at the Graduate Faculty, but the latter had quit before taking up his position to work for his government (Faculty Meetings Minutes, 1941-1942).

Commission. The opportunity to transform this informal seminar into a research group arose when Marschak was appointed head of the Cowles Commission, and professor in the economics department of the University of Chicago.

Marschak's work in stability analysis is also reflected in his own writings on stability analysis, economic policy and statistical testing⁸. At the 1940 meeting of the Econometric Society in New Orleans, he presented a paper on "Identity and Stability in Economics", that was later published in *Econometrica* (Marschak, 1942). In this paper, he tried to distinguish propositions relating to stability conditions from mere identities. His argument was echoed by Samuelson, Hansen and Lange, who were part of a session in the same meeting which touched off the major discussions of this period on the problems of stability.

Stability and full employment

On December 28, 1940, Samuelson, Hansen and Lange took part in the same session of the Econometric Society meeting in New Orleans. This session was particularly important, as it brought together three authors whose paths and ideas proved to be related. Samuelson provided a paper on Say's law, Lange presented a paper on "Price Flexibility, Interest and Full employment" while Hansen introduced his forthcoming book *Fiscal Policy and Business Cycles* (1941).

Samuelson's paper follow up the presentation of a preliminary draft of his path-breaking 1941 *Econometrica* article, that he presented a few months earlier, in July 1940, at the annual

⁸ Marschak wrote a series of papers accessible to a broader audience. His 1941 paper on "The task of economic stabilization" in the New School's journal, *Social Research* was partly inspired by Hansen's own work. It raised the issue of the trade-off between unemployment and wage flexibility, although he does not see any reason hindering the possibility of economic planning. Marschak's interest in problems of economic stability and unemployment was evidenced by his classes and seminars given at the New School. Four seminars in particular were devoted to Hicks's 1939 *Value and Capital*, mathematical economics, econometrics and questions relating to the study of general equilibrium.

Cowles Commission Conference in Colorado Springs⁹. Samuelson urged his contemporaries to develop an approach based on tools appropriate to deal with global systems¹⁰. This, he argued, meant to examine the stability properties of models with differential or difference equations as the only way to derive “meaningful theorems” (Backhouse, 2015). A prerequisite, he added, was to work with stable systems, i.e. systems which dynamic paths would converge to a stationary state¹¹.

It is at that point that Samuelson referred to what he dubbed the “Keynes-Lange model” - a term he later used in the *Foundations* (Samuelson, 1947: 354) - and discussed the efficiency of monetary and fiscal policies¹². It is worth emphasizing that this model was not Walrasian¹³. Although Samuelson referred to Walrasian theory, he was well aware that it was a “global system” not associated with the maximum or minimum of any function (Hands, 2012: 106). Most importantly, at no time, he used that model to discuss the effects of an exogenous change in wages. Does that mean that Samuelson regarded comparative statics based on wages flexibility as no longer relevant due to the instability of full employment equilibrium? This seems to be the case. What could indeed have deterred him from making additional comparative statics exercises¹⁴? This appeared to be confirmed by the presentation Samuelson

⁹ This paper was later integrated in the second part of his book *Foundations of economic analysis* (1947)

¹⁰ Samuelson distinguished that approach from the one centered on “maximum conditions within the firm or household” (Cowles Commission 6th Annual Conference, 1940: 44). Both approaches were deemed equally important but not necessarily compatible with each other. See Boianovsky (2019).

¹¹ Samuelson’s (1939a et 1939b) earlier works consisted of an analysis of the combination of the multiplier and accelerator used to highlight a variety of dynamic trajectories. Soon, Samuelson realized that: “*The acceleration principle can determine the nature of the oscillations but not the average level of the system*” (Samuelson, 1939b: 791, underlined by the author). From then on, he moved from cycles to equilibrium (see Backhouse, 2017).

¹² Samuelson (1941b) addresses changes in the marginal propensity to save or the marginal propensity to invest as well as the effects of fiscal and monetary policies while changes in money wages and prices are not part of the analysis.

¹³ See Rubin (2016) on the early Walrasian interpretation of IS-LM.

¹⁴ It is often pointed out that Samuelson thought that “positions of unstable equilibrium, even if they exist, are transient, nonpersistent states, and hence on the crudest probability calculation would be observed less frequently than stable states” (Samuelson, 1947: 5). This however does not mean that Samuelson thought unstable equilibria did not exist but only that exercises of comparative statics would be irrelevant in that case.

gave alongside Hansen and Lange¹⁵, in which full employment and price flexibility issues are introduced along two questions: “Will any level of prices, however low, lead to full employment? Will prices changing at some rate keep employment full? The reply to the latter question may be in the affirmative, while the first may conceivably admit only a negative answer.” (Econometric society, 1941: 178). It is very likely that the first relates to the stability of equilibrium, asking whether a fall in price can “lead” to full employment, while the second pertains to the existence of full employment equilibrium, asking whether full employment may be reached for any level of price. By answering no to the second question, Samuelson thus acknowledge, though indirectly, that a full employment equilibrium may be unstable and hence unfit for comparative statics analysis.

In his 1941 review of Pigou’s book, *Employment and Equilibrium* (1941), the stability issue is again raised though Samuelson seems to have slightly changed his take, noting: “On the other hand, it is not inevitable that the psychological factor of expectations, generated by price changes and generating changes in the same direction, should lead to an unstable system” (Samuelson, 1941a: 552). But while he tempers the effects of expectations upon stability arguing that “it is not inevitable”, he still leaves the door open for instability noting that “this is not the place to discuss the economics of hyper-deflation and inflation.” (Samuelson, 1941a: 550).

In fact Samuelson never cleared up that issue, at least not by resorting to the “Keynes-Lange” model, whose dynamics was only examined, as stated above, under constant prices and money wages. Even if Samuelson knew Lange’s ongoing work on full

¹⁵ The summary of his article states that “Finally, and most deserving of attention, is the view that general involuntary unemployment is impossible in a world of perfectly flexible prices” (Econometric society, 1941: 178).

employment and price flexibility initiated in the late 1930s - he even referred to it in 1943 - he however never undertook any systematic analysis, simply contending that “This is not the place to attempt to deal adequately with so complex a doctrine” (Samuelson, 1943: 39).

Unlike Samuelson, Lange aimed at clarifying the cases in which downward flexibility of money wages would be destabilizing. In his 1940 presentation “Price Flexibility, interest and full employment” which can be seen as a first step towards his 1944 monograph *Price flexibility and employment*, preliminary findings based on the notion of expectation elasticity are provided. One can find however no reference to Samuelson’s stability analysis, to which he was introduced only a few months earlier at the Cowles Commission Research conference. It took him however only a year to adopt it.^{16 17}

Disequilibrium and instability

Within just three years, Lange built a disequilibrium approach which had an important impact on the Cowles Commission¹⁸. Lange’s research was focused at first on the link between monetary policy and technological unemployment, a problem that he addressed both theoretically and statistically. He was helped by his assistants (Melvin Reder, then Leonid

¹⁶ It is likely that Lange had not seen between July and December 1940 how Samuelson stability analysis may have helped him to build his own approach.

¹⁷ Hansen - as evidenced by chapter 12 of his 1941 book - adopted a significantly different view. There may not exist a price system that could “provide full employment.” (Hansen, 1941: 288). Putting it differently, there may be no positive value of the rate of interest able to equilibrate saving and investment at full-employment income and flexibility of money wages may be of no help to lead to it. Worse, pushed to its limits, such an adjustment may break down the economy whatever the stability property of any hypothetical full employment equilibrium.

¹⁸ Lange left Europe in 1937 and was a lecturer in the University of California in 1937-1938. He moved to Chicago in 1938 where he became an assistant professor. In 1939, he was appointed associate professor (see the Report of the Cowles Commission for 1939: 4). Staff mobilisation in the war effort, along with the subsequent loss of communication with parts of Europe, left him in charge of editing *Econometrica* and one of the most important researchers of the Commission. During his stay in the US, Lange was also praised for his teaching abilities, underlined by former students like Hyman Minsky (1982: 5) or Patinkin, who kept his course notes as a reference for many years (Patinkin, 1995: 372). Solow (1983) also reports how Evsey Domar assured him “that Lange was a supernaturally clear lecturer”.

Hurwicz in 1941-42) in particular to conduct statistical tests of business cycles and most importantly to work on the issue of the relationship between price flexibility, employment and economic stability¹⁹.

A first important milestone was reached at the 1941 New York meeting of the Econometric Society, in which Lange resorted for the first time to Samuelson's stability analysis. Lange's goal, as evidenced by the title of his paper, "The stability of economic equilibrium" was to restate "the theory of stability of general equilibrium as formulated by J. R. Hicks and [...] the dynamic stability theory of Samuelson." (Leavens, 1942: 176). In a short period of time, he came up with a new theorem on "stability rank" based on different dynamical systems indicating how many prices need to be rigid to guarantee the stability of equilibrium, a theorem later incorporated into the appendix of his 1944 monograph and set out in his course on mathematical economics given in 1945 at the University of Chicago²⁰.

A second milestone was reached with his 1942 paper in which instability issues are connected to problems arising when agents decide "to increase cash balances (relative to the quantity of money available) by more than the excess supply of products, and also by more than the excess supply of factors and direct services." (Lange, 1942: 58-59). It is in that context that Lange related the stability properties of the equilibrium to the real balance effect and Say's law arguing that "Equilibrium can be restored only through abatement of the desire to increase cash balance relative to the quantity of money" (*ibid.*: 59). When the fall in prices resulting from the excess supply of goods tends to make excess demand of money equal to

¹⁹ "The study on price flexibility, employment, and economic stability was concerned with the problem whether and under what conditions flexibility of price of factors of production serves to obtain full employment, and what policies have to be taken in the cases when flexibility of factor prices fails to achieve that result" (Report of the Cowles Commission for 1942: 4).

²⁰ The content of this course is conserved in the Don Patinkin Papers at Duke University, alongside other courses notes taken by Patinkin.

zero, “we may say that in such cases the conditions for a stable monetary equilibrium are satisfied. Otherwise there is no tendency to reach an equilibrium, and the general stability conditions [...] are not satisfied” (*ibid.*). Malthus would have been the first one to have seen that point, unlike Ricardo and Say, that the main cause of unemployment was due to this kind of instability.

From this point on, Lange drew a clear line between his own disequilibrium approach that one can date from 1941 and alternative equilibrium approaches, especially those based on a horizontal supply curve. His point was that the labour market was no different from other markets of production factors and should be studied with the help of decreasing labour demand curve and increasing labour supply curves, a point which has not always been noticed. This is because Lange believed that Keynes’s analysis should have been interpreted with the help of a horizontal supply curve, an argument he brought up for the first time in 1938. Lange indeed argued that the notions of equilibrium and “involuntary unemployment” could be made compatible only if one assumes that the demand of labour intersects the supply curve in its flat part. It was only in that case that an equilibrium could be reached in all markets without requiring a maximum level of employment. Nevertheless, Lange was himself not interested in the working of such economies. Instead, his focus was on economies featured by “normal” supply curves, and in which disequilibria are accompanied by price adjustments²¹. It is by following that line that Lange was led to depart from Hicks’s analytical framework and to abandon especially Hicks’s notion of temporary equilibrium. In *Value and*

²¹ There is some confusion on the use by Lange of the term “involuntary unemployment” and “underemployment”. The first one is represented in Lange’s work by the distance between the kink of the horizontal supply curve and its point of intersection with the decreasing demand curve while the second, is defined as the gap between a positively sloped supply curve and a decreasing demand curve. As soon as one swaps the terms “involuntary unemployment” and “underemployment”, his stand becomes clear: exploring the working of an economy plagued by what one calls today involuntary unemployment (see De Vroey, 2016).

Capital (1939), an equilibrium is determined every “Monday” for given expectations that are allowed to be revised only on the next “Monday”. Expectations thus remain unchanged the whole “week”. Resorting to a differential dynamical system required to assume that expectations are revised all along the adjustment process while as soon as the economy has reached an equilibrium, nothing can make them change. So, unlike Hicks, Lange does not analyse an equilibrium predetermined by expectations. It may of course be predetermined by other variables like the stock of capital, the quantity of money, the state of technology, etc. but not by expectations, which is besides perfectly consistent with Lange’s assessment of the horizontal supply curve of labour.

Lange’s Cowles Commission monograph - as evidenced by the Cowles Commission reports and Lange-Samuelson correspondence - was finished in 1943. The whole analysis was based on a discussion of what Lange called a “monetary effect” caused by price adjustment²². It is the sign of this monetary effect which determines the stability properties of full employment equilibrium. When it is negative, full employment equilibrium is unstable and price flexibility “becomes a source of economic instability”. In that case, “a fall in the price of an underemployed factor diminishes employment of the factor; if, in consequence, the price of the factor falls further, employment diminishes still more, and so on. The fall in prices and in employment becomes cumulative.” (Lange, 1944: 11-12). On the contrary, when

²² The monetary effect was assumed to result from the combination of a “substitution” effect and an “expansion” effect. Let there be an excess supply of a factor of production when all other prices remain constant. If the price of that factor falls, the increase in the quantity demanded will take place due to 1) the substitution of this factor for other factors that are now relatively more expensive and 2) the expansion of production of all goods which costs have been reduced as a result of the price fall. What happens now if other prices are allowed to change? Besides the fall in the price factor - as long as the demand of money remains unchanged - prices of goods which cost has been reduced will fall proportionally. “The effect of a change in the price of a factor of production upon the prices of the other factors and of products thus depends upon the way in which the community reacts to a proportional change in all prices ... This reaction to a proportional change in all prices will be called the *monetary effect* of a general price change.” (Lange, 1944: 7, underlined by the author).

the monetary effect is positive, full employment equilibrium is stable and price flexibility secures economic stability. Finally when the monetary effect is “neutral”, price flexibility leaves real quantities unchanged and no equilibrium is reached.

The “monetary effect” is easier to grasp with the help of Tobin’s (1975) distinction between price level effects and price change effects, which makes a clear demarcation between the effects of deflation (reduction in the price level) and falling prices. Over time, deflation generates a lower price level which stimulates aggregate demand directly through a real balance effect (Pigou effect) and indirectly through a fall in the rate of interest (Keynes effect)²³. In addition, it generates expectations of falling prices and lower future prices which depress aggregate demand. The strength of the Lange model is that it explains the effect of both a lower price and expectations of falling prices.

When expectations are inelastic, i.e. when current prices are assumed to “continue during that part of the future which is relevant to present decisions” (p. 20), the monetary effect only depends on stabilizing price level effects. As long as the nominal quantity of money is constant, any fall in prices thus makes the monetary effect positive: “flexibility of factor prices automatically maintains or restores full employment and prevents or absorbs excess demand for factors of production.” (Lange, 1944: 14). In addition, an “automatic restoration of equilibrium” will operate more efficiently when it directly stimulates consumption than when it stimulates investment via changes in interest rates. When expectations are elastic, the monetary effect becomes negative and full employment equilibrium is unstable.

²³ “The ensuing fall in interest rates stimulates the demand for investment goods and thus, directly or indirectly, leads to an increase in demand for the unemployed factor. The increase in demand for the factor is the greater the greater the elasticity of investment with respect to reductions in interest rates.” (Lange, 1944: 17-18)

Lange was able to take up the tools of stability analysis put forward by Samuelson to support his own vision of an economy that was unstable and dependent on state interventions. It is this vision that was disseminated at the Cowles Commission where it was challenged by Patinkin and attacked by Friedman.

3. Setting a new agenda (1943-1947)

The first works of Samuelson and Lange were a preliminary step toward the construction of the Cowles Commission research program. A new step was taken with the organization of a team under the lead of Marschak, who became research director of the Cowles Commission in January 1943. He brought to the Commission his colleagues from the New York seminar, and managed to foster an environment that propelled the Commission at the forefront of economic research. One of the most important addition was that of Klein, freshly graduated from MIT and in charge of building a macroeconometric model of the United States. The work done during those years was guided by a certain political vision initiated by Lange.

Lange, Marschak and the turn of the Cowles Commission

Marschak's arrival at the Cowles Commission was a turning point embodied for instance in the creation of a reprint series in 1943 that were titled Cowles Commission Papers, New Series, even though it was the first series printed (Dimand, 2019). This is also evidenced in the Cowles Commission reports. While the earlier reports seem fragmented, by 1943 the activity was organized along clear lines: "wartime price control and rationing", "studies in economic behavior" and "unemployment and business cycles" (Report of the Cowles Commission for 1943: 1), all related to empirical research. It should be noted that the idea of disequilibrium was already in the research program, as evidenced by Lange's work, although

it is often associated with Patinkin at the end of the 1940's²⁴. The importance of this line of thought during the 1940's is further indicated by a memo written in February 1946, where Marschak mentioned Samuelson's "work in the general theory of disequilibrium"²⁵. The third area of research comprised works by Hurwicz and Lange on business cycles theory. The modeling approach advocated by Lange and inspired by Samuelson was also used by Mosak, who presented an article on general equilibrium that worked out the Hicks conditions during the September 1941 Chicago meeting of the Econometric Society. Mosak would later on publish his monograph on *General equilibrium theory in international trade* (1944) the same year that Lange published his monograph. And as we will see, Klein, who joined the Commission in 1944, also became an important part of this program.

Lange was less involved in the Cowles Commission in 1942-1943, while he was on leave at Columbia. Meanwhile Marschak was taking over the directorship of the Cowles Commission, and building a team that would include among others Koopmans, Haavelmo, and Klein (Bjerkholt, 2015). At that time, Lange had already prepared a manuscript titled "Price Flexibility and Unemployment"²⁶, a draft of his upcoming monograph. This work is presented in the 1943 report as a "synthesis [...] attempted between Keynes's hypothesis and the achievements of the modern theory of dynamic markets" of Hicks and Samuelson (Report of the Cowles Commission for 1943: 7-8). The report also shows that Lange took it upon himself to reach a large audience, with papers published in the press and presentations, among others, at the Social Science Division of the University of Chicago, the Rand School

²⁴ As noted by the report for 1943, "These studies were started in 1942 to deal with the theoretical aspects of economic disequilibrium, and with the methods of testing hypotheses referring to business cycles" (Report of the Cowles Commission for 1943: 7). A work that was already begun by Marschak at the New School.

²⁵ Memo of a discussion between Marschak and the vice-president of the University of Chicago on potential hires (Collier, 2018).

²⁶ Lange had presented this paper at Cambridge for Harvard graduate students in March 1943, under the title "Price flexibility and Employment". This is actually the final title of the monograph, which shows the evolution from "Price flexibility, interest and full employment" in 1940.

of Social Sciences or the Institute of World Economics (Report of the Cowles Commission for 1942: 11-12).

In 1944, two lines of research are mentioned, on quantitative studies of economic behavior and studies on price control, which were mainly focused on the work of the Committee on Price Control and Rationing, jointly organized with the NBER. The members of this committee were Lange, Marschak, Edward Mason, Jacob Viner, Clair Wilcox and Theodore Yntema among others, with Hurwicz acting as first Associate Director of the Committee and a plethora of assistants and office staff working for the Committee. George Katona, a member of the Cowles Commission in 1942-43, produced a monograph on *Price control and business* from the work of this committee, where we find the information above in the acknowledgment section, and which can be seen as a continuation of the questionnement on the link between expectations and stability.

After that, the main program of the Cowles Commission was led by Klein who was asked by Marschak to build a vast model of the American economy, and benefited from the help of Koopmans, Haavelmo and others.

Testing instability: Klein's work at the Cowles Commission

Klein had studied statistics in Berkeley under Jerzy Neyman²⁷, and had transferred to MIT for his graduate studies, where he became the first student of Samuelson. His background in statistics, but also in economic theory and his knowledge of keynesian economics meant that he fit very easily in the burgeoning group of economists working in New York, Cambridge and Chicago on econometric issues and mathematical economics. At MIT, he organized

²⁷ It was also in Berkeley that Klein first became acquainted with Keynes's ideas under Leo Rogan. We thank Mr Dimand for this information.

himself a statistical seminar where he managed to invite, among others, Haavelmo, Wald and Harold Hotelling, in addition to his doctoral advisor Samuelson, and the latter's former professor at Harvard, E. B. Wilson (Klein, 1991).

In September 1944 at the Cleveland Meeting of the Econometric Society, Klein presented a paper titled "From the Treatise to the General Theory: A Study in Keynesian Economics" (Hurwicz et al., 1945) that drew on the content of his upcoming PhD thesis. That paper favorably impressed Marschak, who chaired the session and was looking for a young able economist to develop the modeling program that he was launching at the time. Marschak, Koopmans, Hurwicz and Klein discussed the idea of recruiting Klein at the Cowles Commission at a dinner during the last day of the meeting (Bjerkholt, 2014)²⁸.

Thus Klein took on his work of building an economic model for the estimation of business cycles²⁹. This program that was started as one general enterprise aimed at a better understanding of the business cycle in relation to economic theory and statistical estimation gave way in the end to two distinct results that were deeply influential for decades to come and that were spelled out in two monographs published simultaneously in 1950. Monograph n°10 was a collection of works on statistical estimation edited by Koopmans, while monograph n°11 gathered the results of Klein on the building of macroeconometric models.

²⁸ Klein chose the Cowles Commission over an offer at the Federal Reserve. On his arrival at the Cowles Commission see in particular Pinzon Fuchs (2017: 73 sq) and Bjerkholt (2014). In October 1944, Marschak asked Samuelson his advice on his student to recruit him for the economic part of the Cowles Commission research program: "The particular gap which Klein would be expected to fill is primarily in the field of economic rather than in statistical theory. We need a first class man who would go over the economic literature on business cycles to get from it suggestions for various "dynamic models," to be formulated mathematically" (in Bjerkholt, 2014: 4). Samuelson's response praised the capacity of his student, and Klein was ultimately hired by the Cowles Commission at the end of 1944.

²⁹ "In November, 1944, Lawrence R. Klein joined the Cowles Commission. His task (in cooperation with J. Marschak and S. Tekiner) is to scrutinize hypotheses and arrange data to be submitted to the statistical tests and measurements." (Cowles Commission Report for 1944: 5)

Klein had divided his published work in three parts presenting three different models in increasing order of complexity, the first two being more of a pedagogical exposition of his methodology, while the third one was the real “Tinbergen-like” model comprising 16 equations. This model attracted the interest of policy experts in Washington, who asked Klein through the voice of Albert Hart to run his model to give a postwar prevision for the American economy. Klein was perhaps the most surprised by the results of this first simulation, which, contrary to what he believed and to the general ideas of experts at the time, gave positive results and even warned against the dangers of inflation rather than depression.

Klein’s point of departure in his MIT thesis was a Keynesian model T featured by exogenous investment and a simple Keynesian consumption function whose stability properties are examined. Depending on the value taken by the propensity to consume, it is shown that the economy will stabilize or not in a situation of “unemployment equilibrium”. Next, the analysis moved to a “General system of Interdependence” - highlighting the connection between goods and money markets. The system was similar to an IS-LM model made of two blocks deduced from saving and investment functions whose arguments were the rate of interest and income.

Following Hansen, Klein then identified the conditions under which the economy is likely to reach a full employment equilibrium. For a given level of money wages, he showed that when the savings and investment curves are inelastic with respect to the rate of interest, both may intersect only for a negative rate of interest: “If the savings and investment schedules are both interest-inelastic, as we now believe, then it is easy to see why there is no perfect

equilibrium of perfect competition possible.” (1944: iv.). And he added: “Because a perfect equilibrium solution is not possible, unemployment exists.” (1944: iv.)

Whatever the shape of the labor supply curve, claimed Klein, unemployment will still persist. If, for instance, money wages adjust downwards, full employment will not be achieved. This is because money wages are supposed to impact the level of employment only indirectly, through the rate of interest resulting from changes in the real quantity of money. Because the rate of interest cannot fall below zero, full employment will not be reached. So, even if stabilizing forces are acting, they will not be strong enough to help reach full employment. Such adjustments taken to their logical conclusion means “unlimited decrements in w [money wages]” will be those of “hyper-deflation and social revolution.” (Klein, 1944: 100)³⁰. Furthermore, because no such deflationary “phenomena” have ever been observed, concluded Klein, wage rigidity “prevent hyper-deflation and make the unemployment situation one of persistent equilibrium.” The argument is then extended to the long-run, Klein noting that “similar results are obtained for the long-run situation in which the stock of capital is allowed to vary and in which savings and investment reach their long run zero levels.”

One can hence summarize Klein’s message by these two propositions: 1) there does not exist a positive rate of interest for which the aggregate supply equals aggregate demand at full employment; 2) any attempt to reach full employment by letting money wages adjust downwards will generate hyper-deflation. With his arrival at the Cowles Commission, Klein slightly adjusted his position. Regarding the former; he agreed with Lange that there always exists a full employment equilibrium for a positive vector of prices including the rate of

³⁰ It is worth noting that Samuelson already referred to “hyperdeflation” in 1943.

interest: “a method of assuring a full-employment solution to the system, although it is highly artificial and unobserved in the real world” (Klein 1947: 112). Klein underlined this latter proposition, but now with the help of the empirical model he had just developed at the Cowles Commission. This model integrated a Phillips curve equation and postulated output adjustment on the goods market, and led to the conclusion that any downwards adjustment of money wages will “make the system unstable and make it likely that wage cuts will push the system away from rather than toward its full-employment equilibrium.” (Klein 1947: 113).

The ideas that were discussed at the time between the walls of Chicago, New York or Cambridge were deeply rooted in a worldview that was shaped by their modelling tools and findings.

A new political vision

Lange is representative of the symbiose between a cutting-edge research and a deep political belief. There is no need here to go back to the socialist calculation debate that raged during the interwar between Lange and his followers on one side, and Mises and his party on the other, but the “american parenthesis” of Lange and the theory he developed while in the US shows well how he managed to relate his understanding of economic instability to his political commitment³¹.

During the interwar, Lange’s use of walrasian theory was that of a tool aimed to demonstrate the possibility of a socialist planned economy. After he was introduced to

³¹ Concerning his political commitment, Patinkin’s autobiography (1995) mentions the absence of Lange during the spring of 1944, the purpose of which was revealed by a front page newspaper photograph of Lange and Stalin in Moscow. Those disparitions, which continued until Lange eventually resigned to work for the new Polish government, attracted some scrutiny on Lange’s political activism, but the University of Chicago defended him against his prosecutors (see for example the public hearing of the Chancellor of the University of Chicago, Robert M. Hutchins, in April and May 1949. In Collier [2019])

Samuelson's work on stability, he integrated those new tools to give an explanation of the world in terms of instability. The demonstration of instability, by its own essence, gives only two alternatives to the politician: letting the system run its course in a desperate collapse of capitalism, or legitimating an intervention to keep the system stable. And in order to achieve the latter option, it appears that for Lange the tools used to demonstrate the instability and the conditions of stability can be used at a centralized level to maintain the economy on a path towards full employment.

Indeed, Wade Hands has already noted (1994), concerning this matter, that "Lange seems to be arguing that the only systems where competitive markets would be stable (or at least where Hicksian and local stability coincide) would be systems where a (price) adjustment potential function is available for manipulation by a central planning authority" (Hands, 1994: 277). Lange actually used the fact that the identity between the Samuelsonian true dynamic stability conditions and Hicks static stability conditions are found for symmetric matrices, to advance the proposition that there exists a class of function maximised by an adjustment path that he qualifies "potential adjustment" in an "integrated system". The economic significance of such a system for Lange is that a planning authority can determine the adjustment paths maximising the welfare of a community by maximising this potential function, and this resonates strongly with the idea that the stability of an economic system is not ensured by price flexibility but by the stabilizing interventions of a central authority.

This was something also more or less pointed out by Lloyd Metzler, who demonstrated that if the goods were gross substitutes, the Hicks conditions were equivalent to the true dynamic conditions of Samuelson, and also that if the Hicks conditions were verified, the stability of equilibrium did not depend upon the speed of adjustment of the different markets.

Metzler underlined the fact that the Hicks conditions were more readily understandable from an economic point of view, and also that “if the Hicks conditions of perfect stability are not satisfied, stability of the system clearly depends upon a relative inflexibility of certain prices” (Metzler, 1945: 284), adding later on that “if these inflexible prices became more responsive, such a system might become unstable” (291). A result that was also probably foreseen by Samuelson, whose help Metzler acknowledges in the same article, but who was however not very enthusiastic about the implications of the idea. It would actually go a long way towards explaining why Samuelson was more than reluctant to engage in the study of a flexible price system; what if the only way out of a downward spiral was centralized planning?

Lange’s ideas on instability were thus shared by a group of economists, in the Cowles Commission but also elsewhere. Mason, himself a member of the Cowles Commission at the time, noted years later in his eulogy of Metzler that “The 1930s were also a period of upheaval in the country and in the University. In some respects it resembled the late 1960s though the protagonists and antagonists were not as strident or violent. It was a period when new ideas percolated the environment and questions of public policy were much to the fore. The influence of Keynes dominated the last few years of the decade, and Lloyd soon found himself in the middle of Keynesian controversies”³². But with the end of the war and anti-communist sentiment settling in, it became increasingly difficult to defend a radical position. With Lange gone, and a new generation taking power in Chicago, the ten year long debate on stability that was born out of the *General Theory* and that blossomed at the Cowles Commission was relegated to the background by the same institution that helped foster such a subversive view.

³² See Collier (2017)

4. Closing the debate: 1947-1948

At the end of the 1940's, the Cowles Commission became the subject of attacks. The growing wave of anti-communist sentiment made it more difficult to defend an analysis that extolled the virtues of central planning against the ills of capitalism. The arrival of Milton Friedman and his strong critiques of Lange's works as well as Klein's models was also a factor in the move from Chicago to Yale of the Cowles Commission a decade later. The new search for microfoundations was pursued at the expense of the macroeconomic approach mainly supported by Patinkin whose line was different from that of Lange and Klein.

Patinkin's take on disequilibrium and instability

Patinkin's career and ideas have already been scrutinized in particular by Rubin (2002, 2005, 2010) and Boianovsky (2002). There is no doubt that Patinkin started from a theory of unemployment based on the concept of inconsistency, addressed in his thesis with a "theory of compromise"³³, that failed to convince the members of the Cowles Commission. Consequently, he shifted to another approach, one based on disequilibrium that he developed several years later in his classic *Money, interest and prices* (1956, 1965). Patinkin's impact on the Cowles Commission evolution is more questionable. Rubin asserted that for Patinkin only two options were available for Keynesians to demonstrate that the economy can be unstable: reducing the Keynesian theory to "a demonstration of instability", or building "a model based on price rigidities" (Rubin, 2005: 67). These two "options" were in fact entirely consistent in the works of Lange and Klein, both concluding that only rigid wages were able to stabilize an unstable economy. The way in which Patinkin took part in that debate needs to be reassessed.

³³ See (Rubin 2010) for a more thorough review of the theories contained in Patinkin's thesis.

It turns out that Patinkin had a debt toward Lange and Klein, even though he distanced himself from the political vision embedded in their works.

The Klein-Lange-Patinkin connection

Patinkin started his studies at the University of Chicago in the early 1940's, where he entered in contact with the newly arrived Cowles Commission, eventually becoming a research associate from 1946 to 1948, with the help of a Social Research Council Scholarship. During this time, he was heavily influenced by the debates that mobilized the Cowlesmen, and in due course started participating in them.

In 1995, Patinkin described his years at Chicago in an autobiographical piece published fifty years after the events. According to him, these were the days of transition between the old traditional school of Chicago, represented by Knight, Simons, Viner and Mints, while the new school led by Milton Friedman was rising after the return of the latter to Chicago. And of course, these were also the heyday of the Cowles Commission, which was instrumental in bringing Patinkin to the fore of economic research. In 1995 as well as in his early papers, Patinkin paid a tribute to his professors and fellow students of Chicago and the Cowles Commission, who included on one hand the old Chicago School of Viner, Simons and Knight, and on the other the new mathematical school represented by the Cowles Commission and the teaching of Marschak and Lange.

The teachings of Lange were in fact done through at least two courses, one on mathematical economics and the other on business cycles, the contents of which are to be found in the Patinkin's papers at Duke University. As is made clear by Patinkin, the one on mathematical economics was a guide through Hicks's 1939 mathematical appendix and the

seminal article of Samuelson on the stability of equilibrium (1941b), and it was used by Patinkin as a reference “for many years to come” (Patinkin, 1995: 371-372). It seems nevertheless that Patinkin changed his mind about the intellectual debt he owed to Lange in retrospect³⁴. Indeed in the late 1940’s when he published his first papers he was much more critical of the “inconsistency” of Lange’s monograph (see for instance Patinkin [1949], especially pp. 19-21).

The problem of inconsistency was actually a main theme of his dissertation that was submitted in the spring of 1947 (Boianovsky, 2002: 227) and it was discussed by members of the Cowles Commission in spite of his initial brashness toward the rules of the institution³⁵. The discussion papers from Marschak, Koopmans, Henderson, or Simon show that although they were willing to discuss Patinkin’s theory of compromise, they were having a hard time buying into this idea whereby the gap between supply and demand is met halfway by workers and producers, which is creating the situation of unemployment³⁶.

In fact Patinkin had not come directly to the problems of unemployment, and had started his PhD thesis with empirical research in mind. In particular, he tried to estimate the dynamic process of Samuelson-Lange models in late 1946. According to his autobiographical note, it was from those early endeavours that he first got the idea of exploring the origins of involuntary unemployment, and thought of interpreting it as an inconsistency that “caused workers to be off their supply curve of labour” (Patinkin, 1995: 379).

³⁴ “Though Lange was no longer in Chicago at the time I wrote my thesis, his influence is most apparent in it, particularly in its first parts” (Patinkin, 1995: 380).

³⁵ See the discussion papers of earlier drafts of his ideas in the Patinkin Papers at Duke University, as well as a letter to him by J. Marschak asking him to stop the publication process before his ideas had a chance to be discussed by the Cowlesmen.

³⁶ See Rubin (2010) for a thorough review of the theories contained in Patinkin’s thesis

Although it was a starting point for him to develop his disequilibrium theory over the next decades, in those early days, when his ideas were still foggy and had yet to be established, Patinkin was still a young associate of the Cowles Commission and was still under the influence of Lange and of his young colleague, Klein.

In his 1948 *American Economic Review* article “Price flexibility and full employment”, the title of which can only remind the reader of Lange’s monograph, Patinkin recognized that the problems he tackled had been at the center of debates for the last ten years between the Keynesian theory and the classical approach, and he suggested to summarize the arguments on both sides and “to analyze the present state of the debate” (Patinkin, 1948a: 543). Starting from a static point of view, Patinkin then clearly established that the problem is not only one of consistency, that is, of the existence of a position of full employment in a perfectly competitive economy, but also one of stability, and he underlined the necessity to find some automatic mechanisms that exists to bring back the economy to its equilibrium position in order to defend correctly the classical position (Patinkin, 1948a: 547). He also recognized that this question was made clear by the mathematical analysis of dynamical system initiated by Samuelson and Lange (Patinkin, 1948a: 560-561).

Patinkin’s summary of the arguments of the debate further match our account of the two previous chapters, when he underlined the role of expectations in the destabilization of the economy: the Pigou effect can indeed be slowed down by at least two factors, which are expectations and the amount of the price fall necessary. For the former, Patinkin notes that it was one important point in Keynes (1936), and adds in note the works of Hicks (1939) and Lange (1944) both these factors interacting have for consequence that “The end result of letting the Pigou effect work itself out may be a disastrous deflationary spiral, continuing for

several years without ever reaching any equilibrium position” (Patinkin, 1948a: 559), terms that can only remind the reader of Klein’s own interpretation of instability. But as we will see in the next section, Patinkin himself was not too much enthused by this explanation and he quickly abandoned it.

As we see, Patinkin took up the argument of Lange and Klein previously presented on the inefficacy of the Pigou effect upon the stability of equilibrium. This is noted by Rubin (2005: 53), but is also obvious in his 1948 article, as well as in a reply of Patinkin to a comment of Herbert Stein to this article (Patinkin, 1949b; Stein, 1949). Interestingly, in his reply Patinkin used empirical elements to sustain his interpretation, to underline the fact already noted by Lange that during the period 1929-1932, while the cash balances were continuously improving, the prices continued to fall steeply. His conclusions cannot be more clear: “These results give even less encouragement than the original ones for faith in the usefulness of the Pigou effect as a policy measure.” (Patinkin, 1949b: 728). But there are other times where Lange’s influence can be seen in Patinkin’s writings.

Indeed another controversial point concerns the respective positions on the supply curve of labour of Lange and Patinkin. According to Rubin (2018), we have to read Lange’s position in the monograph as one advocating the use of a horizontal supply curve of labour to represent involuntary unemployment, and thus Patinkin was the first to extract himself from this point of view and to suggest a real disequilibrium approach. It is not certain that Patinkin thought this was in fact the case, although some elements seem to go that way, for instance in a 1949 paper where he asserted that “The only serious attempt to deal with this last question [involuntary unemployment] proceeds by assuming a special shape for the supply curve of

labour” (Patinkin, 1949a: 360), adding a note that references Oscar Lange’s monograph and a figure of a horizontal supply curve of labour.

Our contention with that interpretation has already been documented. Lange did not advocate himself the use of the horizontal supply curve, he used it merely to point out this device as an interpretation of Keynes. Where Patinkin was right however, was when he showed that the situation described in disequilibrium was not one of underemployment but one of involuntary unemployment, while Lange seems to use the terms without distinction in his monograph.

Were the approaches of Lange and Patinkin so different in the end? In his 1948a article, Patinkin suggested a typology of the different Keynesian interpretation, that was grounded on the separation between existence and stability. The first type of response was that of the “radicals”, who stated that unemployment stemmed from the inconsistency of the model, due to the absence of equilibrium for a positive value of the interest rate. The second type of response laid in the instability of the competitive economy, advocated by Lange or Klein. But for Patinkin, neither of these positions was tenable in that they did not demonstrate the possibility of underemployment equilibrium in a perfectly competitive economy. He himself advocated a third way, that would reconcile in his mind the equilibrium position with the possibility of unemployment.

Closing the Pandora box

While his macroeconomic approach was rooted in Lange’s and Klein’s works, there is no doubt that Patinkin strayed away from their interpretations of Keynes and proposed a synthesis that came in large part to represent the mainstream of economic thinking after the

war. Following Marschak and Koopmans, Patinkin shifted away from an empirical approach towards a methodology based on the specification of economic behaviors. This is apparent in early drafts as well as at the conference of the Econometric Society in Atlantic City in January 1947, where he proved critical of the Samuelson-Lange approach of dynamics³⁷. In 1995, when concluding his souvenirs of his Chicago days, he was adamant on the need to shift away from empirical estimation: “Nevertheless, this experience at the Cowles Commission - reinforced by others in the years which followed - left me with a good deal of scepticism about our ability to derive empirical macroeconomic structural relations which will stand up under the test of time.” (Patinkin, 1995: 387).

Stemming from his more thorough approach of general equilibrium, one of the main critiques of Patinkin towards Lange was that the latter did not integrate properly a demand for money in the utility function of agents in the economy. In his 1949 *Econometrica* paper, Patinkin underlined that Lange’s system is overdetermined because of his assumptions of homogeneity of the excess demand (Patinkin, 1949c: 18-19). This was a point he already made earlier in his paper concerning the classical system and Modigliani’s interpretation of the Keynesian system, and he had underlined it when he claimed that “this inconsistency is again due to the failure to put money in the utility function” (Patinkin, 1948b: 153).

Besides this different points, the main distinction between Patinkin and those who advocated an instability approach of unemployment came from his rejection of expectations and distribution effects, that he considered were too much particular assumptions and not

³⁷ “there has not yet been made any attempt at connecting up the market adjusting equations with any behavioristic formalisation” (Patinkin Papers, preliminary draft, 1946: 2). And “This approach [of Lange and Samuelson] is objectionable since the behavior described [...] is not localized in any specified behavior unit (e.g., firm) except in a few markets where there is an official auctioneer.” (Report of the Atlantic City Meeting, 1947: 172)

robust enough (see Rubin, 2005: 63-66). Patinkin made this clear as early as 1949, when he wrote about instability that: “we need not go to such an extreme case – again, a mathematical, not necessarily a realistic, extreme” (Patinkin, 1949a: 383).

Since at least his 1948 *American Economic Review* article, Patinkin made clear that his position was to reject the possibility of instability. Indeed, although he took up the Klein-Lange argument that the Pigou effect was not enough to go back to full employment, his justification was not so much grounded on agents expectations but rather on the slowness of the necessary adjustment. This caused him to abandon the idea that the competitive economy could be fundamentally unstable, and led him to justify a governmental intervention by considering the length of time that would be necessary to go back to equilibrium only *via* the Pigou effect.

In 1948, Patinkin came to realize that the importance of the Keynesian contribution was only seen when in the framework of dynamic economics, where “the fundamental issue raised by Keynesian economics is the *stability of the dynamic system*: its ability to return automatically to a full-employment equilibrium within a reasonable time [...] In other words, what Keynesian economics claims is that the economic system may be in a position of underemployment disequilibrium” (Patinkin, 1948a: 562, underlined by the author).

This shows well how Patinkin himself abandoned the idea of conciliating unemployment with a position of equilibrium, and came to embrace the idea of disequilibrium economics, as has already been shown elsewhere (Rubin, 2012). But it would be wrong to think that he was the first one to do this, for he came to this conclusion only with the help of Samuelson and Lange’s dynamic analysis, that made possible to think of a disequilibrium situation by abandoning, at least partly, Hicks’s awkward concept of temporary equilibrium.

In the end, Patinkin's own approach is not entirely different from that of the partisans of instability. He has however contributed to a change of meaning of this instability, considering it not in terms of the possibility of a collapse of the competitive economy, but in terms of long term adjustments and persisting unemployment, that justified the action of governments on top of the too slow Pigou effect.

Where Patinkin was the most hurtful to the vision developed at the Cowles Commission in the 1940's was in his defense of unit elasticities of expectations that closed the door of the possible collapse of the economy, and his advocacy of a specification of the individual behaviors of the economy, that started off a competing way against the macroeconomic modeling which was then advocated most fruitfully by L. Klein.

5. Final remarks: microfoundations and instability

Samuelson's own practices show that the problem of microfoundations was far from evident³⁸. He advanced the idea that walrasian theory was not compatible with a macrodynamic system and advocated for the separation of dynamical analysis of global systems and analysis based on maximizing behavior. This separation opened the way for two lines of research that were successively pursued at the Cowles Commission: one on the study of global dynamical systems, the other based on maximising behaviours.

Lange, Klein and even Patinkin, at least in his early works, followed Samuelson in the study of global systems. They were able to shed a new light on the issues of (in)stability featured in those systems. With Marschak's arrival at the Cowles Commission, an important part of its agenda became the search for microfoundations, the second line of research

³⁸ Weintraub (1991) underlines the fact that it took twenty years to arrive at a demonstration of stability rooted in maximising behaviours.

underlined by Samuelson. This paved the way for the path breaking papers of Arrow and Debreu in the 1950's. Soon, it was proved that stability could be guaranteed only at the price of important restrictions (gross substitutability, symmetry...), that would amount to reduce the economy to the case of a representative agent, a point that was already underlined by Lange and foreseen by Samuelson (Wade Hands, 1994)³⁹. In the end, it appears that both lines of research have led to new understandings of instability.

³⁹ This was also noted by Franklin Fisher (2006), who discussed the implications of the tâtonnement dynamical process first laid out by Samuelson, and the problems stemming from a theory which implies that the agents do not trade out of equilibrium: "one cannot understand the workings of the Invisible Hand by examining only situations where the Hand has already done its work. Samuelson may have been the first to truly understand this." (Fisher, 2006: 145). This is also described by Boianovsky (2019)

Acknowledgements: We would like to thank Mauro Boianovsky, Robert Dimand, Harald Hagemann, Rodolphe Dos Santos Ferreira, Sylvie Rivot and the (other) participants of the workshop on “Macroeconomics: dynamic stories. When statics is no longer enough” (Université Haute-Alsace, Colmar, France, May 16-18, 2019). We also thank Goulven Rubin and the participants of the 2019 ESHET session “Dynamics and stability in the history of macroeconomics”.

References

- Arrow, K. J. 1991. “Jacob Marschak 1898–1977. A Biographical Memoir.” *National Academy of Science, Ed. Biographical Memoirs* 60: 129–46.
- Arrow, Kenneth J. 1978. “Tributes to Jacob Marschak: Jacob Marschak’s Contributions to the Economics of Decision and Information.” *The American Economic Review* 68 (2): xii–xiv.
- Backhouse, Roger E. 2015. “Revisiting Samuelson’s *Foundations of Economic Analysis*” *Journal of Economic Literature* 53 (2): 326–50.
- . 2017. *Founder of modern economics: Paul A. Samuelson. volume 1, Becoming Samuelson, 1915-1948*. New York: Oxford University Press.
- Bjerkholt, Olav. 2014. “Lawrence R. Klein 1920–2013: Notes on the Early Years.” *Journal of Policy Modeling* 36 (5): 767–84.
- . 2015. “Trygve Haavelmo at the Cowles Commission.” *Econometric Theory* 31 (1): 1–84.
- Boianovsky, Mauro. 2002. “Patinkin, the Cowles Commission, and the Theory of Unemployment and Aggregate Supply.” *The European Journal of the History of Economic Thought* 9 (2): 226–59.
- . 2019. “Paul Samuelson’s Ways to Macroeconomic Dynamics.” Paper presented in *Macroeconomics: Dynamic Histories. When Statics Is No Longer Enough*. Colmar.

- Collier, Irwin. 2017. "Harvard. Mason, Domar and Samuelson at Metzler Memorial Service, 1980." *Economics in the Rear-View Mirror* (blog). 2017. <http://www.irwincollier.com/harvard-mason-domar-and-samuelson-at-metzler-memorial-service-1980/>.
- . 2018. "Chicago. Marschak on Potential Hires for Department, 1946." *Economics in the Rear-View Mirror* (blog). 2018. <http://www.irwincollier.com/chicago-marschak-on-potential-hires-for-department-1946/>.
- . 2019. "Chicago. Chancellor Hutchins Interrogated Regarding Lange's Leave of Absence, 1949." *Economics in the Rear-View Mirror* (blog). 2019. <http://www.irwincollier.com/chicago-chancellor-hutchins-interrogated-regarding-langes-leave-of-absence-1949/>.
- Dimand, Robert, and Harald Hagemann. 2019. "Jacob Marschak and the Cowles Approaches to the Theory of Money and Assets." Paper presented in *Money, Banks and Finance in Economic Thought*. Lille.
- Dimand, Robert W. 2019. "Macroeconomic Dynamics at the Cowles Commission from the 1930s to the 1950s." Paper presented in *Macroeconomics: Dynamic Histories. When Statics Is No Longer Enough*. Colmar.
- Econometric Society. 1941. "Report of the Chicago Meeting, December 27-28, 1940, and of the New Orleans Meeting, December 27-30, 1940." *Econometrica* 9 (2): 165–84.
- . 1947. "Report of the Atlantic City Meeting, January 24-27, 1947." *Econometrica* 15 (2): 152–77.
- Hagemann, Harald. 2011. "European Émigrés and the 'Americanization' of Economics." *The European Journal of the History of Economic Thought* 18 (5): 643–71.
- . 2016. "Jacob Marschak (1898–1977)." In *Handbook on the History of Economic Analysis*, edited by Gilbert Faccarello and Kurz Heinz. Vol. 1. Edward Elgar Publishing.
- Hands, D. Wade. 1994. "Restabilizing Dynamics: Construction and Constraint in the History of Walrasian Stability Theory." *Economics & Philosophy* 10 (2): 243–283.

- Hands, D Wade. 2012. "The Rise and Fall of Walrasian Microeconomics: The Keynesian Effect." In *Microfoundations Reconsidered: The Relationship of Micro and Macroeconomics in Historical Perspective*, edited by Pedro Garcia Duarte and Gilberto Tadeu Lima, 93–130. Cheltenham: Edward Elgar Publishing.
- Hansen, Alvin H. 1941. *Fiscal Policy and Business Cycles*. New York: WW Norton & Company.
- Hicks, John Richard. 1939. *Value and capital: an inquiry into some fundamental principles of economic theory*. Oxford: Clarendon press.
- Hurwicz, Leonid, Melvin Reder, Tjalling Koopmans, Jacob Marschak, Guy H. Orcutt, Zenon Sztatowski, L. R. Nienstaedt, Titus L. Podea, Lawrence R. Klein, and Benjamin Higgins. 1945. "Abstracts of Papers Presented at the Cleveland Meeting, September 13-15, 1944." *Econometrica* 13 (1): 79–86.
- Keynes, John Maynard. 1936. *The General Theory of Employment Interest and Money*. London New York: Macmillan St Martin's press.
- Klein, Lawrence R. 1944. "The Keynesian Revolution." PhD diss., MIT.
- . 1947. "Theories of Effective Demand and Employment." *Journal of Political Economy* 55 (2): 108–31.
- . 1950. *Economic Fluctuations in the United States, 1921-1941*. John Wiley & Sons, Inc. Cowles Commission Monographs 11. New York.
- . 1991. "The Statistics Seminar, MIT, 1942-1943." *Statistical Science* 6 (4): 320–30.
- Koopmans, Tjalling. 1978. "Tributes to Jacob Marschak: Jacob Marschak, 1898-1977." *The American Economic Review* 68 (2): ix–xi.
- Lange, Oskar. 1938. "The Rate of Interest and the Optimum Propensity to Consume." *Economica* 5 (17): 12–32.
- . 1942. "Say's Law: A Restatement and Criticism." In *Studies in Mathematical Economics and Econometrics: In Memory of Henry Schultz*, edited by Oskar Lange, Francis McIntyre, and Theodore Otte Yntema, 49–68. Chicago.

- . 1944. *Price Flexibility and Employment*. The Principia Press, Inc. Cowles Commission Monographs 8. Bloomington.
- Leavens, Dickson H. 1942. "Report of the New York Meeting, December 27-30, 1941, and of the Dallas Meeting, December 29-30, 1941." *Econometrica* 10 (2): 169–91.
- Marschak, Jacob. 1941. "The Task of Economic Stabilization." *Social Research* 8 (3): 361–72.
- . 1942a. "Economic Interdependence and Statical Analysis." In *Studies in Mathematical Economics and Econometrics: In Memory of Henry Schultz*, edited by Oskar Lange, Francis McIntyre, and Theodore Otte Yntema, 135–50. Chicago.
- . 1942b. "Identity and Stability in Economics: A Survey." *Econometrica* 10 (1): 61–74.
- Metzler, Lloyd A. 1945. "Stability of Multiple Markets: The Hicks Conditions." *Econometrica* 13 (4): 277–92.
- Modigliani, Franco. 1988. "Ruminations on My Professional Life." In *Lives of the Laureates: Seven Nobel Economists*, edited by William Breit and Roger W. Spencer, 91–110. MIT: MIT Press.
- Mosak, Jacob L. 1944. *General Equilibrium Theory in International Trade*. Bloomington: Principia Press.
- Patinkin, Don. 1948a. "Price Flexibility and Full Employment." *The American Economic Review* 38 (4): 543–64.
- . 1948b. "Relative Prices, Say's Law, and the Demand for Money." *Econometrica* 16 (2): 135–54.
- . 1949a. "Involuntary Unemployment and the Keynesian Supply Function." *The Economic Journal* 59 (235): 360–83.
- . 1949b. "Price Flexibility and Full Employment: Reply." *The American Economic Review* 39 (3): 726–28.
- . 1949c. "The Indeterminacy of Absolute Prices in Classical Economic Theory." *Econometrica* 17 (1): 1–27.

- . 1956. *Money, Interest, and Prices: An Integration of Monetary and Value Theory*. New York: Row, Peterson Evanston.
- . 1965. *Money, Interest, and Prices; an Integration of Monetary and Value Theory*. Harper & Row. New York.
- . 1995. “The Training of an Economist.” *BNL Quarterly Review* 48 (195): 359–95.
- Pigou, A. C. 1943. “The Classical Stationary State.” *The Economic Journal* 53 (212): 343–51.
- Pinzón Fuchs, Erich. 2017. “Economics as a ‘Tooled’ Discipline: Lawrence R. Klein and the Making of Macroeconometric Modeling: 1939-1959.” PhD diss., Paris 1.
- Rubin, Goulven. 2002. “From Equilibrium to Disequilibrium: The Genesis of Don Patinkin’s Interpretation of the Keynesian Theory.” *The European Journal of the History of Economic Thought* 9 (2): 205–25.
- . 2005. “Patinkin and the Pigou Effect: Or How a Keynesian Came to Accept an Anti-Keynesian Argument.” *The European Journal of the History of Economic Thought* 12 (1): 47–72.
- . 2010. “From Equilibrium to Disequilibrium: The Genesis of Don Patinkin’s Interpretation of the Keynesian Theory.” *The European Journal of the History of Economic Thought* 9 (2): 205–25.
- . 2016. “Oskar Lange and the Walrasian Interpretation of Is-Lm.” *Journal of the History of Economic Thought* 38 (3): 285–309.
- . 2018. “Élasticité des anticipations et instabilité de l’équilibre général chez Hicks, Lange, Modigliani et Patinkin.” *Revue d’histoire de la pensée économique* 2018 – 1, n° 5. *varia*, 55–87.
- Samuelson, Paul A. 1939a. “A Synthesis of the Principle of Acceleration and the Multiplier.” *Journal of Political Economy* 47 (6): 786–97.
- . 1939b. “Interactions between the Multiplier Analysis and the Principle of Acceleration.” *The Review of Economics and Statistics* 21 (2): 75–78.

- . 1941a. “Professor Pigou’s Employment and Equilibrium.” *The American Economic Review* 31 (3): 545–52.
- . 1941b. “The Stability of Equilibrium: Comparative Statics and Dynamics.” *Econometrica: Journal of the Econometric Society*, 97–120.
- . 1942. “The Stability of Equilibrium: Linear and Nonlinear Systems.” *Econometrica* 10 (1): 1–25.
- . 1943. “Full Employment after the War.” In *Postwar Economic Problems*, edited by Seymour E. Harris, 27–54. New York: McGraw - Hill.
- . 1944. “The Relation Between Hicksian Stability and True Dynamic Stability.” *Econometrica* 12 (3/4): 256–57.
- . 1947. *Foundations of Economic Analysis*. Harvard University Press. Cambridge.
- . 1991. “Statistical Flowers Caught in Amber.” *Statistical Science* 6 (4): 330–38.
- Stein, Herbert. 1949. “Price Flexibility and Full Employment: Comment.” *The American Economic Review* 39 (3): 725–26.
- Tobin, James. 1975. “Keynesian Models of Recession and Depression.” *The American Economic Review* 65 (2): 195–202.
- Vroey, Michel De. 2016. *A History of Macroeconomics from Keynes to Lucas and Beyond*. Cambridge: Cambridge University Press.
- Weintraub, Eliot Roy. 1991. *Stabilizing Dynamics: Constructing Economic Knowledge. Historical Perspectives on Modern Economics*. Cambridge: Cambridge University Press.

Archives

Duke's Economist Papers Archive:

- Don Patinkin papers
- Paul A. Samuelson papers

Cowles Commission Archives:

- Monographs: <https://cowles.yale.edu/publications/archives/cfm>
- Research Reports, 1932-1996:
<https://cowles.yale.edu/publications/archives/research-reports>
- Miscellaneous Publications, 1933-2008 (including reports of the Annual Research Conference):
<https://cowles.yale.edu/publications/archives/misc-pubs>

New School for Social Research:

- <https://digitalarchives.library.newschool.edu/>