

Lindahl and Frisch: Linking macroeconomics and national accounting in the interwar years for economic policies and planning¹

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The specific Scandinavian contribution to national accounting relates to the links knitted by Ragnar Frisch and Erik Lindahl between macroeconomics and national accounts in the 1930's. They share a common epistemological aim and a common theoretical inheritance. Firstly they were both driven by the ambition to get concepts and analytical framework for understanding business cycles and for designing economic policies. This conceptual work is strongly embodied to empirical investigations, national accounts being viewed as the experimental basis for macroeconomics and the base for policy and planning purposes. Secondly we will show that their common methodological ambition was rooted in sharing of the legacy of Wickseil's theoretical proposals. This could explain why Frisch and Lindahl both distinguish real items from financial items, real from financial accounts, real from financial economic circulation in order to stress the impact of money on real economic phenomena. They also attempted to carry on in their respective national accounts an *ex ante/ex post* analysis in order to underline the role of the agents' anticipations in the economic processes and cycles.

Keywords: Macroeconomics, national accounts, economic policies

1. Introduction

Frisch coined the terms Econometrics already in 1926 [47] when tackling utility measurement issues:

“Intermediate between mathematics, statistics, and economics, we find a new discipline which for lack of a better name, may be called *econometrics*. Econometrics has as its aim to subject abstract laws of theoretical political economy or “pure” economics to experimental and numerical verification, and thus to turn pure economics, as far as is possible, into a science in the strict sense of the word [47]”

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As chief editor of *Econometrica*, he broadly contributes in setting up boundaries to this new discipline then defined as a “unification” between economic theory, mathematics and the statistics, articulation designed by him as an “unification” of these three fields [33, p. 1]. He took an active part in the invention of new methodological and theoretical instruments based on a certain shift from “political Economy” towards “rational Economy”. This switch has been called “the triumph of the interventionism” [25, p. 69]. The methodological and conceptual challenges were huge at that time and are still currently huge for the community of Econometricians. These challenges can explain the focus on very technical issues in statistics per se and in econometric modelling, and can explain why econometrics is less perceived as a scientific discipline but more as a set of tools.

But, to contrast this opinion, we should have in mind that, at that time i.e. at the beginnings of Econometric Society, the magnitude of the economic and monetary world crisis of the Thirties, then the task of rebuilding Europe after World War II imposed the idea of an active and even radical public intervention in economic affairs. The econometricians, in particular Jan Tinbergen and Frisch, were active in proposing new instruments for economic policy, and gave them a very pronounced technical orientation. They made major contributions to bring together the academic and administrative spheres in economic policies, not only by training the future executives of the administrations in charge of the definition and control of economic policies but also by their direct implementation of new econometric techniques of modelling and estimation for economic policies in the 1930s and 1940s, at last the setting up of national accounts.

Frisch’s econometrics does not only provide a specific articulation between “economic theory, mathematics, and statistics” [33, p. 1], but also states a specific approach to “the social responsibility of the econometrician” [40]. In other words the development of analytical tools such as a national accounting system, macrodynamic models, and above all the development of structural modelling have to be related to scientific requirements – setting up a new branch of economics – but also to the enforcement of economic policies.

As Odd Aukrust [5] already stressed, the peculiar Scandinavian contribution to national accounting refers to the links knitted by Ragnar Frisch and Erik Lindahl between macroeconomics and national accounts in the 1930’s. Pioneering the development and the analysis of aggregate indicators in a specific Scandinavian approach in comparison with Keynes’s works, the innovative aspects of Frischian econometrics in the light of Lindahl’s work relies on both the definition of national accounts as a basic tool for applying economic policy, and the specific link between macroeconomics and national accounting. Frisch and Lindahl both considered macroeconomics and national accounting as complementary heuristic devices to understand and represent economic mechanisms. After a brief presentation of their respective inputs in this matter, we will relate that specificity to the fact that they both shared a common epistemological aim and a common theoretical inheritance.

Their conceptual approach to economics emphasized empirical inquiries and the development of statistics, national accounts being viewed as the experimental basis for macroeconomics. And it must be noticed that their common methodological ambition was grounded in the share of the legacy of Wicksell's theoretical proposals, especially about the way to deal with time in economic analysis and in the way to develop a macroeconomic approach of the economic fluctuations. This could explain why Frisch and Lindahl both distinguished real items from financial items, real from financial accounts, real from financial economic circulation in order to stress the impact of money on real economic phenomena. They also attempted to present in their respective national accounts an *ex ante/ex post* analysis¹ in order to underline the role of agents' anticipations on the economic processes and cycles and then pave the way to research on planning theory under uncertainty. However, in keeping with the Wicksellian heritage, they made two important contributions to the Scandinavian history of economic thought: the econometric program and the program of the Stockholm School of economics,² which aimed to develop theories and methods to define monetary policies and to reduce unemployment and the fluctuations of the business cycles in the thirties.

After explaining how Frisch and Lindahl came to consider economic policy requirements and the way to define and implement them (Section 1), we relate this awareness to their business cycles' respective analysis (Section 2). At last, we show that national accounts were thought of both as the empirical counterpart of macroeconomics and as the basic tools for planning (Section 3).

2. National accounting as the main framework for economic policies

As clearly and formally stressed by Frisch [40] and Lindahl [67], economic knowledge is useless if confined only to the understanding of economic life without employing it for foresight and planning. Macroeconomics and national accounting are the grounds of understanding, representing, forecasting and driving economic life. As Lawrence Klein [56,59], Bjerkholt [9–11], Lie [61] and Lie and Roll-Hansen [61] have argued, Norwegians emphasized the linkages between econometric modelling, national accounting and national budgeting in order to develop steering and planning the national economy. At the same time in Sweden, national accounting appeared with Lindahl's work as a key element of economic policy and monetary policy.

Alongside the historical context, common Scandinavian analytical roots also characterize the definition of motivations for economic state intervention. Following the

¹See Frisch 1935 for an explicit reference to *ex ante/ex post* analysis while Lindahl contribution is relatively well known.

²The Swedish economists involved in the program of the Stockholm School of economics dealt with various subjects: Ohlin asserted that they anticipated Keynes main message, Myrdal developed cumulative processes before to turn to development theory, Lundberg worked on empirical business cycle analysis. See Steiger [77] for further details.

publication of *Circulation Planning* [34], Frisch developed a counter cyclical policy approach where economic and political dimensions of the socio-economic world were jointly investigated. His analysis of economic phenomena, and particularly of the business cycles and disequilibria, was not only a pure analytical exercise, but also a prescription for political intervention aiming to counteract the socio-economic consequences of crisis.

2.1. *The aims of economic policy according to Frisch*

The analysis of business cycles, especially in the *Cassel Model* [30], and of a system of exchanges in *Circulation Planning* [34], leads Frisch to consider indirect intervention by state authorities in the economic sphere. Indeed, his research in econometrics drove him to conclude that there are persistent disequilibria, even if the true nature of the economic system is a stable equilibrium. Economic crisis is pictured by Frisch in the early 1930s as the outcome of two types of dysfunctions and adjustments” problems to the Equilibrium position Dupont-Kieffer [21, Chapter 4], Dupont-Kieffer [22] Louça [70, pp. 410–411]:

- The first type of dysfunctions is technical problems within the production process. Frisch mainly stresses time lags between investment projects and variations in consumption, as explained by the accelerator principle;
- The second type of dysfunctions is the different forms of the exchange organizations

The former are simply manifestations of the accelerator principle presented in the 1933 impulse-propagation model. Thus, Frisch explains that the economic system is subject to delays in response: the production of capital goods and that of consumer goods are not well synchronized, or at least the former is subject to the whims of the latter, with a certain time lag. The relative shares of replacement investment and net investment in gross investment, stemming from the rate of growth of consumption of final products, will determine the evolution of total investment. Slowdown in total investment and the production of capital goods will, in turn, foster tensions associated with the evolution of consumer goods production.

The organizational arrangements of trade or obstacles to free movement in the competitive system’s market mechanism are a second cause of crises. One of the disturbances in exchange may arise from tensions produced by banking and financial authorities in the money market and financial assets market. We should remember that Frisch is returning to an idea dear to Wicksell, according to which there are two interest rates: that established by banking intermediaries and that reflecting the balance of global capital supply and demand in a market with free competition, i.e. the natural rate of interest.³ Now the fact that monetary and banking institutions are both

³Frisch’s positions on this point are to be linked with Wicksell’s analysis of the cumulative processes, developed in *Interest and Prices* (1898) and in *Lectures II* (1906). Wicksell defines two rates of interest,

subject to routines explains the lag between the actual rate and the rate of equilibrium position. This discrepancy gives rise to cumulative processes that make the market system veer away from its global equilibrium. In the 1933 [30] article, Frisch once again picks up this idea to show that banking and monetary authorities always have a delayed reaction to the growth or drop in demand for money. This creates tensions in the demand for money and, thus, limits various economic agents' demand for consumer and capital goods. This constraint, putting pressure on agents' needs for liquidity, leads to reduced demand in the goods and services market, curtailing demand for production and consumer goods.

In these two cases, Frisch pictures economic crises as adjustment problems related to the equilibrium position. These maladjustments lead to under-consumption situations and require some intervention by State and political authorities:

“If we ask what will happen, we must accept the two following alternatives: we could introduce a communist mode of production or, if we wish to keep a private mode of production, we must allow the government to manipulate certain components of the machinery, such as, for example, monetary and credit policies, the policies of trust companies, and commercial policies, thus, retaining the conscious objective of indirectly protecting the economy against chaos, in the context of defining a social plan. In other words, we could undertake the creation of an indirectly planned economy. To accomplish this task, close cooperation is necessary between governmental authorities and various economic organizations. Personally, I believe that we should choose the second path [29, p. 2].” (author's translation)

Frisch drafted an initial response to these dysfunctions in 1934 in a lengthy and interminable article that only appeared in *Econometrica* under pressure from Frisch.

The rather utopian project described in the 1934 article on “Circulation planning” corresponds to a “reality test” compelling Frisch to face the tension between economic analysis based on the equilibrium concept and economic policy aiming at controlling disequilibria. Due to the practical and theoretical impossibility of setting up a General Equilibrium model of the entire economy, this issue drove him to reconsider the conditions for designing and implementing any economic policies [4,21,22]. Indeed, after the Second World War, Frisch focused on building up models for economic

the so-called “normal” rate that would balance savings and investment and the “market rate”, or bank interest rates. The problem is that, in this framework, the banks are construed as the only intermediaries and transform savers' deposits into credits for enterprises. The banks are “affected” by routines, meaning that the bank rate of interest is rarely adjusted and, consequently, generally differs from the normal interest rate. Thus, when the bank or market rate is higher than the rate of equilibrium, the banks attract savers' deposits and discourage investor borrowing. This discrepancy draws liquidity towards the banks, reduces agents' consumption and triggers a contraction in credit, which discourages the expansion of investment throughout this period. For further details on Frisch's definition of the equilibrium between savings and investment, in the Wicksellian tradition, the reader may refer to Andvig [2] and my Master thesis (1995, pp. 84–93).

planning compatible with the free market competition using econometric tools to set up guidelines to production and exchanges planning:

“the matter of a wise planning is to carry out several specific objectives, while preserving as much as possible the advantages of the system of competition” [44, Conference of the Vatican, p. 1198].

At the end of the Second World War, after ten months of internment in the Grini concentration camp in Norway, near Oslo, Frisch was increasingly convinced of the need to consider econometrics not only as a heuristic tool, but also as the support and vector of economic policy. In the editorial of the first edition of *Econometrica* after the war [40], he reaffirmed this ambition he had announced at the start of the 1930s, calling for “the responsibility of econometrician.”

In the preface to the presentation of the OSLO Channel Model (1957), we can find an explicit classification of approaches to economic policy based on a process of econometric modelling. This classification corresponds to the four approaches which are stages in the process aiming at an extensive use of models: the *on-looker* approach, the *ad hoc instrument approach*, the *feasible instrument* approach, and the *optimalization approach*. This classification appears to reflect an explicit awareness of econometrics having a changed status, from a tool contributing to knowledge, to its current status as a technology associated with economic policy. In both cases, econometrics is a technology that couples the use of an analytical methodology and representation of economic phenomena – the analysis of the confluence articulated by structural modelling – and the specific creation of particular heuristic instruments like models, statistical indices, macrodynamics analysis, national accounting and national budgets. Its status differs according to whether the economist adopts a positive or normative perspective. This double dimension is one of considerable ambiguity.

As its name indicates, the first approach, “the spectator approach”, is positioned on the margins of economic policy. It predicts future economic developments, the econometric model’s functioning being designed specifically to make predictions:

“He [the on-looker analyst] simply tries to guess at what will happen without making any systematic attempt at finding what somebody – the Government or a private organization or a coalition of private organizations – *ought* to do if they want to influence the course of affairs” [43, p. 89] (Frisch’s underlining).

The second approach, the “ad hoc instrument approach”, advocates a slightly less passive role for econometrics, and we see the start of the shift in the econometric model as a tool of knowledge to that of an instrument of economic policy. At this stage, one must admit that it is possible to define some instruments that will allow for the modification of economic and social phenomena. It gradually becomes a question of examining the compatibility of objectives and tools. To that end, the econometrician’s work may be defined as:

“An ad hoc instrument approach to forecasting and programming is, therefore, warranted only as a very first and tentative preparation for a detailed analysis that does lead to a precise dynamic model with well defined number of degrees of freedom” [43, p. 90] (Frisch’s underlining).

In the present eventuality, the definition of degrees of freedom in the macrodynamic model signifies that the econometrician seeks flexible, not fixed, objectives, determined by the actual functioning of the economic system. Given the way the system works, what are the variables on which one could act without modifying the structure of the system itself? What are the degrees of latitude allowed by the very functioning of the economic mechanism?

For the third approach, the “feasible instrument approach,” the use of models to develop economic policy is to produce alternative policies with two priorities: producing different models using various types of economic policy instruments; and creating models that incorporate exogenous influences on the development of economic activity. The ultimate criterion remains the creation of feasible policies from these models such that “for each set of values given to exogenous influences there is a set of alternative fixations of the instruments which span the feasibility space” [11, pp. 326–327].

In the context of the last approach, that of “optimalization”, it is no longer simply a matter of outlining various possibilities, but of choosing which actions to take to influence economic activity. Thus, it is an optimization approach within limits, based on the definition of a “function of preference” – which comes back to determining certain social and economic targets and the instruments to achieve them⁴ – and the mathematical programming techniques that should contribute to defining the preferred policy amongst the range of possibilities, in order to achieve the goals defined by the nation’s representatives. It is from this perspective that cooperation between political leaders and economists outside the political decision-making sphere becomes crucial, especially because it is difficult to identify and list all possible scenarios:

“When the effort to map out a spectrum of feasible alternatives has gone for a while, the conclusion will inevitably force itself upon the public and the authorities that the number of feasible alternatives is so great that it is impossible to keep track of them simply by listing them and looking at them” [43, p. 93].

From Frisch’s perspective, the structural econometric model could be a useful tool, if and only if, democratic authorities specify the present and future changes that they hope to bring about in the structure of the economy, as a function, for example, of the more or less urgent nature of economic tensions to be eliminated in the markets and in production, consumption and exchange activities. This specification occurs through the definition of a *function of preference*, that itself leads to the construction of *decision-making models*.

Hence he drew a sharp distinction between the selection and the implementation. Selection consisted in laying down specific economic objectives with a relevant

⁴Thus Frisch implicitly returns to Tinbergen’s rule that stipulates that economic policy must define instruments, as well as goals.

structure in order to arrive at feasible solutions, while implementation had to deal with the relevant institutions for the achievements of these objectives. Frisch was mostly concerned by the selection and did not explain the second step of his policy methodology in detail but the implementation relied on the construction of *decision models* defined as sector and multi-sector structural econometric models.

With regard to the selection, Frisch put forward the necessity to distinguish between the description of the structure of the economy (for which the structure of the model had to account for) and the aims of economic policy. The selection phase must clarify the *preference function* of the political agents – the democratically elected representatives of the people. The task of the econometrician was to elicit the preferences regarding economic development, through interviews as proposed by Frisch, and then to formalize a policy based on the political leaders' preferences and to calculate the optimal solution for accomplishing them.

Frisch advocated for economic modelling allowing both understanding and forecasting. On this basis, he had a specific way to articulate modelling and economic policy, being reluctant to the development of direct planning. During his career, Frisch stressed three cases of direct planning that are potentially very damaging for economic mechanisms: 1) an economic policy based on the Phillips curve [the "Samuelson-Solow type"] inefficient consequently to reactions of the banking and financial institutions; 2) an economic policy carried on in mixed economies is an ineffective system of production and exchange because the direct state interventions to regulate the produced and exchanges quantities of goods tend to undermine individual initiatives; 3) the Soviet centrally planned economies are harshly condemned for efficiency reasons as well as the lack of regard for individual economic and political freedom.

We find an attempt to justify the need to plan, which he defines as "The use of models to develop a rational economic policy" [41]. Frisch then identifies three patterns: 1) the political climate in certain countries (but Frisch does not specify the type of "political climate" that would justify planning in a market system); 2) the appearance of new criteria of social justice; and 3) the situation of international commerce, and its impact on national economies.

Frisch's ambition trained the civil servants who governed the economic policy in Norway. However, this naive ambition is in fact an *a posteriori* justification. As argued by Andvig [4], Aukrust [5], Bjerve [14,15,17], Lie [60] and mainly Bjerkholt [10,11], Norway developed, from the crisis of the 1930s and more after the Second war, an enhanced engagement of economists in the design of economic policy objectives and instruments. In this context, the Norwegian economic policy has been, directly and indirectly, anchored in a Frischian philosophy of public intervention in the economic sphere, leading to define its instruments by the compilation of national budgets as the articulation between national accounting, macro-econometric models and planning.

"The use of macroeconomics models for economic policy in Norway has been closely related to the reliance upon 'national budgeting' in the management of

economic policy. Frisch had casually coined this catchword term and introduced the idea of a forward-looking policy pendant to national accounting at a meeting in 1940.⁵ The national budget came to play a most prominent role in post-war economic policy, spelt out in the spirit and in the concepts of the Frischian national accounts. The national budget served as a conceptual framework as well as a quantitative instrument for economic planning” [11, p. 321].

Contacts between the Labour Party and the Institute of Economics founded and directed by Frisch [3,24] increased during the second half of the 1930's, along with the general bond between political leaders and academics looking for solutions to the economic depression and social tensions in the thirties. From 1936 the Institute was asked to carry on a study entitled “Project for a survey of the Norwegian economy”⁶ for a better understanding of the economic activities of production and exchange of the national economy [5, p. 21].⁷ This study was the starting point of Frisch's conceptual setting up of a system of national accounts for Norway [36–38].

In this context of economic shortage from the 1930s to the post-war years marked by a close social links between academic spheres and political circles, national budgets became the key element of Norwegian economic policies. Three alternatives were considered during the preparation of the first national budget designed by the Norwegian government and adopted by the Parliament in 1947:

“The *diagnostic budget* could be prepared simply as a summary of plans and expectations, which in general would not be consistent with the balance equations, but could serve to reveal gaps and inconsistencies. A *prognostic budget* could be conceived as a complete and consistent national budget based on assumptions about the behaviour of agents and assessment on exogenous influences. Both of these alternatives were discarded, however, in favour of the *programmatic budget* with targets of economic policy embedded in the national accounting figures. The programmatic budget's range of targets must be supported by a set of instruments to make the targets achievable” [11, p. 322].

Norwegian national budgets had been defined and designed according to a thorough comprehension of economic interrelationships: macro-econometric models provide causal analysis and econometric estimation provides values for parameters, whereas national accounts provide model “identities”. This was an ambitious methodology for this time so much from an epistemological point of view as well as from a political one. Lindahl did not elaborate such a complex methodology as Frisch and the Norwegian economists of the post-war years did, but the ambition was there as well as the search for countercyclical policies.

⁵ Here the author refers to Bjerve, 1998.

⁶ Plan til økonomisk strukturoversikt for Norge, see Frisch, Keilhau and Wedervang, 1936.

⁷ Frisch's achievement was not the only outcome of this investigation on implementing regulation and economic policies, see COLBJØRNSSEN, Ole and Axel SØMME (1933).

2.2. *The aims and means of economic policy according to Lindahl*

The Swedish experience of the thirties is very relevant with respect to the debate on the influence of economic experts on the policy makers. Between 1931 and 1937, Sweden was a pioneer in the implementation of price level targeting policy.⁸ The theoretical grounds of this program were primarily located in the Wicksell and Lindahl's definitions of the inflation acceleration in the model of cumulative process and in the definition of norms for monetary policy. During the last years of the First World War, inflation in Sweden went up to 40 percent a year and this period has been followed by deflation during the beginning of the Twenties. This magnitude of price movements was targeted by Wicksell as the main issue for the economists' community at that time. Many of the monetary debates during this period focused on the question of a possible restoration of the gold standard.⁹ According to the theoretical conclusions of the model of cumulative process, Wicksell advocated for staying off of the gold standard¹⁰ but he recommended combining the system with a rule for monetary policy stipulating that the rate of interest should increase when prices went up and decrease in the opposite case.

Lindahl was also greatly driven by this question when he wrote *Scope and Means in Monetary Policy* [63]. His starting point was that the come back to normal inflation rates would not mean restoring the traditional rules of the gold standard and he advocated for the necessity to discuss new rules to govern monetary policy in the future. Consequently, the main goal of monetary policy was to ensure a stabilized economic environment, "by a consequent focus on a certain goal to guarantee the rule of law and confidence in economic life" [63, p. 4]. This goal was related to the need to ensure a "minimum deviation between actual and intended outcomes of agreements in terms of money", as Wicksell stated in 1922:

"With the present variability and uncertainty of all values, in other words, with the present legal uncertainty, as everyone must recognize, the whole of business life has been transformed into a pure game of chance. Hard work and honest efforts do not longer serve. (. . .) It has been made clear from the start, both to debtors and to creditors, that the debtor will not be compelled to pay more or the creditor to accept less than the value of the sum agreed upon when the contract was effectuated. Only then will trust be restored and will it be possible to speak once more of healthy, and therefore successful business activity" [84, p. 194].

This requirement implied the consideration of the agents' expectations as special cases, which Lindahl aimed to introduce in a general dynamic theory. Indeed, as explained in next section, he translated a succession of time sequences into a

⁸See Claes Berg and Lars Jonung 1999; and Jonung, 1979.

⁹John Maynard Keynes contributes to the debate in 1923 in *A Tract on Monetary Reform*.

¹⁰A major part of the other Swedish economists thought that a return to the gold standard would to some extent be a guarantee against the monetary excesses during and after the First World War.

set of functions, coefficients and parameters empirically relevant for each historical context, compiling an elaborated accounting system.¹¹ His complex general accounting structure- based on the net output value by sector and the net investment and consumption- was designed to be a cornerstone of his more general dynamic theory embracing aggregates and atoms, shocks and flows, real and financial variables, subjective and objective values, *ex ante* and *ex post* variables. By the way, it represented the more advanced elaboration of the “intra-period identities” of the Stockholm School.¹²

After the Second World War, Lindahl aimed to define a standard system, as a set of “uniformly correct methods of calculation which could be applied irrespective of the objects of the calculations” [68, p. 71]. He proposed three basic principles for the design such system, characterizing methodological guidelines for works of the Stockholm School: 1) the aggregates should be regarded as sums of microeconomic magnitudes; 2) each aggregate should be related to a particular group of behavioural units; 3) each behavioural unit should be counted in one country only.

In this context, Lindahl kept advocating for a norm of price stability as defined in the Thirties: price stability requires that prices vary in inverse proportion to changes in productivity. He remained opposed to any kind of deliberate inflation and proposes essentially aggregated demand correctives for all kind of inflation. Then, the level of interest rates, rather than the money supply, is pictured as the appropriate policy parameter for the central bank. Lindahl asserted that consumption plans should, in dynamic system, always be regarded as fulfilled in an *ex ante/ex post* accounting framework.

2.3. National accounting as the empirical counterpart of macroeconomics

As Vanoli ([79, pp. 26–28], 48–49 in 2005) underlines, the development of national accounts in the 1930s went far beyond the earlier approach of measuring national income. Especially in Scandinavia in this period, national accounts were viewed as crucial and major conceptual issues related to understanding and measuring economic fluctuations and the social and economical consequences of economic disequilibria. We can say that if macroeconomics is the necessary tool to **understand** economic cycles, national accounting is the key tool to **measure** and to account for them:

“We can say in order to illustrate what we mean [about the search for causal relations in the economic sphere and the multitude of economic futures] by an analogy to a big and complex machinery made of many notched wheels, of different types of gears, of various pistons and connecting rods, etc. A given

¹¹The earlier Lindahl’s contribution to National Accounts is *National Income of Sweden 1861–1930*, written with E. Dalgren and K. Koch in 1937 [69] during ten years. He works on this issue after the World War II but adopts then a more theoretical approach [68].

¹²See Lundberg [71].

national budget – or a given system of national accounts – is the description of a given state of this machinery, this state can be given by the fact that each piston and gear is precisely described” (Frisch [42] in Frisch [45, p. 176]) (our translation from Norwegian).

National accounts aimed to give a precise, i.e. a quantitative, image of the national economic machinery. However, both Frisch and Lindahl thought that a taxonomic task allowing the identification and the definition of the major economic concepts used in macroeconomic analysis was an essential pre-requisite to describe the economic mechanisms and gears. The building up of national accounts relied on a high degree of standardization:

“Economic theory in the 1920’s, when Frisch started his professional career, was constrained by the fact that no unified system of concepts terminology existed for use by economists (. . .). Frisch felt strongly that this confusion had to be cleared up if advances in economic theory were to be possible. During a period of more than 20 years, starting in 1928, Frisch devoted an astounding amount of his time (and of his assistants) to conceptual issues, cumulating with his ‘eco-circ System’, a first version was ready in 1942” [4, p. 18].

This taxonomic task can also characterise the work of Lindahl in that particular field of economic investigation. It is the only time he attempted to propose income and capital concepts that can be applied for empirical investigation. And this can explain that his two volumes on ‘National Income in Sweden 1861–1930’ was introduced by defining national income and four alternative methods for its estimation. Finally, he proposed a definition that is known nowadays as the net domestic product at market prices.

The building up of systems of national accounts in Frisch and Lindahl’s perspective was not only supported by the ambition to link theoretical and empirical investigation of macroeconomic phenomena. They also aimed to offer a clear picture of their countries’ respective national economic structure in a political and historical context of the crisis after World War I and of the *Great Depression*. Indeed, Lindahl started in 1926 his research on national accounting before the national politicians had given the priority on the understanding of the crisis and the definition for solutions based on evidence.¹³ Lindahl is given the responsibility of a study of the Swedish national income over a period from 1861 to 1930, which was published in 1937.

Lindahl’s and Frisch’s work on national accounts raised a number of common issues related on valuation and estimation of macroeconomic variables such as income, investment, gross output, on the relevant statistical material, and on the picture of the national economic structure in a Wicksellian inheritance perspective.

¹³The Rockefeller foundation funded Lindahl’s work in as much it provided resources to the development of the Frisch’s economic institute.

3. The building up of macroeconomics in order to understand fluctuations of economic activity: The Wicksellian touch

As indicated earlier, Frisch and Lindahl both shared the conceptual legacy of Knut Wicksell, a major figure of the Scandinavian economic thought in the late 19th century and the beginning of the twentieth century. Their theoretical frameworks, even though both focused on equilibrium and time concepts, considered the conceptual issues raised by Wicksell when he accounted for economic fluctuations by his famous “cumulative process”. However, Lindahl never used the marginalist theory of distribution preferring instead the classical theory. In this regard, he was at variance with Wicksell's heritage and agreed with Cassel.

3.1. *Equilibrium and time as the key concepts of their macroeconomics*

This distinction between impulsion and propagation is introduced in the first macrodynamic model, the Frisch's rocking horse model of 1933 when the distinction between inter-temporal and temporary equilibrium is the explanation proposed by Lindahl. And, the time issue is at the core of the investigation of equilibrium since Böhm-Bawerk and Wicksell. Frisch and Lindahl insisted on the need to develop the dynamic perspective following different conceptual and methodological approaches.

3.1.1. *Frisch and rocking horse model (1933)*

The rocking horse model was developed with reference to the cumulative processes posited by Wicksell [2,85] who distinguished the impulse effects, when the rocking horse is hit by a wood stick, from the propagation effects, the movement of the hit rocking horse after the shock. This idea was transformed by Frisch in his report on Johan Åkerman's thesis in 1928 when he introduced a seminal distinction between “free” or “forced” oscillations in the explanations of cycles, whose shape and amplitude depend on the nature of the impulsion: “in the case of a forced oscillation, the general characteristics and the temporal periodical structure of the oscillation are both determined by the intrinsic characteristics of the system” [28, p. 134]. Accordingly, Frisch was convinced that business cycles analysis had to focus on the understanding of these free oscillations. Once we accept the idea that the explanation of economic cycles is based on free oscillations, we meet with the distinction between impulse and propagation phenomena. Frisch used the analogy with a pendulum which has its own movement (propagation) but when hit by, say, peas shot at it (impulses) its movement will be invigorated but without changing the pattern of movement. Without any new external shock, the system would only produce damped cycles after being removed by a former impulse.

This modelling of business cycles analysis enlighten the importance of the underlying statistical theoretical framework and is built in reaction to the empirical approach of Wesley Clair Mitchell [72,73] and the American institutionalists [20], and especially against their time and equilibrium approach.

For Mitchell, the business cycles were a never-ending process of fluctuations reflecting the particular state of institutions and the use of money, the time is historical and the concept of equilibrium was a non sense. Business Cycles analysis is a descriptive work of the successive phases that characterize the continuous movement of economic life. Frisch defined the economic system as a mechanism characterised by an equilibrium position. His econometrics is based on the idea that econometricians should tend to study economic phenomena without any reference to historical conditions. Business cycles analysis has to analyse the causes and the way this economic mechanisms is moving from its initial equilibrium position from time to time.

According to Frisch, the time dimension is very important in explaining the economic fluctuations but in no way it has to deal with historical: time is only analytical for one who wants to stick to Judy Klein's distinction [57,58]. In Frisch's view, dynamic analysis is only a method to analyse the economic fluctuations and not a way to define them intrinsically. This method is based on the introduction a mixed system of difference and differential equations in 1933 in the rocking horse model.

The Cassel Model¹⁴ was based by Frisch on a system of three key equations. The central one is the production of capital goods started in the considered year t depends on the consumption at the national level also named national income by Frisch because he assumes that there is no savings,¹⁵ and the carry-on production of capital goods including the production started in previous periods. This first equation is related to the accelerator principle, well defined by Aftalion [1] and that influenced Mitchell and J.B. Clark [13,21].

The second equation, also named by Frisch the consumption equation, explains the "encaisse désirée" accounting for the consumption variations, i.e. the increase of the demand of consumption goods as function of the rigidity exerted by the money supply on the liquidity demand, the latter depending on the demand of liquidity for purchasing consumption goods and capital goods.

The way Frisch stated this equation implies assuming a fixed system of prices. The assumption is not made explicit but is implicit to his description of the breaks on an increasing demand for consumption generated by a rigid money supply.

Even if Frisch considered the three equations as dynamic, the dynamic perspective of the macro approach is truly introduced in the third one, where the increase of the stock of capital good is computed as the difference between the achieved production and the carry-on production.

This gap can be mainly explained by the time lag existing between the variations of the demand for consumption goods and the production of capital goods required to produce this rising demand, and the actual realisation of this net investment. This difference is related to the delays of the production of capital goods, accordingly to Aftalion's idea.

¹⁴The Rocking Horse model also called propagation-impulse model, is also sometimes called the Cassel Model because Frisch presented it in an article written in the honour of Gustav Cassel.

¹⁵ x is the production of consumption goods within the period. Frisch assumes that all these goods will be consumed within the year too.

3.1.2. Lindahl: From static to inter-temporal and temporary equilibrium

At the beginning of the thirties, Wicksell's scientific legacy allowed Lindahl to improve the time dimension of the economic analysis, particularly with regards to the treatment of expectations. After a focus on the study of static equilibrium [80], Wicksell presented in the *Lectures* [81] a theory of capital consistent with his theory of value and then devoted a chapter to capital accumulation, i.e. the sequence of temporary equilibrium. However, despite this improvement in the ability to solve of many problems associated with the question of capital accumulation which had been previously so little investigated, Wicksell agreed that a lot of development was still necessary, opening the way for his Scandinavian successors, especially those from the Stockholm School in the thirties. Among these pupils, Lindahl developed a sequential dimension within a dynamic framework elaborating a disequilibrium dynamics of the economy in *ex ante/ex post* perspective. The evolution of the economy over time is described as an equilibrium sequence defined as a short-period position of an economy, where at each date the plans over future periods are formulated on the basis of the revised expectations of the possible future realisations of the states of the economy.

Since the idea of static equilibrium was not capable of accounting for the role of time in economic decisions, Lindahl followed up his approach in terms of sequences in order to build a consistent analysis of disequilibrium for the relation between the understanding of individual agents' behaviour and equilibrium adjustments of the system was still missing. The notion of equilibrium over time should not only be studied regarding regular and repeated movements of prices and quantities. More complex patterns of prices and quantity movements had to be considered and integrated into the understanding of equilibrium, even when prices and quantities are correctly anticipated by economic agents. Even then these irregular prices and quantities movements should be considered compatible with equilibrium position over time:

“Individuals consider not only the needs of the moment but also those of the future in their economic actions. (. . .) Individuals have full knowledge of all future data which they take into consideration in their economic planning. (. . .) As a result, equilibrium is defined as a situation in which individuals' ideas concerning the future are such that their actions bring about exactly the conditions which they anticipated” [63, pp. 284–285].

Static equilibrium appeared in Lindahl's work as a particular situation within a dynamic process. His introduction of the notions of inter-temporal¹⁶ and temporary

¹⁶Friederich von Hayek [49–51], John Hicks [52] are with Lindahl and Gunnar Myrdal [74,75] the leading economists on the notion of inter-temporal equilibrium. But Debreu mentions Lindahl as having been the first to produce “a general mathematical study of an economy whose activity depends over a finite number of elementary time intervals” [19, p. 35]. Lindahl's paper appeared in the *Ekonomisk Tidskrift* in 1929, but not in English until 1939.

equilibrium represents a move towards an analysis of disequilibrium processes. Inter-temporal equilibrium is consequently, in principle, an extension of the static system in which the plans of individuals are consistent not only *ex ante* but also *ex post* over an infinite sequence of future dates and unforeseen event leading individuals to modify their plans is impossible. On the other hand, temporary equilibrium requires *ex post* consistency only at each current date, for the fulfilment of expectations over future dates cannot be guaranteed in general.

The development of the notion of inter-temporal equilibrium also aimed to solve the difficulty of defining the quantity of capital outside a one-commodity dimension system. When advocating for inter-temporal equilibrium, Lindahl stated as following the reason why the issue of capital was insolvable within the traditional long-period frame of reference:

“Only under very special assumptions is it possible to conceive of a natural rate of interest determined purely by technical considerations, and thus independent of the price system. For this to be true it must be supposed that the productive process consists only in investing units of goods. . . of the same type as the final product” [66, p. 247].

One should note that Lindahl added a footnote to these sentences, indicating that an economy consisting of a single agricultural product would satisfy such a condition.¹⁷ It was as much for this reason as for including uncertainty and expectations that Lindahl adopted the notion of inter-temporal equilibrium. According to him, the problem of defining the concept of capital made the concept of the general rate of profit “empty of any clear and concise content and therefore lacking in scientific value”¹⁸ [66, pp. 245–246].

To grasp the notion of inter-temporal disequilibrium, one has first to cut loose the short-period problem from its traditional long-period moorings (amounting to a severe break with the traditional antagonism between equilibrium and disequilibrium) and then to focus upon it specifically. This, of course, is precisely the point at which early work of Lindahl is so strikingly at variance with Wicksell’s standings.¹⁹

Even a proper dynamic analysis would entail a much closer examination of both the process of revision of plans, and the analysis of causal connections between initial conditions and the subsequent outcomes at a future date. The notion of sequence allowed Lindahl introducing a dynamic dimension in his theory. In *The Dynamic Approach to Economic Theory* [66], he deals with shortcomings and weaknesses

¹⁷Sraffa [76] argued that this was the only way the problem could be resolved while maintaining the traditional object.

¹⁸This amounts more to the abandonment of the natural rate of interest as object than a refutation of Wicksell’s theory.

¹⁹After this shift from the traditional disequilibrium approach to the inter-temporal equilibrium one, Lindahl considered the feasibility to distinct planned and actual actions in other cases than the fixed price situation.

in both the inter-temporal and the temporary equilibrium approaches. He removed the hypothesis of consistency between *ex ante* and *ex post* realisations because even during a short-time period, it is unlikely that individuals, even in the case of perfect foresight, may find their plans wholly feasible. As the result, the temporary equilibrium approach cannot account for the occurrence of unforeseen events during a period. This is relevant particularly when the plans of individuals are not synchronised with respect to the moment of their revision. Plans are in principle designed for the entire future and they have immediate relevance only for the next period in time. The actions undertaken in later periods will be determined by new or revised plans. The next step of Lindahl's argument deals with the appropriate length of the period during which the consistency of plans required by temporary equilibrium is satisfied:

"In reality, however, the synchronization is very incomplete, and the period during which the relevant plans of all members of a group are retained unchanged, must therefore be taken to be fairly short. . . One cannot count upon all these plans being kept wholly unaltered during any long period. The attempt to realize the plans must quickly reveal that they are more or less incompatible. The actual course of events cannot correspond to all anticipations of the individuals about the behaviour and the others. The result must therefore be a modification of some of the plans" [66, p. 55].

Although the assumption that the plans will be revised only at the end of each current period as required in the temporary model can be made with respect to each single agent, by means of a specific analysis of the appropriate length of the "period of registration" of relevant events, it should be problematic when considering a group of agents. Consequently, the pricing process is changing continuously under the influence of demand and supply functions. Lindahl's proposal for a theory of dynamics of the economy was the period analysis which became a distinctive characteristic of the Stockholm School. Economists have to deal with possible inconsistencies between *ex ante* plans and their *ex post* realisation in each current period. Lindahl's 1939 essay is a sort of manifesto for a new dynamic theory relying on the necessity for a more general approach:

"The individual agents' actions, for a shorter or a longer period in the future, represent merely the fulfilment of certain plans, given at the beginning of the period and determined by certain principles which it is possible to state in one way or another. These principles should in general state that the plans are made for the fulfilment of certain aims (. . .) and that they are based on individual expectations concerning future conditions, expectations which in turn are influenced by individual interpretation of past events" [66, p. 55].

Lindahl insisted on explaining why even the most sophisticated temporary equilibrium analysis cannot account for the "true" dynamics implied by the revision of individuals' plan. Thus he provided a much more accurate discussion of how to improve on the shortcomings of the temporary equilibrium approach. Unlike the

temporary equilibrium model, where the different periods are considered separate and as complete descriptions of the current state of the economy, Lindahl was looking for a method of linking the different periods, so as to derive and deduce a causal sequence of events in which it should be explicitly shown how the *ex post* outcomes of the current period influence the *ex ante* plans for the following one.

3.2. Monetary brakes generating business cycles

The monetary mechanisms are at the core of the origins of the crisis, with a focus on the behaviour of the banks as a constraint of the market mechanisms in both Frisch's and Lindahl's approaches of business cycles and economic disequilibria.

3.2.1. Frisch and the rocking horse model (1933)

The three equations of the Cassel model mainly explain how the accelerator principle, the core of Frisch's business cycles analysis, is working out through time. This principle mainly relates the net investment to the increasing demand for consumer's goods. In order to explain why the latter can fall and then induces a fall in the investment, Frisch turned to Wicksell's 'encaisse désirée': the rigidity of the money supply constrains the growth of the consumption. The money market and the difference between the market interest rate and the natural one are at stake when he talks about 'monetary brakes'.

In *Circulation Planning* [34] the Wicksellian idea of the disturbing role of the banking and monetary institutions on the exchange system was complemented, by the idea of Fisher stated in *Econometrica* in 1933, according to the debt distorting the exchanges rules or as to say the debt distorting the understanding of the true real volume of exchanges.²⁰ Frisch, then without a rigorous argument, put forward that the anticipations made by the agents on the forthcoming growth influenced directly the decisions of selling and purchasing.²¹

On this basis, Frisch decided to focus on the analysis of the following paradox: "poverty is imposed on us in the midst of a world of plenty" [34, p. 259]. Then the cause of depressions is not shortages but the "present *form of organization* of industry and trade" (Frisch, *id.*, his emphasis). "(...) And the disastrous effects produced by the present organization of industry and trade is what might be called the *incapsulating phenomenon*" (Frisch, *id.*). This concept terms the situation where "the blind 'economic laws' will, under certain circumstances, create a situation where these groups [the modern economic life is divided into number of regions and groups] are forced *mutually to undermine each other's position*" ([34, p. 259], his emphasis). The idea is that certain agents following their pessimistic anticipations

²⁰Precisely, Fisher's concept was "debt deflation" [25] but Frisch most of the time distorted the concepts for his own sake.

²¹Note that Frisch referred both to the Wicksellian cumulative processes and to the Fisherian debt distortion.

will deprive other agents of their outlets perspectives by cutting down their purchases and contracting the demand for manufactured and capital goods. The ‘incapsulating phenomena’ are conceived as a *catch 22* where a set of opposite forces rules the market when the debt and the rate of interest disturb the agents’ anticipations. Moreover Frisch explained in 1935 [35, p. 16] and in Frisch [31] that the initial problem in the circulation system was rooted in the fact that the majority of banks had an inflationist or deflationist behaviour inducing pessimistic and optimistic anticipations.

Even if the liquidity constraint should play as a counter-cyclical factor, Frisch infers from Wicksell’s proposals the need to develop a new approach of dealing with time and with the idea of equilibrium in economic analysis, while Lindahl went developed the divergence between the two interest rates.

3.2.2. Lindahl: Divergence between natural and market interest rate

There is an important connection between Wicksell’s analysis of the cumulative process, Myrdal’s *ex ante/ex post* method and Lindahl’s notion of inter-temporal equilibrium. Clearly, the distinction between planned and actual demands and supplies is not necessarily the same thing as the notion of inter-temporal equilibrium. This latter implies that the different markets can be set up all together in an interdependent and coherent system not only at a certain period but also between time periods, meaning that the individuals plan their activities simultaneously for many periods ahead in time and considering different markets.

Planned projects being not always actually achieved can be treated simply as a short-period deviation of the actual system from its long period normal or natural position. Indeed, this is close to Wicksell’s analytical construction of the cumulative process [81, pp. 2, 145–146 and 159], where the distinction between *ex ante* and *ex post* can be encompassed by the traditional idea of a deviation between the *market* rate of interest and the *natural* rate of interest (defined as the rate of interest that at the same time ensures the balance between saving and investment and produces full employment).

This assumption of perfect foresight over time remained problematic for Lindahl. The hypothesis that individuals know what future prices will be is equivalent to assuming that they know in advance the results of their actions and use this knowledge to act. However the institutional context within which the adjustments take place does not permit to ensure this hypothesis and the study of the imperfect foresight situation led Lindahl to build the notion of inter-temporal equilibrium.

“The plans of the economic subjects at any given point of time are neither fully consistent with one another nor with the external conditions, and therefore they must be successively revised. (. . .) All plans prevailing at the starting point are based on expectations in conformity with reality, and that they will undergo no change with the lapse of time. . . can be treated in essentially the same manner as the equilibrium of static theory” [66, p. 38].

Lindahl stressed the necessity to incorporate the interplay between expectations and actual realizations of the relevant economic variables in order to analyse the conditions required for achieving an equilibrium position, when disturbed.

Lindahl deals particularly with divergent expectations as the main cause for the revision of the plans of individuals. He emphasizes that most planned actions depend on the realization of past actions, and this achievement conditions the future plans and in a way are mirrored in the future. As a consequence, changes in expectations and the related revision of plans are considered as the normal succession of events.

Lindahl then explained how the analysis of the pricing process must be amended in order to take into account exchanges at disequilibrium prices. The individual expectations can be fulfilled during the prices determination process but generally need to be revised. The dynamics of the system, which Lindahl called “the theory of economic development”, can thus be explained by considering two basic elements: the assumptions about individual planning and the emergence of unexpected exogenous events. The interaction of these two elements generates the aggregate outcome, which differs from equilibrium if individuals are forced to revise their expectations both by external events and the realization of planned actions. According to Lindahl, the endogenous case – revision of plans and expectations – is generated by the organization of exchanges as for Frisch [34] – which is such that the announcement of prices for exchange and the acts of exchange do not temporarily coincide. In this latter situation, prices announced by dealers at the beginning of a period will be associated with acceptances of trade by other dealers which do not necessarily correspond to those anticipated by those who set prices. The result is that some agents will be rationed at those prices. This will lead a change in the announced prices for the subsequent period. Lindahl was unable to elaborate a convincing theory of the price mechanism based on these considerations. In fact, while it is true that prices are fixed at the beginning of each period so as to induce adjustments of quantities with respect to the ex ante plans, prices adjust instantaneously at the conjunction of two consecutive period: thus a crucial aspect of the pricing process remains unexplained.²²

The outcome of Lindahl’s analysis is clear: within a very short period of time, one cannot take for granted that a Walrasian process of prices’ adjustment will take place. Hence the process of price adjustments brings about an endogenous process of revision of expectations implying for Lindahl’s analysis to entails the discussion of the organization of exchanges in its dynamic theory.

4. The specific Scandinavian approach to national accounting

As Frisch, Lindahl also wanted to articulate theoretical measurement on issuing macroeconomic understanding and economic phenomena with an empirical investigation. However, as for his colleagues of the Stockholm School, modelling was

²²Lindahl accepts transactions out of equilibrium which is bound to make the analysis very complicated.

not a way to achieve this articulation between mathematical economics and statistics and national accounts. Following Ellis [23], Frisch and Lindahl focused on the need to join 'abstract' and 'concrete' numbers, but it seems nevertheless that Frisch conceived econometrics as a way to deal with this need as a new heuristic approach. And this is why he focused so much on identification, estimation, statistical and modelling issues because they are all a means to answer the question of being sure that the 'abstract' number and the 'concrete' one coincide [13,21]. We may assume that Lindahl did not turn to econometrics because the structural modelling approach put a heavy constraint at the pure analytical level on the way to deal with monetary and foresight phenomena. This can fit in the very deterministic and mechanist epistemological scheme of Frischian econometrics. Lindahl focused less on these methodological issues and more on analytical ones. His interest in capital value and income valuation as far as the exploration of the perfect foresight assumption takes most of his time and efforts. But if he can be acknowledged for clarifying the grounds of the theoretical causes of changes in the value capital by the use of income and not the use of capital, he did not propose concepts able to carry on empirical measurement as Hansen underlines [48, p. 200]. We consider that the important step of his attempt to link analytical and empirical investigations is the building up of systems of national accounts as the empirical counter part of his macroeconomics. Despite the significant empirical features of his work on the Swedish National Accounts system, it is also acknowledged as an important theoretical step in National Accounts development [53, p. 8]. From his understanding of Wicksell's cumulative processes and Myrdal's distinction between *ex ante* and *ex post*, Lindahl developed the notion of inter-temporal equilibrium and focused on the reconciliation between agents' expectations and actual demands and supplies as the main goal of economic and political interventions. Indeed, if the expectations of agents are realised in the temporary equilibrium situation, discrepancies between expectations and actual demands and supplies may nevertheless occur across periods, especially if the expectations are revised and the inter-temporal equilibrium points change.

The result of Frisch's investigation was the Eco-circ system [37].²³ The study is mainly a conceptual undertaking of what national accounts should look like. As underlined by Aukrust [5], the estimates were made by Petter Jakob Bjerve and Odd Aukrust²⁴ during World War II and published in 1946. If Frisch was still involved in 1948 with Aukrust and Bjerve [6] in the national accounts research, it was the responsibility of Bjerve and mainly of Aukrust to set and statistically implement the System of National Accounts in Norway [60,61]. Aukrust succeeded in synthesizing Frisch's ideas with the Keynesian perspective developed by Richard Stone.²⁵

²³First drafts were disseminated in 1935 while a more accomplished version was released in 1942.

²⁴They estimated the loss of capital during the war to 17% of the national wealth (Aukrust, O. and P.J. Bjerve) *Hva krigen kostet Norge*, Oslo: Dreyer 1945).

²⁵Aukrust's PhD on the Norwegian system of national accounts was "1952-55: *Nasjonaltregnskap*" In *Samfunnsøkonomiske studier*; 4, PHD dissertation.

Lindahl's work on national accounts [69] is less conceptual than Frisch's ones but still provided a conceptual framework alongside with a large and exhaustive survey of the Swedish economy over eight decades with estimates of major aggregates by industry (e.g. net value of outputs by industry).²⁶

This paper does not aim to provide a detailed survey of Lindahl and Frisch's systems of national accounts, but to underline that their respective designs of national accounting – the theoretical perspective of Frisch and the empirical building-up of Lindahl – present some common technical aspects, beyond sharing the ambition of getting empirical estimates for macroeconomic variables and characterising a Scandinavian design of national accounting [5,15,17,79].

4.1. The sector approach of economic circulation in Frisch's and Lindahl's systems of national accounts

The design of national accounts is constrained in both cases by the statistical material available in Norway and Sweden at that time. As statistics on income and consumption were weaker, the statistical systems in Scandinavia focused on industrial and production statistics. This could explain why Frisch's and Lindahl's accounting system focused on the production side rather than on the demand and consumption side as their macroeconomics might suggest. A pragmatic standing has probably been adopted by Frisch and Lindahl to define a mechanism based on poles and flows to picture the production and exchange activities according to an industrial classification, as well as the interconnections between sectors defined as a sub-group of homogenous industries regarding their output. The causal interrelations they put forward rule each industrial sector, but they don't explain how flows of items and incomes circulate between two sectors. In both cases the explanation stress the way the production activities mobilise and use capital stock and flows. Then an aggregate output for each branch of industrial activity is obtained by adding the output of the different sectors belonging to the branch.

Frisch articulated the industrial sectors with organisational sectors defined according to the market structure (free competition, monopoly. . .) in order to complete the picture of the industrial and productive network.

The sector approach remains one of the major Lindahl and Frisch's contributions to national accounts: 1) economic activities are understood from a circulation point of view (the hydraulic approach so well known in the post-Keynesian approach) and 2) the circulation of goods and money is studied **within** each sector, and not between pairs of sectors. This latter point has to be put in contrast to the approach defined

²⁶The historical study was undertaken after WWII by Olof Lindahl (Lindahl Olof, 1956; *Sveriges Nationalprodukt 1861–1951*, Meddelanden från Konjunkturinstitutet, Serie B:20, Stockholm) and his contribution covers the 1930–1950 period and later by Östen Johansson ([54], *The Gross domestic product of Sweden and its Composition 1861–1955*, Upsalla). But it was Ingvar Ohlsson who was in charged, after WWI, to set up and implement statistically a system of national accounts for Sweden.

in the thirties and developed after 1945 by Richard Stone²⁷ who mainly focuses on the inter-sector payments, i.e. flows of money, or by Leontief and the US Bureau of Labour Statistics for the inter-industrial transactions. In brief, the Scandinavian accounting was focused on a sector approach as later Leontiev and Stone were focused on the inter-sectorial approach. The fact can be explained by the influence of Wicksell on Frisch and Lindahl who pictured the crises as an organizational one with misleading information given by the prices within each activity sector. The solutions proposed by Frisch and Lindahl, especially by Frisch in *Circulation Planning* is on the organization of transactions within each sector and not amongst the sectors of economic activities. We can then understand that both wanted to developed standards concepts with a sector perspective and not a “macro” one in the sense of the holistic approach of the national economy. Lindahl and Frisch adopted a partial equilibrium approach to national accounts against a general equilibrium perspective.

This focus on the production side, for practical reasons, can explain the accuracy of the issue they both raised between the factor cost²⁸ and the market price valuation. Both Lindahl and Frisch explained the difference by the government direct and indirect taxes [38,39,68] and raised two issues: the definition of the value – Frisch referred explicitly to the theory of marginal utility as the key framework for the valuation of each item – and the government implication in the economic affairs through taxation policy and the creation of value by producing non market goods such as education or health.

More broadly, Frisch and Lindahl dedicated time to define taxonomy and the key relevant concepts for national accounts. The issue of the key concept is strongly correlated to the perspective that should be adopted. We have seen that one aspect was the question of the sector vs. the inter-sector approach. In this case, theoretical concern (the definition of value) was intertwined with pragmatic one, as the availability of data and the actual data collection. Frisch and Lindahl put forward an innovative approach. The second innovative and interesting point is their distinction between real and financial objects and flows. Here again, conflicts between theoretical aims and pragmatic considerations were at stake. Finally, this research also led to the development of innovative statistical techniques.

4.2. *The distinction between real and financial flows and items*

The second common point between Frisch and Lindahl is the introduction of the distinction between real and financial items and flows differentiated by their property rights. A real object can be defined without regarding the ownership while a financial

²⁷This latter approach is the one adopted after the Second World War and prevailing by the western countries, especially under the influence of the OEEC, and later by the OECD, which was in charge of surveying and studying the economies of the countries benefiting from the funds of the Marshall plan.

²⁸The factor cost approach is also used by Keynes in 1936 for the valuation of the labour factor and applied in the British national accounts in 1941 (Stone and Meade).

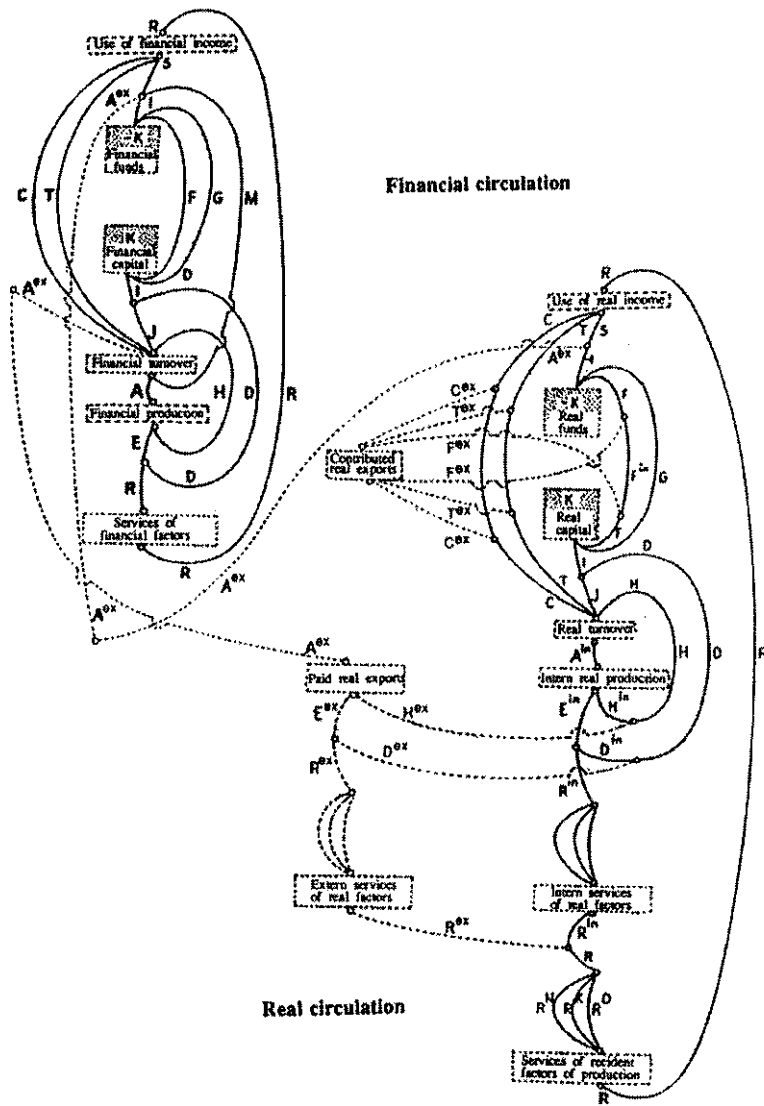


Fig. 1. The real and financial circulation of an open sector.

object is identified by a specific relation between a creditor and a debtor. The property right of a real good is then different from the good itself and can be sold without moving the real good. The real circulation concerns real items, real stocks and flows as the financial one concerns the financial objects and flows. Lindahl and Frisch assimilated financial to monetary phenomena according to their common inheritance

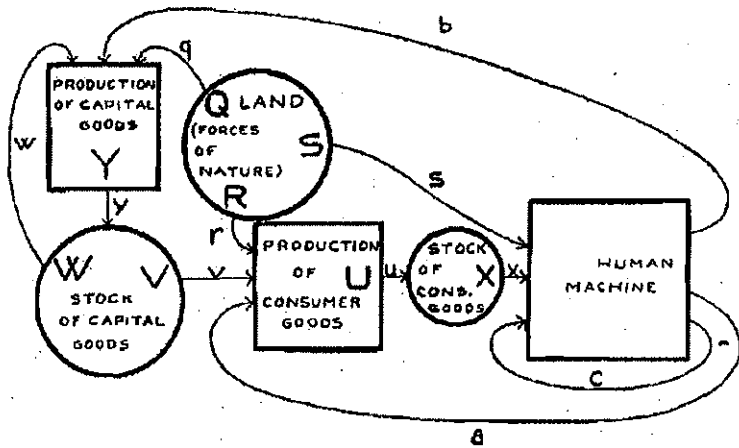


Fig. 2. Tableau Economique [30, p. 4].

of Wicksellian ideas which pave the way to the end of the theoretical dichotomy between real and monetary phenomena. However, Frisch moved forward the analysis in term of the real *versus* financial circulation, and developed a financial circulation as the exact mirror to the real one as described in the picture above: “*Figure of the real and financial circulation of an open sector in Frisch [37, p. 119]*”.

The scheme should be applied to any sector or branch of the economic life. This scheme was inspired by the description of the economic machinery and the circulation of flows proposed in the Rocking Horse/Cassel model in 1933 [30, p. 4]. In the latter, the circulation dealt with flows of goods between poles of economic activities as production of capital goods, production of consumer goods, human factor, land (and the “forces of nature”), stock of capital goods and stock of consumer goods.

At that time Frisch already aimed to describe the “kind of relations that exist among the various magnitudes in the Tableau Economique” (Id.). What is of interest in 1942 are that firstly that his scheme to represent economic flows for the National Accounting was directly inspired by his own macrodynamic understanding of economic life as a circuit articulated around types of economic activities and not types of agents; and secondly that he then introduced the distinction between real and financial flows to account for discrepancies between anticipations and actual realisations.

The scheme should be applied to each sector of the national economy and at last all the schemes will be aggregated to provide an overview of the national situation.

Within this framework distinguishing real from financial circulation, Lindahl and Frisch clearly separated the micro from the macro level analysis. For example, for Frisch a **transaction** is an exchange about one specific economic object – real or financial – while a **flow** is an aggregate of transactions about a certain kind of economic objects. Lindahl developed complicated system of micro-economic relations in order to take into account a complete set of exchanges of real and

financial items. By aggregating all these micro-relations he expected to validate the macro-equations for a relevant group of agents or items, and then, he aimed defining and computing relevant equations for the national economy level.

This distinction between real and financial was related to the one between *ex ante* and *ex post* variables. Frisch and Lindahl both stressed the necessity to introduce the measurement of the impact of perfect foresight of economic agents. They both attempted to produce a system of national accounts in an *ex ante* perspective and one another in an *ex post* perspective. However, the conceptual and technical difficulties to introduce foresight in the analysis and to compare and reevaluate the two systems of national accounts for the actual period and for the future one lead them to abandon the idea of an *ex ante/ex post* national accounts system. But this is thought as a huge and important conceptual failure especially in the view of using national accounts for political purposes in order to establish countercyclical measures.

5. Concluding remarks

National accounting and macroeconomics appeared in Frisch and Lindahl perspective as two complementary heuristic devices aiming to the understanding and the representation of economic life. As macroeconomics was devoted both to the definition and analysis of the causal relations at stake when economic disequilibria occur and to the time dimension of economic analysis, national accounts were perceived as the moment of macroeconomic concepts standardisation and their empirical estimation and were a key stage in measuring economic disequilibria. However, this measurement approach to macroeconomic phenomena the moment to drawn and established a clear and quantitative picture of the national economic structure and a detailed picture of the production, consumption and exchanges activities underlying the economy.

Moreover, quantitative economics based on the intertwining between macroeconomics and national accounting allows forecasting economic fluctuations and consequences of economic policies. This use of national accounts and macroeconomics relies on a mechanical epistemology that assimilates the socio-economic sphere to big machinery ruled by mechanical and physical laws.

On this epistemological basis and in the historical context of the rising of the 'Welfare Society' both in Norway and Sweden, we can understand national accounting and macroeconomics as the tools of economic policy technology that the economist as expert has at his disposal in order to define economic norms. The economist is then the one who has the 'positive knowledge' and the tools that can help to define an 'equity society' and the path to establish it. Because Frisch and Lindahl helped in developing these 'positive' tools, they contributed to the coming out of the expert figure in Scandinavia.

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