On the origins of the Triffin dilemma: Empirical business cycle analysis and imperfect competition theory

by I. Maes

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Abstract

Robert Triffin became famous with his trenchant analyses of the vulnerabilities of the Bretton Woods system. These are still at the center of many discussions today. This paper argues that there is a remarkable continuity in Triffin's work. From his earliest writings, Triffin developed a vision that the international adjustment process was not functioning according to the classical mechanisms. This view was based on thorough empirical analyses of the Belgian economy during the Great Depression and shaped by a business cycle perspective with an emphasis on the disequilibria and the transition period. His doctoral dissertation on imperfect competition theory and his Latin American experience further reinforced this basic view.

Key words: Triffin, Bretton Woods, international liquidity, business cycle theory, imperfect competition theory

JEL codes: A11, B22, B31, E30, E50, F02, F32

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1. Introduction

Robert Triffin (1912-1993) played an important role in the international monetary debates in the post-war period[1]. He became famous with his book *Gold and the Dollar Crisis*, published in 1960, in which he predicted the end of the Bretton Woods system[2]. In Triffin's view, there was an obvious dilemma, as the increase in foreign dollar balances to meet international liquidity needs was only sustainable when there was no doubt about their convertibility into gold. But once foreign dollar balances loomed large relative to US gold reserves, the credibility of this commitment was threatened.

Triffin's approach to economics was well summarised by Jacques de Larosière, "The most remarkable thing about the work and personality of Professor Robert Triffin, in my view, is the combination of three aspects: his power of analysis, his institutional imagination, and his pragmatism as a practitioner." (de Larosière, 1991: 135).

Triffin's analysis has been the subject of major debates in the academic and policy-making world. Also now, the Triffin dilemma is still very present[3]. Even the Chinese central bank governor referred recently to it (Zhou 2009). Moreover, Farhi, Gourinchas and Rey (2011) argue that a modern version of the Triffin dilemma is emerging with regard to the US external debt, "In the 1960s, the source of the problem was the mismatch between the amount of gold held by the US Federal Reserve (the 'backing' of the dollar) and the outstanding dollars held abroad. Similarly, there is a growing asymmetry today between the fiscal capacity of the United States (the 'backing' of US Treasury bills) and the stock of reserve assets held abroad - in other words, the US external debt." (Farhi, Gourinchas and Rey 2011: 19). The late Tommaso Padoa-Schioppa (2010) argued that Triffin's analysis transcended the Bretton Woods system. He advanced Triffin's "general dilemma", that "the stability requirements of the system as a whole are inconsistent with the pursuit of economic and monetary policy forged solely on the basis of domestic rationales in all monetary regimes devoid of some form of supranationality".

In this paper, we provide an analysis of the evolution of Triffin's ideas on the international adjustment process. We do not go into the question of whether Triffin was the first to formulate the "Triffin dilemma". Eichengreen (1992: 203) argues, quite convincingly, that Mlynarski (1929) had already formulated the "Triffin dilemma"[4]. But, as observed by Eichengreen (2011: 51), Triffin was a "hedgehog", Triffin focused on the inherent vulnerability of the Bretton Woods system "virtually to the exclusion of all else. ... He did this so single-mindedly that his name became synonymous with the problem."

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1 For instance, a Bank of England internal note, arguing the case for preserving sterling as a reserve currency if Britain were to join the EEC, observed that, "The General may object, Rueff may scoff, Triffin may pontificate" (Capie 2010: 407).

2 The main body of the book had already been published earlier, in the March and June 1959 issues of *Banca Nazionale del Lavoro Quarterly Review*.

3 See Koeune (2012) and Koeune and Lamfalussy (2012).

4 Mlynarski (1929: 12) himself observed that also adherents of a "managed currency" as Keynes (1927) were concerned about certain vulnerabilities of the gold exchange standard, especially the "hoarding" of gold by France.

The focus of this paper is on the development of Triffin's ideas before his formulation of the "Triffin" dilemma. We argue that there was a remarkable continuity in the work of Triffin. From his earliest writings, he developed a vision that the international adjustment process was not functioning according to the classical mechanisms. We first take a look at Triffin's formative years, focusing particularly on Dupriez's business cycle economics at Louvain and the 1935 Belgian franc devaluation, imperfect competition theory at Harvard in the late 1930s and his Latin American missions in the first half of the 1940s. Thereafter, we turn to Triffin's main writings on the international monetary system, especially *National central banking and the international economy* (1947) and *Gold and the Dollar Crisis* (1960). Lastly, we confront Triffin's analysis with the demise of the Bretton Woods system.

2. Triffin's formative years

2.1. The Institut des sciences économiques

Robert Triffin (1912-1993) did his undergraduate studies at the University of Louvain, obtaining a degree in Economics (*Licencié en Economie*) in 1935. The interwar period was an important turning point for Belgian economics. In the aftermath of the First World War, Belgium was confronted with severe economic problems, especially a large public deficit and debt and high inflation. So, more economic analysis was necessary. In the early 1920s, under the impulse of A.-E. Janssen, the National Bank of Belgium (NBB) set up a research department. The NBB hired Paul van Zeeland, a brilliant young economist who had studied Monetary Economics at Princeton, to head the new department (Maes 2010).

In October 1928, the University of Louvain, with A.-E. Janssen and P. van Zeeland, set up the *Institut des Sciences Économiques*. Its research agenda was directly inspired by the activities of the *Harvard Committee for Economic Research* (van Zeeland 1929). In the interwar period, the Institut became the first modern research centre in economics in the Low Countries (Maes and Buyst 2005). The dominant figure was Léon-H. Dupriez, who had studied at Harvard in 1918 and 1919. Dupriez was a leading scholar in business cycle analysis, to be considered in a broad sense, i.e. the interaction of growth and different types of cycles in economic life. The focus was very much on the different industrial sectors of the economy, which were then at the centre of the economic growth process[5]. Dupriez (1959: 468) described the industrial revolution as "une grande aventure *prométhéenne* de l'humanité" ("a great *Promethean* adventure for humanity", original italics). Moreover, for Dupriez, who also had a position at the NBB, money and finance had a central place in economic life (Mandy 2005). He was also a pioneer in the introduction of statistical methods of business cycle analysis in Europe. Two elements were typical for Dupriez. Firstly, he based his analysis on extensive empirical investigations (with a lot of attention to descriptive statistical methods, as well as charts and tables). Dupriez himself described it as "une théorie conjoncturelle «collant aux faits»" ("a business cycle theory 'sticking to the facts'") (Dupriez 1959: VIII). Secondly, he was not in favour of new schools of economic thought, like Keynesian

[5] The Flemish economists, under the leadership of Gaston Eyskens, focused much more closely on the structural problems of the Flemish economy, especially high unemployment (see Abraham 1972).

economics. He disliked the use of models, econometrics and national income accounts. Dupriez's theoretical approach was very much inspired by Walrasian general equilibrium theory. For him, it was crucial that economic theory should go back to individual economic decisions.

It is further noteworthy that Frank Taussig, one of the dominant figures at Harvard, was very critical of Cassel's purchasing power parity theory (Sember 2012)[6]. In a seminal article, Taussig (1917), also developed the differential role of export, import and domestic prices in the process of balance of payments adjustment, which would also become a hallmark of Dupriez and the Louvain school of economics. As observed by Viner (1937: 323), "While the distinction between "domestic" commodities and those entering into international trade dates at least from Ricardo, and subsequent writers made clear that international uniformity in the prices of identical commodities after allowance for transportation costs was a necessary condition under equilibrium only for "international" commodities, Taussig was the first to lay emphasis on the significance for the mechanism of adjustment of international balances to disturbances of changes in level of domestic commodity prices as compared to the prices of international commodities". Later, several students of Taussig, like Jacob Viner and Harry Dexter White, undertook empirical studies to test Taussig's theories.

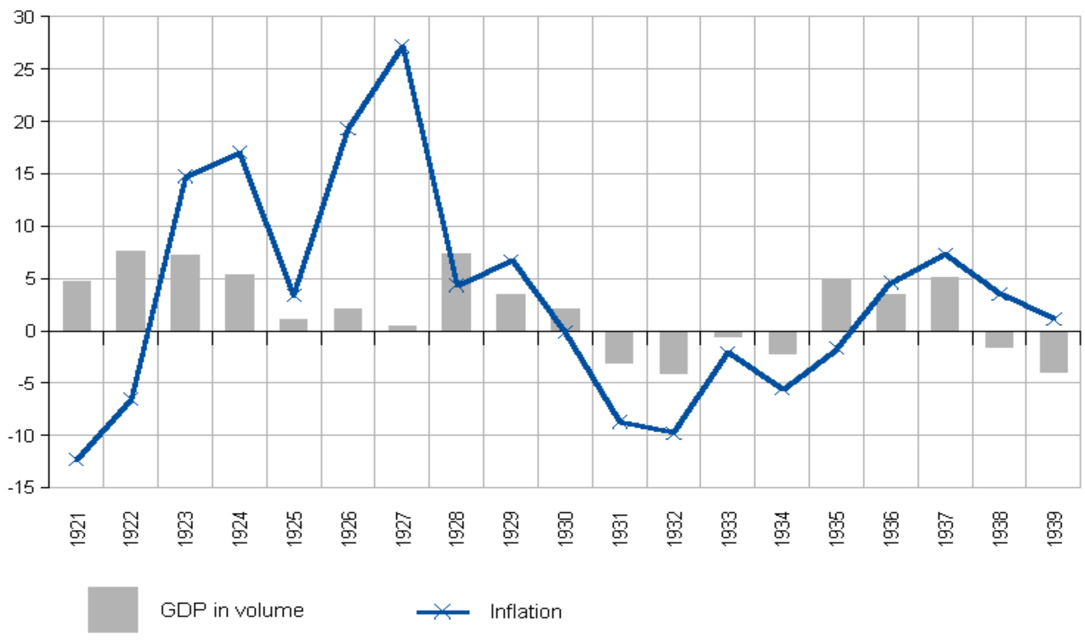
2.2. The Belgian franc devaluation of 1935

As a small open economy, Belgium was badly affected by the Great Depression in the 1930s, especially by the sharply contracting world trade and falling international prices. Yet, in Belgium, there was unanimous support for maintaining the existing gold parity, even after the devaluation of the British pound in September 1931[7]. This implied there was no alternative to a deflationary policy, under which domestic prices had to be adjusted to the lower world market prices by cutting costs. But the fall in nominal wages came up against particularly stiff resistance. Company closures and restructuring led to a further rise in unemployment. The Belgian economy went into a downward spiral (see Chart 1). The financial system was hard hit and some banks went bankrupt.

6 Taussig was prominent in the field of applied economics, "His work was remarkable for its historical perspective and his intuitive sense both for orders of magnitude of economic variables and for the political feasibility of proposed economic measures" (Haberler 1968).

7 The difficulty in stabilising the Belgian franc in 1926 was still too fresh in everyone’s memory.

Chart 1 Economic Growth and Inflation in Belgium, 1921-1939 (percentages)



Source: NBB.

The deflation prompted major debates, within the National Bank of Belgium too (Van der Wee and Tavernier 1975). In the spring of 1934, Dupriez wrote a memorandum claiming that the deflation policy was not sustainable. In his view, a devaluation was the only solution. NBB Vice-Governor van Zeeland was close to Dupriez. With bank crises and rising unemployment, the deflationary policy was losing all credibility. In early 1935, capital flight accelerated, which put the Belgian banking sector under even more pressure.

In March 1935, the political cards in Belgium were radically reshuffled. Paul van Zeeland was appointed Prime Minister. He immediately devalued the franc by 28 %. The young Robert Triffin was responsible for the calculations for the devaluation percentage.

Triffin was one of Dupriez's pupils. His economic career began in 1935 with a statistical article explaining the calculation and interpretation of differential group indices of wholesale prices in Belgium. In the article, Triffin analysed the movement of 25 agricultural product indices and 28 industrial product indices, for the period from 1927 to 1934 (see Annex 1 for the different product groups). One of the distinctions he made was between raw materials, semi-finished products and finished products. He had also separate indices for imported and exported industrial products and imported agricultural products[8].

Triffin argued that the differential movement of different prices, especially the rigidity of domestic costs, was leading to serious losses in Belgian manufacturing, leading to closure of firms: "le maintien relatif de nos prix de vente ... reflétait uniquement la rigidité des éléments intérieurs de nos prix de revient: salaires et surtout charges de capital. Et des prix de vente, apparemment favorables, constituaient pour nos industriels des prix de famine, qui, en 1934, mettaient en perte la moitié des entreprises du pays" (Triffin 1935: 290)[9]. In his conclusion, Triffin emphasised that there was a problem in the structure of relative prices in Belgium and that the deflation process was not solving this.

It is further noteworthy that Triffin also concluded that agricultural prices were much more sensitive to the business cycle, "C'est tout d'abord l'intensité de la crise agricole au cours des dernières années, tout au moins dans les spéculations végétales, qui, par leur nature même et par la moindre protection qui leur est accordée, sont plus dociles aux cours mondiaux fortement déprimés"[10] (Triffin 1935: 290). This would become an important theme in the later work of Triffin, emphasising that deflationary policies at the centre of the economic system would have even greater deflationary effects in the periphery of the world economy. Here, he would be close to several of Raul Prebisch's ideas[11].

In 1937, Triffin, then a graduate student at Harvard University, published an article entitled *La théorie de la surévaluation monétaire et la dévaluation belge (The theory of currency overvaluation and the Belgian devaluation)*, going further into the theoretical and empirical background of the Belgian devaluation. Triffin started with a trenchant critique of Cassel's purchasing power parity theory[12]. His main criticism was that Cassel's theory was not suited to situations of disequilibrium, "Guide utile dans les situations à l'occasion desquelles elle était apparue, la doctrine de Cassel était, au contraire, trop brutale, pour donner des résultats satisfaisants dans la mesure et l'analyse des déséquilibres beaucoup plus restreints des années récentes. Basée exclusivement sur la considération, d'ailleurs essentielle, de positions statiques d'équilibre, elle négligeait trop les

8 For exported agricultural products, the base was not wide enough (Triffin 1935: 274).

9 "The relative stability of our sales prices ... only reflected the rigidity of the domestic elements of our cost prices: wages and, above all, capital charges. And the seemingly favourable sales prices constituted starvation prices for our industrialists, leaving half the country's enterprises trading at a loss in 1934."

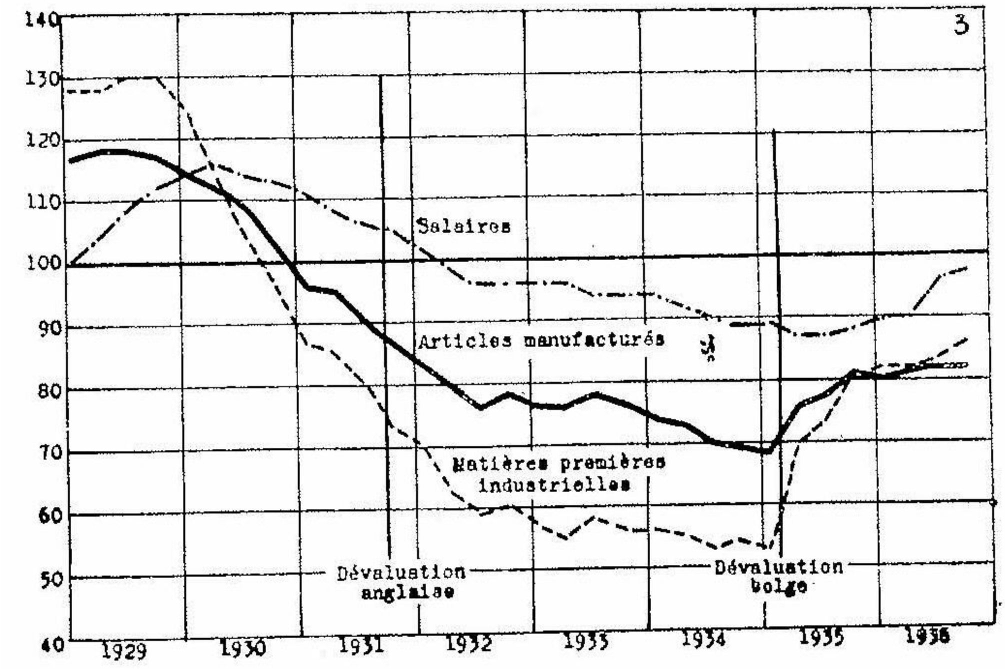
10 "It is above all the sheer intensity of the farm crisis over the last few years, at least in plant products, which, by their very nature and the lower protection they are given, tend to follow the highly depressed world prices more closely."

11 Triffin and Prebisch would meet in October 1943 during a series of seminars at the Mexican Central Bank and become close friends (Dosman 2008: 193).

12 Triffin focused on Cassel (1925), especially the chapter "Deviations from purchasing power parities".

phénomènes secondaires, caractéristiques des périodes de transition. C'est précisément l'étude de ces phénomènes qui se révèle comme déterminante dans l'analyse des difficultés des pays de l'ex-bloc-or." (Triffin 1937: 32)[13].

Chart 2 Flexibility of different types of prices, 1929 - 1936
(index 1927 - 1933 = 100)



Source: Triffin (1937).

Triffin's fundamental criticism, in line with his earlier article, was that Cassel did not look at the structure of prices in a country. Like Taussig and Dupriez, he made a distinction between "sheltered" and "non-sheltered" sectors of the economy[14]. In the non-sheltered sector of the economy, sales prices had to be aligned on world market prices. However, costs in the non-sheltered sectors were largely determined by domestic factors[15], leading to a profit squeeze. "Et c'est ici qu'apparaissent, me semble-t-il, les importants phénomènes de transition, caractéristiques de la surévaluation monétaire: cette inégale flexibilité des divers groupes de prix provoque dans

[13] "A useful guide in situations where it had actually arisen, Cassel's doctrine was, on the other hand, too brutal to give satisfactory results in measuring and analysing the much more moderate imbalances of recent years. Based exclusively on the consideration, indeed essential, of static equilibrium positions, it paid too little attention to the secondary phenomena that are characteristic of transition periods. It is precisely the study of these phenomena that proves to be the determining factor in the analysis of the former gold standard countries' problems."

[14] Later, referring to his 1937 article, Triffin (1947: 77) explicitly used the term "non-sheltered" for "industries which were in competition with foreign firms in the national or international markets."

[15] Like later in the so-called "Swedish" model of inflation analysis (see, e.g., Lindbeck 1979).

l'économie du pays les troubles les plus graves, en désorganisant les relations entre prix de vente et prix de revient. Les prix de vente du producteur sont des prix de gros, donc assez flexibles: les producteurs d'articles standardisés, et notamment de matières premières industrielles, sont ceux dont les recettes sont le plus atteintes, mais les autres prix de gros subissent également la baisse avec intensité. D'un autre côté, les coûts sont loin de diminuer dans la même proportion: les industries transformatrices sont évidemment avantagées par la flexibilité extrême du prix des matières premières, mais cet élément est généralement plus que compensé par l'extrême rigidité des autres éléments du coût: salaires et charges de capital (Triffin 1937: 37-38)[16]. This difference in the structure of prices had serious consequences for the relevance of Cassel's theory in situations of disequilibrium, "Ainsi donc, alors que dans la théorie de Cassel, la réadaptation des prix de gros résout le problème de disparité, elle n'est ici que le point de départ même des difficultés, dues à l'inégale flexibilité des divers groupes de prix. A cet égard, plus l'adaptation des prix de gros est parfaite, plus difficile se trouve la situation des producteurs" (Triffin 1937: 38)[17].

Consequently, the Belgian economy's loss of competitiveness, due to the devaluation of the pound sterling, was not so much visible in the producer prices of the non-sheltered sectors or the trade balance as in a decline of profits in the non-sheltered sectors, a decline in production and increases in unemployment. Moreover, the decline of industry had significant consequences for the financial system, as the banks made important losses on the credits which they had given to industry. This would become the direct reason for the March 1935 devaluation of the Belgian franc.

2.3. Imperfect competition theory

Robert Triffin went to Harvard in 1935 for his Ph.D. in Economics. There, he fell under the spell of Joseph Schumpeter and pure economic theory. As he wrote in an autobiographical article, "A few weeks at Harvard, however, sufficed to convince me that what I missed most was an adequate training in pure theory, then taught at Harvard by Professor Schumpeter whose broad culture in that field, and others, was as unique as his class showmanship." (Triffin 1981: 241). At the centre of economic theory, for Schumpeter, was general equilibrium theory. As observed by fellow Harvard student Samuelson (1951: 103), Schumpeter was "surprisingly un-Austrian" in his approach towards economic theory, and much more Walrasian. In a retrospective article, Triffin (1950: 414) further emphasised that, for Schumpeter, economic theory was a method: "Il m'a appris tout d'abord que la théorie économique n'est pas une dogmatique, mais une méthode. La

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16 "And it seems to me that it is here that the major transition phenomena, characteristic of currency overvaluation, appear: this uneven flexibility of the various price groups causes the most serious disruption in the country's economy, by disorganising relations between sales prices and cost prices. The producer's sales price are wholesale prices, so quite flexible: producers of standardised items, and notably industrial raw materials, are those whose revenue has been hit the hardest, but other wholesale prices are also going through an intense downward phase. From another angle, there is little sign of costs falling in the same proportion: the processing industries are obviously gaining an advantage from the extreme flexibility of raw materials prices, but this element is generally more than offset by the extreme rigidity of the other cost factors, namely wages and capital charges."

17 "So, while in Cassel's theory, the re-adjustment of wholesale prices solves the problem of disparity, here it is only the point at which difficulties actually begin, due to the uneven flexibility of the various price groups. In this respect, the more perfect the adjustment of wholesale prices, the harder the situation producers find themselves in."

théorie économique ne répond pas à nos questions; elle aide à les bien poser et, par conséquent, à les bien aborder. C'est une méthode de travail, et non un recueil de recettes toutes faites[18]."

Triffin wrote a dissertation on *General Equilibrium Theory and Monopolistic Competition*, under the direction of Schumpeter, along with Leontief and Chamberlin. In this work, he tried to reconcile imperfect competition theory, which had its origins mainly in Marshallian partial equilibrium theory, with general equilibrium theory. "Monopolistic and imperfect competition theories have been evolved in the United States and in England alike along the lines of the theoretical tradition dominant in both countries: the particular equilibrium economics of Alfred Marshall. What we might well do now is to restate the whole problem in terms of the Walrasian, general equilibrium system of economic theory, so much more influential in economic thought on the continent of Europe." (Triffin 1941: 3). So, Triffin became an authority on imperfect competition theory. For instance, his book figures quite prominently in Shackle's *The Years of High Theory* (1967). Moreover, imperfect competition theory would also shape Triffin's perception of international monetary phenomen, as we shall see in section three.

2.4. The Federal Reserve and the Latin America missions

After obtaining his Ph.D., Triffin moved back to Belgium. However, as he could not find an appropriate job, he returned to Harvard in 1939. From 1942 to 1946, Triffin was on the staff of the Board of Governors of the Federal Reserve System in Washington[19]. During this period, he worked mostly on Latin America. He was more and more absorbed by what one might characterise as a "progressive Keynesian" spirit. As observed by Helleiner (2009), the Triffin missions to Latin America represented a remarkable episode in US financial diplomacy and constituted a break, both in contents and methods, with the earlier approaches to "international money doctoring", like the US Latin American missions of Kemmerer[20] or the League of Nations financial missions of the 1920s in Europe[21]. US central bank officials not only rejected the classical liberal policies recommended by Kemmerer during the 1920s, but they also "went out of their way to consult with, and learn from, their Latin American counterparts as well as to tailor and differentiate their advice to the specific needs of each country" (Helleiner 2009: 24). Triffin himself described his reform proposals as "truly revolutionary at the time". He emphasised that his aim was to put monetary and banking policy at the service of the "overwhelming development objectives previously ignored in central bank legislations copied one from the other and trying merely to imitate a distant and largely inappropriate Bank of England or U.S. Federal Reserve model" (Triffin 1981).

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[18] "He learnt me that economic theory was a method, not a dogma. Economic theory doesn't answer our questions: it helps with asking them well, and, as a result, to organise them well. It is a working method, and not a ready-made list of recipes."

[19] He also became a US citizen.

[20] Kemmerer had also been Paul van Zeeland's professor at Princeton and influential in his doctoral thesis on the US Fed (van Zeeland 1922). See also Gomez Betancourt (2010).

[21] Triffin (1944: 94) was highly critical of the League of Nations missions: "The futility of many of their undertakings in the economic and financial field cannot be explained away as merely due to the stupidity or wickedness of national statesmen. The League's advice, however good in general, was primarily derived from the experience of the more stable and diversified economies of industrialized nations and could often be rightly regarded by less developed countries as impracticable or even irrelevant to their problems."

Triffin's advice was based on a thorough analysis, both theoretical and empirical, of the situation of the Latin American countries. This was in line with his earlier formation, both at Louvain (business cycle analysis with a strong empirical emphasis) and Harvard (economic theory). For Triffin, the economic cycle in Latin American economies was not so much determined by domestic savings and investment, like in the older industrial countries, as by the inflow or outflow of foreign exchange. Triffin observed that "Domestic savings and investments are on a relatively minor scale, and the business cycle is dominated by the international movements of capital and by the fluctuations of imports and exports" (Triffin 1944: 104). In line with his earlier criticism of the classical theory of balance of payments adjustment, he felt this had serious implications for the orthodox gold standard theory: "The essential weakness of the theory is that the fluctuations of the balance of payments in Latin America are determined only to a minor extent by international cost comparisons. The inflow or outflow of foreign capital in Latin America obeys largely other influences of a more purely speculative nature, and most Latin American exports are generally accounted for by one or a few agricultural products or industrial raw materials, the supply of which may be determined by the vagaries of the weather and the demand for which is predominantly influenced by the state of the business cycle in the buying countries" (Triffin 1944: 108). For Triffin, the policy conclusion was clear, and just the opposite of the classical gold standard adjustment, "the proper policies to be followed should be to offset and neutralize the effects of such erratic fluctuations of the balance of payments on the domestic money market rather than to magnify them through cumulative contraction or expansion" (Triffin 1944: 108)[22].

Triffin was further critical of exchange rate adjustments as an instrument of economic policy in these countries. He questioned the efficacy of a devaluation to bring about a readjustment of the balance of payments, as these were highly specialized countries, with few export products, facing inelastic demand. "A devaluation by Argentina would probably be followed in short order by devaluations on the part of her main competitors, and the final increase in Argentine exports would not compensate Argentina for the lowering of unit prices in terms of the buying countries' currencies." Triffin's analysis was thus also clearly shaped by his background in imperfect competition theory, "The situation recalls the case of oligopolistic competition in which none of the sellers are usually able to profit for very long from price-undercutting policies" (Triffin 1944: 112)[23].

3. National central banking and the international economy

So, during this period at the Federal Reserve, Triffin became more closely involved in analyses of the international adjustment process. He also wrote a first important essay on the international monetary system, *National central banking and the international economy* (Triffin 1947). In his awarding speech for the first San Paolo Prize for Economics in October 1987, former Bank of Italy governor Paolo Baffi paid significant attention to this article. Baffi stressed that Triffin was the first economist to underline the fundamental inconsistency between the stability of the international

[22] Triffin (1947: 60) praised the offsetting policy of Prebisch, then governor of the Argentinian central bank.

[23] Triffin rather exaggerated when he wrote, "but when the opportunity came at the Federal Reserve, I gladly forgot monopolistic competition and pure theory. I have never regretted it" (Triffin 1981: 242).

monetary system and national sovereignty in economic policy-making: "he was the first thinker ever to emphasize that recurring crises and unrest in external economic relations stem from a fundamental dilemma existing between national sovereignty in economic policy decisions and the measure of international incompatibility inherent in such 'atomistic decisions'." (Baffi 1988: 16).

In the introduction to the article, Triffin underlined how the world had changed with the Great Depression and World War Two. In his view, "managed currencies" were unavoidable: "The events of the thirties, the increasing influence of Keynesian economics, and finally the financial impact of World War II have destroyed the institutional and ideological framework of the automatic gold standard. Tomorrow's currencies will be managed currencies." The crucial issue would be to reconcile national objectives with international balance: "Any attempt to enforce rigid solutions patterned after orthodox gold standard doctrines would be even more futile in the postwar period than it has proved to be in the interwar period." (Triffin 1947: 47-48).

The focus of Triffin's paper was therefore on reconciling domestic monetary policies with the prerequisites of international balance. This was not an issue under the gold standard as the domestic money supply escaped the control of national authorities. However, in the new postwar world, this was no longer an option, as countries were now much more attached to national economic policy objectives.

As in his earlier 1937 article, Triffin was also very critical of the classical theory, which ascribed balance of payments disequilibria to international cost and price disparities. He raised two main criticisms, in line with his earlier work on cycles and imperfect competition theory. "These views of the mechanism of international adjustment under gold standard assumptions are open to grave question. First, they fail to distinguish between a fundamental disequilibrium in one country's international position and world-wide disturbances in balances of payments associated with cyclical fluctuations. Secondly, the explanation of the readjustment of a country's balance of payments is vitiated by the underlying and totally unrealistic assumption of near-perfect competition between nations of roughly equal strength and importance in world trade." (Triffin 1947: 55).

Triffin then raised the question whether the international monetary system in the interwar period was a gold standard or a sterling exchange standard, "in recent years many writers have emphasized the central position occupied by Great Britain in the nineteenth century functioning of the gold standard. It has been suggested that that position 'made the pre-war gold standard essentially a sterling exchange standard system,' but the concrete implications of that assertion have not been fully drawn." (Triffin 1947: 58). Triffin argued that changes in the discount rate also had significant effects on capital movements[24]. Consequently, as Great Britain was the major centre of world trade and finance, the British discount policy immediately affected not only the domestic economy and prices but also other countries, thus transmitting British cyclical fluctuations. Triffin further underlined the asymmetric nature of the adjustment process as the discount policy of debtor countries did not have the same effect: "Capital tended to flow toward them in times of prosperity and away from them in times of depression, irrespective of their

24 According to Triffin (1947: 59), Tooke had recognised the effects of changes in the discount rate on capital movements as early as 1840.

discount policy. The effect of such fluctuations in capital movements was to smooth down cyclical monetary and credit fluctuations in the creditor countries, but to accentuate them in the debtor countries. To that extent the financial centers could shift part of the burden of readjustment upon the weaker countries in the world economy" (Triffin 1947: 60).

According to Triffin's statistical evidence, the consequence was that a restrictive British monetary policy would lead to an improvement in Britain's terms of trade and balance of payments, as prices in other countries were more affected than those in Great Britain. He said the "improvement in the British terms of trade in periods of rising discount rates should not be surprising, in view of the special position of Britain as a financial center for world trade. On purely *a priori* grounds, it would appear at least as probable as the opposite pattern contemplated by the classicists" (Triffin 1947: 61).

This dominance of the London discount market had serious implications for the international adjustment mechanism. "Thus, the problem became essentially one, not of disparities between one country and the others, but of a simultaneous upward or downward movement engulfing most other nations along with Great Britain. ... The failure of British discount policy to effect the type of readjustments contemplated in classical theory is thus easily understandable. It was due primarily to the *international* character of the London discount market, whose expansion and contraction affected foreign prices as much as or more than British prices. It is also explainable by the fact that producers of agricultural and raw materials are more vulnerable to cyclical and credit fluctuations than is the British economy[25]. The main result of 'orthodox' gold standard policies under such circumstances was to spread throughout the world at large any cyclical disturbance arising in major industrialized nations." (Triffin 1947: 62-63)[26]. Triffin further emphasised not only Keynesian quantity type adjustments, but also, in line with his analysis of the Belgian situation in the 1930s, imbalances in the structure of relative prices, "Balance of payments deficits would be corrected in the end, but mostly through a general contraction in income and economic activity, rather than through direct price readjustments. Furthermore, the accompanying price changes would leave in their wake a basically unbalanced structure of international prices when the cyclical depression subsided and more normal conditions were restored." (Triffin 1947: 63). As in his earlier article on Latin America, Triffin also made an explicit link with imperfect competition theory: "Price deflation and devaluation spread from country to country without increasing export receipts, especially if world demand for a nation's exports is relatively inelastic. The situation presents a strong analogy with that of oligopoly, where each effort by one seller to cut into the competitors' markets is thwarted by the competitors' price retaliation" (Triffin 1947: 80).

In Triffin's view, all this had important policy conclusions: compensatory policies should be followed to the fullest possible extent. This put global liquidity at the core of the international monetary system. It was necessary to have a "high level of international reserves, especially in raw

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25 As mentioned before, Triffin (1935) had already concluded in his first article that agricultural prices were the ones most affected by the Great Depression.

26 Eichengreen (1992), calls this the "Triffin effect". As observed by Haberler (1947: 87), earlier writers, like Hawtrey, had already observed this phenomenon. However, they had not systematically elaborated on the idea. Triffin (1947: 63) acknowledged this too.

material and food producing countries, and the willingness to spend these reserves liberally in times of crisis and to accumulate them during prosperous years." Triffin had also a clear ranking of policy instruments, preferring exchange controls to devaluation. "When reserves are insufficient, foreign or international assistance - such as is contemplated under the International Monetary Fund - will be necessary. Failing this, exchange control should be used as a third line of defense, in order to continue compensatory policies and avoid the greater evils inseparable from deflation or currency devaluation." (Triffin 1947: 80).

4. Gold and the dollar crisis

In 1946, Triffin went to the International Monetary Fund, where he became head of the Exchange Control Division in Washington, before moving to Paris to lead the IMF's Representative Office in Europe. From 1949 to 1951, he was a Special Advisor to the (US) European Recovery Administration in Paris. During these years, his focal point of interest was the European Payments Union[27]. In 1951, he became a professor at Yale[28].

In 1960, Triffin published *Gold and the dollar crisis,* the book that made him famous[29]. In line with his earlier work, the focus of the book was on international liquidity and the vulnerability of the international monetary system. Triffin emphasised the fragility of the gold exchange standard system, stressing the contradiction of an exchange standard "whose operation becomes increasingly dependent on one or a few *national* currencies as major components of *international* monetary reserves." (Triffin 1960: 19 original italics).

Triffin took a broad perspective on the evolution of the monetary system. In his view, the First World War and the global depression had completely changed the role of monetary reserves. In Triffin's view, the universal disappearance of gold coins from active monetary circulation had deeply modified the significance of central bank reserves. Their main function was no longer to preserve the overall liquidity of individual central banks, "but to permit the financing of short-run deficits in the country's external transactions" (Triffin 1960: 33).

In line with his earlier analyses, Triffin distinguished two types of balance of payments deficits which had to be financed by international reserves, "The first is that of reversible deficits reflecting purely temporary fluctuations in foreign receipts and expenditures on current and capital account. The second case is that of more fundamental disequilibria, calling for corrective action, but in which the most appropriate and desirable remedies will act relatively slowly and smoothly, and leave residual needs for the financing of tapering off deficits." (Triffin 1960: 34). For Triffin, deeply

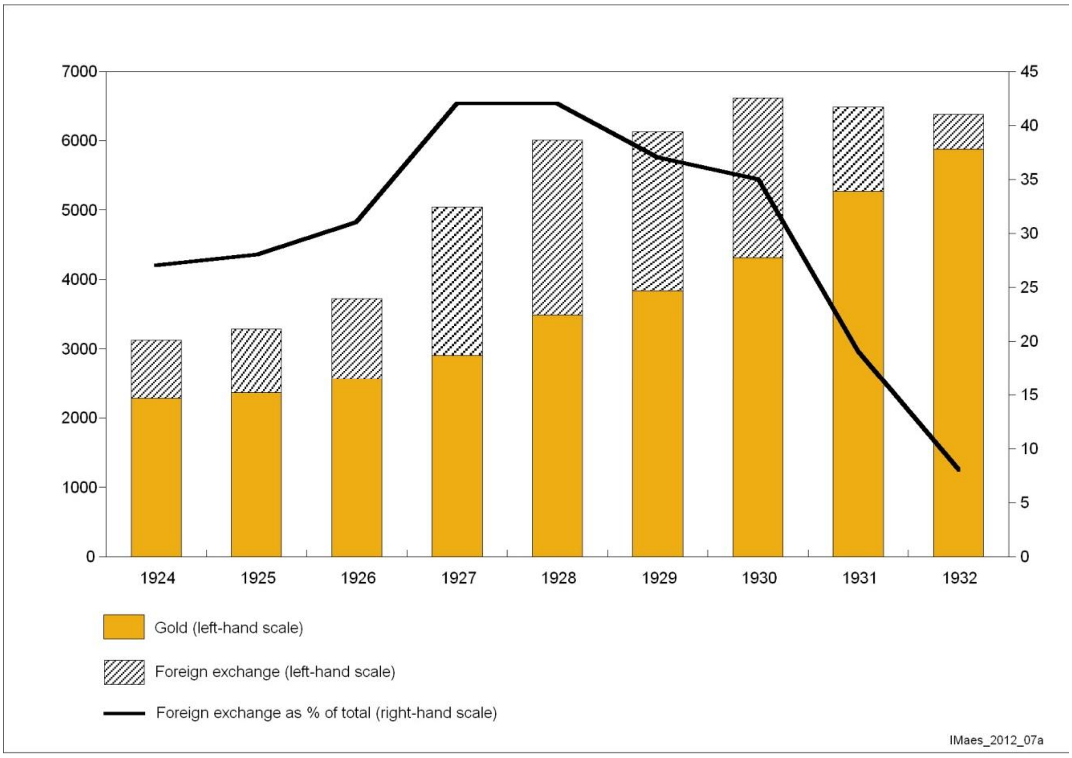
[27] Triffin's regional approach to the international monetary system rather clashed with the world-wide approach of the IMF.

[28] However, he remained very closely involved in policy work, for instance as an advisor to European Commission Vice-President Robert Marjolin and to Jean Monnet's Action Committee for the United States of Europe. Triffin thus played a very influential role in the process of European monetary integration, see, e.g., Maes and Buyst (2004) and Ferrant and Sloover (2010).

[29] For instance, it was an important topic of discussion among central bankers. For the discussions in the Federal Reserve, see Meltzer (2009: 219-224). M.-H. Lambert, in a National Bank of Belguim internal note (Les propositions de M. Triffin et la réforme du Fonds Monétaire International, 4 July 1960, NBBA C.402/24), underlined the continuity of Triffin's ideas with those of Keynes.

affected by the experience of the 1930s, the alternative was gloomy: "In both cases, an insufficient level of reserves will force the deficit country to resort to otherwise unnecessary measures of deflation, devaluation or restrictions" (Triffin 1960: 34).

Chart 3 Gold and foreign exchange reserves, 1924-1932
(in millions of US dollar and per cent)



Source: Nurkse, 1944, Annex 2.

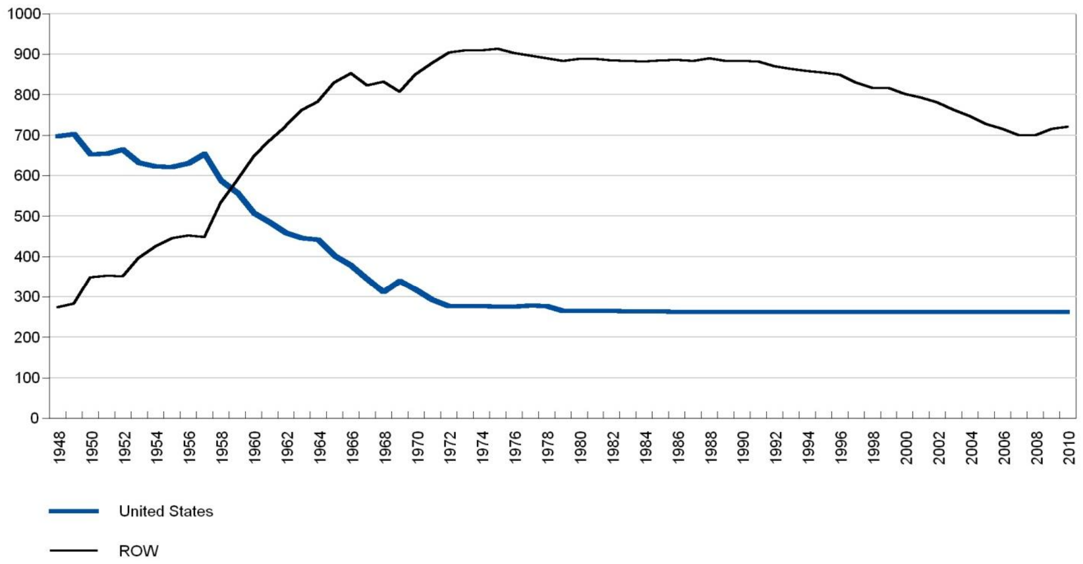
Triffin then observed that the world's liquidity requirements were being increasingly met by the growth of foreign exchange reserves, especially dollar balances. He was strongly concerned by this. He again turned to the interwar period and the experience with the sterling exchange standard. "The growth of foreign exchange reserves during and after World War II repeated, but on a much larger scale, their similar expansion after the First World War. Foreign exchange reserves had then risen from an estimated $ 500 million (16 per cent of total reserves) in 1913 to $ 3 250 million (38 per cent of reserves) in 1928[30]. In Triffin's view, this trend was encouraged by policy-makers, as at the international monetary conference in Genoa in the spring of 1922, due to a shortage of gold. However, Triffin also strongly emphasised the specific role of the United

30 In Nurkse (1944), the source of the data in the chart, the share of foreign exchange reserves also reaches a maximum in 1928, but at 42 per cent. Naturally, these data on interwar foreign exchange reserves are subject to caution. For a recent discussion of foreign exchange reserves in the interwar period (with a critique of Triffin's data too), see Eichengreen and Flandreau, 2009.

Kingdom. "It was also propagandized throughout the 1920s by the United Kingdom, whose very low reserve position was considerably eased by foreign accumulation of sterling balances. The British return to convertibility in 1925 was thus assisted to a great degree by the maintenance of short-term balances by foreign countries in the London market." (Triffin 1960: 56). For Triffin, however, this was a very fragile construction. He thought the British position was highly vulnerable as funds could move in and out as a consequence of changes in relative interest rates and/or changes of exchange rates expectations[31]. Moreover, the return to gold at the pre-war rate made sterling highly vulnerable on the foreign exchange markets. The financial crisis of the 1930s put the pound further under pressure. "The final blow came in the summer of 1931, when the development of the world crisis put into difficulties the Credit Anstalt of Vienna, triggering a financial panic which spread rapidly throughout Central Europe and led to further and massive withdrawals of funds from London." (Triffin 1960: 57). The devaluation of sterling in September 1931 had devastating implications for the global monetary system and international liquidity. It marked the end of the sterling exchange standard. "The conversion of pounds into gold and dollars was accompanied and followed by similar conversions of dollars into gold. The foreign exchange component of the world's monetary reserves was nearly wiped out in the process, except for the countries of the sterling area." (Triffin 1960: 57 see also Chart 3). The result was a fall in international monetary liquidity, contributing to the Great Depression.

31 These were also concerns for central banks. For an overview of the management of the international reserves of the National Bank of Belgium in these years, see P. van Zeeland, Note sur la gestion des avoirs en devises de la Banque de fin septembre 1930 à fin septembre 1931, 16 November 1931, NBBA, N017/31.

Chart 4 Gold Stock of the US and the Rest of the World, 1948-2010 (in million ounces)

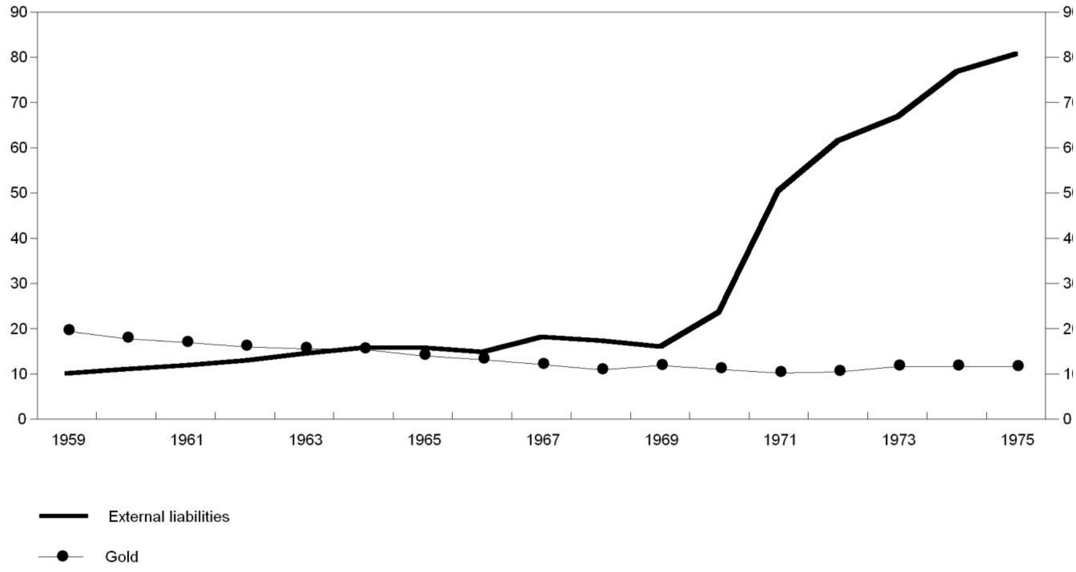


Source: IMF, International Financial Statistics.

By the end of the 1950s, Triffin became more and more worried about the international reserve position of the United States due to the country's gold losses and the increase in dollar liabilities (see charts 4 and 5). In Triffin's view, influenced by the experience of the pound sterling in the 1930s, the continued deterioration in the US net reserve position would undermine foreigners' confidence in the dollar as a safe medium for reserve accumulation. "The time will certainly come, sooner or later, when further accumulation of short-term foreign liabilities will either have to be slowed down or substantially matched by corresponding increases in our already bloated gold assets. If this were not done on our own initiative, foreign central banks would do it for us by stopping their own accumulation of dollar assets and requiring gold payment instead for their overall surplus with the United States." (Triffin 1960: 63)[32]. For Triffin, the conclusion with regard to international liquidity was clear: "further increases in dollar balances cannot be relied upon to contribute substantially and indefinitely to the solution of the world illiquidity problem." (Triffin 1960: 63).

32 It would become the policy of France in the 1960s, under the influence of Rueff, like also in the interwar period. According to Irwin (2010), the French share of world gold reserves rose from 7 % in 1926 to 27 % in 1932. In his view, France's policies accounted for about half of the 30 % deflation experienced in 1930 and 1931.

Chart 5 US Gold Stock and Dollar Liabilities, 1959-1975 (in billion dollars)



Source: IMF, International Financial Statistics.

So, in Triffin's eyes, the gold exchange standard was not sustainable, leading to his famous dilemma: "The gold exchange standard may ... help in relieving a shortage of world monetary reserves. It does so only to the extent that the key currency countries are willing to let their net reserve position decline through increases in their own gross reserves. If they allow this to happen, however, and to continue indefinitely, they tend to bring about a collapse of the system itself through the gradual weakening of foreigners' confidence in the key currencies." (Triffin 1960: 67)[33].

Triffin did not fear a dollar collapse, but a return of a liquidity shortage and a repeat of the gloom and doom of the 1930s, predicting that "the growing inadequacy of world reserves would be most likely to lead, within a relatively short span of years, to a new cycle of international deflation, devaluation and restrictions, as it did after 1929." (Triffin 1960: 70).

In his analysis of the Bretton Woods system (but not in his policy conclusions), Triffin was quite close to French economist Jacques Rueff. They were both marked by the implosion of the sterling standard in the 1930s. Since the 1930s, Rueff had been a strong opponent of the gold exchange standard (Rueff 1977). In his view, it permitted reserve-currency countries to live beyond their means as they could borrow in their own currency to finance balance of payments deficits. This

[33] Eichengreen (1992: 203 and 1996: 116, both without page reference) also mentions that the "Triffin dilemma" had already been set out in Triffin's 1947 article. However, while Triffin is clearly critical of the sterling exchange standard, I did not find a formulation of the Triffin dilemma. Also Triffin (1960: 19) himself does not refer to his 1947 article, but to his earlier book *Europe and the Money Muddle* (Triffin 1957: 296-297).

idea was also an important element in Triffin's analysis of the Bretton Woods system. Furthermore, Rueff, like Triffin, strongly criticised the fact that international liquidity was crucially dependent on the dollar and sterling balances: "Can one seriously allow the immense weight of the international monetary system to rest on the currency of two countries with constant balance-of-payments deficits? This situation is truly preposterous, and what is worse, it can only disappear through the elimination of the gold-exchange standard that produced it" (Rueff 1972: 110)[34].

Triffin, like Keynes (but unlike Rueff), sought a more "international" solution for the world liquidity problem, in line with the development of national monetary systems[35]. "The most promising line of approach to a long-term solution of the problem lies in the true 'internationalization' of the foreign exchange component of the world's international reserves, protecting the world monetary system from the instability resulting from arbitrary shifts from one reserve currency into another or into gold. Such a solution should be regarded as the normal culmination of one of the techniques used in the past to adjust the monetary system to the requirements of an expanding economy, i.e. the gradual withdrawal of gold coin from active circulation, and its concentration into the monetary reserves of national central banks." (Triffin 1960: 71). For Triffin, there was an almost perfect analogy with a national banking system: "Just as the development of national banking systems served to offset a deflationary pressure ... The substitution of a credit mechanism in place of hoarding would have repeated in the international field the same miracle ... of turning a stone into bread". (Triffin 1960: 91)[36].

Triffin further relativised the loss of sovereignty which his proposals might imply. In his view, national sovereignty was always subject to stringent limitations, not so much because of legal agreements or international commitments, but due to economic imperatives, especially the balance of payments constraint.

In Triffin's view, a sustainable international monetary system would thus depend not only on an ample provision of international liquidity to finance temporary disequilibria, but also on the coordination of economic policies so that long-run equilibrium in each country's overall balance of payments could be preserved. "The internationalization of foreign exchange reserves would help provide this financing and give the International Monetary Fund the necessary leverage to promote such harmonization." (Triffin 1960: 146).

5. The demise of the Bretton Woods system

Triffin was not alone in his criticism of the Bretton Woods system. In the academic world especially, there was a growing tendency in favour of flexible exchange rates. In a classical essay in 1953, Friedman put the case for flexible exchange rates again on the agenda. He advanced two main

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34 As a policy conclusion, Rueff argued for the liquidation of the foreign-exchange component of the Bretton Woods system and a return to a more gold-standard-like system. Rueff inspired De Gaulle's criticism of America's "exorbitant privilege" and the French government's threat to liquidate its dollar balances.

35 For a discussion of the Keynes plan, see Triffin (1957), Chapter III.2. Triffin considered the Keynes plan "to this day, far superior to any of the practical alternatives offered to it" (Triffin 1957: 107).

36 Triffin's proposal to substitute a new reserve asset for the dollar in order to provide the international monetary system with sufficient liquidity was generally well received by weak-currency countries, but opposed by their strong-currency counterparts (like Germany) and the United States.

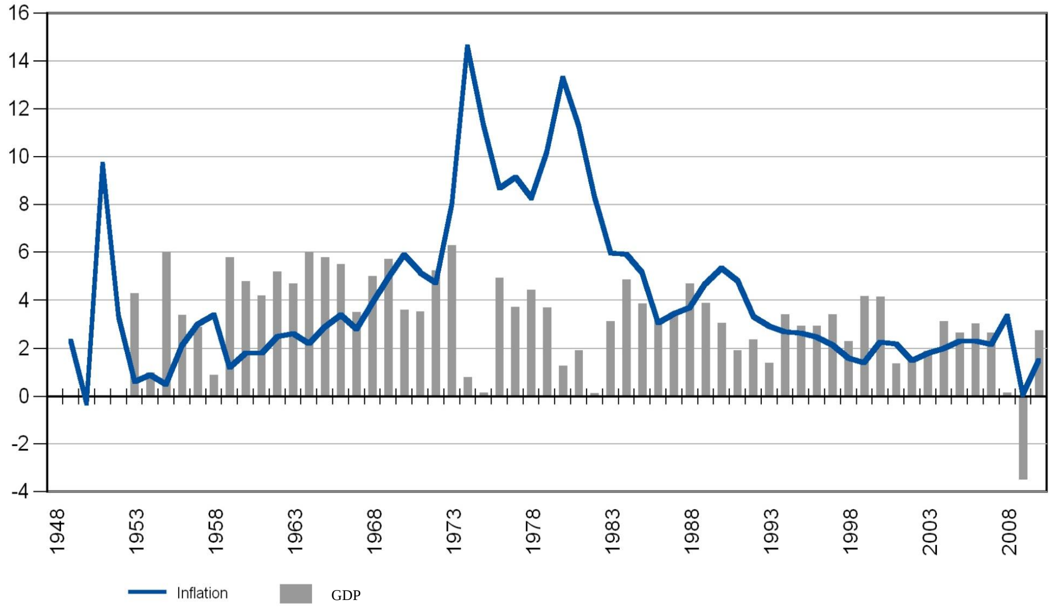
arguments: (1) exchange rate changes are the more appropriate instrument for correcting current account imbalances; and (2) flexible exchange rates give countries more freedom to pursue their own domestic macroeconomic policy objectives. The partisans of flexible exchange rates would gradually gain in importance. Initially, their influence spread mainly in the academic community, while policy-makers remained committed to stable exchange rates.

The stress in the international monetary system was initially most keenly felt by the British pound. Indeed, the United Kingdom was at the time the sick man of Europe, with slow economic growth and recurring balance of payments problems. The sterling balances were a further complication. The devaluation of sterling in November 1967 was an important warning for the sustainability of the Bretton Woods system.

Monetary tensions quickly turned to the dollar. Three lines of defence were set up in the early 1960s (Toniolo 2005). The first was the Gold Pool, whereby central banks intervened in the London gold market to stabilise the gold price. Secondly, a swap network between central banks was set up, allowing for bilateral currency swaps and credits between central banks. The third line of defence came in the form of the General Arrangements to Borrow.

The summer of 1965 brought what Harold James (1996: 167) described as the "partial conversion to Triffinism" of US Treasury Secretary Fowler. With US external dollar liabilities exceeding gold reserves and serious tensions on the London gold market, the United States reversed its position, siding with the proponents of Special Drawing Rights (SDR).

Chart 6 - Inflation and growth in industrialised countries, 1948-2010
(in per cent)



Source: IMF, International Financial Statistics.

As already mentioned, Triffin feared that the United States would revert to deflationary policies to fend off a collapse of the dollar, effectively starving the world of liquidity. However, US monetary policy was mainly determined by domestic considerations. The Vietnam War and President Johnson's "Great Society" project further increased pressure on budgetary policy. So, an excessive supply of dollars became the problem (De Grauwe 1989). In the 1960s, the world moved from a dollar shortage to a dollar glut. Inflation, not deflation, became the fundamental policy problem in the ensuing decades (see chart 6). So, while Triffin correctly foresaw that the Bretton-Woods System was not sustainable, the collapse occurred in a different way than he had expected.

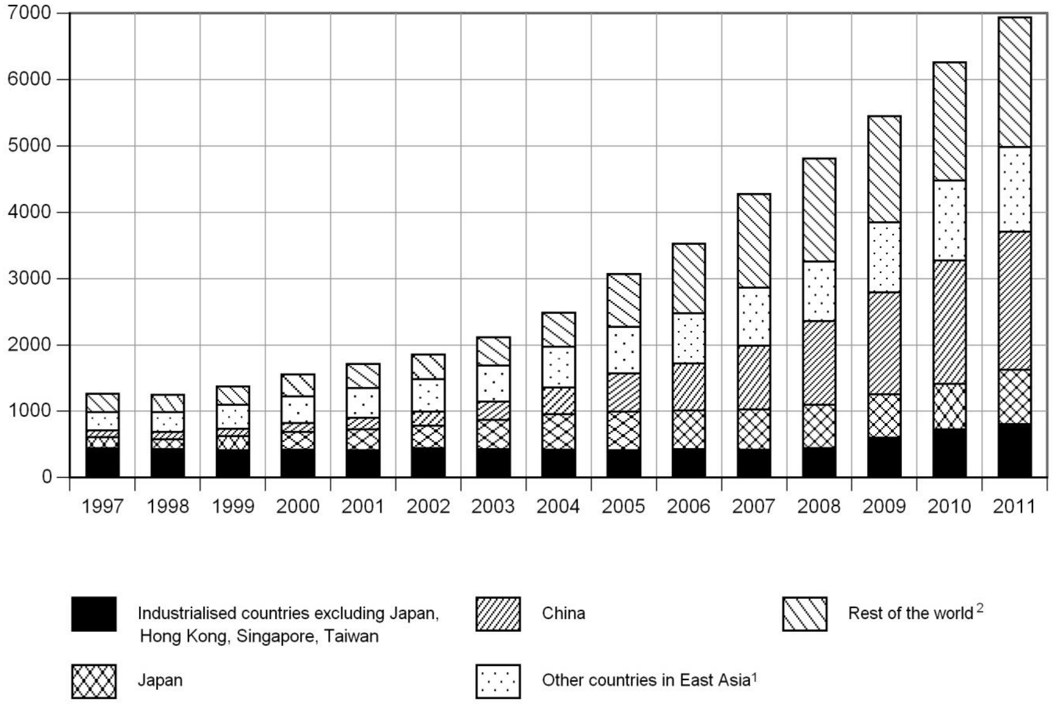
However, foreign governments supported the dollar because it was the linchpin of the Bretton Woods system and because there was no consensus on how the system might be reformed or replaced. But, at the end of the 1960s, there was a significant deterioration of the US balance of payments[37]. The Spring of 1971 saw massive capital flows from the dollar to the Deutschemark. Fearing inflation, Germany halted intervention and allowed the mark to float upwards. Over the weekend of August 13, the Nixon administration suspended the gold convertibility of the dollar. Extensive negotiations culminated in the Smithsonian Agreement of December 1971, comprising a general realignment of parities and a widening of the fluctuation bands. However, the new

[37] The problems with the Bretton Woods system also induced the European Community to develop its monetary union project, as stable exchange rates were important for Europe's Common Market (Maes 2002).

arrangement did not end the turmoil (Krugman 1989). On 1 March 1973, the international currency markets were closed again, this time until 19 March. Thereafter currencies were left to float freely.

Officially, this signified the end of the dollar standard. In reality however, the dollar held its ground and even extended its influence (Van der Wee 1986: 493). World reserves were increasingly expressed in dollars and the dollar remained important as an intervention currency too. The dollar further played a dominating role in the international capital markets. Also in the 21th century the United States is still playing a pre-eminent role in the global financial system. Not only does the United States possess deep financial markets, but the dollar remains the main international currency, both for trade transactions and for currency reserves of central banks. As argued by Farhi, Gourinchas and Rey (2011), two factors largely explain the dominance of the dollar as a reserve currency. The first is the depth of the markets for US Treasury bonds, while the second is related to the (perceived) safety of US Treasury bills, "the risk of erosion of their value through inflation, devaluation of the dollar, or default is considered to be low. These safety features are directly related to the perceived institutional quality of the United States and the fiscal capacity of the US government ... The solvency of the US economy, the world's largest, is the sine qua non for the international liquidity of US Treasuries. This solvency is of particular importance in times of systemic crisis, when US Treasury bills help protect their holders from global shocks." (Farhi, Gourinchas and Rey 2011:10).

Chart 7 - Official reserves
(outstanding amounts in billions of SDR's, end of period, excluding gold)



Source: FMI.
1 Korea, Hong Kong, India, Indonesia, Malaysia, Philippines, Singapore, Taiwan and Thailand.
2 Non-industrialized countries of Europe, other Asian countries, Middle East, Latin America and Africa.

The current international monetary system has even been described as a type of a "revived" Bretton Woods system (Dooley, Folkerts-Landau and Garber 2003). There are indeed similarities with the post-war period. Firstly, several Asian countries, like China, are pegging their currency against the dollar. The export-led growth strategy of those countries has quite some similarities with those of Germany and Japan in the early post-war period. This also implies that, in terms of production, the world economy is becoming multi-polar. However, financial markets in the emerging economies are less developed. The export-led growth strategy, of the Asian countries, led to an accumulation of dollar reserves by these countries, contributing significantly to the financing of the US current account deficit.

Farhi, Gourinchas and Rey (2011) argue that a modern version of the Triffin dilemma is so emerging, "In the 1960s, the source of the problem was the mismatch between the amount of gold held by the US Federal reserve (the 'backing' of the dollar) and the outstanding dollars held abroad. Similarly, there is a growing asymmetry today between the fiscal capacity of the United States (the 'backing' of US Treasury bills) and the stock of reserve assets held abroad - in other words, the US external debt. ... However, the fiscal capacity of the United States is bound to decline relative to the size of the global economy. Beyond the exchange rate regime, it is the ability to provide liquidity in times of global economic stress that defines the issuer of the reserve currency. This capacity depends on the issuer's fiscal capacity. In a growing world, then, the United States will inevitably lose its reserve currency monopoly." (Farhi, Gourinchas and Rey 2011: 19). In their view, there is no real alternative to a multipolar world with also other reserve currencies, like the euro and the yuan.

6. Conclusion

Robert Triffin is best known for his book *Gold and the Dollar Crisis*, in which he predicted the end of the Bretton Woods system. According to the Triffin dilemma, the increase in foreign dollar balances to meet international liquidity needs was only sustainable when there was no doubt about their convertibility into gold. But once foreign dollar balances loomed large relative to US gold reserves, the credibility of this commitment was threatened. Also now the Triffin dilemma figures prominently in the discussions on the international monetary system. Even the Chinese central bank governor referred recently to it. Moreover, several authors argue that a modern version of the Triffin dilemma is emerging with regard to the US external debt, as there is a growing asymmetry between the fiscal capacity of the United States (the 'backing' of US Treasury bills) and the debt.

In this paper, we focused on the origins of the Triffin dilemma. We argued that there was a remarkable continuity in Triffin's work. From his earliest writings, in 1935 and 1937 when he was still a graduate student, Triffin developed a vision that the international adjustment process was not functioning according to the classical mechanisms. This view was based on thorough empirical analyses of the Belgian economy during the Great Depression and shaped by a business cycle perspective with an emphasis on disequilibria and the transition period (all typical elements of Dupriez's Louvain school of economics). His doctoral dissertation on imperfect competition theory at Harvard in 1938 and his Latin American missions for the Federal Reserve in the 1940s further reinforced this basic view.

Like so many economists of his generation, Triffin was marked by the Great Depression of the 1930s. Triffin was particularly influenced by the fall of sterling. From his early years, Triffin was critical of the classical theory of the international adjustment mechanism. As early as a 1937 article, based on Belgium's experience in the first half of the 1930s, he strongly criticised Cassel's purchasing power parity theory, as not suitable for analysis of the transition period, which was of crucial importance for policy-making. In the 1940s, Triffin argued that the international monetary system in the interwar period was a sterling exchange standard. Consequently, as Great Britain was the major centre of world trade and finance, the main result of "orthodox" gold standard policies was to spread British cyclical disturbances throughout the world. For Triffin, the policy conclusion was to put international liquidity at the core of the international monetary system. Moreover, in Triffin's view, a sustainable international monetary system depended also on economic policy coordination. As he observed in *Europe and the money muddle* (1957), "Countries whose peace, progress and welfare are intimately interdependent must, in their own interest, learn to use or limit their national sovereignty in the light of their interdependence" (Triffin 1957: 30).

Annex 1: Product indices in Triffin (1935)

I. Industrial indices

Raw materials
- Plant origin
- Animal origin
- All

Semi-finished products
- Plant origin
- Animal origin
- All

Finished products
- Plant origin
- Animal origin
- All

Main products
- Plant origin
- Animal origin
- All

By-products
- Plant origin
- Animal origin
- All

Imported products
- Exotic
- Complementary
- Wheat
- All

Products for processing
- Single-stage
- Prepared
- Various
- All

Consumer goods
- Plant origin
- Animal origin
- All

II. Agricultural indices

Raw materials
- Minerals
- Textiles
- Various
- All

Semi-finished products
- Minerals
- Textiles
- Various
- All

Finished products
- Minerals
- Textiles
- Various
- All

Main products
- Minerals
- Textiles
- Various
- All

By-products
- Minerals
- Textiles
- Various
- All

Import products
- Minerals
- Textiles
- Various
- All

Export products
- Minerals
- Textiles
- All

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