



A return to international policy coordination in the age of secular stagnation

Koichi Hamada¹ · Makoto Sakurai²

Received: 2 March 2022 / Accepted: 3 August 2022 / Published online: 2 September 2022
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Abstract

The interdependence of economic policies calls for international policy coordination. This paper reviews various patterns of macroeconomic interdependence and policy coordination during the fixed as well as the flexible exchange rate. There was a period where laissez-faire policies rather than policy coordination were required under the flexible rate. After the Lehman Crisis, however, insufficient attention to this interdependence by the Bank of Japan, for example, brought considerable damage to the Japanese economy from this difficulty through excessive appreciation of the yen. Governor Kuroda rescued the Japanese economy with his quantitative easing (QE) during 2013–2015. But, after the zero or minus interest rate, the world economy plunged into the age of secular stagnation that may require macro-policy coordination of fiscal expenditures, possibly supported by the Yield Curve Control.

Keywords International policy coordination · Game-theoretic analysis · Strategic substitutes and complements · Lehman Crisis · *Abenomics*

Introduction

The present world is highly connected with prevalent trades and factor movements. Moreover, national economic policies are interdependent in the sense that the fact or condition in a country depends upon that in the other countries [3, 4, 5]. In the presence of policy interdependence, we need policy coordination, that is, the collaboration of policies that adopted by governments that are more than mere cooperation, but collaboration that actually supports a common objective.

In retrospect, international economics has been developed under the assumption of the existence of a large economy, namely, the United States. The phenomenon

✉ Koichi Hamada
koichi.hamada@yale.edu

¹ Yale University (Emeritus), New Haven, USA

² A Former member of the Bank of Japan Policy Board, Tokyo, Chuo-ku, Japan

of interdependence was not too seriously taken into account. After the Lehman Crisis, when the magnitude of reactions of central banks were so substantial that effects of monetary interdependence became hard to neglect. The major error of the Bank of Japan (BOJ) after the Lehman Crisis was an insufficient attention to the interdependence of monetary policies and failed to adopt quantitative easing (QE) in order to halt excessive yen appreciation, when major countries engaged in massive QEs during 2008–2012.

The bold quantitative ease (QE) by the BOJ under Haruhiko Kuroda worked to remedy this mistake, in particular during 2013–2015. In 2016 another kind of difficulty fell upon the world economy. The so-called Soros Chart, the link between the ratio of monetary base and the exchange rate, which the BOJ relied on after the Lehman Crisis disappeared after 2016 because of the zero or minus interest rate. The world sank into the age of secular stagflation with the zero- or minus-interest rate that became a norm rather than exception. We will argue that the nature of interdependence changed from the *strategic complements to the strategic substitutes* after the monetary policy was put into the secondary role to keep interest rate from rising. If that is correct, the world will need the policy coordination, particularly of the kind that Richard Cooper intended to realize.

In this precious occasion to discuss, though only virtually, to my old colleagues and new friends, we will discuss how and why the research of policy coordination faded during the latter part of the last centuries. Under the age of secular stagnation, world situations such as the zero or minus interest rate, reduction of price and exchange rate volatility, seem to suggest that topics of international policy coordination will return from now on.

Prototypes of the strategic international policy interdependence

To contrast the nature of strategic interdependence in various phases of the world economy, let us present here some simple equations and graphs. The graphical treatment may not describe the precise features of interdependence, but it will present the basic typology or topology of interdependence and reaction behavior of national economic policies.

Fiscal interdependence in the Keynesian model: *strategic substitutes*

Let us start with the interdependence of fiscal policies in the Keynesian model. This is a highly simplified version of initial attempts to introduce strategic thinking in international macroeconomics like [3, 5] and Niehans [20].

Consider a symmetrical two-country Keynesian model with its typical assumption of a low rate of interest, where policy instruments are fiscal expenditures of the two countries G and G^* (from now ‘*’ mark indicates variables for the foreign country).

Then if we obtain the suitably standardized, output levels of the home and foreign countries as Y and Y^* , a is the value of the multiplier and larger than unity, and b is

in this case a positive spillover effect of the foreign government spending that is the multiplier of the foreign country

$$Y = aG + bG^* \tag{1}$$

$$Y^* = bG + aG^* \tag{1*}$$

where $0 < b < a, 1 < a$. If countries are only interested in achieving desirable output levels that are determined by the output levels, \bar{Y} and \bar{Y}^* that correspond to the NAIRU (non-accelerating-inflation level of unemployment.), then those countries try to minimize the distances, or maximize W and W^* such that

$$W = -[Y - \bar{Y}]^2 \tag{2}$$

$$W^* = -[Y^* - \bar{Y}^*]^2 \tag{2*}$$

Reaction curves are derived by choosing the best reaction of G , given G^* and vice versa. Then the world will achieve the combination of desired output levels. Y and Y^* are chosen and there is no need arise to coordinate policies, that is, the reaction curves of the two countries will be:

$$G = (\bar{Y} - bG^*)/a \tag{3}$$

is the reaction function for home country given the fiscal policy G^* of the foreign country,

$$G = (\bar{Y}^* - bG)/a \tag{3*}$$

is that of the foreign country, given fiscal expenditure G of home country.

As is in Fig. 1, which depicts the simplest world with $\bar{Y} = \bar{Y}^*$ the reaction curves have an intersection at the efficient output combination.

$G = G^* = \bar{Y}/(a + b)$ is the desirable amount of fiscal expenditure to a symmetric world with $\bar{Y} = \bar{Y}^*$.

But, if the two countries have other objectives in addition to national income, such as the balance of payment, independent policy interplays no longer achieve efficient solutions to the world. Suppose the current account of the balance of payments is determined by the difference of fiscal stances in such a way as assumed in the textbook of Hafferman and Sinclair [9].

$$CA = c(G^* - G) \tag{4}$$

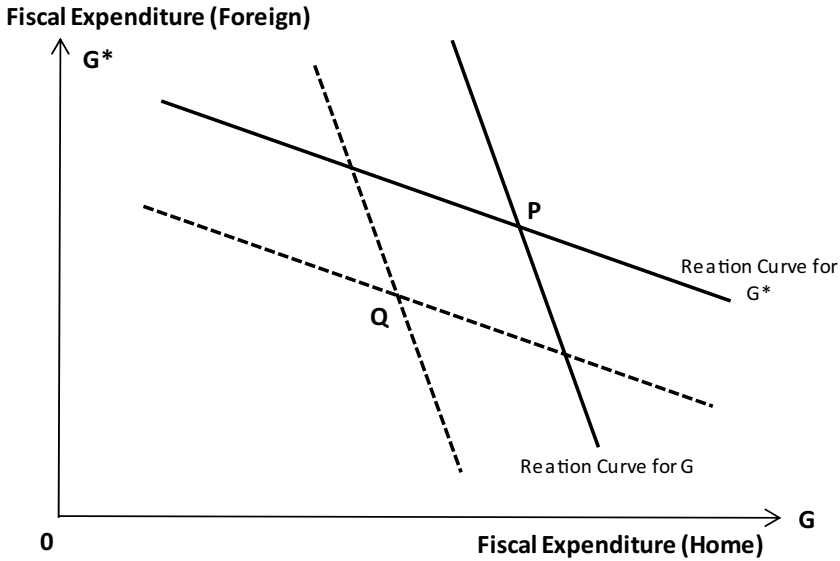


Fig. 1 Fiscal expenditure game under the fixed exchange rate

$$CA^* = c(G - G^*) \tag{4^*}$$

Moreover let us assume that each government prefers surplus in the current account. That is, the two countries are supposed to prefer the surplus rather than the deficit of the current account. The objective functions to be maximized are written as:

$$W = -[Y - \bar{Y}]^2 + dCA = -[Y - (aG + bG^*)]^2 + \gamma[G^* - G] \tag{5}$$

$$W^* = -[Y^* - \bar{Y}^*]^2 + dCA^* = -[Y^* - (aG^* + bG)]^2 + \gamma[G - G^*] \tag{5^*}$$

where $\gamma = cd(0 < \gamma < 1)$ is the weight that policy makers put weight on the balance of payment effects of the difference in fiscal expenditures.

AT Point Q in Fig. 1 it is shown that the inclusion of concern to the balance of payments makes this simple game of policy interaction an inefficient one.

A case for policy coordination is simply stated. If other objectives, like a surplus in the balance of payments, then the outcome of laissez-faire would be inefficient. Therefore, both countries are recommended to coordinate economic policies in order to achieve a Pareto efficient state for the world. For example, if they choose the policy combination corresponding the current account balances, in this simple case, that is, the solution with $G = G^*$, then the world equilibrium will restore efficiency. In other words, if both countries agree with operating their fiscal expenditures to eliminate each other’s balance of payments equilibrium, then $G = G^* = \bar{Y}/(a + b)$ will achieve the desired combination of national income.

In game theory's terminology, this strategic situation is called as "strategic substitutes." The stability of the Nash equilibrium is sustained by the condition $b < a < 1$.

The condition for stability is that a country's increase in fiscal expenditure has a smaller effect on the foreign country and vice versa.

Inflation targets and the monetary approach under the fixed exchange rate

The world like the textbook Keynesian model shifted to the inflationary world that was triggered by oil crises, and standard economics was also transformed to monetarism. Volker's anti-inflationary measure was welcomed and Lucas' rational expectations model prevailed in the academy. As an international variation of the Chicago School, Harry Johnson [17] developed the monetary approach [18, 19] to balance of payments. Hamada [10] applied game theoretic analysis to the coordination problem of international corporate taxes. Hamada [12] applied game theory to this combination of inflationary targets making use of Harry Johnson's approach.¹

Consider a symmetric two country model of monetary economy connected by the fixed exchange rate. In this simple world, policy objectives are the common rate of inflation and Instruments are the rate of excess creation m and m^* , that is, the rates of monetary growth net of required money growth such that, $\dot{m} = \dot{M}/M - \frac{kgY}{Y}$, where \dot{M}/M is the rate of increase in money supply, and g is real rate of income growth, and k is the Marshallian k , that is, the ratio of the money demand to nominal GDP. Then the rate of inflation is the average of excess monetary growth, and in its formulation the balance of payments is proportional to the difference of excess money creation. Suppose that both countries prefer to achieve price stability, but that both of them prefer to acquire positive balances of payments.

The common rate of inflation in both countries is written as follows.

$$\hat{p} = \dot{p}/p, \hat{p}^* = \dot{p}^*/p^*$$

The average of two excess monetary creation under the fixed exchange rate, and the balance of (financial) payments normalized by money balance (balance of payments) is related to the difference of excess monetary creation.

$$\hat{p} = p^* = (m + m^*)/2$$

$$BP = (m^* - m)/2$$

$$BP^* = (m - m^*)/2$$

¹ See also, Eichengreen (1985), Hamada (1974), (1979) and (1985).

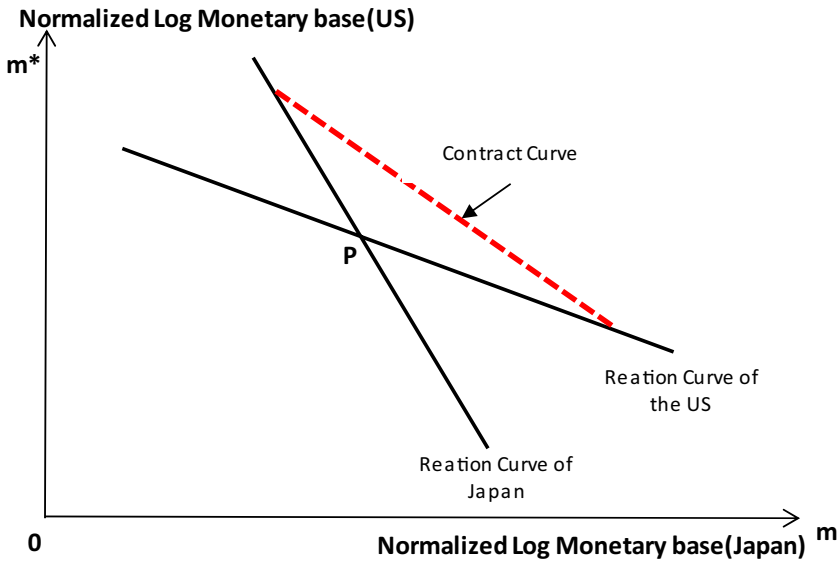


Fig. 2 Inflation target game under the fixed exchange rate Adopted from Hamada [12]

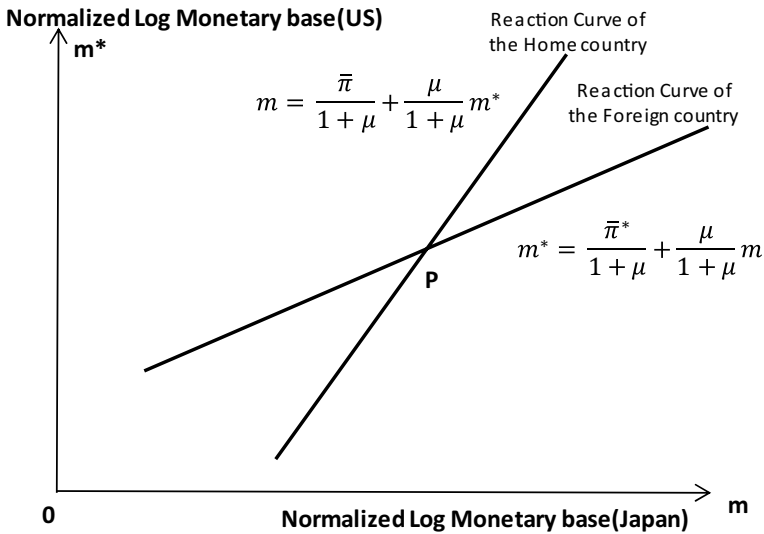


Fig. 3 Monetary interdependence with inflation targets under the flexible exchange rate

Using a Stackelberg analysis, Hamada [12] showed the following: If countries minimize the objective functions that depend on the sum of the square difference of the actual and desired inflation and the square of the distance between the desired and actual balance of payments, then the Nash equilibrium of this game is Pareto suboptimal as in Figs. 2,3,4,5,6,7,8 and 9.

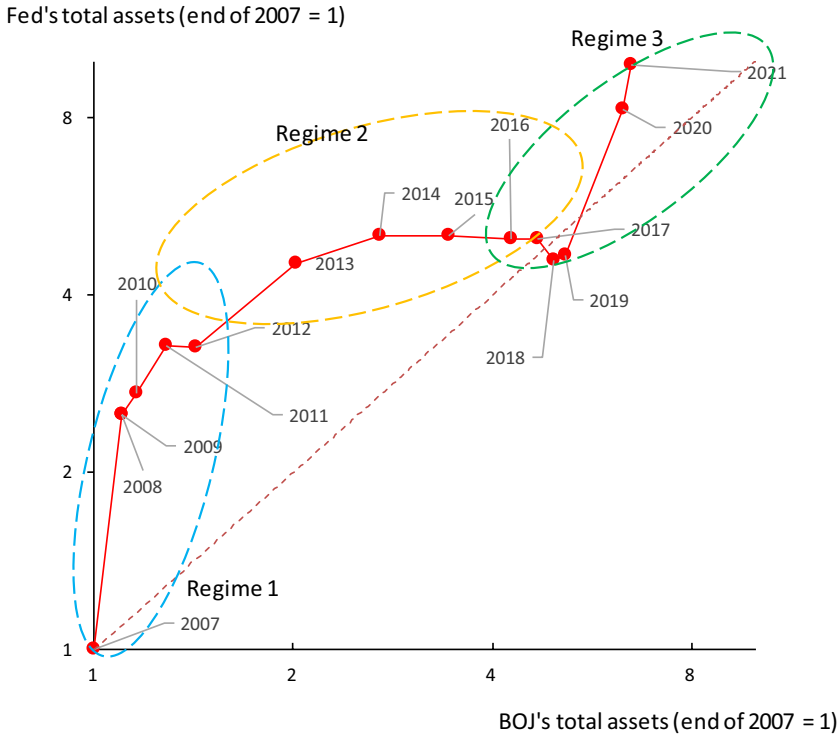


Fig. 4 The scatter diagram of monetary bases in the US and Japan (End of the Year, log scale) Source: Sakurai and Kimata [23]

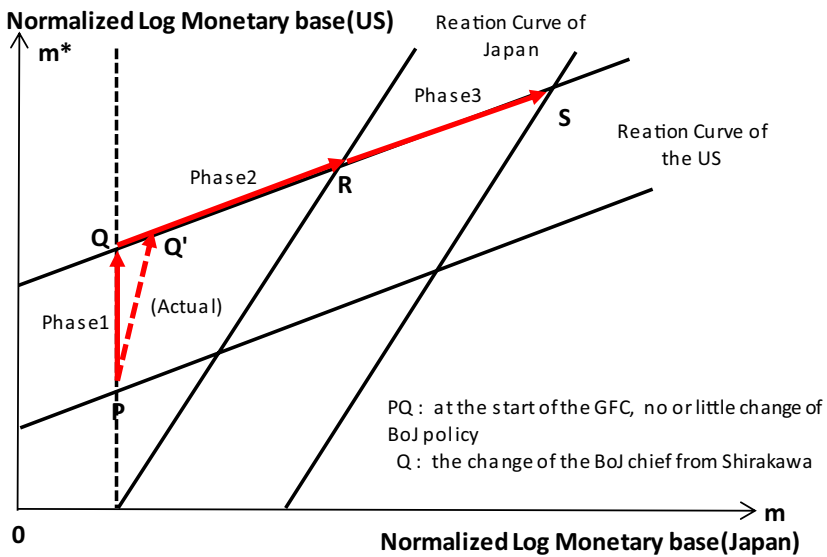


Fig. 5 Reaction curves in the after Lehman crisis

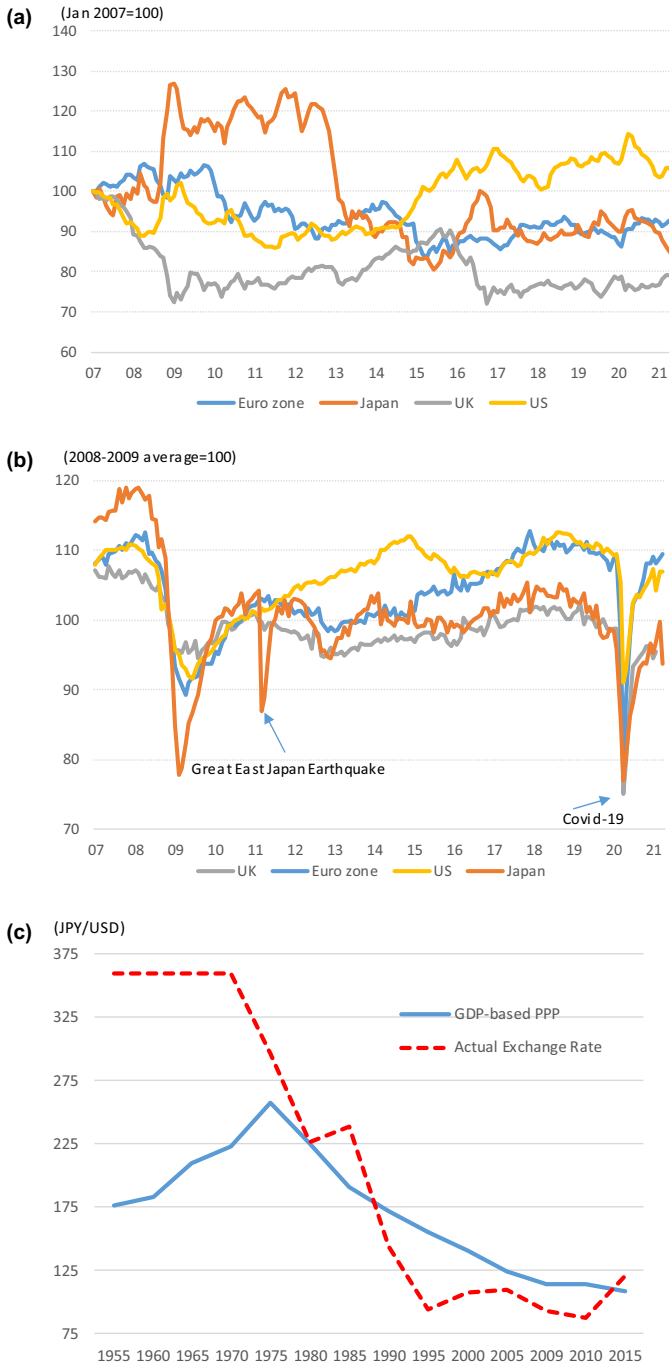


Fig. 6 **a** Real effective exchange rates. **b** Industrial productions. **c** PPP compatible exchange rate and actual exchange rate **a** Source: BIS. **b** Source: BIS. **c**Source: Jorgenson, Nomura and Samuels (2018), Table 1

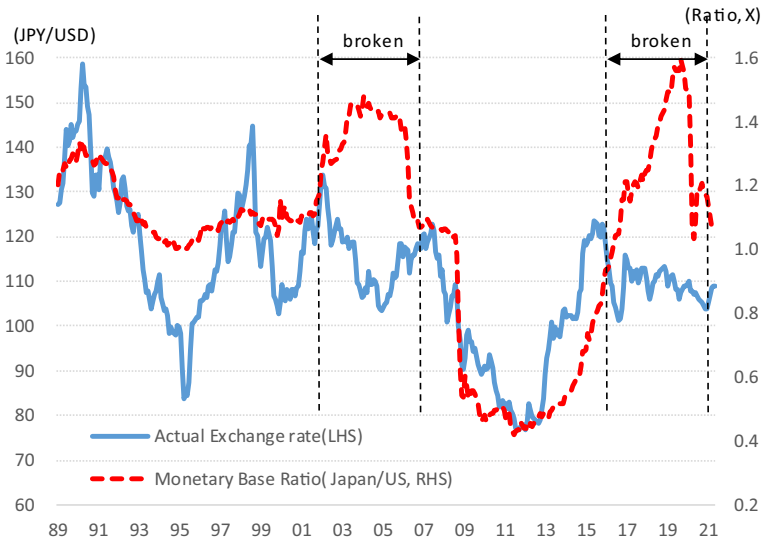


Fig. 7 The ‘Broken’ Soros chart Source: FRB and BOJ

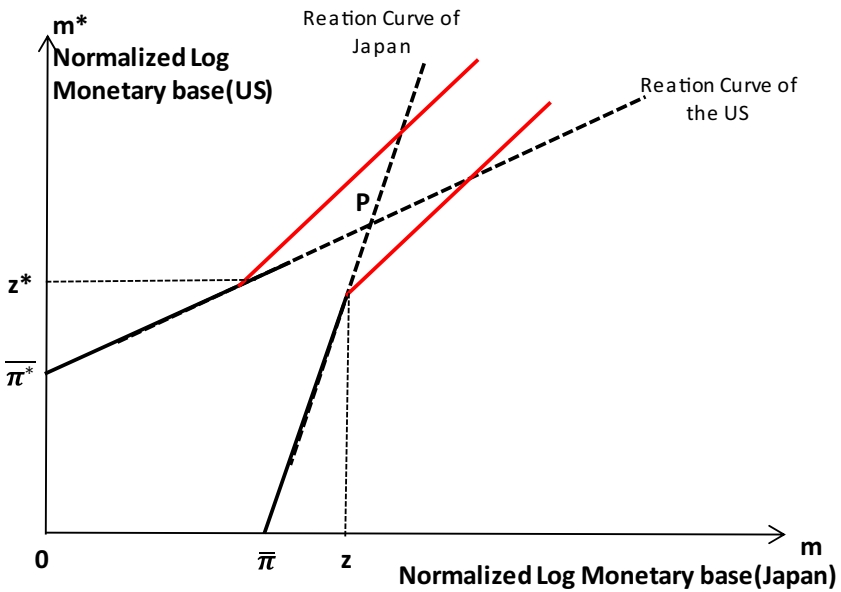


Fig. 8 “Kinked” reaction curves in the flexible exchange rate system

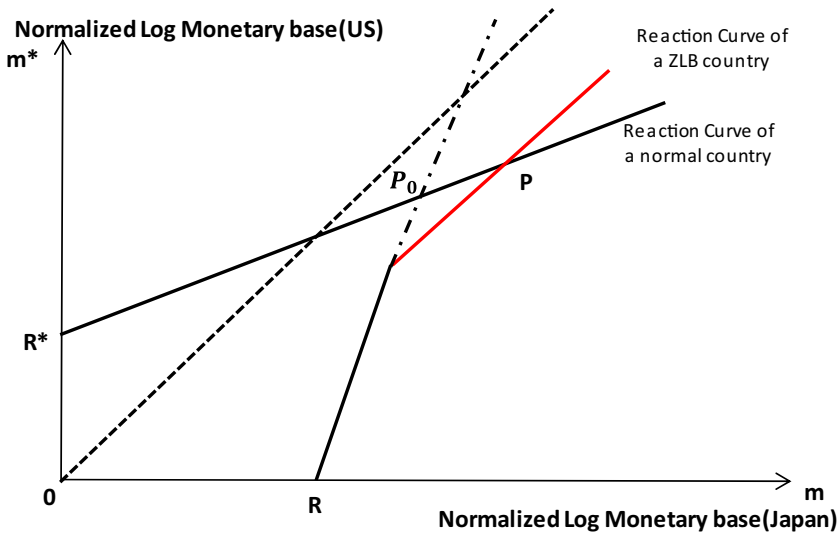


Fig. 9 Reaction curves with zero-lower bound (z.l.b)

Inflation targets with the laissez-faire monetary policies under the flexible exchange rate

When these earlier articles on policy coordination were published, a drastic institutional change occurred in the international monetary system, that is, the collapse of the Bretton Woods System. Major economies changed their exchange rate systems from the fixed exchange rate to the flexible exchange rate. Under the fixed exchange rate, an increase of money in the foreign country means an increased demand pressure to the home country. Under the flexible rate, on the other hand, — under the monetarist model or the standard portfolio choice model—an increase in foreign money will appreciate the value of home currency and *decrease* the demand for the home goods. Moreover, under the flexible exchange rate, the level of the financial balance of payments Johnson focused on became of secondary importance. Let us note two countries aggregate demand as x and x^* , and let us normalize the transmission of domestic effect of monetary expansion as unity as in Fig. 9. Adding the cross-country effects through the foreign exchange rate which depend on the difference of monetary excess creation, the reaction curves will be both upward sloping rather than downward-sloping (for example, by Oudiz and Sachs [22], Canzoneri and Gray [1], Canzoneri and Henderson [2]). For the difference of monetary transmissions under alternative exchange rate, see Hamada and Sakurai [13].

In contrast to the situation of the fixed exchange rate, under the flexible exchange rate the increase in the foreign monetary expansion has a negative effect on the home price level. Thus the reaction curves of the two countries become, normalizing the direct effect of m to the domestic economy as unity,

$$\bar{\pi} = m + \mu(m - m^*)$$

$$\bar{\pi}^* = m^* + \mu(m^* - m)$$

where $\bar{\pi}$ and $\bar{\pi}^*$ are inflation targets and where μ (< 1) indicates the relative strength of the exchange rate, relative to the direct, domestic, effect of monetary expansion to the domestic economy. The effect through the exchange rate or the external channel, depends essentially on the ratio of the two moneys used within these countries [14, 15]. The reaction curves become upward sloping and generate the nature of *strategic compliments* in this game of monetary interdependence with inflation targets.

It is obvious that given the other country's strategy, the home country can achieve the first best goal of desirable level of aggregate demand. As Oudiz and Sachs [Sakurai and Kimata23], and Canzoneri and Gray [1] have argued, the *laissez-faire* policy of monetary policy becomes the norm policy under the flexible exchange rate.

Thus under the flexible exchange rate regime, the need for international coordination of economic policies disappeared. Accordingly, the intellectual curiosity for discussing the game theoretic approach to international economy under the flexible rate seemed also to have declined substantially.

The cost of the negligence of interdependence as a historical example: the bank of Japan monetary policy after the Lehman Crisis, 2008–2009

After nearly 40 years, this topic of interdependence and coordination of monetary policy came to our attention in the simple scatter diagram of monetary bases of the Federal Reserve Board (FRB) and the BOJ after the Lehman Crisis Sakurai and Kimata23. Let us re-introduce here the scatter diagram as Fig. 4. At the first stage after the Lehman Crisis, reactions of the BOJ and the FRB present quite interesting policy drama and serious consequences particularly to Japan. The following contains a bit repetitious though shortened account of Sakurai and Kimata23, quoted as Fig. 4 here.

We will discuss the actual BOJ and FRB policies in each period and the consequences to the Japanese monetary history in more detail in the next section. First, in order to connect to the theoretical analysis in the previous section, we conduct a somewhat abstract experiment to discover what would happen after a sudden explosion in a QE in one country under the flexible exchange rate as indicated Fig. 5.

Schematically, the Japanese situation can be explained by Fig. 5. In phase I (theoretical phase roughly corresponding to historical Regime 2008–2012.), in spite of the upward shift in the reaction curve of the Federal Reserve Board, the Bank of Japan does not follow the reaction curve. The monetary base was only slightly increased. The intersection of Reaction Curves moved from P to Q', and just slightly above to Q the real exchange rate of highly appreciated, leaving Japan into a deep recession. This may be what Frankel and Rocket [8] warned about that coordination goes astray when a model of the economy is different between players. In phase II

(roughly corresponding to 2012–2015), Japan realizes the mistake and the economy recovers.

After this more schematic analysis of the situation in Fig. 5, let us return to the scatter diagram of actual monetary bases. In the abstract diagram, Diagram 5, we used the word “phases” after the Lehman Crisis, but we return to the word “regimes” within the practical explanation of original data in the original diagram. Here are three policy regimes in this the monetary drama acted by the FRB and the BOJ after the Lehman crisis (see Orphanides [21] for the development of BOJ monetary policy during these periods.)

Regime I (2008–2012): the outset of the Mortgage Bond Crisis

The financial bubble had a redeeming aspect that low-income people could access mortgages to obtain housing. But many of them obtained loans without sound prospects of repaying, and portfolio management technique could not sustain the majority of insolvent securities—Mortgage Based Securities (MBS) as solvent. A financial panic followed, and the FRB, as emergency measures, had to convert these almost valueless securities into money. Here, monetary policy was close to the “helicopter money:” that is backed by the creation of the real balance or purchasing power.

The diagram introduced by Sakurai and Kimata [23] tells us conspicuously the actual combination of monetary-base expansions took place (Fig. 4). The figure depicts the monetary base, or the magnitude of the Central Bank’s Balance sheets, of the FRB and the BOJ. Because of the catastrophic condition in the US financial market, the FRB grossly increased the monetary base. This was considered a sharp shift of the reaction curve of the FRB, upward. In actual data on the volumes of base monies in the United States and in Japan, as circled as Regime 1 in Sakurai and Kimata [23], one would say, as we already stated above, that the BOJ before Governor Shirakawa hardly relaxed monetary base. On the other hand, Sakurai and Kimata [23] are more sympathetic to the BOJ and emphasize a slightly inclined slope of the scatters from the exactly vertical one in Regime 1. Thus, they defend the Central Bank that even the BOJ before Kuroda had tried to relax the money supply, that is, not exactly vertically from P to Q but slightly more obliquely to the Northeast.

The Japanese monetary authority would have been motivated to increase its base money along the Reaction Curve of Japan in Fig. 3. A belief or one way of thinking at the BOJ by former Governor, Masaaki Shirakawa was that monetary policy is ineffective under the zero lower bound in Japan.^{2,3}

² In any case, the BOJ insufficiently recognized the proper reaction curve in this monetary policy game. This caused severe yen appreciation. This phase is characterized by inaction on the side of Japan, and the cost of inaction was enormous to Japan. The Japanese economy fell down even more deeply than most of the epicenter advanced countries.

³ Note that since the data were taken at the end of the year, a major step for QE was taken during 2013 after Kuroda started his office.

As Hamada, Kashyap, and Weinstein (2011) described with surprising charts of domestic production data after the Lehman crisis, “even though Japan was not at the epicenter of the crisis, waves from epicenter countries attacked the Japanese economy.” Fig. 6(a and b) illustrate the process that epicenter’s monetary expansions led to the sharp appreciation of the yen because the BOJ did not expand its monetary base, and that the industrial production declined more sharply than those in the epicenter. The yen appreciation prevailed. Jorgenson, Nomura and Samuels (2016, 2018) documented that Japanese firms fought the hurdle of yen exchange rate being more than 37 percent in 2011 (Fig. 6(c)). Japan’s GDP dropped, relative to the size of the economy, more sharply than the major countries under the Lehman crisis.⁴

Regime II (2013–2015): the advance of the first, monetary, arrow of *abonomics*

When Shinzo Abe was reelected as the President of the Liberal Democratic Party (LDP) in the fall of 2012, the Tokyo Stock market began to soar. In December when he became the Prime Minister, he adopted the policy to emphasize monetary policy. Audacious monetary policy was the first arrow of his major policy strategy that was called *Abenomics*. Accordingly, the BOJ adopted more reasonable monetary policy reactions to the foreign Lehman shock. As in Phase 2 in Fig. 4, the BOJ policy started to move along the former Reaction Curve of Japan and started to aim to reach R, the intersection of the former reaction curve of Japan and the shifted reaction curve of the FRB.

At least during the first period (2013–2014 or -15) of *Abenomics*, indicated as the two or three years of observations circled as Regime 2, the monetary Arrow achieved substantial and rapid success by the new BOJ Governor Haruhiko Kuroda, who incorporated the “reflation economics” that had been advocated for a long time by Kikuo Iwata, who then became the new BOJ deputy Governor. Major change of monetary policy by the Bank of Japan in Regime II was a substantial shift of Japanese reaction curve (Figs. 4, 5).

Thus, *Abenomics*, up to around the year 2016 in the light of employment expansion particularly monetary policy as its first arrow, did succeed. The inflation target was harder to obtain than in other countries like in the UK or in the EU, but *Abenomics* created a high-pressured economy that gradually encouraged investment. As a total it eventually created about five million new employees from its start to the outset of the pandemic Sakurai and Kimata [23].

⁴ In contrast, during 2020–21 when FRB expanded money to encounter the effect of COVID-19, as Fig. 4 indicates, the BOJ reacted properly to the fast expansion of the FRB. For this time, the yen exchange rate movement was rather moderate.

Figure 9 Reaction Curves with Zero-Lower Bound (z.l.b).

Regime III (2016–2019): the introduction of the yield curve control (YCC) by the BOJ

In Japan, the inflation target became a harder target to achieve than in the United States. According to many influential writers like Gauti Eggertsson, Paul Krugman, and Lawrence Summers [e.g., Eggertson et. al [7] and Summers [24]], the world entered into an age of secular stagnation. The BOJ found, the successful monetary strategy like Phase 2 in our analysis may have gained full employment but definitely did not achieve the objective of the inflation target.

The traditional economist used to consider that if the economy hits the zero lower bound (z.l.b..) monetary policy cannot be effective. *Abenomics* did work because before 2016 when the long-term bond market had still a slight positive interest rate. However, our analysis shows that if monetary policy in all countries were to lose its bases to transmit purchasing power and consequently affect exchange rates. The Soros Chart essentially broke down after 2016 with the adoption of the minus interest rate by Japan. See Fig. 7. When the interest rates in US and Japan recovers after the outbreak of Covid 19, though, reaction curves may seem recovered a little (See again the last circle of points in Fig. 4, the Sakurai-Kimata diagram. At large, the Soros Chart lost the power to transmit domestic real balance effects, and subsequently it would be deprived of the power to rescue the world economy (Fig. 7).

It will be shown in the next section that, under the zero lower bound (z.l.b.), the reaction curve would kink, and the world would not be saved by any combination of monetary stimuli. As will be explained there, if in a part of the world national monetary policy still has power to influence output, then the economy would be raised from the zero lower bound through the exchange rate mechanism. The success of the Japanese economy definitely depended on the fact that the Japanese interest rate of long-term bonds was still slightly above zero. Perhaps it worked as a last resort that the world economy could recover.

In Regime III, there are obstacles to the efficacies of QEs in the real world. Similarly, the latter period of *Abenomics*, after 2016, recovered from QEs of the BOJ monetary policy through exchange channels that were considerably blocked.

Therefore, in Regime III, monetary policy lost its efficacy on its two fronts: it stopped working through the domestic financial market because of the zero lower bound or minus interest bound. Also, the channel through the exchange rate ceased to work because the Soros Chart itself broke as is shown in Fig. 6. Neither could it work through either the monetary aggregate because it becomes uncontrollable.

The Zero lower bound (z.l.b.) and the Vanished Soros Chart

Now monetary interdependence in the two-country world economy could be simply analyzed as follows. Suppose a country reaches a zero lower bound (z.l.b.) at the income level z . Then monetary policy m would not work through the domestic channel beyond z . only monetary policy m would work through the international channel (m - m^*) such that the aggregate excess demand x .

The reaction curves of monetary policies under the flexible rate will thus be changed to:

$$\bar{\pi} = \text{Min}(m, z) + \mu(m - m^*)$$

$$\bar{\pi}^* = \text{Min}(m^*, z^*) + \mu(m^* - m)$$

$$0 < \mu < 1$$

where $\bar{\pi}$ and $\bar{\pi}^*$ are inflation targets of the two countries. Then the world cannot recover from recessions by the laissez-faire policy. And monetary policy interactions would lead to the stagflation trap for the world as a whole. This is the case when competitive devaluations would lead to a catastrophe of the world. (See Fig. 8).

An interesting situation is, however, the world situation where only one of the countries is under z.l.b. situation, while the other country was still without zero interest barrier. If the two countries fell into the trap of z.l.b., then the two reaction curves in the world will be hopeless to recover solely with monetary policies. Curiously, with one of them still being without the z.l.b. the world will still be able, even though hard, to recover eventually by utilizing the recovery power of a country without the zero lower bound (See Fig. 9).

A return to international policy coordination in the age of secular stagnation

A secular stagnation seemed to have been realized when a majority of large countries fell into the z.l.b. Now most of industrial countries are under deflationary situations with zero lower bound (z.l.b.) or the minus interest rate. When zero rates of interest do not support full employment in many countries, then the world will become what we may call in a state of secular stagnation. When the interest rate was positive, the stimulating initiative shifts to the public sector. In the true sense of liquidity, liquidity is the degree of how easily an asset can be spent. In this sense, government bonds with negative interest bonds are more liquid than money balance. Thus buying operation of bonds with money does not enhance the liquidity or aggregate demand. This is probably one of the basic reasons that buying operations stopped to be expansionary and the Soros Chart ceased to exit around the time that the long-term interest rate went into a negative ranges.

The Soros Chart, that is, the relationship between the money bases of the two countries and the nominal exchange, was the most important, external linkage between monetary policies and economic activities. It was the basis of the reaction curve under the flexible exchange rate. This Chart did disappear, particularly just after the BOJ started the negative interest starting in January 2016. It needs probably more explanation, but, in short, the adoption of the Yield Curve Control (YCC) was in a sense a statement of resignation that quantitative monetary policy measure was no longer capable controlling effective demand or price level without the help of

fiscal policies. As far as keeping the Yield Curve Control policy, the quantitative monetary policy has stepped down and the new YCC policy has become a main measure to support fiscal policies by protecting crowding out.

With this backdrop of the zero lower rate, Eggertsson, Krugman, and Summers (Eggertsson et.al. [7]) argue, the world is heading to the age of secular stagnation. And here we need aggregate demand policies are required. We had better rely on fiscal measures such as reducing taxes and increasing public expenditures. In order to increase employment and the price level, not monetary stimulus but public expenditure is the principal trigger for stimulus. When public expenditures increase the nominal interest rate by financial crowding-out effect, then monetary easing is needed as the secondary role. Thus, the fiscal policy became the principal role in the macroeconomic policy game again as in the old Keynesian era. Thus, the distinction of monetary and fiscal policy is blurred. The fiscal measure is the principal and monetary policy is the auxiliary support. Please look back to Fig. 1 of this paper again!

In the world of typical flexible exchange rates where countries were pursuing inflationary targets, the strategic nature of interdependence was a type of *strategic complements*. Moreover, countries were recommended to pursue their own monetary policy as explained in Section II, subsection 3. However, in this age of secular stagnation, the world exhibits a different kind of monetary and macroeconomic interdependence. The system resembles itself, if not completely identified with, the fiscal game under the fixed exchange rate by the following reasons.

- (1) Since most countries have inflationary targets of similar, low rates of inflation, the macroeconomic policy interdependence becomes close to that of Keynesian model under the fixed exchange rate, and the primary macroeconomic instruments are essentially fiscal expansions.
- (2) Monetary policy loses its primary role and assume its secondary role to help fiscal expenditure by curtailing the effects of financial crowding out. The system thus resembles that of the fiscal game under the fixed exchange rate where interest rates are fixed at the bottom.
- (3) Monetary policy becomes a supplementary instrument rather than the main strategy under the monetary game under the flexible exchange rates with the full interest rate flexibility.

According to these three reasons, we could understand that during the Regime I and Regime II in Fig. 4 the game was played between monetary policies under the flexible exchange rate, and that during Regime III, the game is being played between fiscal policies nearly under the fixed exchange rate.

Then the pattern of the strategic interdependence will appear in this situation as the *strategic substitutes* that we introduced in Sect. 2 of our paper. In other words, this is the world that Richard Cooper envisaged as the fiscal confrontation in the Keynesian model.

In this simplified world, which is depicted as a two-country model, the topology of reaction curves is exactly like Fig. 1 in Sect. 2, where national instruments fiscal

expenditures and the objectives are output levels corresponding to the NAIRU. Then there will be no problem and the world will achieve, Point P , the Pareto efficient combination of output.

As was shown by the intersection Q of dotted reaction curves in Fig. 1 in Sect. 2, if countries are constrained by the balance of current account, or by the balance of the government budget, then the laissez-faire solution will not achieve desirable output combinations. Fiscal expenditure and taxes must serve the microeconomic static and intertemporal efficiency but not the literal observation of the government budget balance. What results is the need for policy coordination that would lead to a more favorable combination of outputs. Analytically, we believe, this is what Richard Cooper was concerned about.

Importantly, when conventions like the Maastricht Treaty impose participating countries the objectives of the balanced budget constraints or the primary balance equilibria, then they may not always be helpful for the world. The need for policy coordination may emerge. Moreover, policy coordination in this discussion need not be the only basic strategic or macroeconomic issues as described in this paper. Mutual misunderstanding of the nature of interdependence (Frankel and Rockett, 1986), may disturb the timing of coordination, and manner of persuasion in collaboration are among many other practical issues that Richard Cooper had in mind.

Concluding remarks

We characterized the present policy linkages shifted from a game of *Strategic Complements* with instruments of monetary policies during the inflation target period to a game of *Strategic Substitutes* with instruments of fiscal policies. The Sakurai-Kimata diagram connects rather abstract discussions to the historical game played between the US and Japanese Central Banks during 2010s.

Nobody can guarantee, however, that the shift is permanent. If the government and the central bank lose control of aggregate demand, then the economy may go back to the Volker' era. Economists are expected to learn more when, why and how the transformation of phases takes place in national economies from an inflationary phase to a deflationary phase, and vice versa.

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