# Capitalism, Crisis and the Common Man


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## 1 Introduction

When we were in the first year in Presidency College, Kolkata, Anupda introduced us to the history of the Soviet Union. He also referred to the book, "Soviet Economic Development since 1917" by Maurice Dobb (Dobb 1966). To our great pleasure, we found both his lectures and the book by Dobb equally gripping and fascinating. Soviet Union is no more. The world has become uni-polar. Capitalism and capitalists are ruling the world today. In this context, we gratefully acknowledge Anupda's contribution to our learning as regards how Soviet Union took care of its ordinary citizens from "cradle to grave" and, thereby, awakened hope among the poverty stricken toiling masses all across the world. In today's world, where hostility of the mighty capitalist powers gravely threatens the survival of the socialist states, we consider it important to write a paper on how global capitalists have made and are making the lives of common men miserable all across the globe.

Remarkably, following the collapse of the Soviet Union, the capitalist world is going through a prolonged period of recession. Japan is in recession since 1992. The USA and Europe are in recession since 2001 and 2008, respectively (see Table 1). In all these cases, recessions followed collapse of huge asset price bubbles. Stock and real estate price bubbles collapsed in Japan in 1991. A huge dotcom bubble crashed in the USA in 2001. In many European countries, real estate bubbles burst in 2008. In the USA, the recession that started in 2001 deepened into a severe crisis in the wake of a crash in a huge house price bubble. Speculative activities of global financial capital (global financial institutions) are at the root of all these troubles.

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The latest victim is Greece, which plunged into a severe recession since 2008. The purpose of this paper is to explain how Greece plunged into a severe crisis since 2008, causing tremendous suffering of its common people, who lost jobs on a large scale and suffered drastic cuts in wages and welfare spending including retirement and unemployment benefits.

The dominant view explaining Greek crisis in the literature is the following: In the wake of the formation of Eurozone, there took place large inflows of capital from the centre of the Eurozone to Greece, as exchange rate risk disappeared. Borrowing cost as a result went down in Greece inducing the Greek government and private economic agents to borrow on a large scale. These borrowings made Greece's debt very large. This led to a sharp deterioration in the risk perception of the foreign investors regarding Greece and induced them to stop investing in its assets. With the drying up of foreign capital inflows, government and private spending declined substantially creating a severe recession in Greece. For a detailed exposition of this view, one may go through, for example, Gibson et al. (2014), Krugman (2013), Lane (2012), Dellas and Tavlas (2013). We shall subject this line of thought to close scrutiny in the light of the available evidences, identify the factors responsible for the Greek crisis and present our argument in a rigorous theoretical framework. A careful analysis of data reveals that the Greek crisis is on account of not just one but two factors, namely the recession in other European nations and the USA due to the collapse in the real estate bubbles and a large decline in capital inflows.

To achieve the goal stated above, we first develop a model, which is suitable for explaining the crisis in Greece. The standard IS-LM-based Keynesian macro-models have many deficiencies (for details, one may go though Jha et al. (2016) and Rakshit (1993)). The feature that makes these models unsuitable for explaining the Greek crisis is that they do not and cannot explicitly show how different kinds of expenditures are financed. In case of Greece, foreign capital inflows directly financed government and private expenditures. Obviously, this phenomenon cannot be captured within the frameworks of the models mentioned above. Another major shortcoming of the aforementioned models is that they do not consider financial intermediaries, which play a major role in financing investment and consumption expenditures. Even though Bernanke and Blinder (1988) incorporated banks in the IS-LM model, they could not show how bank loans finance different kinds of expenditures. We shall, therefore, for our purpose develop a model which incorporates financial intermediaries and explicitly shows how different types of expenditures are financed. Jha et al. (2016) develop such a model for an open economy without capital mobility. We shall extend the model to incorporate capital mobility and apply it to the case of Greece.

**Table 1** Annual growth rate of GDP (Annual percentage growth rate of GDP at market prices based on constant local currency. Aggregates are based on constant 2005 US dollars)

| | 1981 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 |
|---|---|---|---|---|---|---|---|---|---|---|
| China | 5.2 | 9.0 | 10.8 | 15.2 | 13.6 | 8.9 | 11.7 | 11.3 | 4.2 | 3.9 |
| France | 1.1 | 2.5 | 1.3 | 1.5 | 1.6 | 2.4 | 2.6 | 4.7 | 4.4 | 2.9 |
| Germany | 0.5 | −0.4 | 1.6 | 2.8 | 2.3 | 2.3 | 1.4 | 3.7 | 3.9 | 5.3 |
| Greece | −1.6 | −1.1 | −1.1 | 2.0 | 2.5 | 0.5 | −2.3 | 4.3 | 3.8 | 0.0 |
| Ireland | 3.3 | 2.3 | −0.2 | 4.4 | 3.1 | −0.4 | 4.7 | 5.2 | 5.8 | 8.5 |
| Italy | 0.8 | 0.4 | 1.2 | 3.2 | 2.8 | 2.9 | 3.2 | 4.2 | 3.4 | 2.0 |
| Japan | 4.2 | 3.4 | 3.1 | 4.5 | 6.3 | 2.8 | 4.1 | 7.1 | 5.4 | 5.6 |
| KoreaRep (South) | 7.4 | 8.3 | 12.2 | 9.9 | 7.5 | 12.2 | 12.3 | 11.7 | 6.8 | 9.3 |
| Malaysia | 6.9 | 5.9 | 6.3 | 7.8 | −1.1 | 1.2 | 5.4 | 9.9 | 9.1 | 9.0 |
| Portugal | 1.6 | 2.1 | −0.2 | −1.9 | 2.8 | 4.1 | 6.4 | 7.5 | 6.4 | 4.0 |
| Spain | −0.1 | 1.2 | 1.8 | 1.8 | 2.3 | 3.3 | 5.5 | 5.1 | 4.8 | 3.8 |
| Thailand | 5.9 | 5.4 | 5.6 | 5.8 | 4.6 | 5.5 | 9.5 | 13.3 | 12.2 | 11.2 |
| UK | −0.8 | 2.1 | 4.2 | 2.3 | 3.5 | 3.2 | 5.5 | 5.9 | 2.5 | 0.5 |
| USA | 2.6 | −1.9 | 4.6 | 7.3 | 4.2 | 3.5 | 3.5 | 4.2 | 3.7 | 1.9 |

(continued)

**Table 1** (continued)

| | 1991 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 2000 |
|---|---|---|---|---|---|---|---|---|---|---|
| China | 9.3 | 14.3 | 13.9 | 13.1 | 11.0 | 9.9 | 9.2 | 7.9 | 7.6 | 8.4 |
| France | 1.0 | 1.6 | −0.6 | 2.3 | 2.1 | 1.4 | 2.3 | 3.6 | 3.4 | 3.9 |
| Germany | 5.1 | 1.9 | −1.0 | 2.5 | 1.7 | 0.8 | 1.8 | 2.0 | 2.0 | 3.0 |
| Greece | 3.1 | 0.7 | −1.6 | 2.0 | 2.1 | 2.9 | 4.5 | 3.2 | 3.1 | 4.2 |
| Ireland | 1.9 | 3.3 | 2.7 | 5.8 | 9.6 | 9.3 | 11.2 | 8.9 | 10.8 | 10.2 |
| Italy | 1.5 | 0.8 | −0.9 | 2.2 | 2.0 | 1.3 | 1.8 | 1.6 | 3.7 | 1.8 |
| Japan | 3.3 | 0.8 | 0.2 | 0.9 | 1.9 | 2.6 | 1.6 | −2.0 | −0.2 | 2.3 |
| KoreaRep (South) | 9.7 | 5.8 | 6.3 | 8.8 | 8.9 | 7.2 | 5.8 | −5.7 | 10.7 | 8.8 |
| Malaysia | 9.5 | 8.9 | 9.9 | 9.2 | 9.8 | 10.0 | 7.3 | 7.4 | 6.1 | 8.9 |
| Portugal | 4.4 | 1.1 | −2.0 | 1.0 | 4.3 | 3.5 | 4.4 | 4.8 | 3.9 | 3.8 |
| Spain | 2.5 | 0.9 | −1.0 | 2.4 | 2.8 | 2.7 | 3.7 | 4.3 | 4.5 | 5.3 |
| Thailand | 8.6 | 8.1 | 8.3 | 8.0 | 8.1 | 5.7 | −2.8 | −7.6 | 4.6 | 4.5 |
| UK | −1.2 | 0.4 | 2.6 | 4.0 | 4.9 | 2.7 | 3.1 | 3.4 | 3.1 | 3.8 |
| USA | −0.1 | 3.6 | 2.7 | 4.0 | 2.7 | 3.58 | 4.5 | 4.4 | 4.7 | 4.1 |

(continued)

**Table 1** (continued)

| | 2001 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| China | 8.3 | 9.1 | 10.6 | 10.1 | 11.4 | 12.7 | 14.2 | 9.6 | 9.2 | 10.6 |
| France | 2.0 | 1.1 | 0.8 | 2.8 | 1.6 | 2.4 | 2.4 | 0.2 | −2.9 | 2.0 |
| Germany | 1.7 | 0.0 | −0.7 | 1.2 | 0.7 | 3.7 | 3.3 | 1.1 | −5.6 | 4.1 |
| Greece | 4.1 | 3.9 | 5.8 | 5.1 | 0.6 | 5.7 | 3.3 | −0.3 | −4.3 | −5.5 |
| Ireland | 5.8 | 5.9 | 3.8 | 4.4 | 6.3 | 6.3 | 5.5 | −2.2 | −5.6 | 0.4 |
| Italy | 1.8 | 0.3 | 0.2 | 1.6 | 0.9 | 2.0 | 1.5 | −1.0 | −5.5 | 1.7 |
| Japan | 0.4 | 0.3 | 1.7 | 2.4 | 1.3 | 1.7 | 2.2 | −1.0 | −5.5 | 4.7 |
| KoreaRep (South) | 4.5 | 7.4 | 2.9 | 4.9 | 3.9 | 5.2 | 5.5 | 2.8 | 0.7 | 6.5 |
| Malaysia | 0.5 | 5.4 | 5.8 | 6.8 | 5.3 | 5.6 | 6.3 | 4.8 | −1.5 | 7.4 |
| Portugal | 1.9 | 0.8 | −0.9 | 1.8 | 0.8 | 1.6 | 2.5 | 0.2 | −3.0 | 1.9 |
| Spain | 4.0 | 2.9 | 3.2 | 3.2 | 3.7 | 4.2 | 3.8 | 1.1 | −3.6 | 0.0 |
| Thailand | 3.4 | 6.1 | 7.2 | 6.3 | 4.2 | 5.0 | 5.4 | 1.7 | −0.7 | 7.5 |
| UK | 2.8 | 2.5 | 3.3 | 2.5 | 3.0 | 2.7 | 2.6 | −0.5 | −4.2 | 1.5 |
| USA | 1.0 | 1.8 | 2.8 | 3.8 | 3.3 | 2.7 | 1.8 | −0.3 | −2.8 | 2.5 |

(continued)

**Table 1** (continued)

| | 2011 | 12 | 13 | 14 | 15 |
|---|---|---|---|---|---|
| China | 9.5 | 7.8 | 7.7 | 7.3 | |
| France | 2.1 | 0.2 | 0.7 | 0.2 | |
| Germany | 3.7 | 0.4 | 0.3 | 1.6 | |
| Greece | −9.1 | −7.3 | −3.2 | 0.7 | |
| Ireland | 2.6 | 0.2 | 1.4 | 5.2 | |
| Italy | 0.6 | −2.8 | −1.7 | −0.4 | |
| Japan | −0.5 | 1.8 | 1.6 | −0.1 | |
| KoreaRep (South) | 3.7 | 2.3 | 2.9 | 3.3 | |
| Malaysia | 5.3 | 5.5 | 4.7 | 6.0 | |
| Portugal | −1.8 | −4.0 | −1.1 | 0.9 | |
| Spain | −1.0 | −2.6 | −1.7 | 1.4 | |
| Thailand | 0.8 | 7.3 | 2.8 | 0.9 | |
| UK | 2.0 | 1.2 | 2.2 | 2.9 | |
| USA | 1.6 | 2.3 | 2.2 | 2.4 | |

*Source* World Bank

## 2 The Model for an Open Economy with Imperfect Capital Mobility

We develop here a model for a small open economy with imperfect capital mobility. Following the Keynesian tradition, we assume that aggregate output is demand determined. Given this assumption, GDP is determined by the following equation:

$$Y = C(Y) + I(r) + \bar{G} + G(r) + \left[ X\left(\frac{P^*e}{P}, Y^*\right) - M\left(\frac{P^*e}{P}, Y\right)\right] \tag{1}$$

In Eq. (1), $X \equiv$ exports, $M \equiv$ the value of imports in terms of domestic goods, $P^* \equiv$ the average price of foreign goods in foreign currency, $P \equiv$ the average price of domestic goods in domestic currency, $Y^* \equiv$ foreign GDP and $e \equiv$ nominal exchange rate. Government expenditure is decomposed into two components: one exogenously given component denoted $\bar{G}$ and another component $G(r)$, which is a decreasing function of interest rate. As the economy is small, $P^*$ is given. $P$ is taken to be fixed. Two exchange rate regimes are possible: the fixed and the flexible. Here, we focus only on the fixed exchange rate regime, as it is the one that is relevant for our purpose.

***Fixed Exchange Rate Regime***

The exchange rate is pegged at $\bar{e}$. Incorporating this pegged value of $e$ into Eq. (1), we rewrite it as

$$Y = C(Y) + I(r) + \bar{G} + G(r) + \left[ X\left(\frac{P^*\bar{e}}{P}, Y^*\right) - M\left(\frac{P^*\bar{e}}{P}, Y\right)\right] \tag{2}$$

Here, we incorporate cross-border capital flows and denote the net inflow of capital by $K$. For simplicity, we assume that $K$ is exogenously given and denote its value by $\bar{K}$. Note that, here $\bar{K}$ is given in terms of domestic goods.

The central bank intervenes in the foreign exchange market to keep the exchange rate fixed at $\bar{e}$. $\left\{X\left(\frac{P^*\bar{e}}{P}; Y^*\right) - M\left(\frac{P^*\bar{e}}{P}, Y^*\right)\right\}\frac{P}{\bar{e}} + \bar{K}\frac{P}{\bar{e}}$ gives the excess supply of foreign currency at the given exchange rate. The central bank buys up this excess supply with domestic currency at the price $\bar{e}$ creating high-powered money to keep $e$ at $\bar{e}$. We further assume for the purpose of illustration that the government borrows from the central bank to finance the autonomous component of its consumption expenditure. We assume that high-powered money is created only on account of government's borrowings from the central bank and central bank's intervention in the foreign exchange market to keep the exchange rate fixed. Thus, the increase in the stock of high-powered money in the period under consideration is given by

$$dH = P\bar{G} + \bar{e}\frac{P}{\bar{e}}\left[ X\left(\frac{P^*\bar{e}}{P}, Y^*\right) - M\left(\frac{P^*\bar{e}}{P}, Y\right) + \bar{K}\right] \tag{3}$$

From Eq. (3) it follows that the stock of real balance created in the period under consideration is given by

$$\frac{dH}{P} = \bar{G} + \left[ X\left(\frac{P^*\bar{e}}{P}, Y^*\right) - M\left(\frac{P^*\bar{e}}{P}, Y\right) + \bar{K} \right] \tag{4}$$

We assume that households do not take any loans, carry out all their transactions with bank deposits, hold all their wealth in the form of bank deposits and banks are the only source of loans to the firms. Foreign investors also invest their fund in bank deposits. These are all simplifying assumptions. We can easily incorporate other financial assets. Given the assumptions stated above, the whole of the high-powered money created will be held by the banks as reserve. Accordingly, the amount of new loans in real terms the banks will plan to supply to the firms in the given period, which we denote by $l_f$, is given by (see Eq. (4))

$$l_f = (1-\rho)\frac{\bar{G} + \left[X\left(\frac{P^*\bar{e}}{P}, Y^*\right) - M\left(\frac{P^*\bar{e}}{P}, Y\right) + \bar{K}\right]}{\rho} \tag{5}$$

where $\rho$ denotes CRR. We ignore excess reserves for simplicity.

We have assumed in this paper that investors finance their investment entirely with bank loans, which is, by assumption, the only source of loans to the private sector. The government also finances a part of its expenditure with loans from commercial banks. Equilibrium in the loan market is, therefore, given by the following equation

$$(1-\rho)\frac{\bar{G} + \left[X\left(\frac{P^*\bar{e}}{P}, Y^*\right) - M\left(\frac{P^*\bar{e}}{P}, Y\right) + \bar{K}\right]}{\rho} = I(r) + G(r) \tag{6}$$

where $I(r)$ is the investment function of the firms. The specification of our model is now complete. It contains three key Eqs. (2), (4) and (6) in three unknowns $Y$, $\frac{dH}{P}$ and $r$. We can solve them as follows: We can solve Eqs. (2) and (6) for the equilibrium values of $Y$ and $r$. Putting the equilibrium value of $Y$ into Eq. (4), we get the equilibrium value of $\frac{dH}{P}$. We show the solution in Fig. 1, where in the upper panel the IS and LL schedules represent Eqs. (2) and (6), respectively, in the $(Y, r)$ plane. The equilibrium values of $Y$ and $r$ correspond to the point of intersection of the IS and LL schedules. These equilibrium values of $Y$ and $r$ are labelled $Y_0$ and $r_0$, respectively. In the lower panel, where positive values of $\frac{dH}{P}$ are measured in the downward direction, the schedule HH represents Eq. (4). It gives corresponding to every $Y$ the value of $\frac{dH}{P}$, as given by Eq. (4). The equilibrium value of $\frac{dH}{P}$ corresponds to the equilibrium value of $Y$ on the HH schedule. We shall now illustrate the working of the model using a comparative static exercise.

***Fiscal Policy: The Effect of an Increase in Government Expenditure Financed by Borrowing from the Central Bank***

Suppose the government raises $\bar{G}$ and finances it by borrowing from the central bank. How will it affect $Y$, $\frac{dH}{P}$ and $r$? We shall examine this question first diagrammatically using Fig. 2, where the initial equilibrium values of $Y$, $\frac{dH}{P}$ and $r$ are labelled $Y_0$, $\left(\frac{dH}{P}\right)_0$ and $r_0$, respectively. $Y_0$ and $r_0$ corresponds to the point of intersection of IS and LL schedules in the upper panel, while $\left(\frac{dH}{P}\right)_0$ corresponds to $Y_0$ on the HH

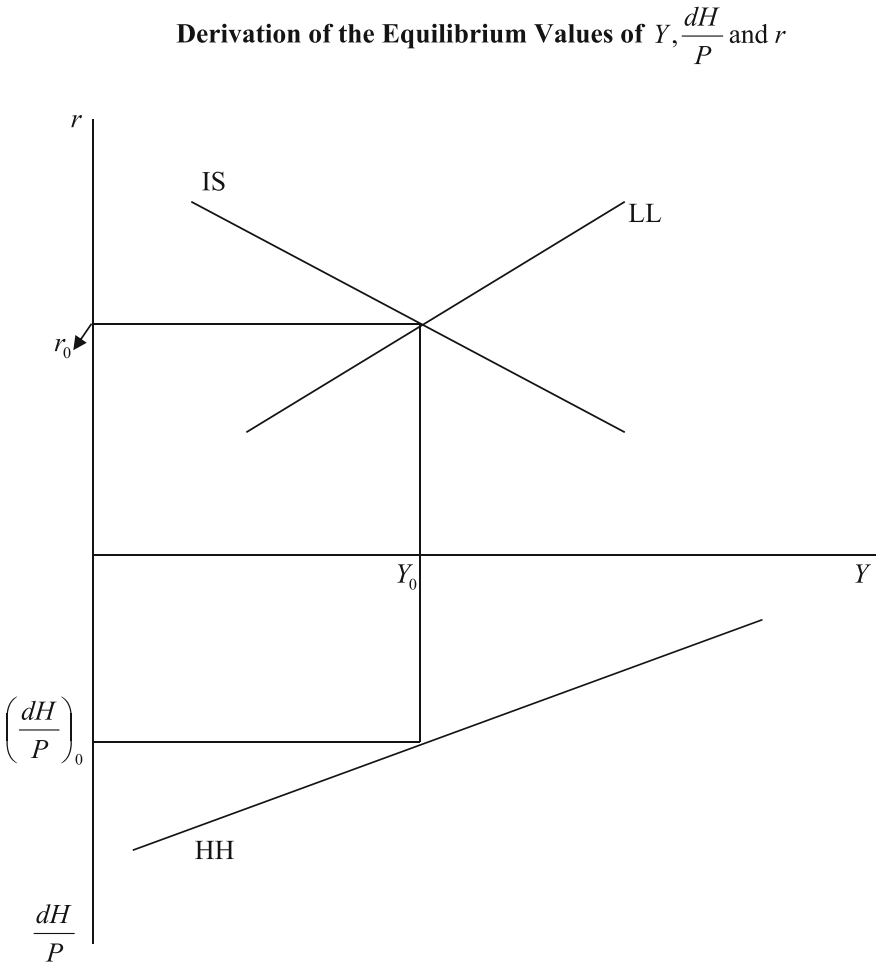


**Fig. 1** Derivation of the equilibrium values of $Y$, $\frac{dH}{P}$ and $r$

schedule in the lower panel. First, focus on the IS curve. Take any $(Y, r)$ on the initial IS. Following an increase in $\bar{G}$ by $d\bar{G}$ financed by borrowing from the central bank, there emerges an excess demand of $d\bar{G}$ for domestic goods at the given $(Y, r)$. At the given $r$, therefore, the goods market will be in equilibrium at a larger $Y$, or at the given $Y$, the goods market will be in equilibrium at a higher $r$. Hence, the IS curve will shift upward or to the right. The new IS is labelled $IS_1$ in Fig. 2. Now, focus on the LL curve. Take any $(Y, r)$ on the initial LL. Following the increase in $\bar{G}$ by $d\bar{G}$ financed by borrowing from the central bank, there now emerges at the given $(Y, r)$ an increase in the supply of new loans by the banks—see the LHS of Eq. (6), while demand for new loans from banks as given by the RHS of Eq. (6) remains unaffected. Therefore, it follows from Eq. (6) that the loan market at the

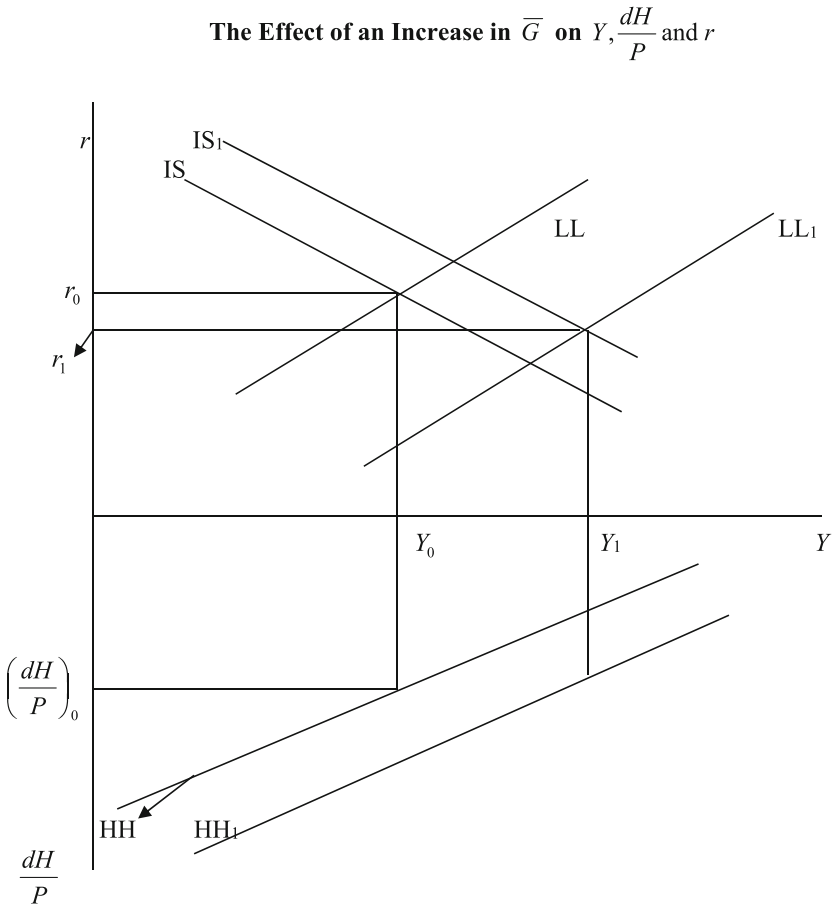


**Fig. 2** The effect of an increase in $\bar{G}$ on $\bar{G}$

given $r$ will be in equilibrium at a larger $Y$ or at a lower $r$ at the given $Y$. Thus, the LL shifts to the right or downward. The new LL is labelled $LL_1$. Hence, in the new equilibrium, $Y$ will be larger unambiguously, but $r$ may change in either direction. However, we have derived mathematically below that $r$ will fall. Let us now focus on the HH schedule representing Eq. (4). Following an increase in $\bar{G}$ by $d\bar{G}$, supply of $\frac{H}{P}$, as given by the RHS of Eq. (4), increases by $d\bar{G}$ corresponding to every $Y$. Hence, the HH schedule will shift southward. The new HH schedule is labelled $HH_1$. Accordingly, the direction of change in the equilibrium value of $\left(\frac{dH}{P}\right)$ is ambiguous. However, we have mathematically derived below that it will increase.

***Mathematical Derivation of the Results***

To derive the results mathematically, we first substitute Eq. (6) into Eq. (2) to write it as

$$Y = C(Y) + \frac{1}{\rho}\left[\bar{G} + X\left(\frac{P^*\bar{e}}{P}; Y^*\right) - M\left(\frac{P^*\bar{e}}{P}; Y\right)\right] + \frac{1-\rho}{\rho}\bar{K} \tag{7}$$

Taking total differential of Eq. (7) treating all exogenous variables other than $\bar{G}$ as fixed, we have

$$dY = C'dY + \frac{1}{\rho}\left(d\bar{G} - M_Y dY\right)$$

Solving the above equation for $dY$, we get

$$dY = \frac{d\bar{G}}{\rho(1-C') + M_Y} \tag{8}$$

Again, taking total differential of Eq. (6) treating all exogenous variables other than $\bar{G}$ as fixed and using Eq. (4), we get

$$dr = \frac{\frac{1-\rho}{\rho}\left[d\bar{G} - M_Y dY\right]}{I' + G'} = \frac{\frac{1-\rho}{\rho}d\left(\frac{dH}{P}\right)}{I' + G'} = \frac{dl_f}{I' + G'} \tag{9}$$

Again, substituting Eq. (8) into the above equation, we get

$$dr = \frac{\frac{1-\rho}{\rho}\left[1 - \frac{M_Y}{\rho(1-C')+M_Y}\right]d\bar{G}}{I' + G'} < 0 \tag{10}$$

From Eqs. (4) and (8), we get

$$d\left(\frac{dH}{P}\right) = \left[1 - \frac{M_Y}{\rho(1-C') + M_Y}\right]d\bar{G} = \left[\frac{\rho(1-C')}{\rho(1-C') + M_Y}\right]d\bar{G} > 0 \tag{11}$$

Again, from Eqs. (5) and (11), we get

$$dl_f = \frac{1-\rho}{\rho}\left[\frac{\rho(1-C')}{\rho(1-C') + M_Y}\right]d\bar{G} = (1-\rho)\left[\frac{(1-C')}{\rho(1-C') + M_Y}\right]d\bar{G} \tag{12}$$

***Adjustment Process***

We shall now explain below how these changes come about. Following the increase in $\bar{G}$ by $d\bar{G}$, $Y$ through the multiplier process increases by $\frac{d\bar{G}}{1-(C'-M_Y)}$. From this additional income, people save $(1-C')\frac{d\bar{G}}{1-(C'-M_Y)}$ and they hold this in the form of bank deposits. Banks receive an additional deposit of $(1-C')\frac{d\bar{G}}{1-(C'-M_Y)}$. Accordingly, their reserves and, therefore, the stock of high-powered money increase by $(1-C')\frac{d\bar{G}}{1-(C'-M_Y)}$. Let us explain this point a little more. When the government borrows from the central bank $d\bar{G}$ amount, the stock of high-powered money in the economy rises by the same amount. But following the increase in $Y$ by $\frac{d\bar{G}}{1-(C'-M_Y)}$, import

demand rises by $M_Y\left[\frac{d\bar{G}}{1-(C'-M_Y)}\right]$ generating an excess demand for foreign currency (in terms of domestic goods) by the same amount. The central bank has to buy up $M_Y\left[\frac{d\bar{G}}{1-(C'-M_Y)}\right]$ amount of domestic currency (in terms of domestic goods) with foreign currency. Thus, at the end of the multiplier process the stock of high-powered money in the domestic economy rises by $d\bar{G}-M_Y\left[\frac{d\bar{G}}{1-(C'-M_Y)}\right]=\left(1-C'\right)\frac{d\bar{G}}{1-(C'-M_Y)}$. Banks get this, as we have already explained, in the form of additional deposits and reserve. Let us make this point clearer. As $Y$ increases by $dY_1=\frac{d\bar{G}}{1-(C'-M_Y)}$, people's saving increases by $(1-C')\frac{d\bar{G}}{1-(C'-M_Y)}$. Besides this, they also have in their hands $M_y\frac{d\bar{G}}{1-(C'-M_Y)}$ part of their income, which they do not spend on domestic goods. Note that $(1-C')\left[\frac{d\bar{G}}{1-(C'-M_Y)}\right]+M_Y\frac{d\bar{G}}{1-(C'-M_Y)}=d\bar{G}$. However, they will not deposit $M_y\frac{d\bar{G}}{1-(C'-M_Y)}$ amount of income with the banks. They will sell it to the central bank for foreign currency. So, the banks will get an additional deposit of $(1-C')\frac{d\bar{G}}{1-(C'-M_Y)}$. In the central bank's balance sheet, the following changes will occur. On the asset side, central bank's credit to the government will increase by $d\bar{G}$ and its stock of foreign exchange will go down by $M_Y\frac{d\bar{G}}{1-(C'-M_Y)}$ so that, in the net, central bank's total asset increases by $d\bar{G}-M_Y\left[\frac{d\bar{G}}{1-(C'-M_Y)}\right]=\left(1-C'\right)\frac{d\bar{G}}{1-(C'-M_Y)}$. On the liabilities side banks' reserve rises by $(1-C')\frac{d\bar{G}}{1-(C'-M_Y)}$.

Banks will not want to keep the whole of the additional reserve idle. They will plan to extend an additional credit of $(1-\rho)\left(1-C'\right)\frac{d\bar{G}}{1-(C'-M_Y)}$. $r$ will, therefore, fall by $\left[\left\{(1-\rho)\left(1-C'\right)\frac{d\bar{G}}{1-(C'-M_Y)}\right\}/\left(I'+G'\right)\right]$ to raise investment and government consumption by the amount of the additional supply of bank credit. This will bring about the second round of expansion in $Y$. At the end of the first round, increases in $Y, dH$ and $l_f$ and the decline in $r$ are given, respectively, by $\frac{d\bar{G}}{1-(C'-M_Y)}$, $\left(1-C'\right)\frac{d\bar{G}}{1-(C'-M_Y)}$, $(1-\rho)\left(1-C'\right)\frac{d\bar{G}}{1-(C'-M_Y)}$ and $\left[\left\{(1-\rho)\left(1-C'\right)\frac{d\bar{G}}{1-(C'-M_Y)}\right\}/\left(I'+G'\right)\right]$.

In the second round, the increase in investment and government consumption by $(1-\rho)\left(1-C'\right)\frac{d\bar{G}}{1-(C'-M_Y)}$ will lead through the multiplier process to an increase in $Y$ by $(1-\rho)\left(1-C'\right)\frac{d\bar{G}}{[1-(C'-M_Y)]^2}\equiv dY_2$. Out of this additional income of $dY_2$, people will save $(1-C')dY_2$ and will not spend $M_Y dY_2$ on domestic goods. Note that $(1-C')dY_2+M_Y dY_2=(1-\rho)(1-C')dY_1$, which is the amount of new credit extended by the banks at the end of the first round. However, the banks will not get back the whole of this credit as new deposit. People will deposit $(1-C')dY_2$ with the banks and sell $M_Y dY_2$ to the central bank. In the balance sheet of the central bank, following changes will occur. On the asset side, central banks' stock of foreign exchange will fall by $M_Y dY_2$, and on the liabilities side banks' reserve will go down by the same amount. In the second round, therefore, the stock of high-powered money will decline by $M_Y dY_2$. In the second round, aggregate saving increases by $(1-\rho)\left(1-C'\right)\frac{d\bar{G}}{[1-(C'-M_Y)]^2}$, which the households will hold in the form of bank

deposits. Banks will receive additional deposits of $(1-\rho)(1-C')^2\frac{d\bar{G}}{[1-(C'-M_Y)]^2}$, which will induce them to extend additional credit of $(1-\rho)^2(1-C')^2\frac{d\bar{G}}{[1-(C'-M_Y)]^2}$. This will increase investment and government consumption by the same amount through the decline in $r$ by $\left[\left\{(1-\rho)^2(1-C')^2\frac{d\bar{G}}{[1-(C'-M_Y)]^2}\right\}/(I'+G')\right]$. Thus, another round of expansion will begin. This process will go on until the amount of additional investment and government consumption generated falls to zero. When that happens, the economy achieves a new equilibrium. Thus, the total increases in $Y$, $dH$, and $dl_f$ and the decline in $r$ are given, respectively, by

$$dY = \frac{d\bar{G}}{[1-(C'-M_Y)]} + (1-\rho)(1-C')\frac{d\bar{G}}{[1-(C'-M_Y)]^2} + (1-\rho)^2(1-C')^2\frac{d\bar{G}}{[1-(C'-M_Y)]^3} + \ldots = \frac{d\bar{G}}{\rho(1-C')+M_Y} \tag{13}$$

$$d\left(\frac{dH}{P}\right) = d\bar{G} - M_Y\frac{d\bar{G}}{[1-(C'-M_Y)]} - M_Y(1-\rho)(1-C')\frac{d\bar{G}}{[1-(C'-M_Y)]^2} - \ldots = \frac{\rho(1-C')d\bar{G}}{\rho(1-C')+M_Y} \tag{14}$$

$$dl_f = (1-\rho)(1-C')\frac{d\bar{G}}{[1-(C'-M_Y)]} + (1-\rho)^2(1-C')^2\frac{d\bar{G}}{[1-(C'-M_Y)]^2} + (1-\rho)^3(1-C')^3\frac{d\bar{G}}{[1-(C'-M_Y)]^3} + \cdots = \frac{(1-\rho)(1-C')d\bar{G}}{\rho(1-C')+M_Y} \tag{15}$$

$$dr = (1-\rho)(1-C')\frac{d\bar{G}}{[1-(C'-M_Y)]}\left(\frac{1}{I'+G'}\right) + (1-\rho)^2(1-C')^2\frac{d\bar{G}}{[1-(C'-M_Y)]^2}\left(\frac{1}{I'+G'}\right) + \ldots = \frac{(1-\rho)(1-C')d\bar{G}}{\rho(1-C')+M_Y}\left(\frac{1}{I'+G'}\right) \tag{16}$$

Clearly, (13)–(16) tally with the values of $dY$, $d(dH)$, $dl_f$ and $dr$ derived mathematically earlier and given by (8), (11), (12) and (10), respectively.

***Irrelevance of the Money Market***

We shall now show that the equilibrium conditions given by Eqs. (2), (4) and (6) imply equality of demand for money and supply of money. Substituting Eqs. (6) and (4) into Eq. (2), we get

$$Y = C(Y) + \left(\frac{1-\rho}{\rho}\right)\frac{dH}{P} + \frac{dH}{P} - \bar{K} \Rightarrow$$

$$(Y - C(Y)) + \bar{K} = \frac{dH}{P}$$

The LHS of the above equation constitutes households' saving plus net inflow of foreign capital. It, therefore, represents domestic households' and foreign investors' demand for additional money or additional bank deposit, as they hold their entire saving/investment in the form of bank deposit/money. The RHS gives the supply of additional bank deposit/money. This ensures equality of demand for money and supply of money. Thus, when Eqs. (2), (4) and (6) are satisfied, money demand and money supply become automatically equal.

***Evaluation of the Model***

This simple model redresses all the major deficiencies of the characterisation of the financial sector in the IS-LM-based open economy macro-models. These models do not show how different kinds of expenditures are financed or how saving generates new credit. Nor do these models consider financial intermediaries, which play a major role in mobilising savings and making them available for financing different kinds of expenditure. The present model incorporates financial intermediaries and brings out clearly the interrelationships that exist among the processes that generate income, saving, new credit and expenditure. It shows that the multiplier process that occurs in the real sector and the money or credit multiplier process that occurs in the financial sector take place simultaneously reinforcing each other. It brings to the fore the process through which savings are used by the financial intermediaries to extend credit.

Unlike the IS-LM-based open economy macro-models, which cannot handle the situation where interest rates are rigid, this model can handle the situation where the interest rates are flexible as well as the one where interest rates are fixed, even though we have not considered the latter case here. The present model can easily be extended to accommodate that case.

Here, we have kept $P$ unchanged. We can easily drop this assumption and explicitly consider the process that determines $P$. We shall now apply this model to explain the Greek crisis.

## 3 Greek Crisis

Greece entered into a severe recession since 2008 (see Table 1). We shall use the model developed above to explain this crisis. Along with the severe recession, Greece also found that it was unable to honour its sovereign debt service commitments in 2008. This is another aspect of the Greek Crisis. In what follows, we shall seek to explain both these aspects of the crisis. Obviously, the two are intimately related to one another. In fact, the severe contraction in Greek GDP since 2008 was a major cause of the sovereign debt crisis.

The currency of the Greece economy is euro. It is a currency, which the Greece government cannot print. It is issued by the European Central Bank (ECB). The stock of euro in the possession of Greece constitutes the stock of high-powered money in the possession of Greece. It is held as reserve of commercial banks of Greece and

currency by the non-bank public. We assume for simplicity that there is no currency holding by non-bank public. The non-bank public hold all their savings as bank deposits. We further assume for simplicity that the bank deposits are the only kind of financial asset available in the economy. Domestic households and foreign investors invest in bank deposits only. The banks in Greece can give new loans only if they get more high-powered money. The only source of new high-powered money to Greece is net exports ($NX$) and net inflow of capital($K$). We regard $K$ to be net of the interest payments made by the banks to the foreigners. We assume the net inflow of capital $K$ to be autonomous, and its value is denoted by $\bar{K}$. We assume for simplicity that Greece trades only with other Eurozone countries so that $\bar{e} = 1$. The option of financing expenditure by borrowing from the central bank is also not available to the Greek Government. Therefore, the supply of new high-powered money in Greece is given by Eq. (4), with $\bar{G} = 0$. Thus, the model that we use to explain the Greek crisis is the one that we have developed above, with $\bar{e} = 1$ and $\bar{G} = 0$.

***The Performance of the Greek Economy in the Pre-Crisis Era and the Beginning of Crisis in Greece***

We shall now use the model developed above to explain the growth performance of the Greek economy in the pre-crisis era and the outbreak of crisis in Greece. From the data presented in Table 1, we find that there took place a decisive break in the growth performance of Greece in 1997. During the period 1981–1996, Greece was an extremely slow growing or almost a stagnant economy. In 1997, the growth rate jumped to a high level and remained at such high levels until 2007 (see Table 1). How do we explain this jump in Greece's growth performance? It is quite easy to explain this. From Table 1 we also find that growth rates in the USA and in many Eurozone and European countries such as France, Germany, Spain, Ireland and UK increased remarkably during the high growth phase of Greece. Capital also began to flow into Greece from the year 2000, and net capital inflow grew at a very high rate during 2003–2007. In terms of our model, $Y^*$ grew at a high rate during the high growth phase of Greece and in the later half of the period along with $Y^*$, $K$ also grew at a high rate. We shall now examine how an increase in $Y^*$ and $\bar{K}$ affects the growth rate of GDP in our model.

## *3.1 Effect of an Increase in Y**

We shall use Fig. 3 to examine how an increase in $Y^*$ affects growth rate. In Fig. 3, initial equilibrium values of $Y$ and $r$, denoted $Y_0$ and $r_0$, correspond to the point of intersection of IS and LL schedules representing Eqs. (2) and (6), respectively. In the lower panel, HH represents Eq. (4) and the initial equilibrium $\frac{dH}{P}$ is denoted by $\left(\frac{dH}{P}\right)_0$. Let us now examine how IS and LL shift following an increase in $Y^*$. Let us first focus on IS representing Eq. (2). Following an increase in $Y^*$, net export rises bringing about excess demand for goods and services at every $(Y, r)$ on the initial IS. Hence, corresponding to any given $r$, the goods market will be in equilibrium at

a larger $Y$. Hence, the IS shifts to the right. Let us now focus on the LL schedule representing Eq. (6). Following an increase in $Y^*$, there emerges excess supply of credit at every $(Y, r)$ on LL. Hence, corresponding to any given $r$, the credit market will be in equilibrium at a larger $Y$. Accordingly, LL shifts to the right. The new IS and LL are labelled $IS_1$ and $LL_1$, respectively. The rightward shift in the IS corresponding to the initial equilibrium $(Y, r)$ will be less than that in LL. Let us explain. Following an increase in $Y^*$, at the initial equilibrium $(Y, r)$, net export becomes larger bringing about an excess demand for goods and services. Corresponding to any given $r$, the goods market will now be in equilibrium at a larger $Y$. However, as follows from Eq. (2), at this larger $Y$, net export must be larger, since the increase in $C$ is less than that in $Y$. Again, at the initial equilibrium $(Y, r)$, there emerges excess supply of credit following the increase in net export caused by the rise in $Y^*$. Hence, as follows from Eq. (6), at the initial equilibrium $r$, the credit market will be in equilibrium at a larger $Y$. At this larger $Y$, as we find from Eq. (6), net export is at its initial equilibrium value. This means that at the initial equilibrium $r$, the rightward shift in LL is larger than that in the IS. In the new equilibrium, therefore, $Y$ is larger and $r$ is less.

We may describe the adjustment process as follows. Following an increase in $Y^*$, at the initial equilibrium $(Y, r)$, net export goes up bringing about an excess demand for goods and services and excess supply of credit. The former will raise $Y$, while the latter will induce a fall in $r$. Equilibrium in the goods and the credit market will be restored through the increase in $Y$ and the fall in $r$. This analysis yields the following proposition:

**Proposition 1** *A higher growth rate in $Y^*$ brings about a higher growth rate in $Y$ and a larger fall in $r$.*

## 3.2 Effect of an Increase in $\bar{K}$

Let us now examine how an increase $\bar{K}$ affects $Y$ and $r$. This we do with the help of Fig. 4, where the initial equilibrium values of $Y$ and $r$, labelled $Y_0$ and $r_0$, respectively, correspond to the point of intersection of IS and LL representing Eqs. (2) and (6), respectively. Following an increase in $\bar{K}$, as follows from Eqs. (2) and (6), IS remains unaffected, while LL shifts to the right. Thus, $Y$ rises and $r$ falls. These results can be easily derived mathematically. The above analysis yields the following proposition:

**Proposition 2** *A higher growth rate in K brings about a higher growth rate in Y and a larger fall in r.*

From Propositions 1 and 2, it follows that the higher growth rate in Greece since 1997 was due to higher growth rates of GDP in other European countries and USA and higher rate of growth of inflow of capital.

It also follows from above that the higher growth rates in other European countries and USA and the higher growth rate in net inflows of capital brought about sharp falls

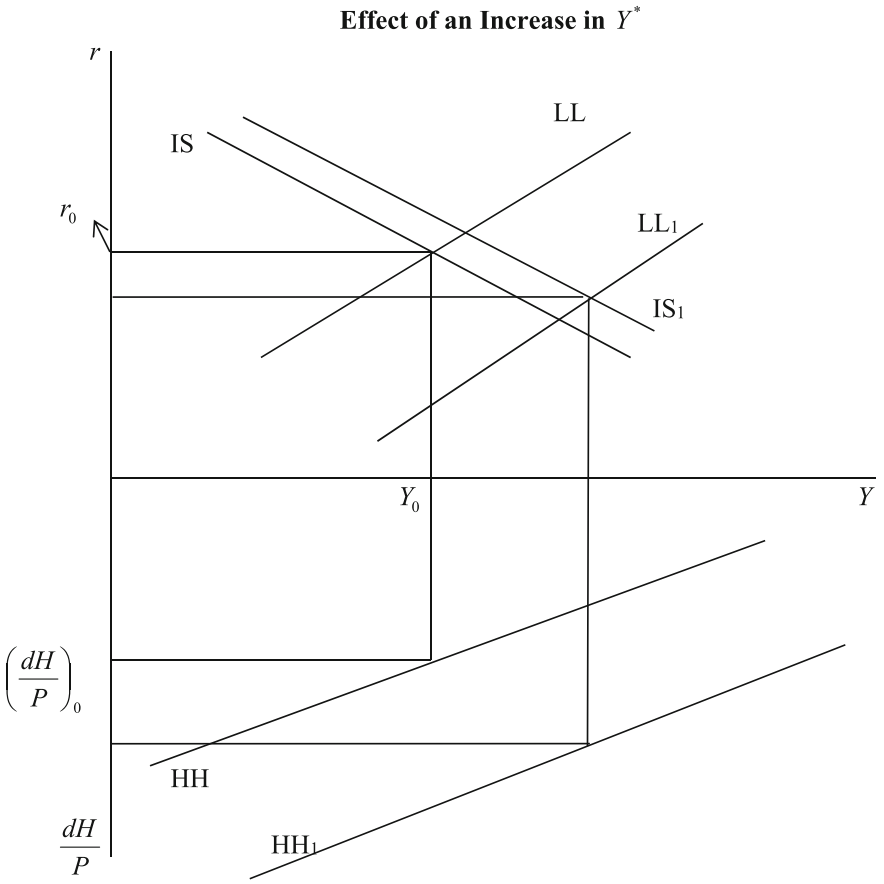


**Fig. 3** Effect of an increase in $Y^*$

in interest rates. This induced the Greek Government to borrow on a large scale to finance additional expenditure. This explains how Greek Government accumulated a sizable amount of debt by the beginning of 2008.

***The Crisis in Greece since 2008***

The crisis that engulfed Greece since 2008 can also be explained using Propositions 1 and 2. From the data given in Tables 1 and 2, we find that the factors that turned favourable since 1997 became extremely unfavourable since 2008. There took place a sharp decline in the growth rates of GDP in all European countries and the USA following the collapse of real estate bubbles. In fact, GDPs contracted in most countries. Capital also instead of flowing in started flowing out of Greece. Both these factors precipitated the severe recession that Greece slipped into since 2008. Interest rates also shot up steeply. As we have already mentioned, Greek Government accumulated sizable debt by the beginning of 2008. With the large contraction in

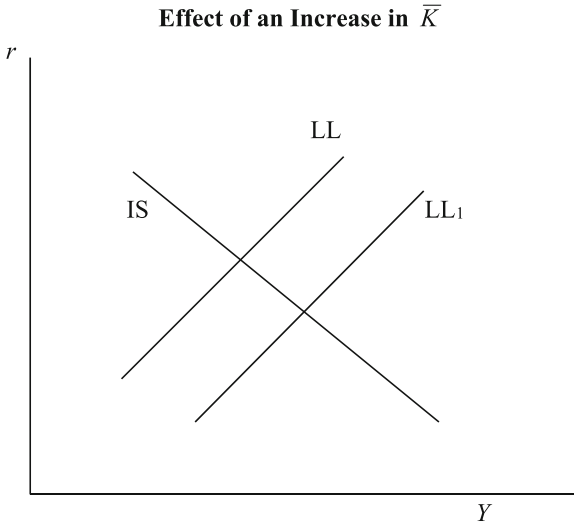


**Fig. 4** Effect of an increase in $\bar{K}$

Greek GDP in 2008 (see Table 1), sovereign debt GDP ratio increased steeply in Greece. Foreign investors' not only stopped lending to Greece but also started withdrawing the funds they invested in Greece. With the contraction in GDP, revenue of the Greek Government declined substantially. With the withdrawal of deposits on a large scale, commercial banks in Greece got into serious trouble and they sorely needed recapitalisation. As a result of all these factors, the revenue of the Greek Government fell far short of what was needed to service Greek Government's debt. New loans were not available either. To avoid loan default, Greek Government had to seek the assistance of the IMF, European Commission and the European Central Bank in 2010. They obliged, but imposed stringent austerity measures, which led to further contraction of Greek GDP. The austerity induced contraction aggravated Greece's debt woes instead of alleviating them. However, how austerity contributed to Greece's problems is beyond the scope of the present paper.

## 4 Conclusion

The paper develops a model to explain the crisis in Greece. The IS-LM model-based open economy macro-models are not applicable to Greece, as they do not show how different kinds of expenditures are financed. Nor do they incorporate financial intermediaries. Bernanke and Blinder (1988) incorporated banks in the IS-LM-based macro-models, but they could not resolve the problem relating to the financing of different kinds of expenditure. The model developed here resolves this problem and shows how net inflows of capital into Greece financed additional private and

**Table 2** Portfolio equity, net inflows (BoP, current US $) (Portfolio equity includes net inflows from equity securities other than those recorded as direct investment and including shares, stocks, depository receipts (American or global) and direct purchases of shares in local stock markets by foreign investors. Data are in current US dollars.)

| Year | 1981 | 82 | 83 | 84 | 85 |
|---|---|---|---|---|---|
| Greece | 0 | 0 | 0 | 0 | 0 |
| Year | 1986 | 87 | 88 | 89 | 90 |
| Greece | 0 | 0 | 0 | 0 | 0 |
| Year | 1991 | 92 | 93 | 94 | 95 |
| Greece | 0 | 0 | 0 | 0 | 0 |
| Year | 1996 | 97 | 98 | 99 | 2000 |
| Greece | 0 | 0 | 0 | −2,588,600,000 | 1,636,800,000 |
| Year | 2001 | 02 | 03 | 04 | 05 |
| Greece | 1,829,000,000 | 1,400,461,074 | 2,568,346,806 | 4,290,377,439 | 6,292,635,261 |
| Year | 2006 | 07 | 08 | 09 | 10 |
| Greece | 7,529,407,898 | 10,865,115,709 | −5,259,941,990 | 763,722,456 | −1,459,911,258 |

*Source* World Bank

government expenditures. It also shows how processes of generation of income, saving, credit and expenditure are inextricably linked together.

Even though the existing literature identifies a surge in capital inflows into Greece and its subsequent drying up as the sole factor responsible for the Greek crisis, we point to an additional factor, namely remarkable jump in the growth rates in many European countries and the USA riding on the waves of the dotcom and real estate bubbles and the severe recession that they went into following the collapse of the asset price bubbles. In sum, the paper attributes the crisis of Greece to the unbridled speculative activities of the global financial capital.

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