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Danielle Cupp  
Gettysburg College  
Class of 2016

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## **Abstract**

This paper presents India's economic growth by comparing it to that of the United States. In addition, this paper analyzes current events in India under a macroeconomic lens as it provides the macroeconomic impacts of said events. More specifically, this paper focuses on the ways in which unexpected severe flooding have impacted Northern India in the short-, medium-, and long-run. Analyses conclude with policy recommendations based on the goals of India's central bank, the Reserve Bank of India (RBI).

## **Keywords**

India, economic growth, macroeconomics, natural disasters

# **Flooding in the Kashmir Valley: Macroeconomic Effects of a Natural Disaster in India**

*by Danielle Cupp*

## **Abstract**

This paper presents India's economic growth by comparing it to that of the United States. In addition, this paper analyzes current events in India under a macroeconomic lens as it provides the macroeconomic impacts of said events. More specifically, this paper focuses on the ways in which unexpected severe flooding have impacted Northern India in the short-, medium-, and long-run. Analyses conclude with policy recommendations based on the goals of India's central bank, the Reserve Bank of India (RBI).

## **I. Executive Summary**

After gaining independence in 1947, India has experienced accelerated growth and is now considered one of the largest and fastest growing economies in the world. After a fiscal crisis in the early 1900s, India's economy adopted open-market policies and opened to international trade, which is considered one of the economy's most substantial boosts. India, however, still faces a number of challenges that impede on its development. India encounters, for example, extreme poverty and unresolved territory disputes with Pakistan and China. In addition, India is experiencing a period of anemic growth, in which its growth rate has declined to 4.4% since 2012. The Indian rupee has been depreciating, adding to these economic difficulties (Ranjan Mishra). India's central bank, the Reserve Bank of India, was conceived after independence in 1947 controls the monetary policy on the Indian rupee and its main objectives consist of maintaining price stability and ensuring that there is an adequate flow of credit to productive sectors in the economy ("About Us").

## **II. Summary on Developments**

Throughout this semester, I have analyzed the macroeconomic consequences of unanticipated events in Indian history while analyzing the nation's growth. When comparing India's GDP to that of the United States, we see that they are converging, affirming the theory that countries with a lower GDP experience higher rates of growth. In addition, we also see that India's output per capita growth rate, TFP contribution rate, and per capita capital contribution are all higher than those of the United States. All of these indicate that India's economy is growing at a faster rate than that of the United States.

In addition, I analyzed the macroeconomic effects of current, unexpected events in India. I predicted, for example, the ways in which output and unemployment would be affected by a devastating flood. I estimated that the impacts would be in particularly severe given the storm's unprecedented harshness and the fact that the economy in that region is heavily dependent on the agricultural sector. Next, I analyzed the macroeconomic impact on the power industry, specifically coal companies as they faced fines and incurred setbacks as the government revoked 214 coal leases. Lastly, I addressed the ways in which Prime Minister Narendra Modi's war on terror would affect the economy, specifically his crackdown on off-shore accounts. I predicted that Indians would transfer more of their money back into Indian accounts, increasing the money supply and increase total output in the country.

Figure 1

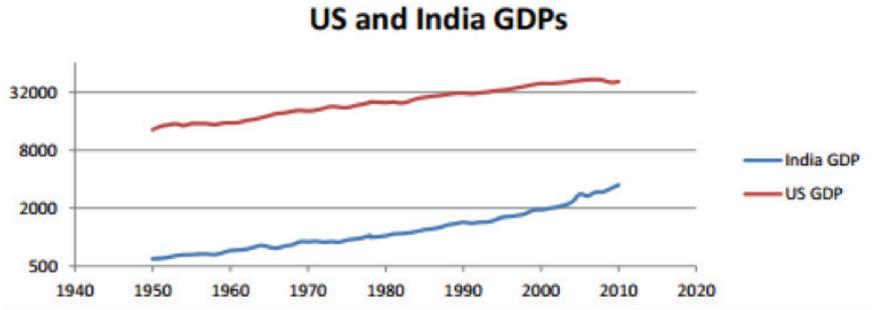


Figure 2

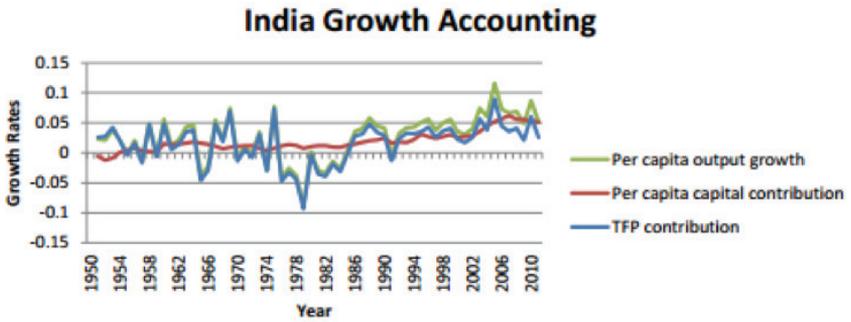


Figure 3



### **III. Shock Under Analysis: Flooding in the Kashmir Valley**

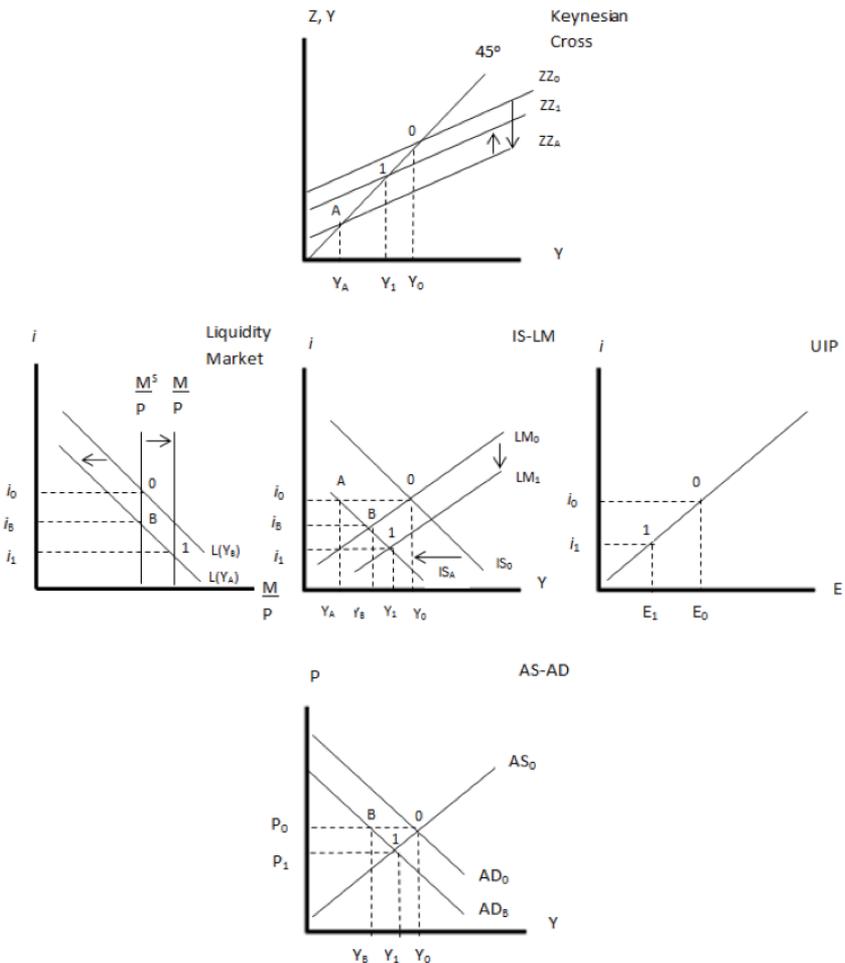
Flooding in the Kashmir Valley in September of 2014 hit record highs in this area of northern India. While monsoons bring devastation to this region every year, this disaster qualifies as a shock because it was the worst flood the valley has experienced in 100 years, leaving 600,000 people stranded and numerous roads, schools, bridges, crops, and hospitals destroyed. (“Kashmir Flood Disaster – How the Next One Could Be Avoided”). The Kashmir Valley lies in the Indian state of Jammu and Kashmir; the economy in this region is in particularly dependent on agriculture and related activities (“CHAPTER III: Socio-Economic and Administrative Development”). Since this flood occurred in September, the region has experienced more flooding, hindering the government’s ability to rebuild and return to the previous rate of productivity.

### **IV. Short-Run Analysis**

To examine the short-run impact on the harshness of the weather conditions, we will use the model provided below. The storm will decrease productivity, employment, and consumption, which can be modeled as a downward shift in the  $ZZ$  curve. When the  $ZZ$  curve shifts down, output decreases (to  $Y_A$ ) and the  $IS$  curve shifts leftward (to  $IS_A$ ). Due to the decrease in output, the demand for liquidity decreases, modeled by a leftward shift in the  $L(Y)$  curve (to  $L(Y_A)$ ). Now, the liquidity and goods markets clear at a lower interest rate and output level ( $i_B$  and  $Y_B$ ). When the shock is incorporated into the  $AS-AD$  model, the  $AD$  curve shifts left. As

a result, the price level decreases, which increases the real money supply. Now, the goods and liquidity markets clear at an even lower interest rate, but a relatively higher output level ( $i_1$  and  $Y_1$ ). Thus, the ZZ curve shifts up (to  $ZZ_1$ ), which demonstrates how the AS-AD model and the liquidity market reduce the multiplier effect. In addition, the exchange rate has decreased as the rupee has depreciated under the UIP condition.

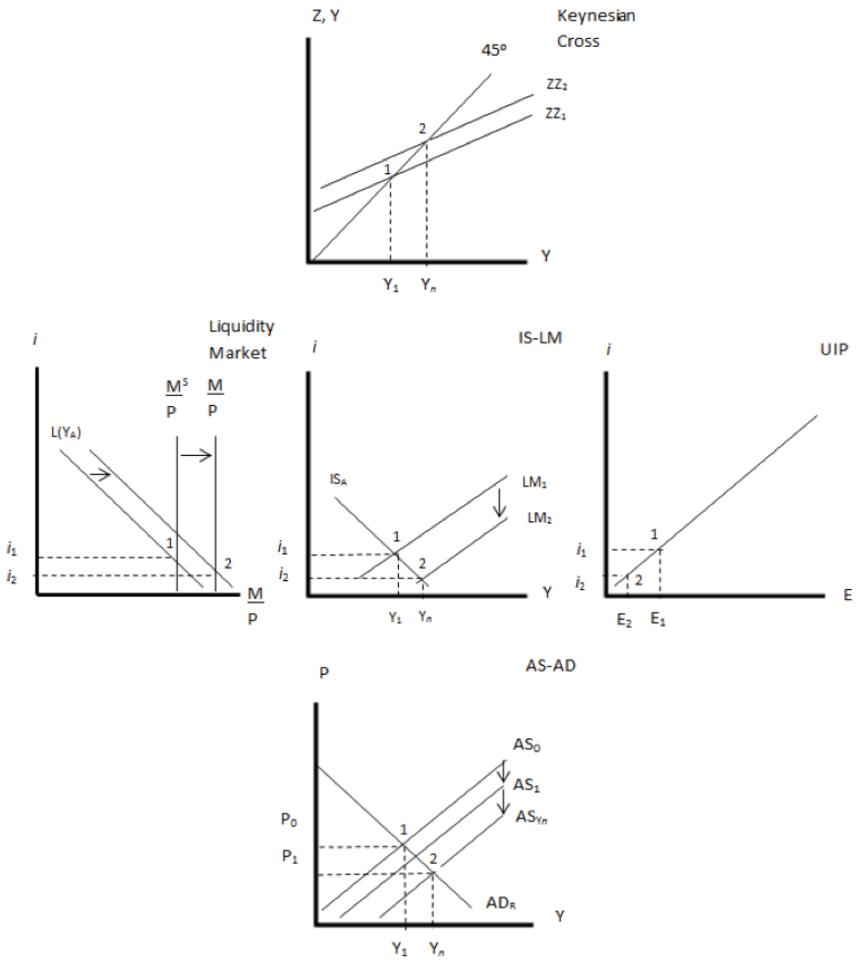
**Figure 4**



## V. Medium-Run Analysis

The same model can be used to display the medium-run implications of the shock. For simplicity, the graphs below only show the short-run equilibrium (1) with the output, interest rate, exchange rate, and price level from the initial equilibrium shown on the axes as a reference. In addition, India's natural rate of output has been added as the economy returns to the natural rate of output in the medium-run. India is characterized by a large output gap and chronic unemployment. The Reserve Bank of India has estimated that the Indian economy has a potential growth rate in the range of 8.2 to 10.2 percent, but in recent years the growth rate in India has fallen short of the lower limit ("Estimation of Potential Output in India"). In 2013, for example, India's economy only grew by 5% ("GDP Growth (annual %)"). As a result of the output gap and chronic unemployment, the natural rate of output will be higher than the initial level of output. In the medium run, output eventually returns to the natural level of output. This adjustment occurs through successive changes in the price level and is modeled by shifts in the AS curve. Since the natural level of output is higher than the actual rate of unemployment, the AS curve will shift down. This lowers the price level (to  $P_2$ ), which increases the real money stock. The rightward shift in the real money results in a decrease in the interest rate and a downward shift in the LM curve. Consequently, the decrease in the interest rate increases investment (from  $i_1$  to  $i_2$ ), which shifts the ZZ curve upward (to  $ZZ_2$ ). The exchange rate has decreased again and the rupee has continued to depreciate under the UIP condition.

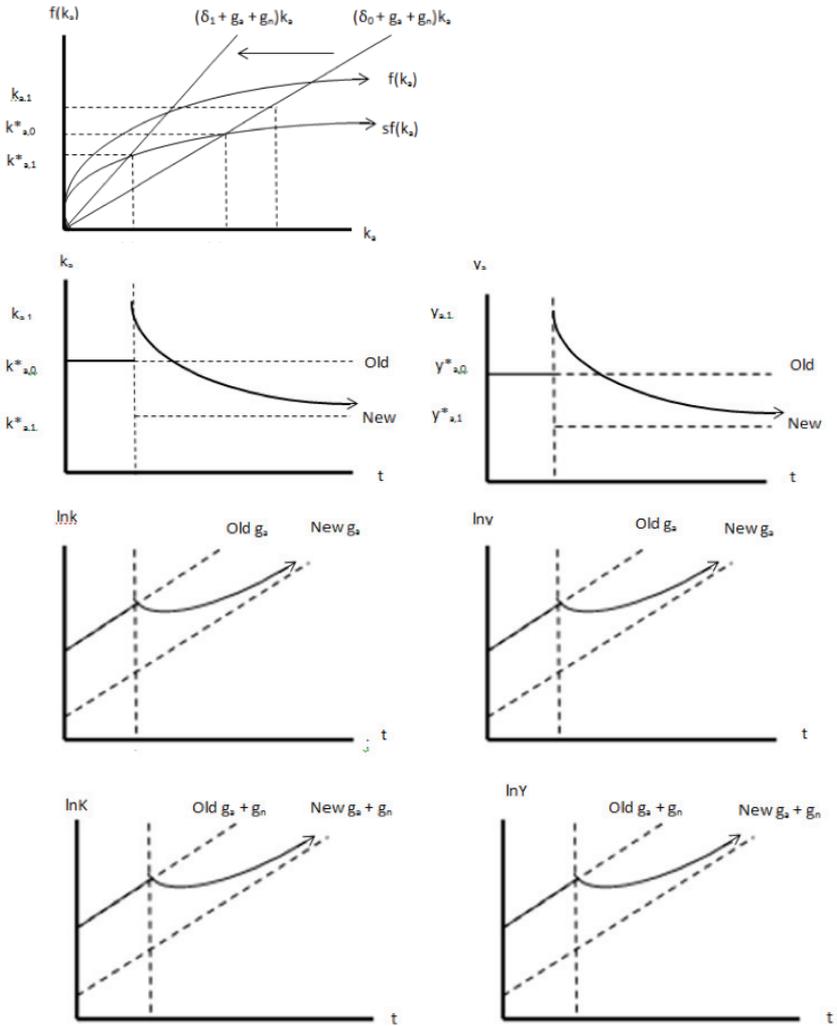
Figure 5



## VI. Long-Run Analysis

The long-run effect of this mass flooding in Kashmir can be modeled in the Solow Growth Diagram. The increase in the severity of this natural disaster (in addition to other flooding that the region already experiences) has caused the physical capital to depreciate more rapidly. This is modeled by a leftward swing in the break-even line. In addition, since the flooding was so severe that it destroyed crops, output decreased. This can be represented as a decrease in productivity ( $A$ ). This would increase the capital per effective units of labor, a rightward jump in  $k_a$ . Initially, the capital per effective units of labor jumps right (to  $k_{a,1}^*$ ) such that it is above the steady-state value ( $k_{a,0}^*$ ). Therefore, the amount of capital per effective units of labor that the economy is accumulating is less than the amount of capital per effective units of labor that the economy is losing due to depreciation, technological progress, and population growth. Capital per effective units of labor decreases (at a decreasing rate due to decreasing returns to scale) until it reaches the new steady state ( $k_{a,2}^*$ ). Now the steady state value is lower than it was initially due to the increase in the depreciation rate. The impulse response functions show the new balanced growth paths. The decrease in productivity means that output per effective units of labor and capital per effective units of labor jump up and then decrease at a decreasing rate until they reach the new, lowered balanced growth path. Output per capita and output both decrease at a decreasing rate until they reach their new, lowered balanced growth paths. These new balanced growth paths are lowered because productivity is permanently lowered by this shock.

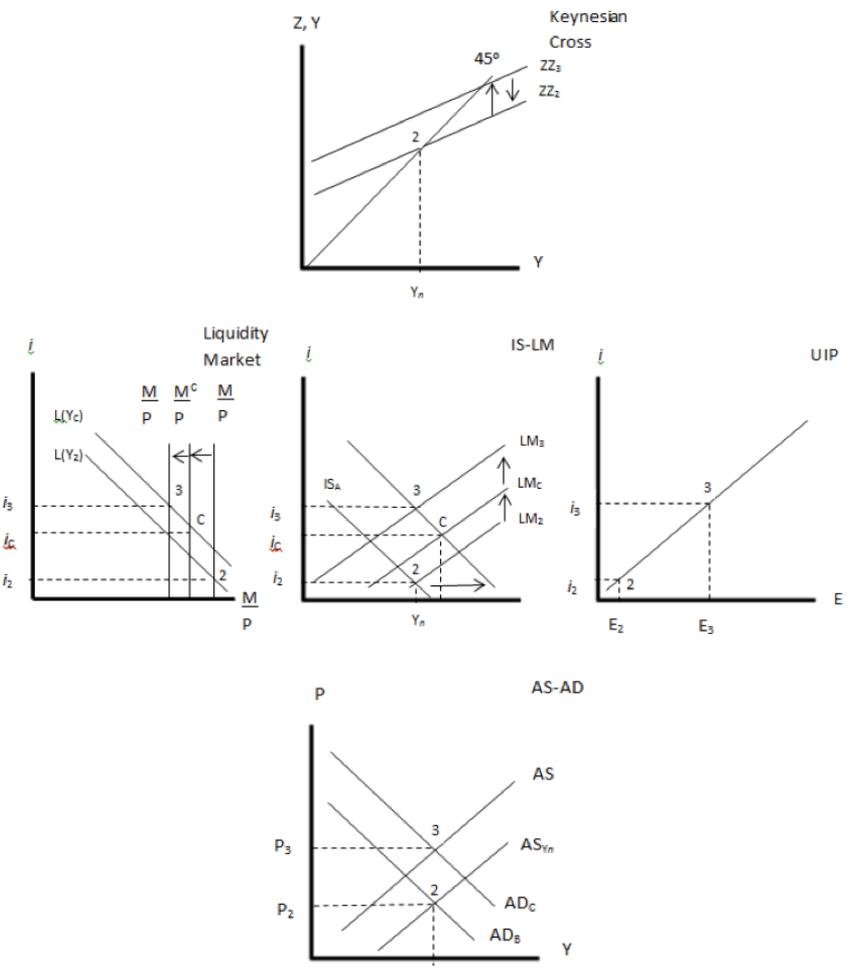
Figure 6



## VII. Fiscal and Monetary Policy Recommendations

One of the objectives of the Reserve Bank of India is to achieve price stability, but one of the long-run consequences of this shock is a decrease in the price level. I suggest both a contractionary monetary policy and an expansionary fiscal policy. Under both, the price level will increase, output will remain at the natural level output, and there will be an appreciation in Indian currency. As a result of the fiscal expansion and the contractionary monetary policy, the ZZ curve shifts up (to  $ZZ_A$ ), the real money demand decreases (to  $MC/P$ ) and liquidity demand increases (to  $L(Y_A)$ ). Consequently, the IS curve shifts right and the LM curve shifts up, such that  $i_c$  and  $Y_c$  clear both the goods and liquidity markets (at point c). The AD curve will shift right, but then the AS curve will also shift such that the economy returns to the natural rate of output. It is important to note that the net effect is an increase in the price level. As a result, the real money supply shifts left again, increasing the interest rate, which also shifts the LM curve upwards (to  $LM_3$ ). The liquidity and goods markets now clear at  $i_3$  and  $Y_n$ . The ZZ curve shifts down such that the output level is also at  $Y_n$ . While there was a fiscal expansion, the increase in the ZZ line was offset by the decrease in investment as the interest rate increased from  $i_2$  to  $i_3$ .

Figure 7



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