Trickle-Down Effects of Changing Value of Euro on US Economy

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TRICKLE – DOWN EFFECTS OF CHANGING VALUE OF EURO ON THE US ECONOMY

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Paper Outline

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I. Introduction

Historically, the US Dollar had been accepted as the strongest currency and it had no competition at the regional or global level. But inception of Euro changed this unique stature and status enjoyed by USD. With introduction of Euro as the common currency, the European Union became USA's closest competitor in terms of economic size, performance, indicators and political and economic clout. Over time, value of euro started appreciating and accordingly, Euro/USD exchange rate which is fully floating, started rising.

A rising Euro affects the US economy in three ways: directly, indirectly and through a cascading effect caused by an interaction of these direct and indirect influences. This paper attempts to identify and explore the effects of an appreciating Euro on some select economic indicators of the US, both historically and projected. It also establishes the relationship between some of these indicators which are not directly cross-related, by analyzing the impact of the Euro on the economy's most sensitive economic parameters. Section I briefly touches upon the scope and objective of this paper. Section II introduces the concept of exchange rate, different exchange rate regimes and determinants of exchange rates. Section III views the historical relationship between the Euro/USD exchange rate and the most important macroeconomic indictors of the US economy. Section IV explores the projected impact of potential future Euro/USD exchange rate on the same indictors and explains the linkages. Section V concludes.

II. Exchange Rate: Basics

When the exchange rate specifies the number of units of domestic currency that could be purchased using one unit of foreign currency, such a system is known as a Direct-Quote X-rate (e.g. 1 EUR = 1.12 USD is a Direct-Quote in US). But when the X-Rate specifies the number of units of foreign currency that a unit of domestic currency can buy, it is known as Indirect-Quote (e.g. 1 USD = 0.89 EUR is Indirect-Quote in US).
Such clarification depends on the specific country in question.

II.A. Exchange Rates Regimes

There are three primary X-rate regimes:
a) Fixed X-rate

b) Floating (Flexible) X-rate and

c) Intermediate X-Rate regime.

In a fixed X-Rate regime, the monetary authority (Central bank) fixes the exchange rate of the domestic currency vis-à-vis foreign currencies, and the domestic currency value does not depend on forex market demand and supply forces. Chinese Yuan is an example of a fixed currency. The EU, too, prefers intra-European fixed rates, and the Euro floats against USD and Yen.

In a flexible regime, the currency value increases (appreciates) and decreases (depreciates) based on currency market demand and supply of forex. As the demand-supply conditions change, the X-rate also changes accordingly. Predicting the value of a floating-rate currency is much difficult, since its value depends on multiple external and internal economic and non-economic conditions.

The USD floats against most major currencies, because for the US, international trade is less important than it is for many other countries - and also, the US is not willing to subordinate its domestic economic policies to an exchange rate objective. Often countries adopt an X-rate system that is neither rigidly fixed nor fully flexible. For example, the Central Bank can "peg" its currency with a dominant currency in world market, most often this chosen currency is that of its most dominant trade partner. Most of such pegging is done to the USD which is considered as one of the strongest "hard currencies" in world market. As and when the USD value changes, the domestic currency value also changes proportionately.

Again, the central banks can fix a "band" within which they allow the domestic currency to move, but if the currency value goes outside this band, they intervene in the forex market and implement required policy adjustments to bring the currency value within the target band.

II.B. Applying X-Rate Regimes: Pros and Cons

A fixed X-rate regime removes sudden and unexpected volatility and the consequent forex market shocks arising out of changes in currency value. However, to ensure effective implementation of a fixed X-Rate, the monetary authority has to ensure a sound and effective regulatory body controlling the policy decisions and their impacts. Also, the internal domestic objectives have to move in tandem with the currency objective. Often, adoption of a fixed currency regime works in detriment to the domestic monetary

objectives under the influence of the so-called "Trilemma of Impossible Trinity", as advocated by the Mundell-Fleming Model.

This model states that out of several objectives of the monetary authority, there are three which can not be satisfied simultaneously: Exchange Rate Stability, Capital Market Integration and Monetary Autonomy. A combination of any two of these has to be satisfied at the cost of the third one, since that can no more be achieved.

Exchange Rate Stability

Impossible Trinity

Monetary Autonomy   **Capital Market Integration**
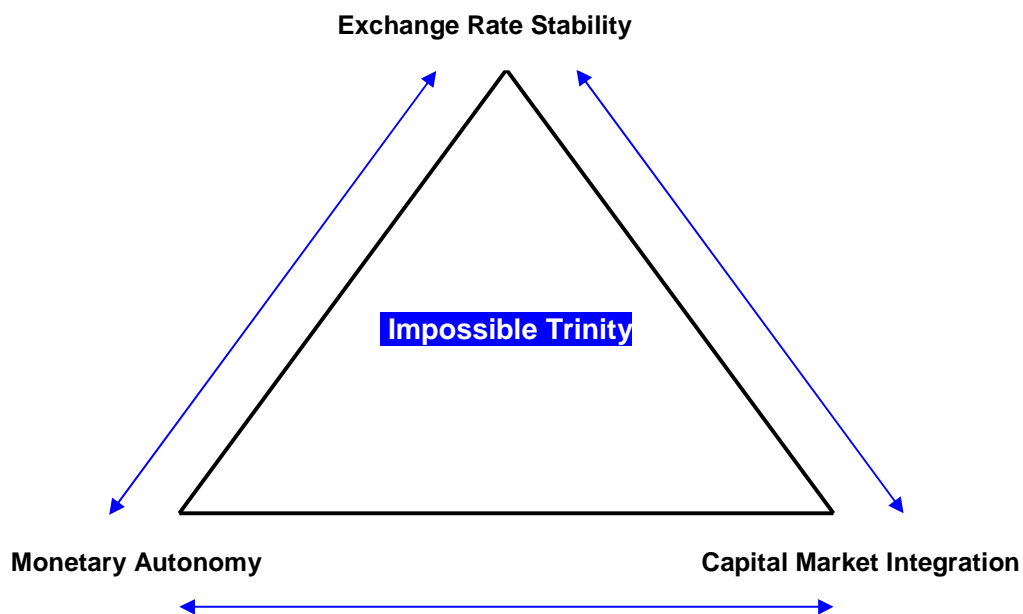
Any pair of goals is achievable by adopting a suitable payments regime abandoning the third. In particular,

- Exchange stability and capital market integration can be covered by adopting a fixed X-rate regime, but by giving up monetary authority. Thus the authorities lose the power of changing the domestic interest rate independently of foreign interest rate.

- Monetary autonomy can be combined with Capital market integration by giving up Exchange stability. Authorities can freely choose the domestic interest rate but must accept the market-dictated (floating) exchange rate.

- Exchange stability can be combined with Monetary Autonomy by giving up Capital Market integration – in presence of capital controls, the interest-rate/exchange-rate link breaks.

Thus, adopting a fixed X-Rate regime necessitates giving up the control over one of the two important domestic policy instruments: Capital Control and Interest Rate. In such situation, an external shock can often get transformed into an interest rate shock.

There are other difficulties in fixing the X-Rate. First, if private capital inflows can not be restrained, fixing the rate is difficult. Second, if the major hard currencies float against one another, to which currency should the domestic currency be pegged? Third, a fixed exchange rate does not automatically adjust the trade balance as floating rate does.

At the other end of the spectrum, floating X-Rates adjust quickly to changing demand-supply patterns and this automatic adjustment mechanism allows a country to mitigate the effects of external shocks and business cycle variations in other countries. It also negates the possibility of a BOP crisis. However, a freely floating X-Rate increases forex exposure volatility. In the financial and corporate balance sheets, if the liabilities are denominated in a free-float currency and assets denominated in domestic currency, a sudden depreciation of the foreign currency deteriorates the financial position, and this comes as a threat to domestic financial stability.

This reason creates a higher "fear of float" especially amongst the emerging economies, since they have smaller variations of nominal X-Rate but face bigger shocks and interest rate and reserve movements.

In between these two extremes, there are intermediate regimes like managed float which the countries often adopt. Normally the X-Rate is allowed to float 'freely', but if it falls beyond a certain (pre-targeted) band, central bank intervenes and exercises contractionary or expansionary measures to bring the rate within the range again. But a huge cost associated with this policy is the cost of such intervention measures (sterilization, for example) – but the main issue here is that even though the cost to the economy of exercising intervention measures can be determined, the cost of not exercising it can not be precisely determined, and thus the actual effectiveness of such intervention measures can not be properly ascertained.

Emerging economies mostly resort to the managed float regime.

II.C. Determinants of Exchange Rate

This section explains the major determinants of X-Rate of two currencies.
(a) Inflation Differential

If inflation rate is lower in a country, its domestic currency has higher purchasing power compared to that in other countries. So its currency value increases.

If European Union has a lower overall inflation rate compared to US, then Euro would buy more goods and services compared to the USD and thus its value would appreciate. Accordingly the Euro/USD X-Rate would appreciate as well.

(b) Interest-Rate Differential.

If rate of interest is higher in EU compared to in US, rate of return is higher in EU which attracts more foreign currency in the form of FDI and FPI. This increases Euro X-rate compared to USD.

However, if inflation is too high in EU, this effect can be mitigated.

(c) Capital Inflows/Outflows

Excessive capital inflows destabilize macroeconomic management through a real X-rate appreciation that causes "Dutch Disease" (situation where a large foreign aid/capital causes real X-rate appreciation that jeopardizes manufacturing prospects, and also threatens growth prospects).

(c) Current Account Deficit/Trade Deficit.

CAD implies an excess of imports over imports, thus more foreign currency is needed to pay for the imports than is generated through exports. Hence there is an excess demand for forex and this depresses domestic X-Rate.

(d) Public debt.

Huge public debt encourages inflation in the economy and then point (a) takes over.

(e) Money Supply.

Higher money supply leads to a lower rate of interest: point (b) takes over.

(g) Output.

If total output of a country increases, the interest rate rises, too.

(h) Fiscal Policy

The government budget deficit/surplus and the quantum of it often determine the demand and supply of forex.

(i) Economic Growth Indicators

(j) State of Economic Growth.

During recession, generally forex demand reduces (due to lower forex transactions) and thus X-Rate goes down, ceteris paribus.

(k) Confidence on the currency, and

(k) Expectations

Expectations play a crucial role in determining an X-Rate. If the financial community perceives a currency to appreciate further after an appreciation takes place, its speculative activities would differ from what would have been, if they considered such appreciation as only temporal.

II.D. Determination of X-Rate: Flexible Regime

This section graphically depicts the demand-supply based X-Rate determination mechanism when demand and supply changes (autonomously).
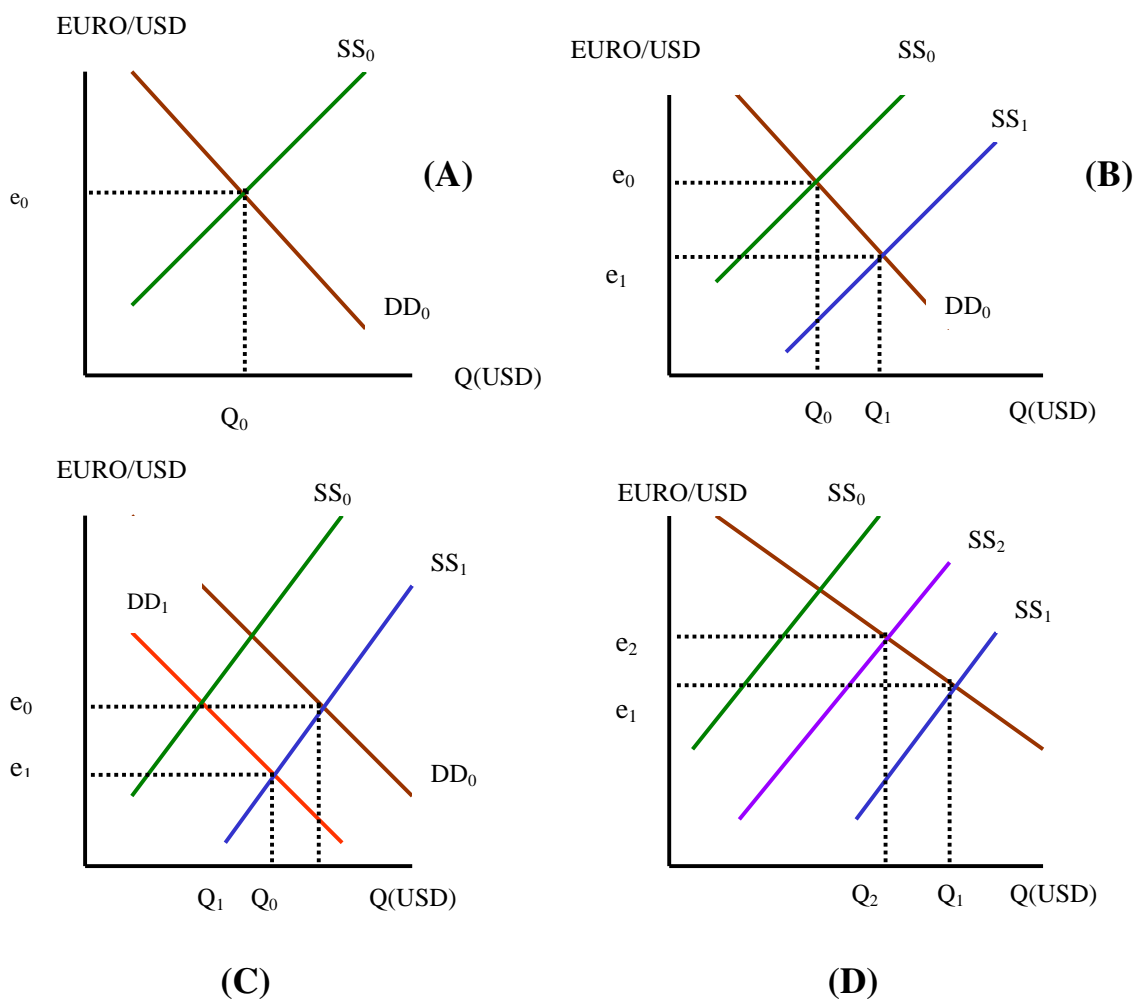

Figure 1

Panel (A) depicts the base case for X-Rate determination, where the rate is determined by intersection of the forex demand and supply curves. It may be noted that forex demand primarily gets generated through imports (since importers need forex to pay for

the imported products), and the base case forex supply is generated only through exports (since exporters receive foreign currency in exchange for their products). In this case, the equilibrium quantity of USD is Q_0 and the EURO/USD X-Rate is e_0.

Any deviation in demand/supply of forex would change these values. Panel (B) depicts an increase in forex supply through addition of capital inflows, which generate more supply of forex into the financial system. Thus, supply schedule gets shifted rightwards from SS_0 to SS_1, intersecting the same demand curve, thus quantity of USD increases to Q_1 but X-Rate reduces to e_1.

Panel (C) depicts a recessionary situation where forex demand inevitably gets lower and demand schedule shifts leftwards from DD_0 to DD_1. The quantity of USD as well as of X-Rate decreases, to Q_1 and e_1 respectively. Finally, panel (D) describes the effect of a reduction of capital inflow which depresses the forex supply curve of panel (B) – SS_1 – leftward to SS_2, and USD quantity decreases to Q_2 from Q_1, and X-Rate appreciates to e_2 from e_1.

II.E. Euro/USD Exchange Rate

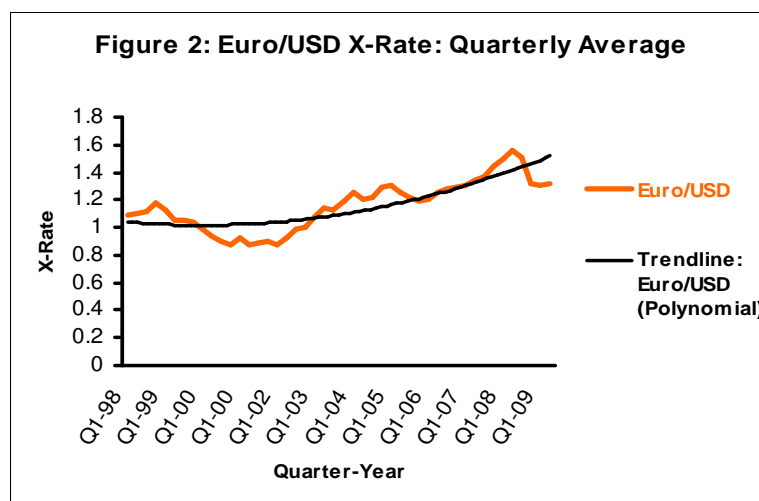The €/$ Exchange Rate has been showing an overall increasing trend as following graph shows.

Figure 2: Euro/USD Exchange Rate (Quarterly Average)

Since the inception of Euro, it has been viewed by the financial world as a viable alternative to USD. Till then, the Dollar had been the dominant Currency in world

economy, since it had no competition – no other economy could come close to the US economy's financial size. So, no other currency could acquire the network externalities, economies of scale and scope, and public goods benefit necessary to rival the Dollar at a global level. Thus, after Euro was adopted as the officially denominated currency by the European Union, it was considered as an alternative to USD in terms of strength and acceptability. The prime characteristics of any legal tender currency are its acceptability as a medium of exchange, as a store of value and as a unit of value. At a global level, its value is determined by the confidence of the stakeholders (the financial transmission and transaction units comprising the household and the institutions), perception about the future performance of the underlying economy and a combination of global economic and financial factors. Soon after its introduction, Euro satisfied all the above criteria and easily occupied the position of a "Hard Currency".

The Euro's increasing popularity is caused by several underlying factors. First, the EU is comparable to US economy in terms of economic size (GDP) and trade openness index. Second, Euro-land has a feasibly controlled rate of inflation that hovers around a narrow band of 1.5-3 % on average. European Central bank (ECB) has been highly successful in keeping inflation under tight control. Thirdly, EU experiences no such tremendous pressure on account of current account deficit and public debt, as US does, to adversely affect its currency.

II.F. Two Crucial Determinants of EUR/USD X-Rate

Euro's value relative to USD depends on two crucial factors: First, the interest-rate differential between European Union (EU) and the US; and second, the inflation rate differential between the two.

II.F.1. Interest Rate Differential and Exchange Rate

In an international economic scenario, the exchange rate between two country's currencies is a function of the differentia between their domestic interest rates:

X-Rate$_{X,Y}$ = f (r_X – r_Y) where

X, Y are the two countries in question and 'r' represents the rate of interest.

Going by above function, if EU has a higher rate of interest compared to that in US, the rate of return is higher in EU which attracts more foreign capital. This drives up the demand for Euro, and its value appreciates against the Dollar, causing a rise in the

Euro/USD exchange rate. This argument implies that Euro/USD exchange rate is positively correlated with the positive interest rate differential between EU and US.
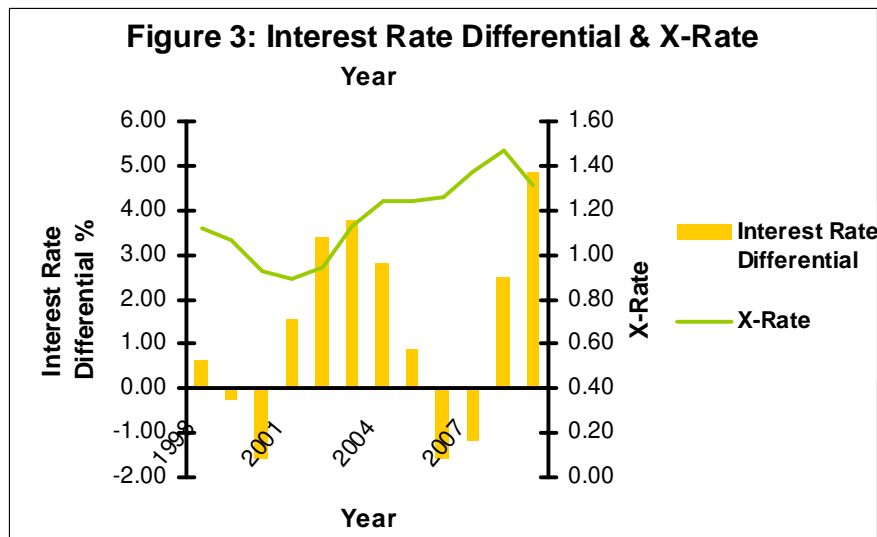
Figure 3: Interest-Rate Differential & X-Rate

Figure 3 considers the annual average interest-rate differential for EU & US and Euro-USD X-Rate for the period 1998-2009 (available till date). Except for four years, the interest differential has always stayed positive, implying a higher interest rate in EU compared to in US. Correspondingly, the X-rate has shown a positive correlation with the change in this differential (Correlation analysis gives a correlation factor equal to 0.1053). However, late-2008 and early-2009 show a reversal of this relationship, which can be attributed to the global financial turmoil and the consequent loss of faith in European economies by the external world. Such lack of confidence in Euro has caused its value to deteriorate in this phase.

II.F.2. Inflation Rate Differential and Exchange Rate

In the two-economy two-currency model, if EU has a lower inflation rate compared to that in the US, the purchasing power of Euro is higher compared to that of USD, and thus Euro gains more value compared to USD, and the X-Rate increases. Hence, the X-Rate shows a negative correlation with any positive inflation differential across the EU and the US.

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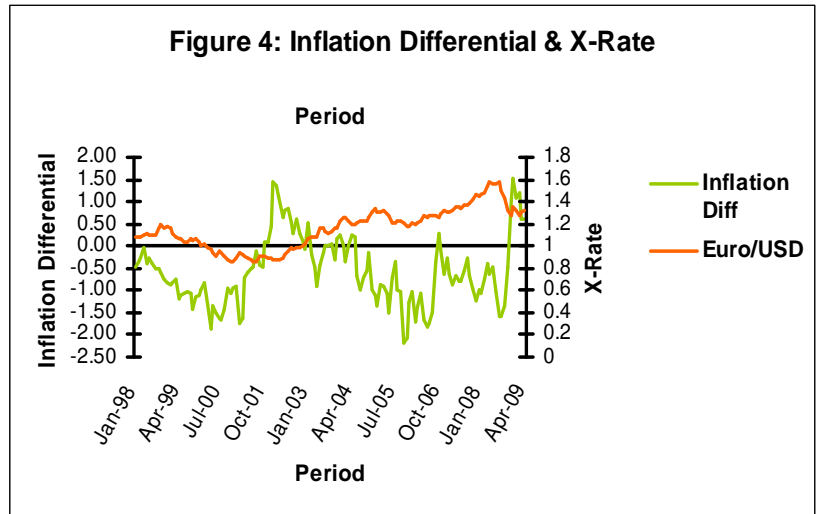
Figure 4: Inflation Differential and X-Rate

Figure-4 shows the quarterly average inflation rate differential and X-Rate for the period 1998-2009 (latest data). For most of this period, inflation differential across the EU and the US has stayed negative, that is, EU inflation rate is lower compared to that in the US. Correspondingly the X-Rate has changed inversely with the direction of change on this differential (Correlation analysis gives a correlation equal to – 0.1439). The graph provides clear evidence that in the period when inflation difference was at the maximum, X-Rate touched its minimum; and the lowest interest differential value was coupled with the highest X-rate (Data Appendix contains quarterly values for some select indicators).

II.G. Future Trend in Euro/USD Rate

Figure 5: Euro/USD X-Rate: Projected
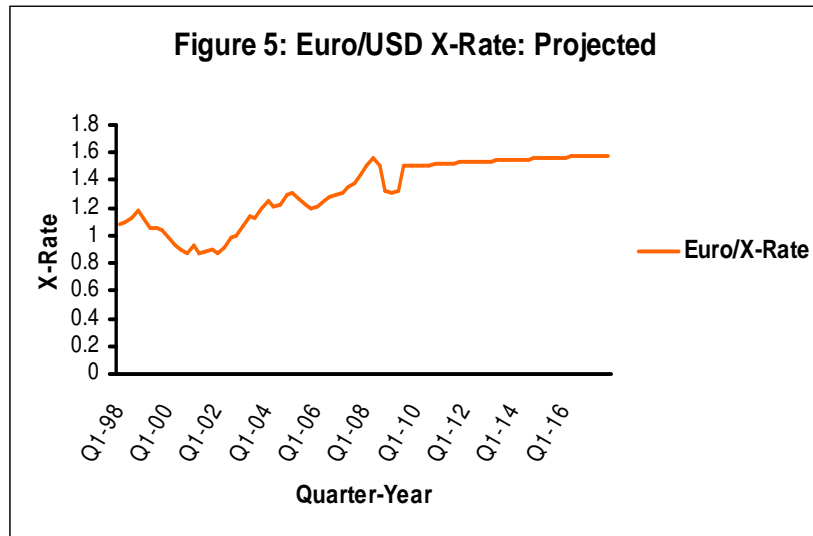
Figure 5: Projected X-Rate (Quarterly)

Based on the trend analysis of quarterly average X-Rate values starting from first quarter of 1998, above projection is made for next seven years. The trend equation has been chosen (included in technical notes) keeping in mind the current and future possible states of the EU and US economies, market conditions and investor confidences, which taken together suggest a not so drastic increase in the Euro-Dollar rate from the present. However, based on an increasing trend in X-Rate, this paper chooses to focus on the cascading impact of a rising Euro-value on the US economy and its important economic indicators.

III. Impact of Changing Euro on US Economy: Historical Evidence

III.A. General Impacts of a Rising Euro on US Economy

A consistent increase in value of Euro vis-à-vis US Dollar could have the following effects on the US economy in general.

Exports & Imports

A strengthening Euro (i.e. a weakening Dollar) would have immediate impact on the export sector of the US. The international exports price would rise proportionately with the Dollar depreciation, which would hit the global export competitiveness. As a result, the exports would shrink. Simultaneously, imports would become cheaper and hence the import volumes would increase.

Trade Deficit

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The combined effect of both the above factors would result in a worsened current account balance scenario: with lower exports and higher imports, the current account deficit (CAD) would increase. If the underlying situation continues for a prolonged period, the CAD as a percent of GDP would continue rising (since, GDP would shrink, too, as one of the essential components of GDP i.e. trade balance as defined by the excess of exports over imports would decrease). In absence of proper checks and balances at an early stage, such scenario could worsen out of bounds and become unsustainable, and an acute BOP crisis would be generated.

Investment and Cost of Capital

A strengthening Euro indicates an excess demand for it which includes investor demand as one of the underpinnings. A continued investor demand preference for Euro-denominated bonds, securities or other kinds of investments compared to the Dollar-denominated instruments would erode the American domestic investment competitiveness, since over time, US would lose its attraction to foreign investors as a preferred investment destination, who would chose the Euro-land instead. This would dry up the capital available to US firms, and as a result, their cost of capital would increase.

Production, Prices, Inflation and Total Output

An increased cost of capital would deter the investment by these firms, and accordingly in medium-to-long term, owing to lack of any expansionary investments, their production would go down. This would immediately affect prices which would go up. A sustained and continuous price-hike situation would fuel inflation. Eventually, higher prices and lower production would depress the national output, too.

External Debt

A rising Euro against USD would worsen the US external debt position, since in such case; the US would have to pay out more Dollars to settle the same amount of Euro-denominated debt. Unless this is controlled, US could find itself in a debt trap. The US already has a huge public debt amounting to USD 10.55 trillion as on April 2009, and this amount had been steadily increasing over last ten years.

III.B. Rising Euro and the US Economy: Historical Evidence

This section inspects the empirical evidence on the direct-impact, indirect and trickle down effects of changes in the Euro-Dollar X-Rate on specific US economic indicators.

III.B.1. Direct-Impact Indicators

Exports, Imports and Trade Balance
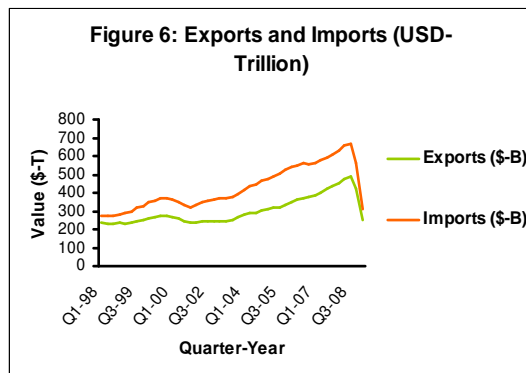
Figure 6: Exports & Imports	Figure 7: Trade Deficit & X-Rate
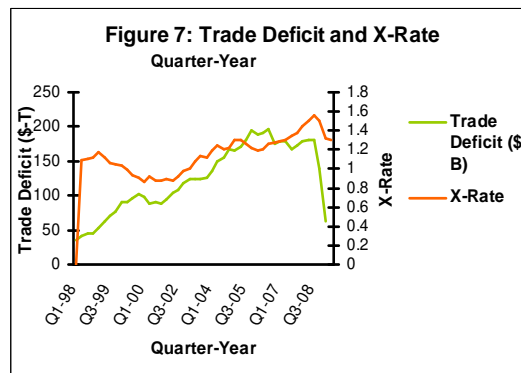
Over the chosen period (1998-2009), growth in exports has lagged much behind that of imports. Correspondingly, trade deficit has risen almost at a steady pace, though there has been a sharp decline in this indicator in the last two quarters. As figure 7 shows, trade deficit and X-Rate have moved almost hand-in-hand along the quarters. Correlation analysis yields coefficients with X-rate equal to 0.6219, 0.6278 and 0.5546 with exports, imports and trade deficits, respectively . However, Q3-2008 onwards both the trade indicators have registered steep decline due to general economic conditions, US financial crisis and its ripple effect on the world economy, and loss of confidence on both USD and Euro.

III.B.2. Indirect Indicators

GDP

A changing X-Rate does not affect the GDP directly. But the GDP gets impacted by changes in exports and imports caused by a change in the X-Rate. This impact takes place by the "Multiplier Mechanism", which measures the change in GDP arising from a unit change in exports and/or imports.
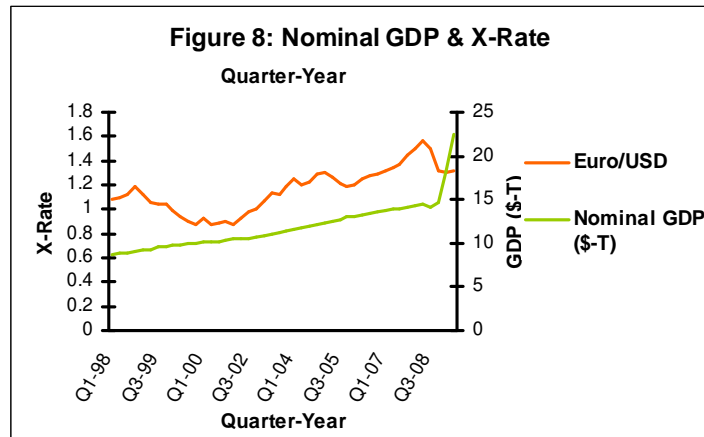
Figure 8: Nominal GDP & X-Rate

Figure 8 reveals a continuously rising trend in nominal GDP (measured in current prices), keeping in pace of a positively trended X-Rate. The nominal GDP shows correlation of 0.752 and 0.7742 with exports and imports respectively.

Investment
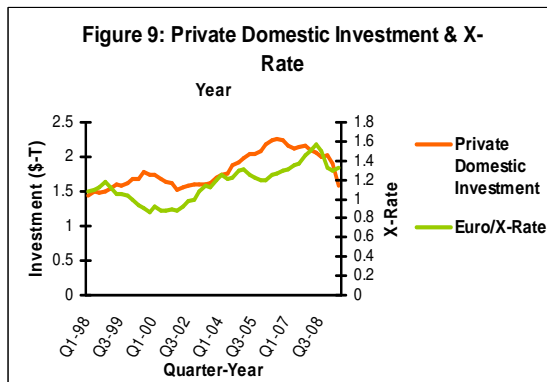
Figure 9: Private Investment and X-Rate
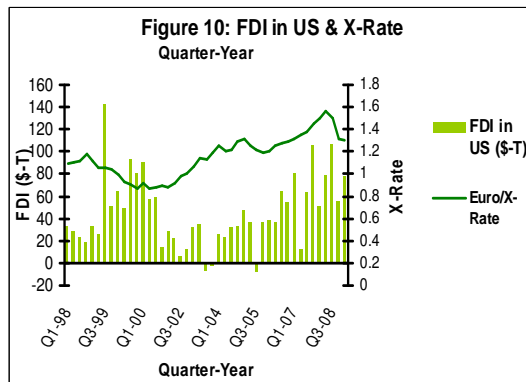
Figure 10: FDI in US & X-Rate

Above graphs validate the logic put forward earlier: as Euro-Dollar X-Rate appreciates; US-bound investment (FDI) and private domestic investment both fall. This relationship is more prominent for FDI in US: almost every change in direction in X-Rate is accompanied by an opposite directional change in the quantum of inbound FDI (Correlation coefficient among these two parameters is 0.144).

External Debt

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Figure 11: X-Rate and US Federal Debt
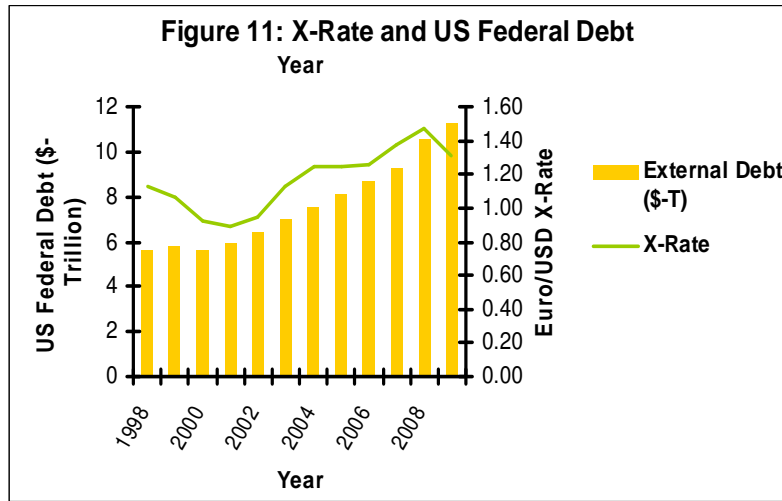
Figure 11: US Federal Debt and X-Rate

Since 1998, US has been showing a continuous and steady increase in its total federal debt. This steady trend is complemented by a similar trend in the X-Rate.

III.B.3. Trickle-Down Factors

This section discusses some of the important "Trickle-Down" effects generated through the interaction of above economic indicators.

I) GDP

As the previous sections explained, GDP in US is not directly impacted by the change in Euro-Dollar X-Rate, but through the changes in trade parameters like exports and imports that have direct influence on the GDP: if exports fall and/or imports rise, GDP would shrink.

The basic national accounting identity splits GDP into four major components:

Output (GDP) = Consumption Expenditure + Private Investment Expenditure + Government Spending + [Exports – Imports], where the last term is the Trade Balance.

Any change in these four components would change the GDP value in the same direction. However, GDP may not be changed by the same quantity of change in its components, due to the multiplier effect(s). For example, a unit increase in consumption would not change GDP by one unit, but more than one unit, since the increase in consumption gives rise to multiple "Ripple-Effects" across the economic entities. Taken together, these effects add up to a more-than-unity increase in GDP.

Measuring the multipliers for consumption, investment, government spending and trade requires complex econometric analysis. Secondly, in reality, some of these components

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are interlinked with one another so that such analysis has to take care of the problem of Multi-Collinearity. This paper has excluded these analyses and measurements for the sake of simplification, and thus, the econometric modeling for GDP is out of scope of this paper.

Instead, this section focuses on identifying the contribution of the components of GDP for the period under consideration, and focus on some of the emerging patterns.
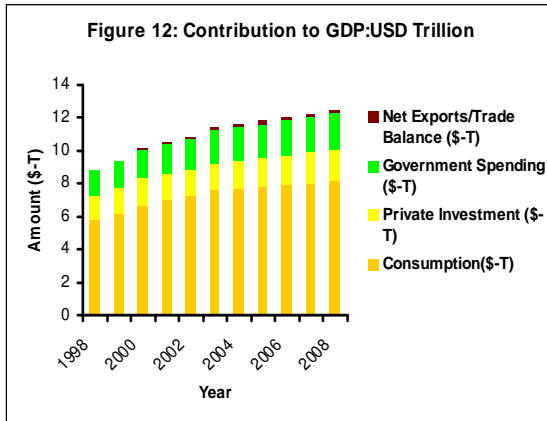
Figure 12: Contribution to GDP ($-T)   *Figure 13: Contribution to GDP by %*
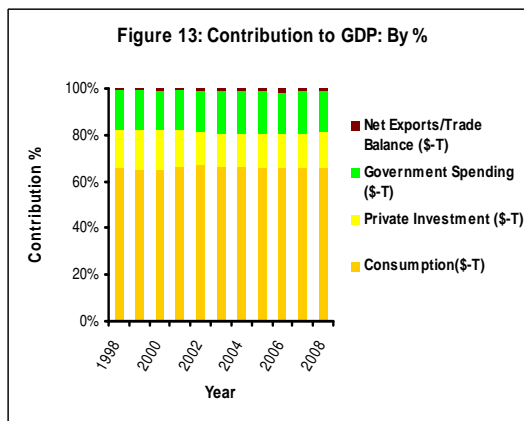
Both the above graphs show similar trends. In terms of absolute value contribution, consumption expenditure occupies the top position, followed by government spending, private investment and finally net exports (trade deficit). Over the years, a declining pattern can be observed for private investment, whereas government spending and net exports have been increasing. But, whereas for net exports, this increase have been from $35-billion to $140-billion, government budget deficit (as defined by the excess of government expenditures over government receipts) has shot up from a situation of budgetary surplus to a deficit of $1.14-trillion over the same period.
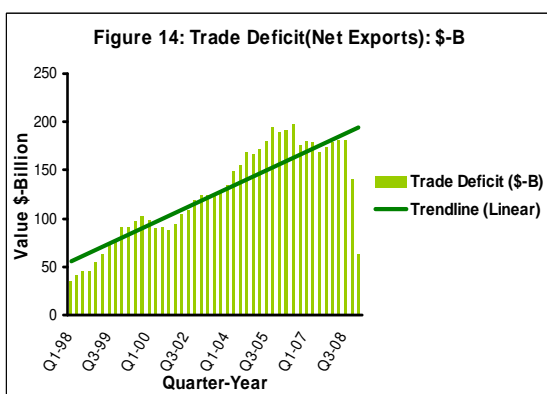
Figure 14: Net Exports ($-B)   *Figure 15: Government Budget Deficit ($-B)*

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The trend-lines for both these indicators display a gradually increasing trend over the period, which is expected to continue in future with high probability.

Two points are to be noted here. One, late-2008 onwards the net exports have come down sharply, due to fall in exports and hike in imports caused by a weak dollar and other policy impacts. Two, government budget deficit has taken a sharp rising trend over this period as well, which is an aftermath of US government's attempts to control the financial collapse in its financial system, and thus various multi-billion dollar corporate bail-out deals implemented by the finance ministry. The crisis has affected the budget deficit in two ways: first, one of the major components of budget deficit – tax receipts – have been adversely affected by the failure of corporate and the public to stay afloat (bankruptcy of Lehman Brothers being a heavy blow to the financial system), and second, the additional expenses incurred by the government to pull out the troubled segment have added to the deficit.

In terms of percentage contribution too, consumption spending comprises the maximum share of the GDP pie (more than 60% consistently), followed by government spending (15-20%), private investment (10-15%) and net exports. As Figure 15 depicts, the share of private investment is consistently falling over time in percentage terms, too. With an active and operative Lag Effect, this situation would result in a shrinking GDP with one or two quarters of lag period.

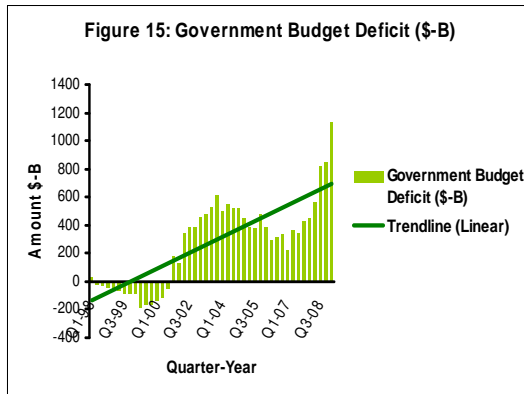Taking all above factors into consideration, this section concludes that even though the GDP would rise in future, the growth rate would show a declining trend (However, such decline can not be attributed solely to the trickle-down effect of a rising Euro, since it would be intertwined with the financial distress that the US is going through).

II) Money Supply

Whereas money demand determines the rate of interest in theory, the supply of money is linked with inflation rate. The mechanism works both ways: when money supply increases in the economy, "too much money chases too few goods" (as production is "sticky" in the short-run, and can not respond to an increased demand immediately), and inflation soars (the reverse happens if money supply decreases). Again, when inflation is high, the central banks apply contractionary mechanisms and instruments to reduce the money supply in the economy. Accordingly, when money supply is the starting point in the transmission mechanism, it is positively correlated with inflation rate. But if inflation rate is the starting point, there is an inverse relationship with money supply.
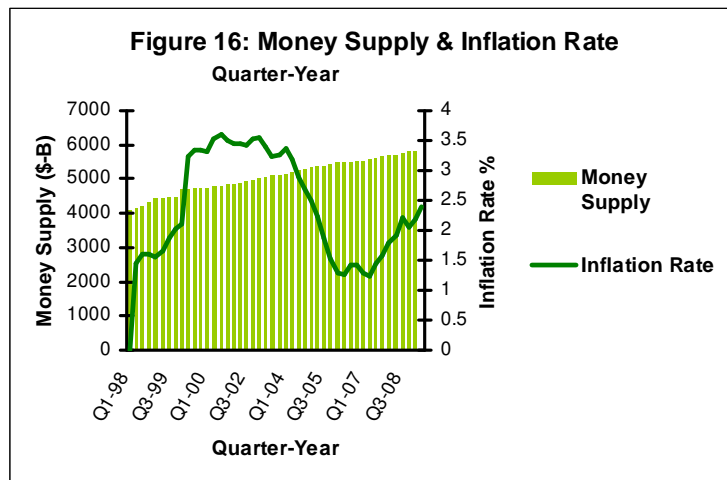
Figure 16: Money Supply & Inflation Rate

Above graph considers the inflation rate as the starting point, and money supply as the consequent policy outcome. It shows an overall inverse relationship between these two parameters, other than some exception periods.

An important implication of the above situation is as follows. If in period t inflation goes up, Fed responds by a tighter monetary policy by squeezing the excess money supply in its financial system. The impact gets rolled over to period $t+1$, when a reduced supply of money coupled with an unchanged money demand (ceteris paribus, assumed) generates an excess demand of money. This induces inflation. A higher inflation rate in US, in combination of an unchanged inflation rate in EU (under assumption of ceteris paribus) causes the Euro/USD exchange rate to go up. Thus, money supply influences the X-Rate through a trickle-down mechanism. Figure 16 displays a rising trend in the inflation rate in the US which conforms to the rising Euro over the period.

III) US Direct Investment Abroad

A strong Euro ensures more foreign investment into EU, particularly driven by the higher interest rate in EU in comparison to that in US. As US interest rate (equal to the rate of return to outside investors) plunges relatively, US domestic investors funnel away their investments from the US economy to other countries which offer a higher rate of return against their investment.

Figure 17: US Investment Abroad & Domestic Interest Rate
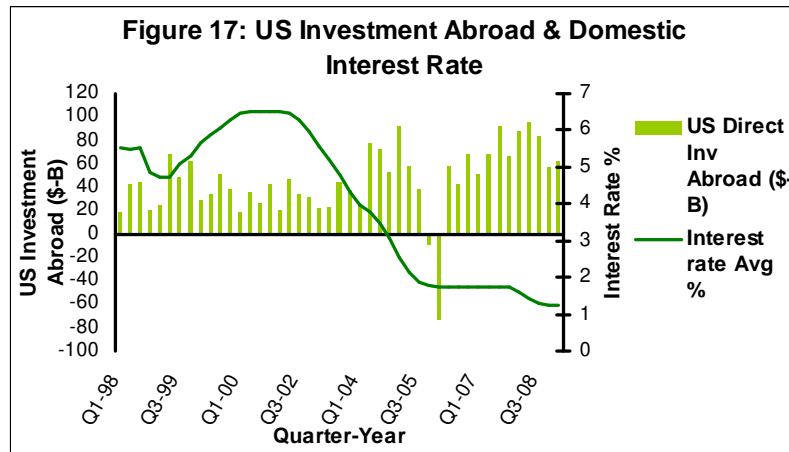
Figure 17: US Investment Abroad & Interest Rate

Figure 17 shows that the domestic interest rate and US investment abroad are inversely related, which confirms the logic cited above. Over the years, Fed has been steadily decreasing the interest rate to boost internal credit creation and eventual expansion of domestic firms. But such a policy is leading to the myopic event of over-dependence of the internal credit system and on the financial institutions, moving away from using domestic savings to be available for investment purposes. With a rapidly declining confidence on all financial institutions in the US following the credit crunch and financial collapse, this policy is detrimental to restoring the financial health in a sustained manner.

IV) Unemployment Rate

Unemployment rate in US is not directly influenced by the Euro value. If GDP growth rate declines, along with a decline in domestic production and investment, a stagnant internal industry would give rise to increasing unemployment rate.

Figure 18: Growth Rate: Unemployment & Nominal GDP

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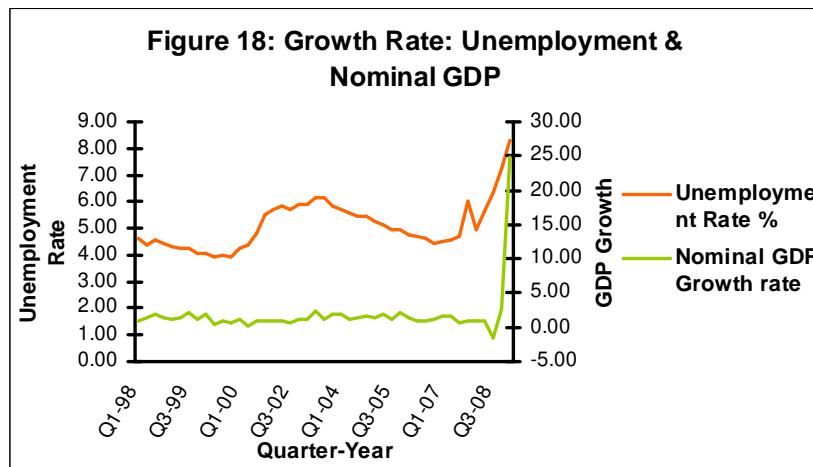
Figure 18: Growth in Unemployment and Nominal GDP

This graph depicts a positive relationship between nominal GDP growth and unemployment rate. In most of the period, they tend to move in tandem.

IV. Rising Euro in Future: Projected Impact on US Economy

As Section II predicts, the Euro is expected to appreciate vis-à-vis USD in the near future, albeit at a modest rate, since the current scenario has eroded the financial community's confidence on not only Dollar but on Euro as well. This section examines the potential impact of the appreciation of Euro/USD X-rate on the economic indicators of US discussed in the previous section.

The projected data considers the projection period up to the last quarter of 2017, on a quarterly basis.

IV.A. Direct-Impact

Exports, Imports and Trade Balance
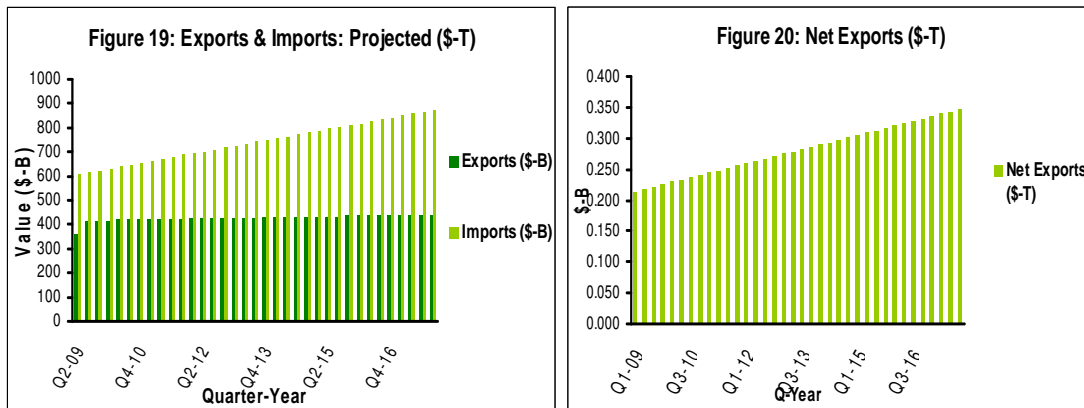
Figure 19: Exports & Imports (Projected)   *Figure 20: Trade Balance (Projected)*

Exports show an almost stagnant/non-increasing trend whereas imports rise steadily. Consequently the trade deficit registers a steady increase and touches a value of $-348 billion at the end of the period. This constancy in exports trend might be attributed to the factor that US being one of the most advanced (developed) economies, its overall growth rate has become quite low compared to other developing or emerging economies, and thus keeping in pace with low growth, the exports growth also has become lower. Secondly, the trend analysis has factored in the current turmoil economic conditions in the US and thus has discounted in the patterns in economic trends. Thirdly, of late the

Euro has been gradually losing confidence on the part of investors, and thus USD is forecasted to be gaining importance once again, in which case a strengthening dollar would ensure higher quantum from exports proceeds.

IV.B. Indirect Impact

GDP

The GDP projection is a result of a multiple regression model with the independent (input) variables being consumption expenditure, private domestic investment, government spending and net exports. Each of these four components has been projected using linear trend projection method. Individual projected contribution of the components to total GDP, in value terms and in % terms, would be discussed in a separate sub-section.
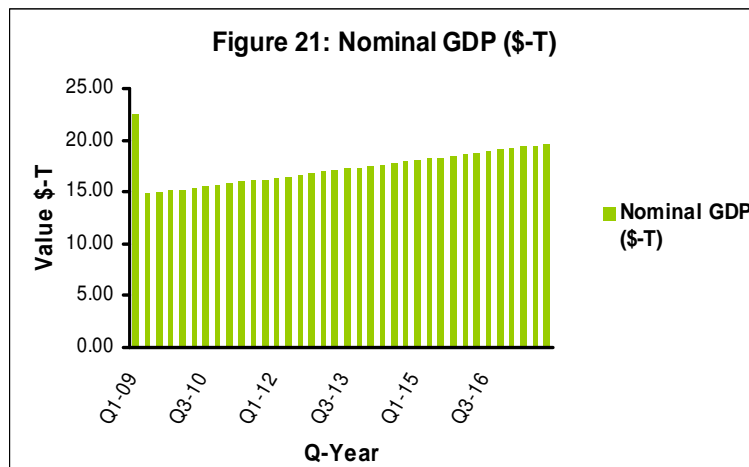
Figure 21: Nominal GDP (Projected)

Investment and Interest Rate

24
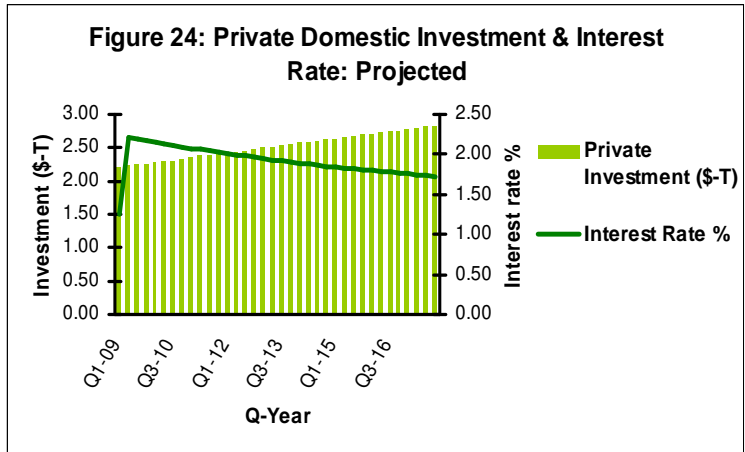
Figure 22: Private Inbound Investment & Interest Rate (Projected)

Interest rate shows a steady and moderately steep decline in the forthcoming period (The Fed interest rate cut has been approaching the near-zero level to stimulate internal economy). Keeping in pace with that, private domestic investment shows an increase, though the growth rate of such investment is declining over time, conforming to an (projected) appreciating Euro.

IV.C. Trickle-Down Factors

GDP: Component-Wise Breakup
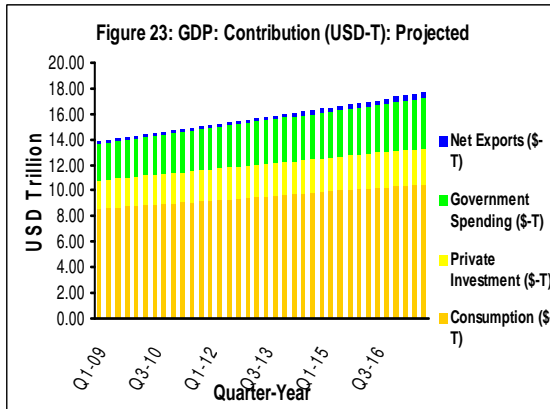
Figure 23: GDP Contribution ($-T)
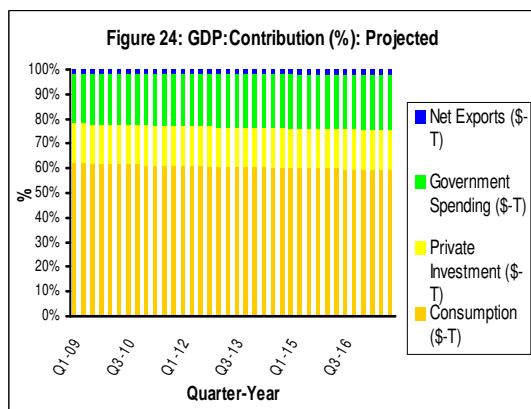
Figure 24: GDP Contribution (%)

Whereas absolute value contribution of all the components show an increasing trend, in terms of percentage composition, consumption percent shows a steadily declining trend (from 62% to 59%) but rest of the components register projected increases, the extent being most for government spending and net exports.(see data table). However, the

composition change % is too small compared to the size of US economy to be considered a threat to the economy.

Money Supply and Inflation

Figure 25: Money SS & Inflation: Projected
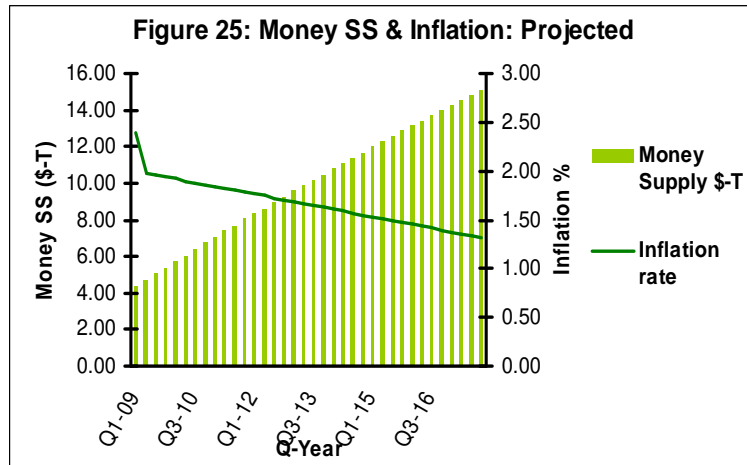
Figure 25: Money Supply & Inflation Rate (Projected)

Money supply and inflation rate project a sharp inversely linear relationship. The inflation rate being the triggering event, as inflation goes down, Fed resorts to expansionary monetary policy to increase money supply to stabilize domestic financial system, and as money supply increases, interest rate falls. Figure 26 depicts the (projected) one-to-one relationship between inflation rate and interest rate:

Figure 26: Inflation Rate & Interest Rate: Projected
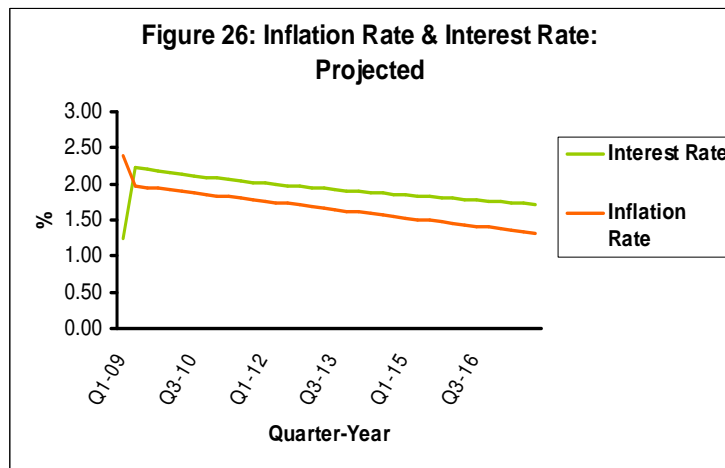
Figure 26: Inflation Rate & Interest Rate (Projected)

Figure 26 confirms the logic mentioned above. As inflation rate falls, through an increase in money supply, the interest rate gets affected and thus inflation and interest rate move in a linearly correlated pattern. They display a correlation factor of 0.7006.

US Investment Abroad and Domestic Interest Rate
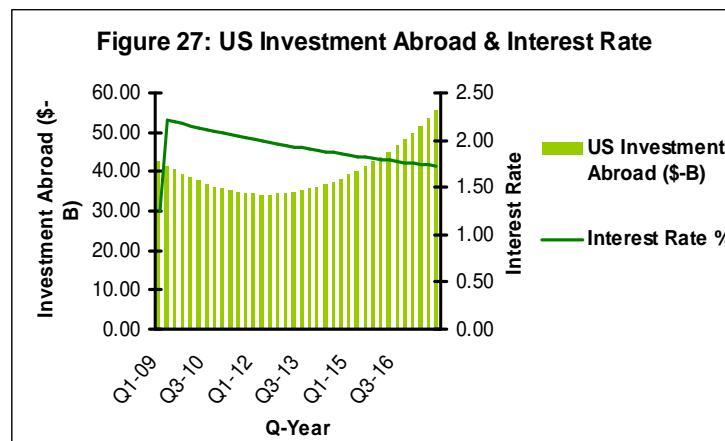
Figure 27: US Investment Abroad and US Interest Rate

In response to a lower domestic interest rate, US investment abroad shows first a declining then increasing trend. The decreasing pattern can be explained using the interplay of two factors: one, in the initial projection period starting from Q1-2009, the financial crisis has left US with lower available capital to invest abroad; two, the lower domestic rate induces US corporate sector to utilize their available resources by raising loans domestically taking advantage of the lower cost of capital. However, once the crises get over, investor normality gets restored and overseas investments start replacing domestic investment. The previous discussions and figures have projected a gradually declining quantum of domestic private investment.

Unemployment and GDP Growth Rate
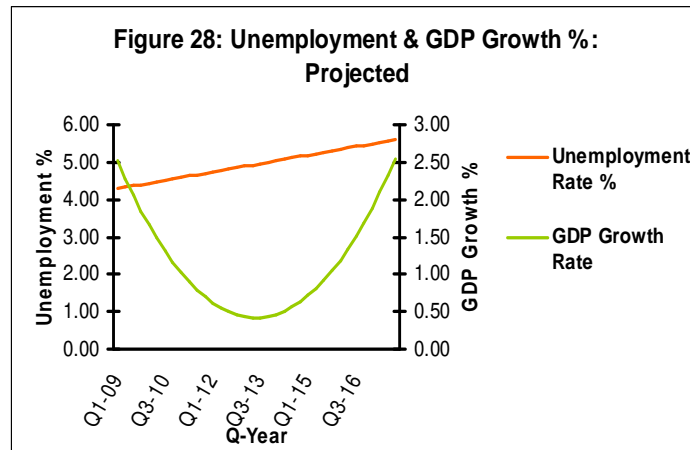
Figure 28: Unemployment & GDP Growth (Projected)

The projected GDP growth rate displays a perfect 'U'-shape, as a reflection of the current scenario extended up to the point when the trough is reached. Once the US economy gets over the damage factors caused by the crisis, it slowly starts strengthening on the recovery path. From mid-2013, the recovery in terms of growth rate is projected to start, and then gradually reaches the normal level. But rate of unemployment shows a gradual increase. Accordingly in the initial years the relative unemployment rate seems too high as the problem can not be cured based on a healthy growth rate.

V. Conclusion

The previous discussion makes clear the following points.

1) An appreciating Euro vis-à-vis USD makes an immediate impact on exports, imports and trade balance in US, by deflating the former and inflating the latter two parameters.

2) As exports decline and imports rise, GDP gets affected by the multiplier mechanism and gets reduced. However, decline in GDP in this case is not entirely dependent on the trade parameters only, but also owing to other factors which have not been considered in GDP change estimation.

3) On the capital and investments front, both the US-bound investments (FDI) and private domestic investment in US decrease.

4) Even though the GDP is projected to an increasing trend over the future, its growth rate is expected to decline. However, this factor can not be solely attributed to the appreciating Euro, as this is caused by a complex mix of numerous changes in economic variables.

5) So long as the EU-US inflation rate differential stays positive, US money supply shows an increasing trend which effects a downward movement of interest rate, which in turn causes a trickle-down effect on the Euro/USD exchange rate which appreciates.

6) As fed reduces domestic interest rate, US investments abroad display a declining trend, and shows an inverse relationship with it.

7) As GDP decreases by interplay of above factors, unemployment rate shoots up in the US.

8) The projections predict an almost stagnant or slowly increasing exports, steadily increasing imports (where growth rate of imports is much higher than that of exports), and a steady and continuous rise in trade balance. This is a sign of a severe BOP crisis.

9) Interest rates show a gradually declining projected patterns and keeping in pace with that, private domestic interest rate increases, albeit at a slow pace.

10) In accordance with the projected decline in US inflation rate, money supply increases.

11) Inflation rate and interest rates are projected to decline in tandem steadily over time.

12) As interest rate keeps on declining in future, initially US overseas investment declines owing to present and lagged effects of the economic crisis, but thereafter slowly catches up with an increasing trend.

13) Unemployment rate shows a steady increasing pattern whereas nominal GDP growth rate too declines in the first half of the projection period, and then rebounds and shows increasing trend.

14) A much important point to be noted is that this paper mostly considers the economic indicators in isolation and as independent, ignoring the reality of existence of multi-Collinearity amongst them, accordingly, this is a Partial Equilibrium Framework.

15) This paper focuses solely on a two-country, multi-period model which excludes the interdependence of other economies on the US.

DATA APPENDIX : HISTORICAL DATA (SELECT)

	E/$	Inf	Ex	Im	TD	GDP	Pvt Inv	FDI	Inv-Abr	MS	Int	U	Grw
Q1-98	1.087	1.46	236	271	35	8.66	1.44	33.4	18.9	4.09	5.5	4.6	0.9
Q2-98	1.101	1.60	232	273	41	8.79	1.51	28.2	42.6	4.16	5.5	4.4	1.5
Q3-98	1.120	1.60	229	274	45	8.95	1.47	23.3	44.1	4.20	5.5	4.5	1.8
Q4-98	1.182	1.55	237	282	45	9.07	1.51	18.5	20.0	4.34	4.9	4.4	1.3
Q1-99	1.123	1.67	233	287	54	9.17	1.55	33.4	24.3	4.42	4.7	4.3	1.1
Q2-99	1.057	1.87	236	300	63	9.31	1.60	26.3	68.6	4.44	4.7	4.3	1.5
Q3-99	1.049	2.03	244	316	71	9.52	1.59	142.5	48.4	4.46	5.1	4.2	2.3
Q4-99	1.038	2.11	252	329	76	9.63	1.63	50.4	62.8	4.48	5.3	4.1	1.2
Q1-00	0.987	3.24	258	348	90	9.82	1.69	64.2	29.6	4.68	5.7	4.0	2.0
Q2-00	0.934	3.35	267	357	91	9.86	1.67	49.7	34.4	4.71	5.9	3.9	0.4
Q3-00	0.904	3.34	273	371	97	9.95	1.78	93.1	51.2	4.73	6.0	4.0	0.9
Q4-00	0.869	3.33	272	374	102	10	1.75	80.3	38.6	4.75	6.3	3.9	0.7
Q1-00	0.922	3.53	269	366	98	10.1	1.74	90.9	18.5	4.76	6.4	4.2	1.1
Q2-01	0.874	3.60	259	348	89	10.1	1.68	56.9	35.7	4.78	6.5	4.4	0.1
Q3-01	0.882	3.51	243	333	90	10.2	1.65	59.2	26.1	4.81	6.5	4.8	0.9
Q4-01	0.895	3.44	234	322	88	10.3	1.61	14.7	43.0	4.83	6.5	5.5	1.0
Q1-02	0.877	3.45	236	330	94	10.4	1.52	28.7	20.1	4.85	6.5	5.7	1.0
Q2-02	0.920	3.43	244	348	104	10.5	1.56	22.8	47.1	4.88	6.5	5.8	1.0
Q3-02	0.984	3.52	248	356	108	10.6	1.57	6.5	34.8	4.91	6.3	5.7	0.6
Q4-02	1.001	3.55	246	365	118	10.7	1.59	12.8	31.8	4.96	6.0	5.9	1.1
Q1-03	1.074	3.39	247	371	125	10.8	1.60	32.3	21.2	5.01	5.6	5.9	1.1
Q2-03	1.136	3.24	247	371	124	11.1	1.61	35.1	22.7	5.06	5.2	6.1	2.4
Q3-03	1.126	3.27	255	378	123	11.2	1.62	-5.8	44.5	5.10	4.8	6.1	1.2
Q4-03	1.190	3.38	269	394	125	11.4	1.69	-2.3	38.0	5.13	4.3	5.8	1.9
Q1-04	1.251	3.20	280	415	135	11.7	1.74	26.1	24.2	5.16	4.0	5.7	1.9

Quarter													
Q2-04	1.205	2.90	287	437	150	11.8	1.77	23.8	77.7	5.19	3.8	5.6	1.1
Q3-04	1.223	2.70	292	447	155	12	1.88	31.7	72.5	5.25	3.5	5.4	1.4
Q4-04	1.297	2.50	302	470	167	12.2	1.93	33.2	52.6	5.29	3.1	5.4	1.7
Q1-05	1.311	2.23	310	476	166	12.3	1.98	47.1	92.1	5.34	2.6	5.3	1.4
Q2-05	1.260	1.86	319	490	171	12.5	2.05	36.9	58.0	5.37	2.1	5.1	1.8
Q3-05	1.219	1.53	321	502	180	12.7	2.04	-7.6	38.6	5.41	1.9	5.0	1.2
Q4-05	1.189	1.28	333	527	194	13	2.08	37.6	-8.3	5.45	1.8	4.9	2.1
Q1-06	1.202	1.25	349	538	189	13.1	2.17	37.9	-72.9	5.47	1.7	4.7	1.3
Q2-06	1.257	1.42	360	552	192	13.3	2.24	37.0	58.4	5.48	1.7	4.7	0.9
Q3-06	1.274	1.43	368	565	197	13.4	2.25	64.0	43.4	5.49	1.7	4.6	0.9
Q4-06	1.290	1.30	380	555	175	13.5	2.23	55.0	68.1	5.51	1.8	4.4	1.0
Q1-07	1.311	1.24	385	565	180	13.7	2.16	80.6	51.8	5.54	1.7	4.5	1.6
Q2-07	1.348	1.44	400	579	179	14	2.12	12.7	68.5	5.58	1.7	4.5	1.6
Q3-07	1.375	1.59	425	593	168	14	2.15	63.3	91.3	5.61	1.7	4.7	0.6
Q4-07	1.449	1.78	435	609	174	14.2	2.16	105.5	66.1	5.65	1.7	6.0	0.9
Q1-08	1.500	1.91	452	630	178	14.3	2.09	51.4	87.8	5.69	1.6	5.0	1.0
Q2-08	1.563	2.20	475	657	181	14.4	2.06	79.7	95.7	5.73	1.4	5.6	0.8
Q3-08	1.502	2.06	486	667	181	14.2	2.00	107.1	83.7	5.76	1.3	6.3	-1.5
Q4-08	1.319	2.19	423	563	140	18.6	2.01	56.2	56.6	5.79	1.2	7.2	2.7
Q1-09	1.302	2.39	251	314	62	22.5	1.91	77.9	62.6	5.82	1.3	8.3	24.8

Legends:

E/$: Euro-USD X-Rate, Inf: Inflation Rate %, GDP: Nominal GDP (USD Trillion)
Ex: Exports (USD-Billion), Im: Imports (USD Billion), TD: Trade Deficit (USD Billion)
Pvt Inv: Private Domestic Investment in US (USD Trillion), Int: Interest Rate %
FDI: FDI in US(USD Billion), Inv-Abr: Investment by US, Abroad (USD Billion)
MS: Money Supply (USD Billion), U: Unemployment Rate %
Grw: Nominal GDP Growth Rate %

DATA APPENDIX : PROJECTED DATA (SELECT)

	E/$	Inf	Ex	Im	TD	GDP	Pvt Inv	Inv-Abr	MS	Int	U	Grw
Q1-09	1.499	2.39	0.357	0.608	0.2508	13.84	2.216	42.7	4.36	1.25	4.28	2.51
Q2-09	1.502	1.97	0.415	0.615	0.2005	13.95	2.233	41.5	4.7	2.22	4.32	2.27
Q3-09	1.505	1.96	0.416	0.623	0.2073	14.06	2.251	40.4	5.05	2.19	4.36	2.05
Q4-09	1.509	1.94	0.417	0.631	0.2141	14.17	2.269	39.4	5.38	2.17	4.4	1.85
Q1-10	1.512	1.92	0.418	0.639	0.2209	14.28	2.287	38.4	5.72	2.15	4.43	1.66
Q2-10	1.515	1.9	0.419	0.647	0.2278	14.38	2.304	37.6	6.05	2.13	4.47	1.48
Q3-10	1.517	1.88	0.42	0.655	0.2346	14.49	2.322	36.8	6.38	2.11	4.51	1.31
Q4-10	1.520	1.86	0.421	0.662	0.2415	14.6	2.34	36.2	6.71	2.1	4.55	1.16
Q1-11	1.523	1.84	0.422	0.67	0.2484	14.71	2.357	35.6	7.04	2.08	4.58	1.03
Q2-11	1.526	1.82	0.423	0.678	0.2554	14.82	2.375	35.1	7.37	2.06	4.62	0.9
Q3-11	1.529	1.8	0.424	0.686	0.2623	14.92	2.393	34.8	7.69	2.04	4.66	0.79
Q4-11	1.531	1.78	0.425	0.694	0.2693	15.03	2.41	34.5	8.01	2.03	4.7	0.7
Q1-12	1.534	1.76	0.425	0.702	0.2763	15.14	2.428	34.3	8.33	2.01	4.73	0.62
Q2-12	1.536	1.74	0.426	0.71	0.2833	15.25	2.446	34.2	8.64	1.99	4.77	0.55
Q3-12	1.539	1.72	0.427	0.717	0.2903	15.36	2.464	34.2	8.96	1.98	4.81	0.5
Q4-12	1.541	1.7	0.428	0.725	0.2973	15.46	2.481	34.3	9.27	1.96	4.85	0.46
Q1-13	1.544	1.69	0.429	0.733	0.3043	15.57	2.499	34.4	9.58	1.95	4.88	0.43
Q2-13	1.546	1.67	0.43	0.741	0.3114	15.68	2.517	34.7	9.89	1.93	4.92	0.42
Q3-13	1.549	1.65	0.43	0.749	0.3184	15.79	2.534	35.1	10.2	1.92	4.96	0.42
Q4-13	1.551	1.63	0.431	0.757	0.3255	15.9	2.552	35.5	10.5	1.91	5	0.43
Q1-14	1.553	1.61	0.432	0.764	0.3326	16.01	2.57	36.1	10.8	1.89	5.03	0.46
Q2-14	1.556	1.59	0.433	0.772	0.3397	16.11	2.587	36.7	11.1	1.88	5.07	0.5
Q3-14	1.558	1.57	0.433	0.78	0.3468	16.22	2.605	37.4	11.4	1.87	5.11	0.56
Q4-14	1.560	1.55	0.434	0.788	0.3539	16.33	2.623	38.3	11.7	1.85	5.15	0.63
Q1-15	1.562	1.53	0.435	0.796	0.361	16.44	2.641	39.2	12	1.84	5.18	0.71

Q2-15	1.564	1.51	0.436	0.804	0.3682	16.55	2.658	40.2	12.3	1.83	5.22	0.81
Q3-15	1.566	1.49	0.436	0.812	0.3753	16.65	2.676	41.3	12.6	1.82	5.26	0.92
Q4-15	1.569	1.47	0.437	0.819	0.3825	16.76	2.694	42.5	12.8	1.81	5.3	1.05
Q1-16	1.571	1.45	0.438	0.827	0.3896	16.87	2.711	43.8	13.1	1.8	5.33	1.19
Q2-16	1.573	1.43	0.438	0.835	0.3968	16.98	2.729	45.2	13.4	1.78	5.37	1.34
Q3-16	1.575	1.41	0.439	0.843	0.404	17.09	2.747	46.6	13.7	1.77	5.41	1.51
Q4-16	1.577	1.4	0.44	0.851	0.4112	17.19	2.764	48.2	14	1.76	5.45	1.69
Q1-17	1.579	1.38	0.44	0.859	0.4184	17.3	2.782	49.9	14.2	1.75	5.48	1.88
Q2-17	1.580	1.36	0.441	0.867	0.4256	17.41	2.8	51.6	14.5	1.74	5.52	2.09
Q3-17	1.582	1.34	0.442	0.874	0.4328	17.52	2.818	53.4	14.8	1.73	5.56	2.31
Q4-17	1.584	1.32	0.443	0.879	0.436	17.63	2.835	55.4	15	1.72	5.6	2.55

Legends:

E/$: Euro-USD X-Rate, Inf: Inflation Rate %, GDP: Nominal GDP (USD Trillion)
Ex: Exports (USD-Billion), Im: Imports (USD Billion), TD: Trade Deficit (USD Billion)
Pvt Inv: Private Domestic Investment in US (USD Trillion), Int: Interest Rate %
FDI: FDI in US(USD Billion), Inv-Abr: Investment by US, Abroad (USD Billion)
MS: Money Supply (USD Billion), U: Unemployment Rate %
Grw: Nominal GDP Growth Rate %

TECHNICAL NOTES

Trend Equations *(Trend Projection Method Unless Stated Otherwise)*

1) Consumption = 0.0542 x + 6.1568
2) Investment (Private) = 0.0177 x +1.4192
3) Government Spending = 0.0324 x + 1.3603
4) Net Exports (Trade Deficit) = 0.0038 x + 0.0426
5) Money Supply = -0.0011 x^2 + 0.3459 x + 4.0174
6) Euro/USD X-Rate = 0.153 ln (x) + 0.91
7) FDI in US = 4.9248 x + 149.95
8) Total US Federal Debt = 0.5225 x + 4.257
9) Interest Rate = 12.678 $x^{-0.4556}$
10) Imports = 7.8492 x + 246.45 (Trend Projection)
11) Inflation Differential = 5E(-06) x^3 – 0.001 x^2 + 0.0558 x – 1.3107
12) Inflation Rate = - 0.0193 x + 2.8624
13) Government Budget Deficit = 18.887 x – 154.66
14) US Investment Abroad = 0.0463 x^2 – 1.3514 x + 44.034
15) Unemployment Growth Rate = 3E(-05) x^4 – 0.0029 x^3 + 0.0783 x^2 – 0.6878 x + 5.7406
16) Exports = - 75.98 + 327.46 (X-Rate) [Simple Regression Method]
17) Nominal GDP = -1.37 + 0.67(Consumption) + 1.22 (Private Investment) + 2.93(Government Spending) – 3.04(Net Exports)
    [Multiple Regression Method]

Correlation Table

	Unemp %	X-Rate	Interest Rate %	Budget Deficit	Inflation Rate	Exports	Imports
Inflation-Diff		-0.1439					
Interest-Diff		0.1053					
Exports		0.6219					
Imports		0.6278					
Trade Def		0.5548					
FDI in US		0.1444					
Pvt Inv		0.6759					
GDP(Nom)		0.6732		0.7996		0.752	0.7742
Money SS			- 0.8325		- 0.2318		
GDP Growth %	0.5342						
US Inv Abroad			- 0.3287				
Inflation %			0.7006				

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