Diagnosing the dutch disease: Are the symptoms present in Bhutan?

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Diagnosing the Dutch Disease: Are the symptoms present in Bhutan?

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Abstract

Bhutan's economy has evolved significantly since embarking on a period of modern development in 1960 when its first motor road was built. Underpinning its economic growth is the hydropower sector among other drivers, which has accounted for nearly 40% of exports on average in the last 5 years. However, the earnings thus far pale in comparison to what is projected with the completion of the recent massive surge in investments in the sector. The destabilizing effects of an unpreparedness to manage such inflows have already begun to manifest in the construction phase of Bhutan's hydropower pursuits as evidenced by the recent balance of payments challenges. Hence, we can intuitively forecast the implications once these power plants are operational and export revenues surge exponentially. The academic consensus on the negative correlation between natural resource dependence and economic growth has been conceptualized in a framework known more popularly as the Dutch Disease. In this paper we attempt to technically assess whether the economy exhibits the symptoms associated with a Dutch Disease based on the three channels which include (1) the resource movement effect, (2) the spending effect and, (3) the monetary effect. Additionally, we also conduct an analysis of another important symptom- the Bilateral Real Exchange Rate- to ascertain whether it has been under pressure and the determinants of its movement. While we do find evidence of some of the symptoms such as real exchange rate appreciation, the estimates aren't robust enough to categorically attribute these symptoms to power exports or a monetary disequilibrium in our framework. However, we argue that the traditional model may have to be tweaked slightly in our case because more traditional outcomes such as the resource movement effect probably manifest in different ways.

Keywords: Bhutan, Dutch Disease, Real Exchange Rate, Energy Exports, Current Account

JEL Classification Numbers: E60, O13, Q48

[1] The views expressed do not necessarily reflect those of the UNESCAP or Royal Government of Bhutan.

Introduction

The hydropower sector forms the bedrock of Bhutan's economy. Despite accounting for nearly 40% of exports on average in the last 5 years, the earnings are small in comparison to what is projected with the completion of Bhutan's 'Accelerated Hydropower Development Initiative' which targets an installation of 10000 MW over the next decade. The investments in partnership with the Government of India are estimated to be as large as 50% of GDP in some years and upon completion will result in a 600% increase in electricity exports. In fact, the IMF projects that, when three of these projects become operational, Bhutan will become the fastest growing country in the world with a projected real growth rate of 11.3% (IMF, 2016).[2] While this presents a unique development opportunity for Bhutan to propel itself to the ranks of higher middle-income status, it is crucial to also consider the potential adverse implications of such an energy-boom. The negative correlation between excessive dependence on natural resources and economic performance has been empirically documented. Sachs and Warner (1996) refer to it as the 'natural resource curse'. Frankel (2011) explores six channels through which the effect occurs. In addition to macroeconomic and structural factors, studies also point to other undesirable outcomes such as rent seeking behaviour and corruption (Leite and Weidmann, 1999).

While we can categorically conclude that the 'resource curse' due to corruption or institutional deficiencies has not resulted for Bhutan, we must ascertain whether the Dutch Disease has manifested through other channels. This study shall attempt to steer the debate by devising a more formal approach of analyses that is based on empirical rather than anecdotal evidence. Such an inquiry is critical at this juncture as we are at a macroeconomic crossroads and an objective assessment of the outcomes thus far will be insightful in formulating a prognosis for the impending energy boom.

Notwithstanding the longer term impacts from power exports thus far, the destabilizing effects of an unpreparedness to manage elevated levels of inflows have also begun to manifest during the construction stage of the Accelerated Hydropower Initiative.[3] With import growth outpacing export growth consistently, the increasing current account deficit with India which surged to -26.7% for the fiscal year 2011-12 continued its deterioration unabated, spurred by consumer credit and more significantly investment spending increases. This may be justified for an economy that hasn't reached its long-term output potential as it requires investment and government consumption to exceed their steady state levels (Aristovnik, 2006). However, more enduring issues such as a lack of diversification as evidenced by a stagnant manufacturing sector and the economy's excessive reliance on hydropower export revenue begs the question of whether or not growth in the energy sector has undermined the non-hydropower export sector through the usual transmission channels of the Dutch Disease.

Hence the challenge in the longer term is managing an increase in natural resource export revenues to ensure that a "Dutch disease" effect or "resource curse" does not erode the competitiveness of the economy. There has been increasing interest in the study of Bhutan's recent macroeconomic

[2] This may have to be revised since the completion date has been pushed back.

[3] This is evidenced by the balance of payment challenges in 2011-2013 whereby the economy faced an acute shortage of Indian Rupee amid increased export earnings and capital flows from India. Despite these turbulences growth hovered at a respectable 8.6% for the period 2009-2012, mainly buoyed by hydropower investments and growth in services although it plummeted to a mere 2.5% in 2013.

turbulence. Ura (2015) delved into the Macroeconomic causes and consequences of the Rupee crunch, whereby he discussed dimensions ranging from a terms of trade deterioration, inflation decoupling and urbanization policy to heavy government investments and a ballooning government sector. Rashid (2012) argued that rupee inflows for hydropower development and revenues of SOEs left the banking sector awash with liquidity that led to a credit multiplier effect and a demand for rupee that was a multiple of the initial injection. Nidup (2015) provides a technical analysis adopting a SVAR framework and concludes that Government construction has a cascading effect on private credit leading to an excess demand for INR.[4]

Objective and Structure

The time period for this study goes beyond the recent period of turbulence and attempts to address some questions related to the structural evolution of the economy in the context of a heavy reliance on hydropower. Thus, we assess whether the economy exhibits the symptoms of the Dutch Disease using a more formal and empirical approach that was first pioneered by Naoko (2005). The paper is structured as follows. The first section delves into a literature review of the frameworks proposed to study the Dutch Disease phenomenon. This is then followed by an application of the technical approach to Bhutan's case to diagnose the Dutch Disease condition. More specifically, we adapt the framework proposed by Naoko (2005) in her analysis of Bhutan's power exports and the Dutch disease, and the seminal works of Corden (1984) and Edwards (1985). Based on their proposed frameworks we verify whether the resource movement and spending effect along with the monetary disequilibrium channels suggest existence of the symptoms. Using more recent data and hindsight, this is complemented by an analysis of Bhutan's Real Exchange Rate and the determinants of its movements. The final section then concludes by offering policy recommendations and areas for further research.

A primer on the Dutch Disease

The literature surrounding the Dutch Disease has evolved significantly. Sachs and Warner (1996) in an empirical investigation find a significant inverse relationship that is robust even when controlling for variables like initial per capita income, trade policy, government efficiency, investment rates etc. Corden and Neary (1982) pioneered the formulation of a formal framework that captures the dynamics between the traded booming sector, lagging sector and the non-traded sector. Frankel (2012) explores six channels through which the resource curse occurs: (i) long-term trends in world prices, (ii) price volatility, (iii) permanent crowding out of manufacturing, (iv) autocratic/oligarchic institutions, (v) archaic institutions, and (vi) cyclical Dutch Disease.

Most attempts to diagnose the condition still refer to the seminal work of Corden and Neary (1982) and Corden (1984). The authors develop a framework comprised of three sectors: the booming natural resource sector which is also tradable, the lagging tradable sector which is manufacturing in this case

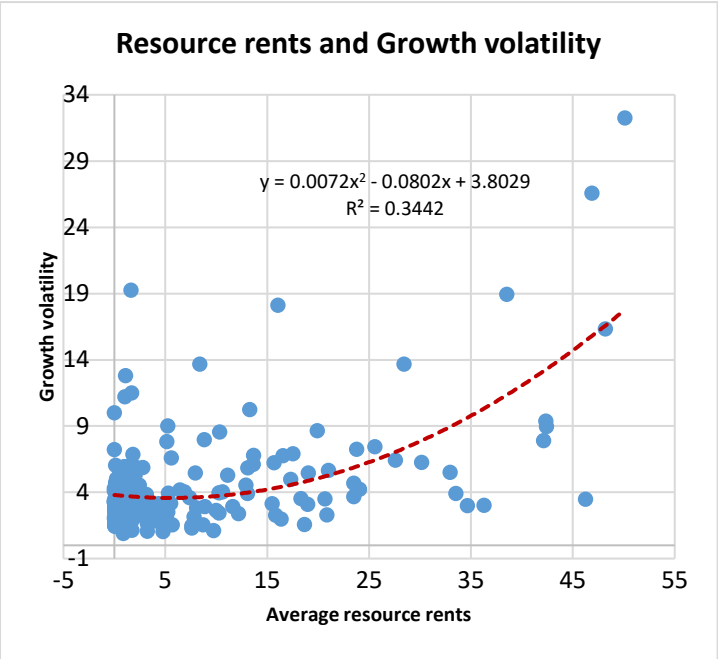
[4] The rupee episode was unprecedented in Bhutan's macroeconomic trajectory. Some of the administrative measures adopted to stem the outflow of INR were rather extreme such as the suspension of vehicle imports and the imposition of a moratorium on the extension of credit. While these actions may have seemed necessary given the limited space for monetary and fiscal instruments, it must be understood that these are only temporary measures and more sustainable solutions need to be adopted. In the Real Sector, the phenomenon has provided an ideal platform and motivation for microeconomic reform to unleash growth in the private sector. On the monetary front, while technical capacities to manage liquidity and international reserves are paramount, a primary concern involves the cornerstone of Bhutan's monetary policy and its sustainability: the one-on-one peg between the Ngultrum and INR (Rashid, 2012).

and the non-tradable services sector. They then demonstrate how a boom due to higher prices attracts factors, assuming inter-sector mobility, to the booming oil sector away from manufacturing resulting in the "Resource Movement Effect". The second effect called the "Spending Effect" occurs simply due to more income accruing from natural resources and consequently resulting in a higher aggregate demand. As more spending occurs, imports rise in response to an increase in demand for tradable; however, the increased demand for non-tradables such as services in the short run is re-equilibrated with an upward adjustment of prices. This appreciation in the real exchange rate leads to a loss of competitiveness. The technical details are deferred to subsequent sections.

However, this framework has been criticized for its static approach by some authors like Bjornland and Thorsrud (2014) who point out that a limitation of the traditional Dutch Disease model is the assumption that productivity is exogenous to the model. They instead propose a model that accommodates spill-over effects and hence learning by doing. The authors provide the example of the development of offshore oil that requires technological solutions, which itself could generate positive knowledge externalities. Such an argument could be made for Bhutan where hydropower results in spill-over effects to construction and geo-mechanical engineering as well. However, we restrict our framework to the more conventional static models.

Despite the abundance of conceptual frameworks most studies are still unable to reach a definitive conclusion of the existence of a Dutch Disease. For instance, Kutan and Wyzan (2005) conclude through an adaptation of the Balassa-Samuelson model, that the symptoms of the Dutch disease are significant in Kazakhstan. However, Egert & Leonard (2006) find that while the real exchange rate has been appreciating in the case of Kazakhstan, non-oil manufacturing had been preserved from the perverse effects of oil price increases. Similarly, while an assessment for the Russian economy by Westin (2004) indicated the existence of the symptoms but not a full-blown disease, Latsis (2005) concluded that the economy exhibited all the classical symptoms. In this study we also intend to present an objective assessment of the symptoms rather than a definitive conclusion.

Nevertheless, a discussion of the Dutch Disease is incomplete without understanding the longer run adverse implications of the resource movement effect, especially away from manufacturing. The rise of manufacturing is associated with structural changes in the world economy and sustained increases in the growth of labour productivity and economic welfare. It creates "*special opportunities for reaping economies of scale, engaging in technological progress and learning, profiting from spill-overs to other sectors and providing job opportunities for variously skilled levels of labour*" (Naude & Szirmai, 2012). Hence, ensuring that sectors like manufacturing are not permanently crowded out assumes importance.



Source: Author's plot based on data from WDI

Excessive dependence on natural resources is also associated with high volatility. Reduction of growth volatility is critical as volatility is empirically associated with lower long-run growth rates (Ramey and Ramey, 1995) as well as private investment (Aizenman and Marion, 1999). Furthermore, resource-dependent economies are more vulnerable to such growth volatilities due to low-price elasticities of supply associated with natural resources (Oomes and Kalcheva, 2007) and price volatility (Frankel, 2012).

Diagnosing the Dutch Disease

In this section we undertake a formal investigation of the symptoms associated with the Dutch Disease. While the theoretical framework of the classical Dutch Disease model proposed by Corden and Neary (1982) distinguish between a resource movement and a spending effect, Naoko (2005) described an additional channel through which a Dutch disease could manifest- a monetary effect. We adopt a similar technical framework of analyses and apply it to an updated data set. Most importantly we follow Naoko's approach to studying the determinants of the bilateral real exchange rate between the Ngultrum and the Rupee.

Before delving into the technical details, it is worthwhile highlighting a few specificities that may require a slight tweaking of the classical model to analyse Bhutan's case. First, the price of energy exports is determined bilaterally in a monopsonistic context with the Government of India and thereby insulated from any swings in international energy prices. The tariffs are revised periodically and hence the transmission channels of a boom are usually the expansion of installed energy capacity as opposed to favourable terms of trade movement. Second, the projects are financed entirely by capital inflows from India and undertaken on an Inter-Governmental basis thereby mitigating some of the capital crowding out effects. Finally, a significant share of the labour requirements, both manual and technical, is sourced from India suggesting that the industry operates along the lines of an enclave sector.

i. The Spending Effect

The spending effect occurs as the result of an increase in natural resource-based export revenues. This leads to either an increase in consumption or investment or both, usually underpinned by receipt and expectations of higher income. This raises aggregate demand in the economy and to the extent that some of this increased demand is directed towards domestically produced goods and services for which supply cannot be increased instantaneously, prices will rise. The prices of traded goods and services remain unaffected as they are determined at an international level. This also induces a real exchange rate appreciation as the relative price of non-tradable to tradable goods and services rises.

In a more formal and detailed analysis, Naoko refers to Gelb's (1986) approach to detect whether or not the symptoms of a spending effect exist for the period 1980 to 2001. The objective of the method is essentially to decompose the absorption of power export earnings into government and private consumption and investment.[5]

Naoko's calibration of absorption of power export revenue by the Bhutanese economy reveals this effect as being particularly strong for the private sector. She observes that the demand for both traded and non-traded goods have increased leading to higher imports as well as the relative price of non-traded goods since capacity to increase production of non-traded goods is limited. In particular, there are two distinct periods where private sector absorption peaks in 1988 and 1999 following surges in power export revenue.[6]

We follow a similar approach with a slightly different dataset and timeframe. For the period investigated by Naoko, our calibration yields generally similar results. What we observe in the period beyond that investigated by Naoko is a stable consumption of power income from 2001 to 2007, which then spiked immediately following the commissioning of the 1020 MW Tala Hydropower Project. Hence there are 3 distinct spikes in absorption of power income by private consumption which are again associated with hydropower export revenues. The first spike beginning in 1987 was financed by the commissioning of the Chukha Hydropower Project followed by an upward tariff revision in 1999, and finally a significant increase following the completion of the Tala Hydropower - the largest hydropower project. We also observe that channelling of power investment for income has been increasing over time as well following trends similar to that of consumption.

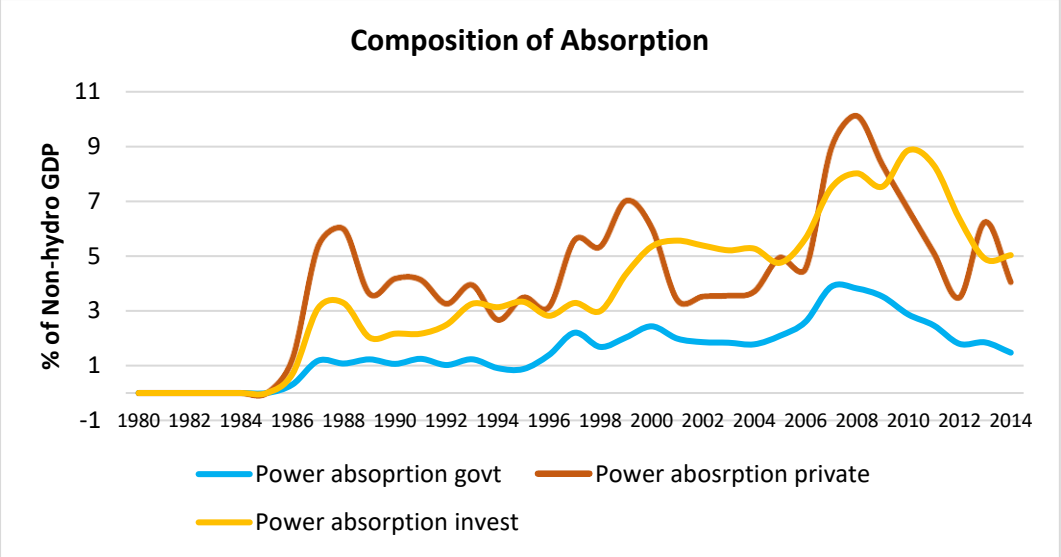
[5] This is derived by the following calculation:

$$Powcons_t^i = \left[\left(\frac{i_t}{Y_t}\right) - \left(\frac{i_t}{Y_t - PY_t}\right)\right],$$

Where $Powcons_t^i = \begin{cases} \text{Government consumption of power income if } i_t = \text{Government Consumption;} \\ \text{Private consumption of power income if } i_t = \text{Private Cosumption;} \\ \text{Investment absorption of power income if } i_t = \text{Investment} \end{cases}$

Y_t is GDP and PY_t is electricity's share of GDP.

[6] An assessment of credit trends also corroborates the private sector's optimistic spending outcomes as credit growth averaged 23% over the last 13 years.



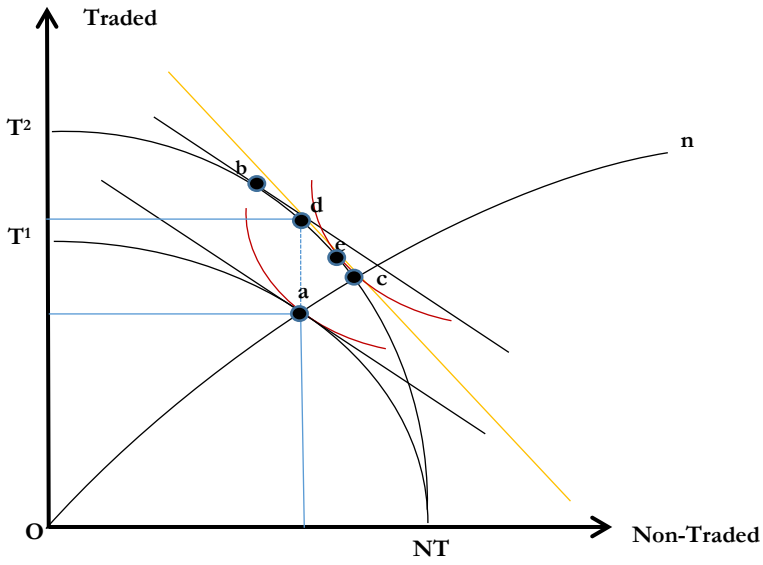
Source: Author's plot adapted from Naoko (2005)

Moreover, as opposed to the period investigated by Naoko it is encouraging to note that investment absorption of power income has been increasing faster than consumption. This is consistent with the government's move towards financing an increasingly larger share of public investment through domestic resources. Recently the Government has been able to finance its entire recurrent expenditure and a portion of its capital expenditure through internal resources, thereby financing 60 percent of its entire expenditure (National Budget, 2015-16). As an aspiration for the 11th Five Year Plan and an indicator towards the pursuit of self-reliance the Government set a target to finance 85% of its expenditure by the year 2019 (GNHC, 2014). Hence, we can reasonably expect yet another spike once the projects under construction begin generation.

In addition to the Government's contribution to aggregate investment, private investment has also been increasing rather rapidly as evidenced by lending activity, especially towards the real estate sector. This effect is particularly significant for Bhutan. As Kalcheva and Oomes (2007) also emphasize that, unlike the resource movement effect which occurs only if factors are sufficiently mobile between sectors, the spending effect occurs regardless of such conditions.

ii. The resource movement effect

The other outcome of the Dutch Disease is a reallocation of resources that may in the longer-term be sub-optimal. Corden and Neary (1982) define the real exchange rate as the relative price of Non-traded to traded. When a boom occurs in a sector like energy, the marginal product of labour increases and draws resources (assuming factor mobility) from other sectors requiring adjustments through the real exchange rate. The resource movement effect, while initially driven by the tradable booming sector's higher returns, is also influenced by the spending effect. Through increased demand for non-traded goods this leads to an increase in its relative price and movement of resources towards the non-traded service sector.

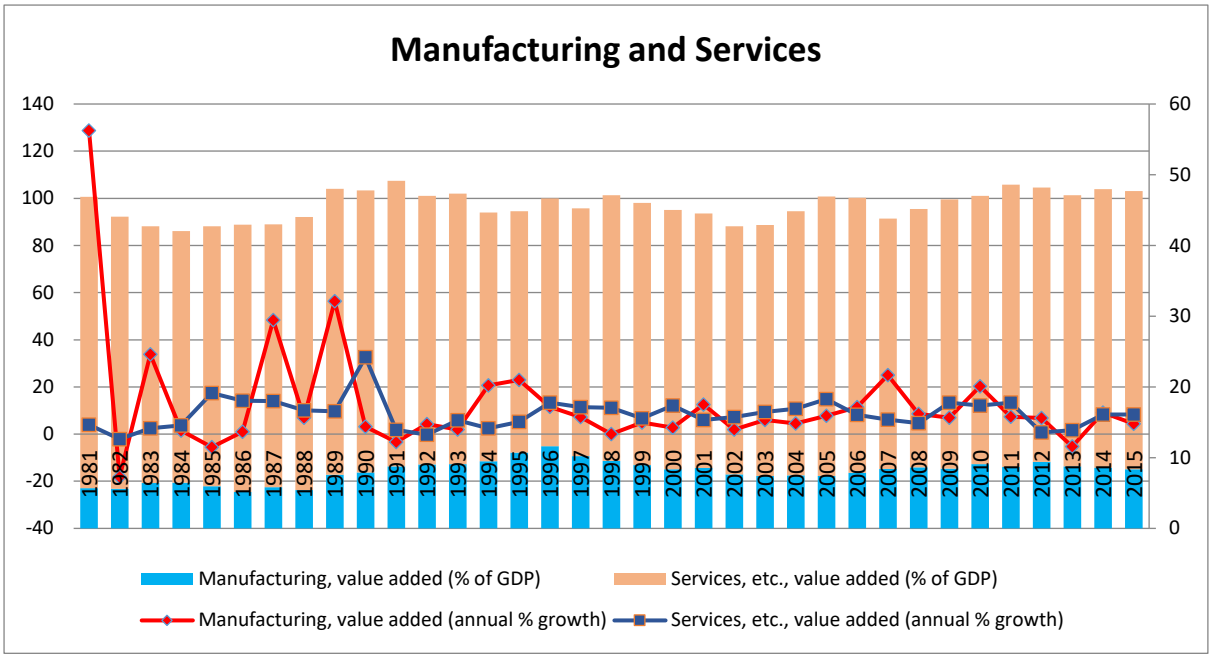


Source: Based on Corden (1984)

This can be captured graphically in the above diagram. We begin where production possibilities are bounded by T^1 and NT of traded and non-traded goods and services respectively. The initial equilibrium is at point 'a'. The curve 'On' represents the demand for non-traded goods and services at the initial relative prices. A boom results in the frontier moving outwards but pivoted from NT as the supply possibilities of non-traded goods and services are still constrained. With an unchanged real exchange rate and assuming labor is mobile this results in equilibrium at point 'b'. However, since the booming sector in Bhutan does not absorb and require much labor we tweak the model to reflect this. This is consistent with Corden and Neary's explanation that if the booming sector uses relatively less resources that can be drawn from elsewhere in the economy, the major effect is through the earlier spending effect. This is perhaps true in the case of Bhutan where the capital and labour resources for hydropower are primarily sourced from India and the impacts are due to spill-over spending effects in other sectors from increased hydropower export revenues.

Hence production of non-traded goods and services does not change as in the conventional model where the booming sector draws factors out of the non-traded sector resulting in an initial decline in non-traded output. In our adaptation we end up at the sub-optimal point 'd' where instead of a tangency we achieve an intersection of the budget constraint and production frontier. An excess demand for non-traded goods and services is visible as 'On' intersects the new frontier at point 'c'. To increase production or availability of non-traded goods and services its relative prices rise, and we ultimately end up at point 'e'.

Moving from the conceptual framework to empirical evidence, most studies simply analyze trends in each sector's contribution to GDP. Typically, an outcome consistent with the theoretical dynamics of the Dutch Disease would involve declining manufacturing output and a growing services sector. We analyze the trend in services and manufacturing from the earliest year in which data is available.



Interestingly, the share of services in 1981 was already as high as 42% of GDP. This is perhaps consistent with the findings of Naude and Szirmai (2012) whereby they note that the "*pattern of structural change in developing countries differs radically from the traditional patterns of structural change, in which the rise of industry precedes that of the service sector.* [Furthermore] t*his is in line with the Gerschenkronian observation that latecomer patterns of structural change are not simple copies of earlier experiences*." In Bhutan's case even this may be an underestimation since a huge proportion of the services sector is informal as in most developing countries, and hence unrecorded. This is further compounded by the sharply increasing value of land in an economy with a narrow range of investment avenues. The non-traded sector could be represented in such a case by the market for land and more importantly location-specific land. Although no consistent time series for real estate exists, the sharply increasing price of land can be gauged from the rate of urbanization and construction activities.

In terms of the manufacturing sector's performance, we find no evidence that there has been a contraction to the extent that it could be diagnosed as a resource movement effect. In fact, manufacturing has grown from about 5% in 1981 to about 9% today, although most of the growth was achieved in the early nineties and has plateaued since then. This can perhaps be attributed to the synergy between the manufacturing sector and the energy sector, whereby most manufacturing in Bhutan is concentrated in the power-intensive segment such as steel, ferro-silicon and cement. For instance, the commissioning of the first mega hydropower plant in 1987 was accompanied by 2 growth spurts in the manufacturing sector as competitively priced energy became abundantly available. A counter argument is whether the manufacturing sector could have been more vibrant had the Dutch Disease not manifested. As already mentioned, the sector functions like an enclave sector and hence does not crowd out other private investments in manufacturing so the counterfactual is unlikely and other factors such as energy supply saturation and an enabling business environment are more instrumental in explaining the stagnation.

While it is difficult to verify the movement of labour due to unavailability of data, an observation of the trends in sectorial contribution to GDP and export also do not support the hypothesis of a

significant resource movement effect. Other sectors have grown in prominence indicating that real appreciation of the Ngultrum has not led to a contraction of the tradable sector relative to the non-tradable sector. Nevertheless, this could have been due to factors such as the immobility of labour and the capital-intensive nature of the booming hydropower sector that does not employ much labour upon completion. It could also be argued that the resource movement effect for labour has been unfolding in a slightly unconventional path whereby the civil service has been growing exponentially at an average of about 5% over the last 12 years (Second Pay Commission, 2014) to the extent that the civil service is the largest formal employer in the country. This is not inconceivable considering that a significant portion of the gains from hydropower are also channelled towards financing the recurrent expenditure of the Government. Moreover, historically tariff revisions have been pursued to finance upward pay revisions for civil servants. Ura (2015) also argues that such increases in wages and salary has been largely responsible for the fiscal expansion that also leads to wage push inflation. Relative to the private sector the civil service is still considered an attractive option and has absorbed most of the new human capital thus far although there has been no reallocation in the theoretical sense of the model.

Regardless of the manifestation of the resource movement effect, it results in an appreciation of the real exchange rate. Corden and Neary (1982) also explain that although "*when the two effects combine, we see that both contribute to a real appreciation…However, the resource movement effect tends to lower the output of services whereas the spending effect tends to raise it, and there is no presumption as to which will dominate.*" Based on our explanation of the insulated nature of the hydropower sector and the immobility of labour, we can reasonably infer that the spending effect is stronger than the resource movement effect for Bhutan.

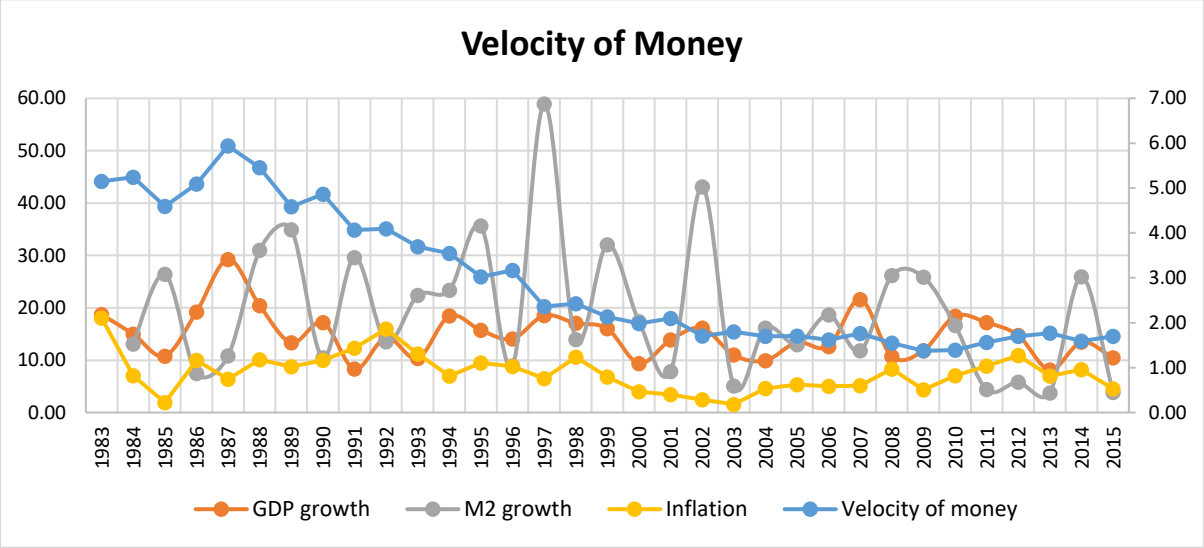
iii. The Monetary Effect

The final and lesser diagnosed symptom known as the monetary effect occurs when unsterilized inflows due to an export boom leads to monetary expansion and excess liquidity. Such effects are usually temporary, and the monetary disequilibrium is a result of short-run money supply exceeding long-run money demand. The adjustment risk is that this eventually causes inflationary pressures to build thereby affecting competitiveness. About 2 years before Bhutan experienced its most significant energy boom in absolute terms with the completion of the Tala hydroelectric project, Naoko (2005) presented several cautionary assessments that have unfolded with a fair level of precision. She cautioned that "*While the excess liquidity has not posed a significant problem to date, risks are that it could at some stage provide the basis for rapid increase in bank lending, in turn putting pressure on foreign reserve levels and the rupee-ngultrum peg itself."* We abstract from the deterioration of reserves and limit our discussion to the inflationary pressures that may have resulted due to the monetary disequilibrium. Excess and volatile liquidity has been a characteristic of the financial sector. This has perhaps played a role in fuelling a credit boom, especially towards personal consumption and real estate, thereby exerting pressure on the relative price of the non-traded sector.

Under a fixed exchange rate regime like that of the Rupee-Ngultrum the transmission channels of increased energy export revenues differ from that of a floating exchange rate regime. In the latter the principal channel is an appreciation of the nominal exchange rate spurred by increasing demand for the local currency. In the case of the former, inflationary pressures sparked by an expansion in the money supply leads to an upward pressure on the real exchange rate thereby effecting

competitiveness despite a fixed exchange rate regime. While the real appreciation of the Ngultrum is inevitable as Bhutan harnesses its natural resource endowments, it is the speed of appreciation that needs to be managed.

Hence, it is noteworthy that M2 growth which averaged 22% from 1983 till 2010 has consistently outpaced the growth rate of nominal GDP which averaged 15% in the same period. While this would have resulted in high inflationary pressures, it was also accompanied by a declining velocity of money. For instance, from 1983 to 2015 the speed at which money was circulating steadily declined counterintuitively from 5.15 to 1.7 despite a consistent increase in credit relative to GDP overtime.[7] These could be due to a variety of explanations such as the low levels of monetization relative to GDP which was much lower in the 1980s thereby resulting in each unit of currency supporting more activity.



Rashid (2012) also observes that demand deposits which provide short term liquidity as a share of total deposits have been increasing providing incentives for shorter term lending. It is probable that such lending directed towards import intensive activities do not necessarily contribute to GDP growth significantly whereas they result in an expansion in the money supply. These deposits can probably be attributed to the transactions of the State-Owned Enterprises which are significant relative to the size of the economy.[8] Hence the new money created towards such transactions do not circulate in the economy as much as money created for other transaction with higher levels of domestic content. This can also perhaps be reconciled with the relatively high Import elasticity of growth whereby most money is being used to finance import-intensive activities resulting in lower levels of circulation but ultimately a higher level of credit.

While the significance of the impact of monetary disequilibrium is debatable, precaution must be exercised as Bhutan positions itself to harness an exponential surge in inflows in the medium term. To mitigate the adverse consequence of such effects Naoko and other studies recommend either

[7] The Velocity of money is the number of times a unit of currency changes hands in the economy. It can be calculated as V=GDP/M. For more on the evolution of the velocity of money refer to Bordo and Jonung (1989) where the authors discern a U-shaped evolution of velocity. Monetization is associated with a declining velocity and financial sophistication and economic stability account for the upward trend.

[8] For instance, in 2015 the total assets held under the SOE holding company DHI amounted to 117% of GDP and income for the year stood at approximately 30% of GDP.

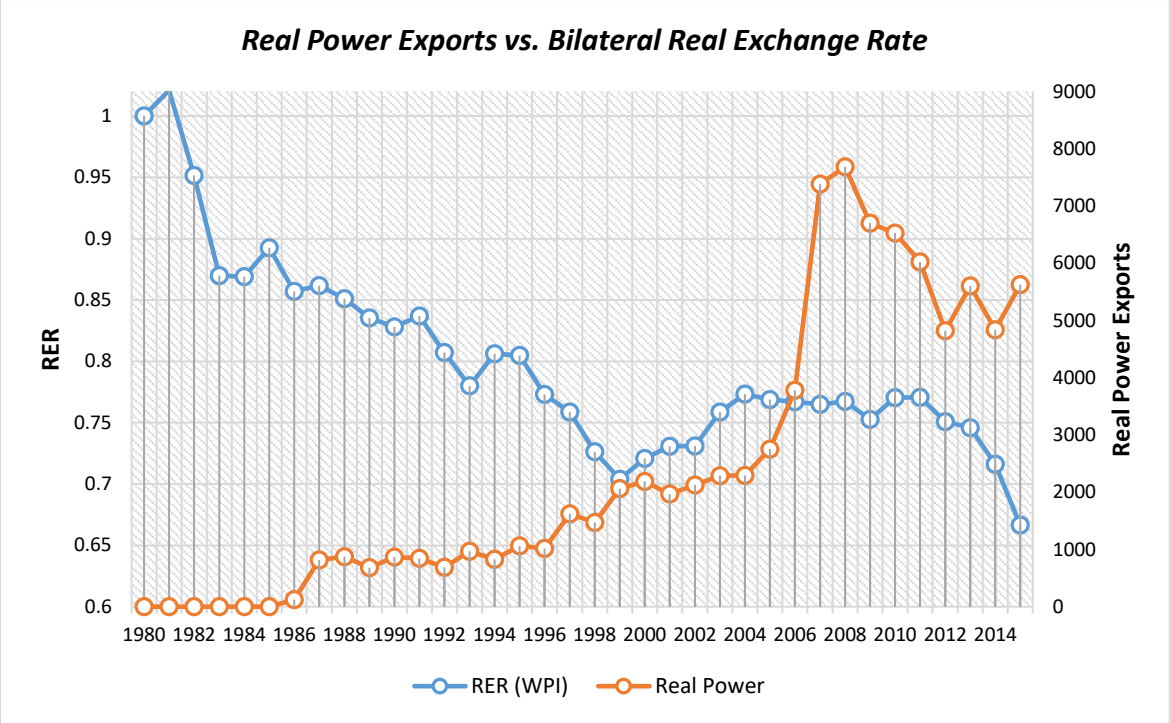
sterilizing such inflows or maintaining some of the export income offshore through a savings fund. The impact of such disequilibrium on the bilateral real exchange rate is also discussed in greater detail in the next section through a more systematic approach. Hence, we've assessed the trends in the economy through the lenses of the three effects and we've observed that the spending effect tends to dominate in our case. We now turn our attention to analysing the evolution of the Bilateral Real Exchange Rate between Bhutan and India since the Dutch Disease as already discussed also manifests ultimately through an appreciation of the BRER.

The Bilateral Real Exchange Rate

This section delves into a more formal and technical assessment of the Dutch disease by analysing the evolution of the bilateral real exchange rate and identifying its most significant determinants. Theoretically, the bilateral real exchange rate can be defined in two ways. The first which is referred to as the purchasing power parity approach simply adjusts the nominal bilateral exchange rate with the ratio of the foreign price level to the domestic price level. The second approach defines the exchange rate as the relative price of traded and non-traded goods, which essentially serves as an indicator of a country's competitiveness level in foreign trade (Kesreyli and Kipici, 2000).[9]

To track price movements and their implications for the Bilateral Real Exchange Rate with India, Naoko emphasized the preference of the WPI (Wholesale Price Index of India) over the CPI. This is primarily on account of the trade-intensive composition of the WPI basket as opposed to the CPI, which includes non-traded items such as services. The author perhaps was referring to the relative price approach for which the former is more relevant in estimating the bilateral real exchange rate. However, we use both indices to extract any significant deviation between the two analyses.

[9] For our purpose, this ratio is defined as follows: $BRER_t^{NU,INR} = \frac{(CPI,WPI_t^{INR})}{CPI_t^{Nu}}$



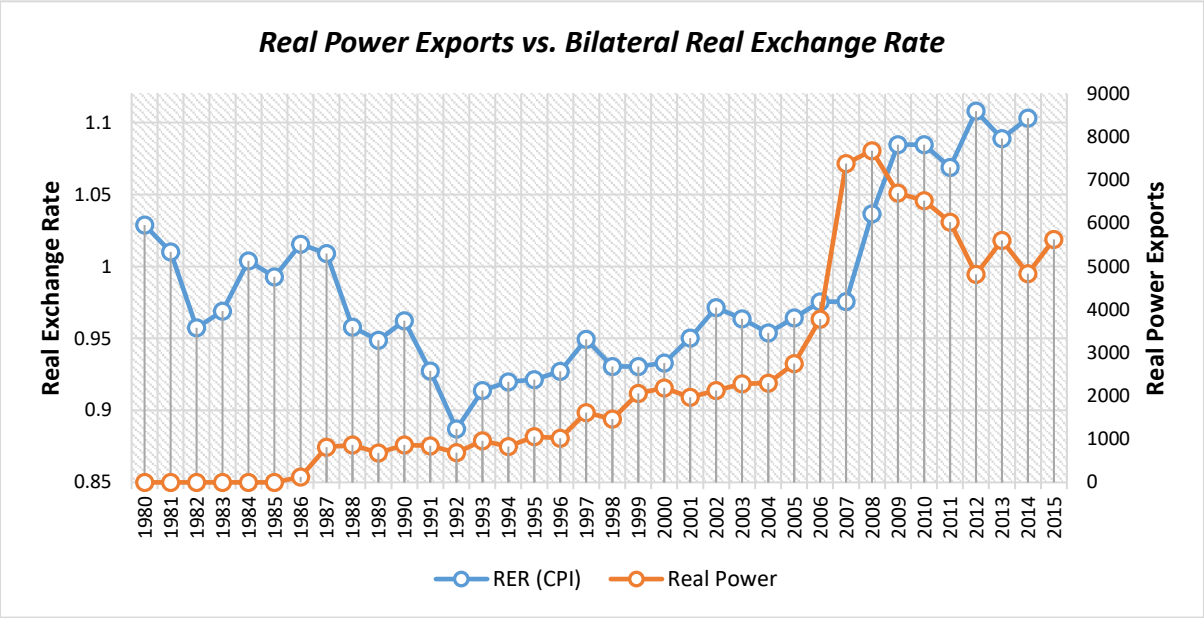
Source: Author based on data from WDI, RMA, NSB and MFCTC

The sharp appreciations in the initial period from 1980-1984 despite the absence of any spike in power exports could probably have been a result of significant capital inflows for hydropower related construction.[10] Given the small base and undiversified nature of the economy, the inflows would have had a rather amplified spill-over effect for non-traded as well as traded goods and services.[11] We then observe a sustained appreciation of the real exchange rate that defies the gradual increases in real power exports till 2000. However, the trend reverses after 2000 and real exchange rate begins to depreciate, and the trend stabilizes after 2004 witnessing another episode of steep appreciation after 2011. This coincides with the year of the period of imbalances that preceded the INR crunch and when annual credit growth was hovering at the 30% mark for the 3 previous years. It also coincides with the period when construction of the new Power Projects commenced. While it is challenging to disentangle the determinants of the real exchange rate's behaviour in the graph, but we can infer a broadly inverse relationship between real exchange rate and real power exports. Given the rapidly evolving nature of the Bhutanese economy, it is possible that other factors may have had an offsetting effect thereby masking the true impact of increased power exports on the real exchange rate. For instance, the surge in real power exports following the commissioning of the Tala hydropower project in 2007 should intuitively suggest an appreciation of the Real Exchange Rate, whereas we only observe a stabilization followed by a mild appreciation. This could have occurred due to some deflationary forces such as the alleviation of numerous supply side bottlenecks relating to import of goods and services although the details would require an investigation of their weights in the CPI basket. On the contrary Ura (2015) expresses concerns over the composition of the consumption basket and the associated weights for the CPI suggesting that they potentially underestimate inflation. While these are all valid possibilities, an in-depth exploration is beyond the scope of this study and provides an

[10] A downward trend of the blue line implies appreciation and vice versa.

[11] To put into perspective, annual inflows during the construction phase of the Project would have averaged 26% of GDP, a large number, by any standard.

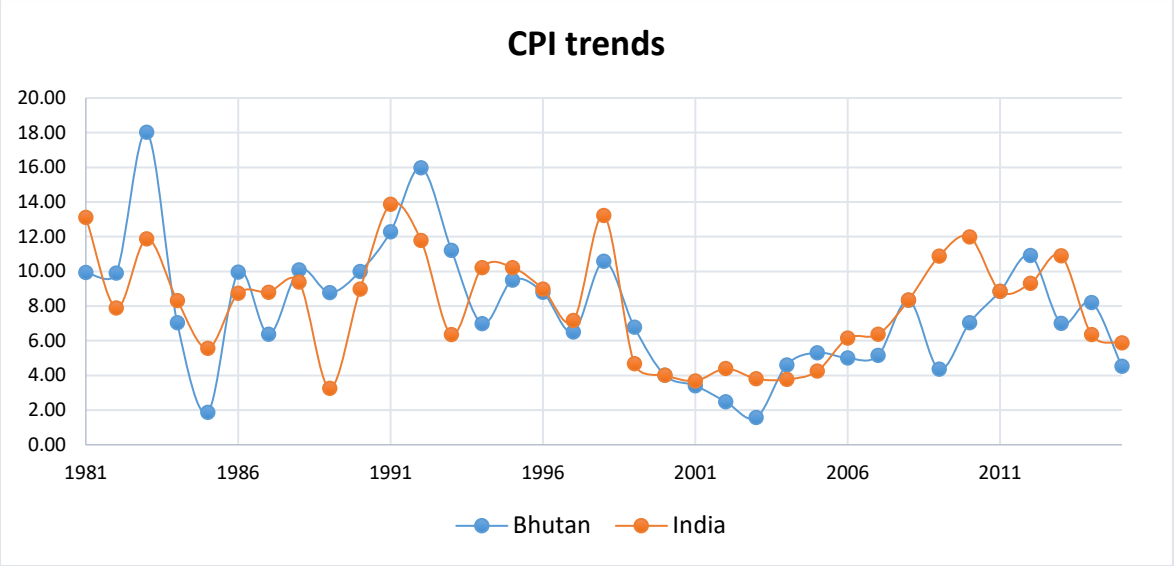
intriguing subject for further research. For this study we restrict our focus to the general trends observed in the data and take their reliability as given.[12]



Source: Author based on data from WDI, RMA, NSB and MFCTC

It is interesting to note that the bilateral real exchange rate is a lot more volatile when using the PPP approach. Contrary to the previous approach, we actually observe a gradual depreciation after 1992. Historically, Bhutan's inflation rate has mirrored that of India's as is apparent from the fairly high level of correlation portrayed below. In fact, this relationship is stronger than that between the WPI and CPI of the two countries which at first appears counter-intuitive given that nearly 80% of Bhutan's total imports come from India and these would be more accurately reflected through the WPI. This could possibly be due to the highly integrated nature of the two economies with a significant presence of labour from India in Bhutan. We also observe a reliable degree of co-movement between the two indices till 2008 after which the relationship is less singificant. Hence, in studying the bilateral real exchange rate and its determinants we refer to both indices for a more comprehensive explanation.

[12] Given the paucity of data and break in series for a number of indicators we have drawn from multiple data sources introducing some adjustments where anomalies exist such as in the WDI data for inflation.



Source: NSB and RBI

The Model

Having assessed the movement of the real exchange rate, we now assess it's within a formal model, using the approach proposed by Naoko (2005) and other studies such as that by Edwards (1985). However, we make some adjustments and use a more recent dataset.

Determinants of the Bilateral Real Exchange Rate

There has been a recent explosion in the literature surrounding the determinants of exchange rates given that it is the key 'relative price' in international finance (Chinn, 2006). The determinants of exchange rate can be bifurcated into the longer-term fundamentals and shorter term monetary variables. Williamson (1994) proposes a fundamental equilibrium exchange rate approach which involves calculating the real exchange rate that equates the current account at full employment with sustainable net capital flows. Chinn (2000) explores the effect of productivity on real exchange rates. Hsieh (1982) deduces that faster productivity growth in the traded sector leads to an appreciation. While a range of approaches have been proposed, most country level analyses contextualize the framework to include the most relevant determinants. We largely adapt the framework used by Naoko which can be captured by the following equations.

$$loge_t = \sigma_0 + \sigma_1 logX_t^P + \sigma_2 logG_t^N + \sigma_3 logODA_t + \sigma_4 e_{t-1} - \rho\left(logM_{t-1}^s - logM_{t-1}^d\right) + \varepsilon_t \ldots (3)$$

The determinants of the equilibrium BRER are expressed in terms of real power exports (x^p), government expenditure on non-traded goods (G^N), net foreign aid (ODA) and the divergence between the lagged value of short run money supply (M_{t-1}^s) and long-run money demand ($logM_{t-1}^d$). The specification allows us to capture the longer term as well as shorter term determinants of real exchange rate behaviour.

Regression Results

As highlighted earlier, we run the model with 2 different indices that capture the PPP approach and the relative price approach. To execute the former, we use the CPI of India and Bhutan; for the latter we use the WPI of India and CPI of Bhutan.

Model	**A (WPI)**		**B (CPI)**	
	Sample: 1983-2015		**Sample: 1983-2015**	
	Coefficient	T- Statistics	Coefficient	T- Statistics
C	0.005332	0.309862	-0.039143	-1.403967
LOG(REXCH_WPI(-1))	0.830742	9.888146	0.895585	10.28008
LOG(RPOWEXP)	-0.006279	-1.749643	-0.007086	1.565615
dLOG(GOVCONS)			0.011512	2.025166
LOG(RM1(-1))-LOG(RM1_F(-1))	0.066506	2.140425	-0.018037	-0.552404
Outlier1	0.060438	2.499768	-0.048093	-2.165574
Outlier2	-0.072184	-3.296093	0.051707	2.329675
R-squared		**0.917089**		**0.906111**

The variables are all stationary when the unit root tests are specified with a constant. In model A we obtain the expected negative signs for real power export but not for the monetary disequilibrium term, which is significant. Real Power Exports are significant at the 10% level, and the other are significant at the 5% level. Since Net ODA and government consumption do not yield significant estimates we drop them from the regression. When replacing the WPI with the CPI approach, the model yields significant estimates only for the parameter for government consumption and the lagged value of the exchange rate. However, the sign for the monetary disequilibrium term is negative. Hence, we primarily focus on the results from the model that adopts the relative price of traded to non-traded goods and services approach.

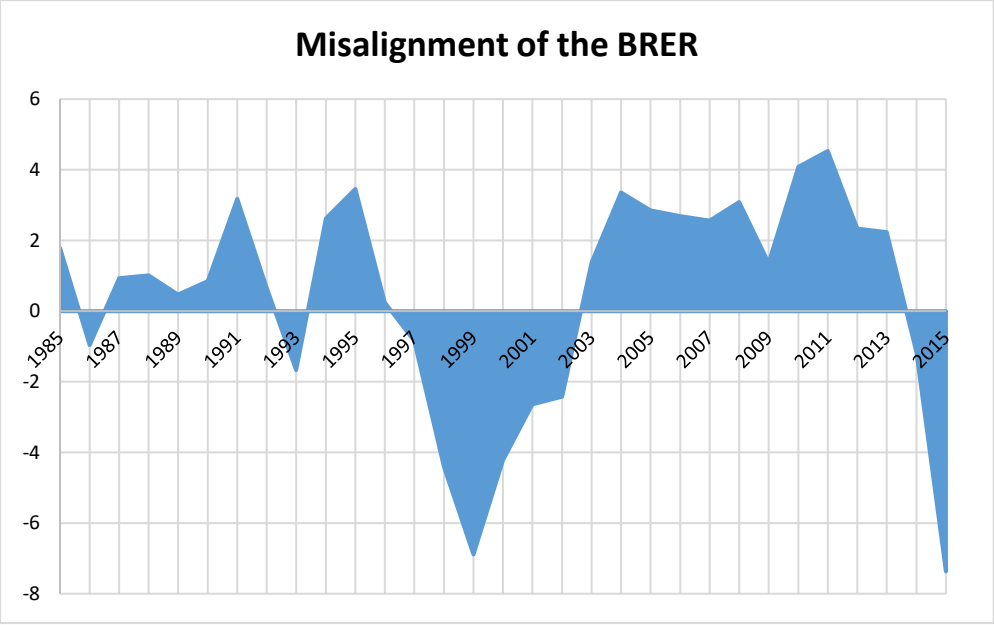
Implications of the estimates:

The estimation exercise suggests that fundamental and monetary factors do determine the evolution of the BRER. While, most of the variation is explained by the previous period's exchange rate, the changes in real power exports also explains some of the variation, although it is much more muted than that estimated by Naoko. The model suggests that a 1 percent increase in real power exports leads to a .006 percent appreciation in the BRER; although this is less than Naoko's result of .04 percent. This could be due to a couple of factors besides the shorter time period from 1983 to 2002 analysed in her study when the impacts from earlier investments in hydropower would have been magnified. Perhaps the diversification of the economy's structure whereby the electricity sector's share has been decreasing compared to the time period when it was steadily increasing in her sample period. For instance, real power exports have actually been declining since peaking at 2007 as no new power projects have been commissioned although we can expect this trend to reverse sharply following the completion of the projects that are currently under construction. Nevertheless, these crude estimates still imply that the 10000 MW initiative which would result in an almost 500 percent increase in power capacity and associated exports would cause a BRER appreciation of 3 percent. However, it must be qualified that this is only in the context of the model and actual outcomes could perhaps be significantly higher given the ambitious speed at which energy capacity expansion would take place. In the context of the model, the impacts of hydropower exports on the real exchange rate are spread over many years and hence, the medium-term effects are probably underestimated in this

model. If we were to use Naoko's estimates which were reported for a shorter time frame, such a surge in power exports would imply a crippling 20 percent appreciation.

However, the most significant impact, despite its unexpected sign, comes through the channel of a monetary disequilibrium effect with a 1 percent increase leading to a .066% depreciation. While we theoretically expect this sign to be negative since an excess of money supply over money demand would result in inflationary pressures, we obtain the reverse in our case. This could be due to a number of reasons that range from the data or some genuine causal factors that we haven't been able to capture. Perhaps the linkage between monetary expansion and inflation is not as robust in Bhutan considering that a significant amount of inflation is imported. Only recently we began to expand the set of domestic goods and services in the consumption basket. Moreover, as highlighted earlier this could also have been due to a declining velocity of money. Nevertheless, we cannot ignore the imminent threat of an exponential monetary expansion once export revenues surge.

The final analyses we undertake is the level of misalignment of the BRER to its Permanent Equilibrium Exchange Rate. We apply the calculation suggested by Lebdaoui (2013) whereby the misalignment is the percentage difference between the BRER and the trend component of the BRER extracted using the Hodrick Prescot filter. We observe that for the most part the real purchasing power of the Ngultrum is overvalued. This is perhaps in part due to the nominal peg between the rupee and the ngultrum which has in part financed increasing imports.



Source: Author's calculation

Data and Estimation Issue

While we have attempted to present a comprehensive appraoch, there are numerous issues that we need to take into consideration. First, although we have been able to draw on a longer time series than was available to our predecessors, 32 observations is still a significant limitation in deriving estimates that are robust to the inclusion and exclusion of parameters. Nevertheless, the scope of the assignment is to arrive at some general and crude estimates to steer discussion in an objective and

systematic manner. We also draw attention to the possibility of structural breaks in the series given that for a small economy, disruptive changes are more common and can have a level-changing impact.

We are also unable to test for more complicated autoregressive functional forms due to the limited time series. For instance, there would definitely be a lagged effect on the BRER of numerous factors as they take time to materialize. Moreover, we do not have adequately disaggregated data to capture lagged effects at smaller intervals. Besides real power exports and the lagged value of the exchange rate, the other parameters are not robustly significant to inclusion and exclusion of variables.

As highlighted earlier that a significant proportion of inflation is imported from India, the WPI feeds into the CPI and hence some of the effects of the Dutch Disease may be diluted as well. This is particularly relevant since the domestic content of the CPI was only adjusted recently thereby masking some of the trends of increasing prices for non-traded services.

Conclusion

In this paper we attempted to diagnose the Dutch Disease for the hydropower-dependent economy of Bhutan. While we can derive a general trend of Bilateral Real Exchange Rate appreciation that is consistent with a Dutch Disease, we cannot unequivocally attribute this to hydropower export revenues. We also do not observe a contraction of the manufacturing sector as evidence of the 'resource movement' effect and instead we observe a gradual increase which could be due to the power intensive nature of the sector in Bhutan. However, we cannot ignore the possibility that the manufacturing sector could have been larger in the absence of real exchange rate appreciation. As is the case in most countries where factor mobility is limited, we do observe the spending effect manifesting in the form of increased private absorption of power income. We also suggest that the resource movement effect in Bhutan probably unfolds in a slightly unconventional way in which more labour is absorbed by the public sector which is financed by hydropower revenue.

However, we acknowledge that data and estimation issues constrain us from acquiring more robust and sophisticated empirical estimates. Regardless of the empirical results, we can intuitively forecast the implications of the imminent energy boom given its magnitude. Anticipating the associated risks and formulating countervailing mechanisms will be critical to prevent a full-blown Dutch Disease since the economy today is more monetized and integrated than when previous hydropower projects were commissioned. Strategies that range from establishing a stabilization fund to structural reforms that encourage diversification will be critical. Macro-prudential policies that also limit excessive speculation in real estate and consumption and instead nudge bank lending towards investment in other sectors will be critical.

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APPENDIX: ECONOMETRIC ESTIMATION

To capture movements in the Bilateral Real Exchange Rate we begin with the following specification:

$$\Delta loge_t = \theta(log\, e_t^* - loge_{t-1}) - \rho\left(logM_{t-1}^s - logM_{t-1}^d\right) + \emptyset Dev_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \text{(1)},$$

Where e* represents the equilibrium BRER and e the actual BRER. The first term essentially captures the deviation of the previous period's value from the equilibrium. Hence the parameter θ functions as an adjustment for any deviation. The second term models the impact of the monetary disequilibrium discussed in the earlier section, which is essentially a representation of excess liquidity also calculated as the gap between money supply and money demand. The final term that captures any devaluation of the nominal exchange rate would be 0 in our case given the peg between the two currencies. Hence, to understand changes in the BRER (e) we need to explore the evolution of the equilibrium BRER (e*).

$$\log(e_t^*) = \gamma_0 + \gamma_1 \log(X_t^P) + \gamma_2\, log(G_t^N) + \gamma_3\, log(ODA_t) + \gamma_4\, log(\tau_t) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \text{(2)}$$

The determinants of the equilibrium BRER are expressed in terms of real power exports (x^p), government expenditure on non-traded goods (G^N), net foreign aid (ODA) and import restrictions (τ_t) which is set to 0 as trade restrictions with India are virtually non-existent. While Naoko includes the power tariff and power volume separately we feel that the dynamics of both can be consolidated in the real power exports variable. All the stated variables are expected to have a negative impact on the dependent variable, or in other words they result in an appreciation of the real exchange rate.

To econometrically model the evolution of the behaviour of BRER we combine the equations 1 and 2.

$$(loge_t - loge_{t-1}) = \theta(\gamma_0 + \gamma_1\, log\, X_t^P + \gamma_2\, log\, G_t^N + \gamma_3\, log\, ODA_t - loge_{t-1}) - \rho\left(logM_{t-1}^s - logM_{t-1}^d\right)$$

$$\Rightarrow \quad loge_t = \theta\gamma_0 + \theta\gamma_1\, log\, X_t^P + \theta\gamma_2\, log\, G_t^N + \theta\gamma_3\, log\, ODA_t + (1-\theta) loge_{t-1} - \rho\left(logM_{t-1}^s - logM_{t-1}^d\right)$$

This yields the econometric specification:

$$loge_t = \sigma_0 + \sigma_1 logX_t^P + \sigma_2 logG_t^N + \sigma_3 logODA_t + \sigma_4 e_{t-1} - \rho\left(logM_{t-1}^s - logM_{t-1}^d\right) + \varepsilon_t \ldots \text{(3)}$$

Where the $\sigma_i = \theta\gamma_i$ and $\sigma_4 = (1-\theta)$ and ε_t is an error term. The specification allows us to capture the longer term as well as shorter term determinants of real exchange rate behaviour. However, we must also estimate the long run demand for money equation to derive the unobserved monetary disequilibrium. The long run demand for money can be captured by the following

$$\left[\frac{M}{P}\right]_t^d = \beta_1 y_t^{\beta_2} \exp(-\beta_3 i_t) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \text{(4)}$$

Where the dependent variable is the real demand for money expressed in terms of real GDP adjusted for inflation. Since the variables are integrated of order 1 we use the Johansen co-integration test to derive the co-integrating equation that describes long run demand for money. The co-integration test reveals that 1 co-integration equation exists. This results in the following estimated parameters:

$$logM_{t-1}^d = \beta_1 + \beta_2 \log(rgdp)_{t-1} + \beta_3 infl_{t-1}$$

Where $\beta_1 = 5.82, \beta_2 = 1.55\ (0.05), \beta_3 = -0.07\ (.008)$.

With the estimated money demand equation we can derive the monetary disequilibrium in our primary regression equation 3.