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Abstract

In the existing literature, we find a huge debate on the impact of exchange rate undervaluation (depreciation) on growth and exports. Some argue that undervaluation has positive effects on growth, especially in the case of developing countries. However there is ample criticism against the undervaluation leads to growth argument as well. The critics argue that large undervaluation discourages investment and in fact may lead to negative economic growth. Our premise is that the impact of currency undervaluation (overvaluation) would be different in countries with different exports structure, particularly between manufacturing vs. mineral exporting countries.

This paper aims to analyze the differential impact of exchange rate undervaluation on growth and exports in different countries. We consider two sets of countries in our dataset-18 countries are included in manufactures- exporting sample while 16 countries are included in the minerals-exporting sample; Countries included in the former group have at least 70 percent share of manufactured products in total exports in 2010; while those in the latter contribute to more than 40 percent in total exports. This paper uses a cross sectional panel analysis using both five years average data and one year average data; pooled OLS, panel fixed effects, random effects estimations. It controls for the endogeneity problem by using a system generalized method of moments estimations. Estimation results of our study suggest currency overvaluation is good for mineral resource exporting countries. Moreover, results show a negative impact of undervaluation on growth and exports in both the long-run and the short-run for mineral and manufacture exporting countries. At the same time, negative coefficients on share of mineral exports on growth and exports implies the need of export diversification in many Latin American countries and Africa.

Keywords: Currency undervaluation, economic growth, exports growth, mineral exporting countries, manufacture exporting countries.

JEL Code: O10, O40, O24, N50, N60

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1. Introduction

In early decades, natural resources owned countries grew faster than other developing countries. Since the 1960s, the resource-poor countries have outperformed the resource-rich countries compared by a considerable margin[1]. According to the Razmi and Blecker (2008), in the past two decades developing countries have significantly increased both their export orientation and the proportion of their exports in manufactured goods. Furthermore, there are certain studies that have discussed export-led growth strategy for developing countries growth by introducing East Asian Four Tigers, namely South Korea, Singapore, Hong-Kong and Taiwan. However, recently, Setterfield (2010) argued that the expanding group of developing countries pursuing an export-led growth strategy may face a dilemma; and that export-led growth model is not a panacea for many developing nations. Moreover, his findings suggest that developing countries obtain significant growth benefits by maintaining low real exchange rates relative to competing developing countries.

Referring to the existing literature, we find that there exists a substantial debate regarding impact of exchange rate undervaluation (depreciation) on growth and exports. Some argue that undervaluation has positive effects on growth (especially in developing economies), while some argue that in the long-run undervaluation has negative effects on growth. Rodrik (2008; 2009) finds that undervaluation of the currency stimulates economic growth and export expansion, particularly in developing countries[2]. Setterfield (2010) argued that developing countries obtain significant growth benefits by maintaining low real exchange rates relative to competing developing countries. Levy Yeyati and Sturzenegger (2007) claim that an undervalued real exchange rate boosts the output and productivity growth. Moreover, Korinek and Servén (2010) assert that the real exchange rate undervaluation can raise growth through learning-by-doing externalities in the tradable sector.

In contrast, there also exists criticism against the undervaluation-growth argument, i.e. large undervaluation would bring in negative growth[3]. Some argue that too much undervaluation discourages investment and thus hurts economic growth[4]. For the middle income countries, it is more difficult to sustain rapid growth with an undervalued exchange rate (Eichengreen *et al.* 2013). Furthermore, Haddad and Pancaro (2010) argue

[1] Auty 2001, p. 840
[2] countries with per capita incomes below $2,500
[3] Aguirre and Calderon (2005)
[4] Williamson (2012)

undervaluation causes high and destabilizing liquidity growth and inflation which lead to financial instability.

Therefore, this paper delves deeper into the effects of undervaluation on growth and exports. We identify one primary reason for this undervaluation debate within different industrial structure in different countries. Some countries have manufacturing industry based growth; but some countries have natural resources based growth. If currency is more undervalued (for the mineral exports) for those countries that highly depend on natural resource exports[5] like Latin America (LA) and many African countries: they get less amount of income in terms of Dollar. At the same time, natural resource exports are not sensitive to exchange rate valuations. Undervaluing the currencies for long time cannot support economic growth. In such a scenario, overvaluation can be good for natural resource exporting countries.

Existing literature explains, on one hand, the natural resource boom growth (Sachs and Warner 1999; De Ferranti et al. 2002; Auty 2001). De Ferranti et al. (2002) explain how successful natural-resource abundant countries such as Canada, Australia, Sweden, and Finland have been very enthusiastic about deepening the region's specialization in natural resources, which is seen as a path way to a knowledge economy. Earlier, natural resource boom growth has been highlighted in Latin American countries. As few examples from the history- in Bolivia, over a 9 year period between 1975 and 1984, revenue from natural resource exports rose from 11% of GDP to 23% of GDP respectively; In Ecuador, just in two years between 1972 and 1974, primary exports revenue rose by 19% of GDP; In Mexico, between 1978 and 1983, revenue from oil exports increased by 6% of GDP (Sachs and Warner 1999). On the other hand, natural resource abundance may also hurt growth (Gylfason 2002; Leite and Weidmann 1999; Blum and Leamer 2004). Recently many of the LA countries show a decline in growth although still being rich in natural resources; likewise many countries in Africa face the same phenomena.

Therefore, we hypothesize that the natural resource based growth and manufacturing led growth depend on how a country controls currency exchange rates. This paper tries to answer the main hypotheses of whether currency undervaluation is good for mineral exporting countries or manufacture exporting countries.

[5] Natural resource exports: we only consider mineral exports and excluding oil.

The analytical part of this study considered the data from 1986 to 2012. Cross sectional panel analysis is done using both five years average data and annual data. We tested two different samples- manufacturing exporting countries versus natural resource exporting countries.[6] Moreover, we estimate not only pooled OLS, panel fixed effect and random effect estimations but also control for the endogeneity by using system GMM models. Estimation results of our study suggest that currency undervaluation might be good for manufacturing exporting countries while currency overvaluation is good for mineral resource exporting countries.

This paper is organized as follows: section 2 provides the theoretical framework and hypothesis. Section 3 discusses the research methodology and empirical data. Section 4 presents and interprets the results. Finally, section 5 concludes the paper with a few policy suggestions.

2. Literature review & hypothesis

Real exchange rate is a binding factor for any open economy, and recently it is getting more attention in the competitive era. UNCTAD (2005) indicated that real exchange rate reflects the underlying relative movement of prices at home and abroad. Generally, currency undervaluation, depreciation or devaluation makes exports more competitive and imports more expensive. Currency overvaluation or appreciation makes imports cheaper and exports more expensive.

With regards to exchange rate undervaluation, the existing literature attributes a clear debate on undervaluation and growth phenomena. Some argue undervaluation has positive effects on growth (especially in developing economies), while others criticize undervaluation effects on growth. In particular, Rodrik (2008) found that undervaluation of the currency stimulates economic growth, more in developing countries than developed economies. Moreover, Rodrik (2009) argued that real undervaluation promotes economic growth, increases the profitability of the tradable sector, and leads to an expansion of the share of tradable in domestic value added. He claimed that the tradable sector in developing countries can be much smaller because it suffers more than the non-tradable sector from institutional weaknesses and market failures. Likewise, a real exchange rate undervaluation works as a

[6] This study considered natural resource as mineral export countries and excludes the oil exporting countries for omitting the sample bias problem (See data and sources for more details in section 3)

second best policy to compensate for the negative effects of these distortions by enhancing the sector's profitability. Higher profitability promotes investment in the tradable sector, which then expands and promotes economic growth.

However, recently there has also been criticism on undervaluation. According to Williamson (2012), more undervalued currencies may hurt economic growth.[7] Eichengreen et al. (2013) argued undervaluation is detrimental because it causes a slowdown of growth since undervalued real exchange rates provide a disincentive to move up the technology ladder. Moreover, as Aguirre and Calderonn (2005) explain that while large undervaluation hurts growth, small or moderate undervaluation enhances growth. Furthermore, Haddad and Pancaro (2010) also explained that real undervaluation works only for low-income countries and only in the medium-term.[8] According to Pettinger (2011), a falling exchange rate can be beneficial if the economy is uncompetitive and stuck in a recession. Therefore, whether it is beneficial or harmful to have undervaluation in the exchange rate is still debatable.

Additionally, there are existing literature talks about the exchange rate volatility. Arize et al. (2000) found a significant negative relationship between an increase of exchange rate volatility and exports in developing countries. Chit et al. (2010) finds a similar result for a panel of East Asian countries. Sauer and Bohara (2001), also indicated that volatility has significant negative effects on exports in Latin America and Africa, but not in Asia.[9] Moreover, though a stable real exchange rate is a necessary condition for developing countries to achieve sustained economic growth, only large fluctuations matter for exports (Haddad and Pancaro 2010). Another strand of the literature argues that there are no effects of exchange rate fluctuations on exports. According to Klein (1990) and Mckenzie (1998), exchange rate variability has no significant effect in driving export volumes.

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[7] Williamson (2012), more undervalued currencies are likely to improve the current account surplus; this stimulates capital flow out of the country instead of in, therefore this impedes the investment from entrepreneurs and the economy cannot grow.

[8] According to Haddad and Pancaro (2010), a stable and undervalued real exchange rate can be a key element in promoting economic growth in low-income countries; but maintaining this policy for too long may have significant adverse consequences. Moreover a stable real exchange rate is a necessary condition for developing countries to achieve sustained economic growth, but only large fluctuations matter for exports (Haddad and Pancaro 2010)

[9] They argue that the effect of real exchange rate volatility on exports depends on the type of goods and the countries involved.

Natural resource exports and growth

According to the literature, natural resources account for 20 percent of world trade, and dominate the exports of many countries. At the same time, natural resource exports or mineral exports and growth were highlighted topics in economic history.[10] Many of them argue that on one hand the natural resource exports create a growth boom while on the other hand natural resource abundance hurts growth. De Ferranti et al. (2002) cited the history of successful natural-resource abundant countries such as Canada, Australia, Sweden, and Finland.[11] These countries are very enthusiastic about deepening the region's specialization in natural resources; and they see this as a path way to a knowledge economy. According to the Standard economic theory, in the long run, the wealth effects associated with natural resources should lead to increased investment and higher economic growth.

The economic history of Latin America indicates that natural resource exports boom leads to growth. For instance, in Bolivia, over a 9 year period between 1975 and 1984, revenue from natural resource exports rose from 11% of GDP to 23% of GDP respectively. In Ecuador, in just two years between 1972 and 1974, primary exports revenue rose by 19% of GDP. In Mexico, between 1978 and 1983, revenue from oil exports increased by 6% of GDP (Sachs and Warner 1999).

Another strand of literature argues that natural resource abundance is a curse for the economy. According to Gylfason (2001), natural resource abundance may hurt growth by harming trade. Blum and Leamer (2004) asserted natural resource abundance is a curse rather than a blessing. Leite and Weidmann (1999) suggest that capital intensive natural resources are a major determinant of corruption. Paldam (1997) explained natural resource abundance is, as a rule, accompanied by booms and busts. A Sachs and Warner's analysis of 1997 found that economies with a high ratio of natural resource exports to GDP in 1970 had a tendency to grow slowly during the subsequent 20 year period from 1970-1990. Moreover, Gylfason (2001) explained that natural resources bring risks; one being that too many people become locked in low-skill intensive natural resource based industries. His study found evidence that nations with abundant natural capital tend to have less trade and foreign investment, more

[10] Natural Resource exports are defined as exports of agriculture, minerals, and fuels (Sachs and Warner, 1997). Mineral exports are defined as only fuels and Primary metals (Sachs and Warner, 1999)

[11] One reason can identify for their success; because they are close to the market. Canada is close to the US; Sweden and Finland are close to the Europe; and Australia is close to the New Zeeland.

corruption, less education, and less domestic investment than other nations. Leite and Weidmann (1999) also found the direct effects and indirect impacts of natural resources. An example of direct effects is the Dutch Disease since the 1960s, whereby large discoveries of natural gas led to a recession in Netherlands. Indirect effects include impact of natural resources on rent-seeking activities and institution building. Thus, some countries like Malaysia and Botswana, have managed to harness the power of natural resources and maintain both economic stability and above average growth rates. Moreover, Fosu (1990) found that developing countries specializing in manufacturing achieved higher economic growth as compared to those specializing in primary sector exports.

When it comes to the exchange rate and natural resources, Paldam (1997) explained that the prices of raw materials fluctuate a great deal in world markets and supplies. According to Paldam (1997), the resulting fluctuations in export earnings trigger exchange rate volatility, perhaps more under fixed exchange rates than under floating rates. However, later studies have shown that the real exchange rate may not necessarily increase in response to an expansion of the natural resource sector (Corden and Neary 1982; Torvik 2001). Sachs and Werner (1995) found that resource rich economies have slower growth in manufacturing exports. According to Ruta and Venables (2012), exchange rate volatility has reached new highs across fuels, minerals, and agricultural commodities. Fuel prices jumped 234% during 2003-08, while mining products and food rose by 178 % and 120%, respectively. Poelhekke and van der Ploeg (2009) also documented direct impact of natural resource abundance on economic growth and indirect effects through volatility of unanticipated output growth.[12]

Table 1 presents a list of the 20 countries with the highest mineral export contributions as a percentage of total merchandise exports in the selected years. It shows that over time, relatively low income countries are becoming increasingly reliant on export revenues from minerals as their main source of foreign exchange earnings. Many of these countries have low Human Development Index (HDI) scores, which draws attention to the potential for productive sectors, such as mining, to make a contribution. In particular, in Chile, Ghana and Brazil, mining areas have enjoyed stronger poverty reduction and social development performance than non-mining areas (ICMM 2012).

[12] They found that the direct effect can be positive, and it can be swamped by the negative impact resulting from volatility.

Table 1: Reliance on export of metallic minerals

Rank by country (2010)	Mineral export contribution as a %e of total merchandise exports in 1996	Mineral export contribution as a %e of total merchandise exports in 2005	Mineral export contribution as a %e of total merchandise exports in 2010
1 Botswana	58.70%	86.50%	83.70%
2 Zambia	79.40%	64.00%	83.60%
3 Dem. Rep. of the Congo	72.40%	70.20%	78.30%
4 Mongolia	60.30%	70.10%	77.60%
5 Suriname	68.00%	64.30%	75.40%
6 French Polynesia	69.20%	55.30%	67.10%
7 Chile	47.70%	56.50%	65.90%
8 Guinea	77.10%	84.00%	65.20%
9 Peru	48.30%	57.90%	62.70%
10 Mauritania	36.10%	49.30%	60.40%
11 Northern Mariana Islands	3.30%	4.50%	58.90%
12 Mozambique	6.10%	66.90%	57.00%
13 Mali	8.50%	37.20%	54.80%
14 Sierra Leone	30.60%	58.20%	54.30%
15 Papua New Guinea	24.50%	39.20%	54.00%
16 Namibia	36.20%	41.20%	53.40%
17 Nauru	73.10%	25.20%	50.80%
18 Armenia	23.90%	39.80%	50.60%
19 Jamaica	49.70%	68.50%	49.60%
20 Cuba	15.10%	39.20%	47.70%

Source: Reproduced from ICMM (2012) (Mineral (non-fuel) exports in 2010 as % of total merchandise exports (UNCTAD data)

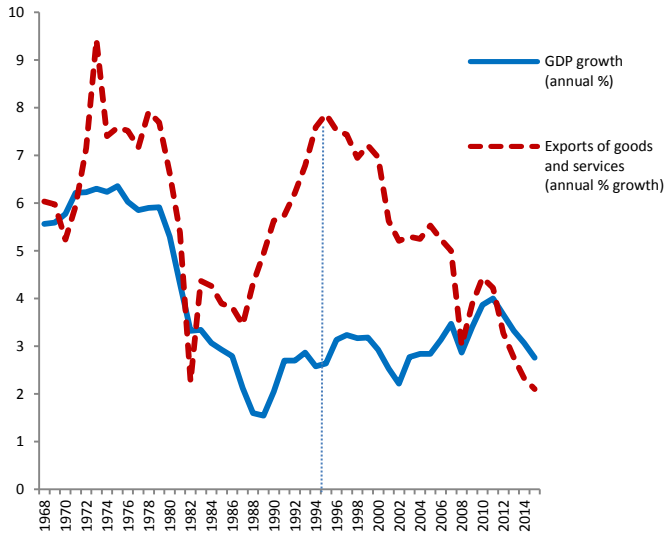
Natural resources and Latin America

A large number of empirical evidences suggest that economies well endowed with natural resources relative to other factors of production have grown slower than other economies over the long term. Sachs and Warner (1999) asserted that Latin America (LA) has been one of the leading laboratories for natural resource booms and busts. While some countries experienced economic boom, some of them collapsed after natural resources. After analyzing 11 Latin American countries, Sachs and Warner (1999) found that there was a significant natural resource boom in four countries, namely Bolivia, Ecuador, Mexico and Venezuela; while there was no boom in the other four countries, namely Argentina, Brazil, Paraguay and Uruguay; along with a mixed evidence of a boom in the other three countries, namely Chile, Colombia and Peru.

Overall, in the recent years, the economy of LA shows a significant economic decline. This slowdown was caused not only by the abundance of natural recourses but also due to

other industrial sectors' decline. Figure 1 shows the decreasing trend of GDP growth and exports growth in LA and Caribbean countries in long run. Furthermore, there is a significant decline in exports growth since the 1995; this being the catching-up period of many emerging countries.

Figure 1: Economic behaviors of Latin American & Caribbean countries.

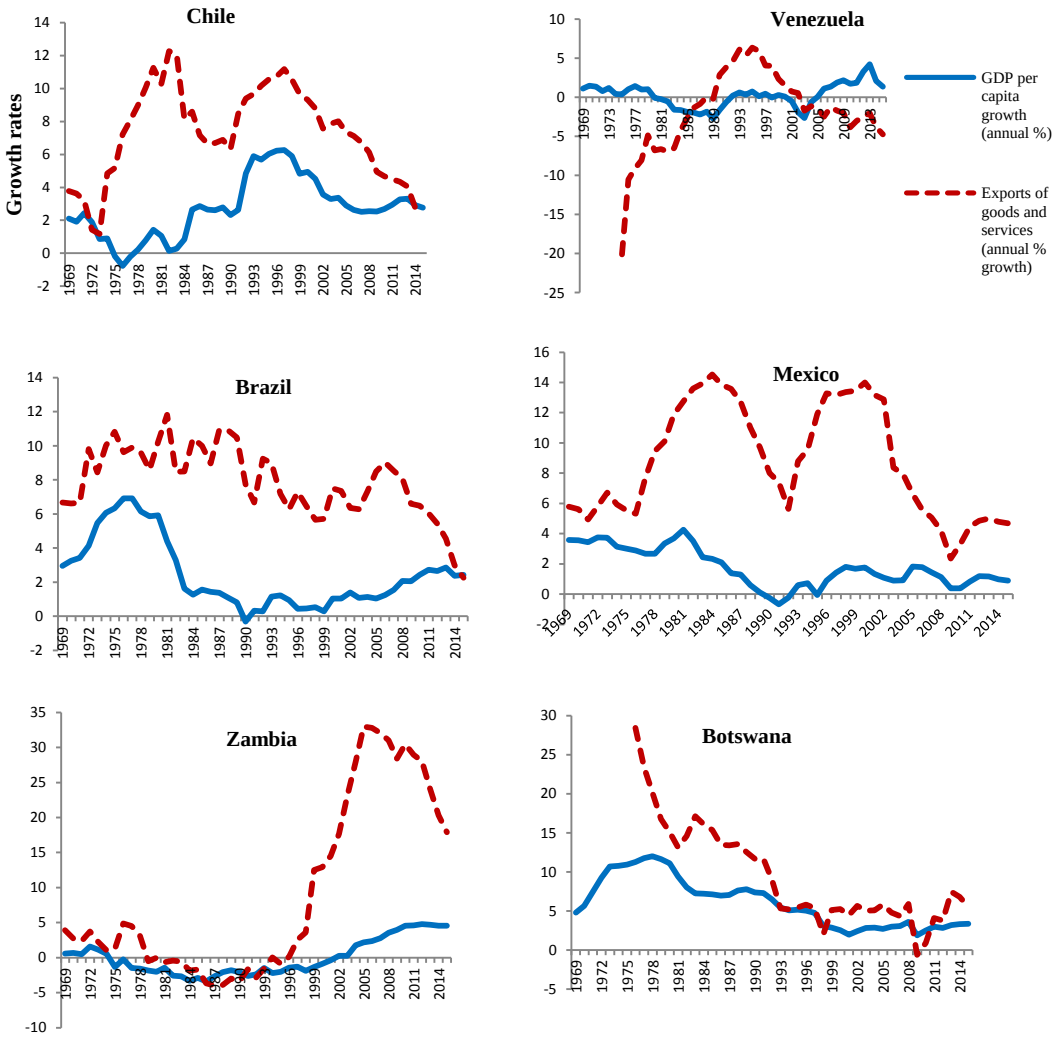


Source: Using World Bank - World Development Indicators Data created by the Authors
*(*figures are in ten years moving average)*

To get a clear image of declining trends in LA country growth and exports , we consider the GDP per capita growth rate and exports growth rate between the 1960 to 2014 in selected countries; namely Chile, Venezuela, Brazil, Mexico, Botswana and Zambia, respectively. According to Figure 2, the exports growth of all these countries has significant declining trends. Botswana and Zambia ranked as the two biggest mineral exporting countries in the world in 2010. Meanwhile, only Zambia shows GDP per capita growth after 2003, thus exports growth shows a significant declining trend since 2003.

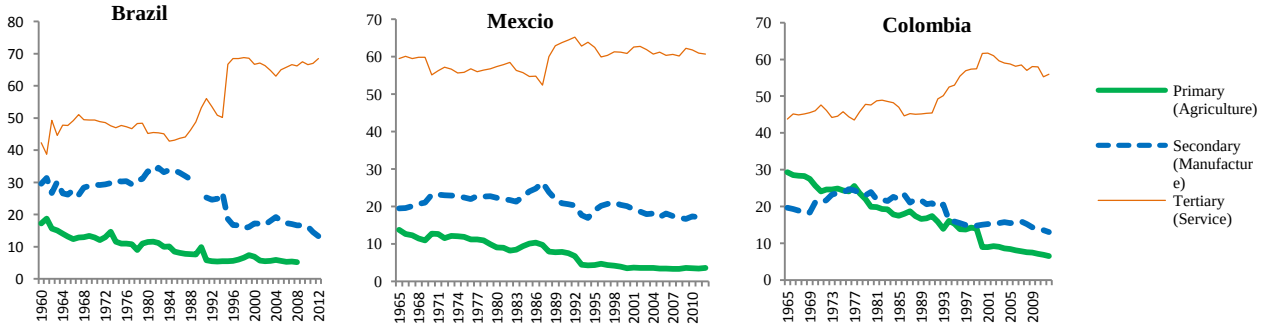
Moreover in LA, approximately 12% of the region's GDP depends on the manufacturing sector. Countries like Mexico and Brazil are significant exporters of manufacturing commodities. Thus, the manufacturing share in GDP has been declining rapidly as well. Figure 3 shows the sectoral decline of three large countries in LA, namely Brazil, Mexico and Colombia respectively. From Figure 3, we observe that both primary and secondary sectors show a significant decline in these countries.

Figure 2: Exports and GDP growth decline in many LA countries



Source: Using World Bank - World Development Indicators Data created by the Authors
*(*figures are in ten years moving average)*

Figure 3: GDP shares of the Primary, secondary, and tertiary sectors in LA



Source: World Development Indicators Database

The International Council on Mining and Metals (ICMM) suggests that the mining sector's contribution is important for sustaining development, especially in developing countries (ICMM 2012). According to the ICMM report in 2012, the nominal value of world mineral production was nearly four times higher than it was in 2002. Usually, when production increases, countries should receive more income. Ironically, it is clear most of the mineral exporting countries are struggling with the problems of declining economic growth and exports growth. At the same time, many of the mineral exporting countries are economically poor.

Therefore, the answer lies in the currency exchange rate. Countries should consider what they export and accordingly adjust their exchange rate policies; either goes for an undervaluation or an overvaluation. Therefore, the hypothesis this study tests is whether currency undervaluation is good for mineral exporting countries or manufacture exporting countries? We suggest that currency overvaluation is good for mineral exporting countries growth and exports.

3. Empirical data, sample & econometric methodology

3.1 Data set and the Samples

This analysis consists of two different samples- manufacturing exporting countries and natural resource exporting countries. The natural resource exporting sample consists of only mineral exporting countries (excluding giant oil exporters). We limit the manufacturing export sample to countries where manufacturing products exports constitute at least 70 percent of their total exports (in at least one of the two years, 1999 and 2001). This percentage corresponds to an average of 68 percent over 1999-2003 reported by UNCTAD (2005). The 18 developing countries that fit this criterion are Bangladesh, China, the Dominican Republic, Hong Kong, India, Jamaica, South Korea, Malaysia, Mauritius, Mexico, Pakistan, the Philippines, Singapore, Sri Lanka, Taiwan, Thailand, Tunisia and Turkey. Nepal also meets this criterion, but was excluded because of its land size. Taiwan was also excluded from our list due to lack of data. We have included Vietnam in our list.[13] For the mineral exporting country sample, we consider 16 countries including Armenia,

[13] To select our manufacture exporting sample we refer some existing literature by Setterfield 2010; Razmi and Blecker 2008; Blecker and Razmi 2007. Thus, we extended the sample data from 1986 to 2012 consisting 27 years. Razmi and Blecker's (2008) sample was form 1983-2001 annual data: Setterfield (2010) and Blecker and Razmi (2007) used the data form 1984-2004.

Botswana, Brazil, Chile, Congo (Dem. Repub.), French Polynesia, Guinea, Jamaica, Mauritania, Mongolia, Mozambique, Namibia, Papua New Guinea, Peru, Suriname, Zambia. To select this sample, we consider those countries which have a share of mineral exports in total exports higher than 40% in 2010. We select the mineral exporting countries based on ICMM (2012) country ranks.

We download the data from UN COMTRADE online database for both mineral and manufacturing exports data. For the mineral exports we use SITC[14] number 3: (Mineral fuels, lubricants and related materials); and for manufacture exports we use SITC number 5, 6, 7, 8 (chemicals and related products; manufactured goods classified chiefly by material, including rubber, textiles, iron and steel; machinery and transport equipment; miscellaneous manufactured articles), similar to Setterfield (2010) and Razmi and Blecker (2008).

3.2 Methodology

This study uses cross sectional data using five years average panel data and annual panel data, from 1986 to 2012 which include 27 years.[15] To ensure robustness of our results, estimations have been done using pooled OLS, panel Fixed effects and random effects as well as system generalized method-of-moments estimators (system GMM) to control for endogeneity issues.

We use the standard growth model specifications, consisting of the typical control variables (X_{it}), a set of the interest variables (Z_{it}), and other controls (O_{it}), as follows.

$$y_{it} = \text{Function}\ (X_{it}, Z_{it}, O_{it}) + e_{it} \quad (1)$$

Where y_{it} is GDP per capita growth rate in country *i* in year *t, and* e_{it} is the error term. X_{it} variables include the (log) initial GDP per capita of a country *i* expressed in constant US dollars (*ln_intgdp*), population growth (*popgrowth*), human capital (*H_cap*) (school enrollment) measured by the primary and secondary school enrollment, and the gross capital formation (*P_cap*). Our variables (Z_{it}) of interest include the variables of undervaluation ($Underval_{it}$) (to see the exchange rate effects), mineral exports share on total exports ($Mineral\_exp.share_{it}$) or manufacturing exports share on total exports

[14] SITC - Standard International Trade Classification

[15] The periods considered are as follows: period 1 from 1986-1990; period 2 from 1991- 1995; period 3 from 1996- 2000; period 4 from 2001-2005; period 5 from 2006-2010; and period 6 from 2011-2012.

($Manufact\_exp.share_{it}$) and interaction term variable of undervaluation and mineral or manufacturing share on total exports ($Underval * Mineral\_exp.share_{it}$) or ($Underval * Manufact\_exp.share_{it}$) . Thus, we have the following simple growth equation:

$$y_{it} = \alpha_1 + \beta_1 ln\_intgdp_{it} + \beta_2 popgrowth_{it} + \beta_3 H\_cap_{it} + \beta_4 P\_cap_{it} + \beta_5(Underval_{it}, Mineral\_exp.share_{it}, Underval * Mineral\_exp.share_{it}) + e_{it} \quad (2)$$

Then our second estimation on exports and undervaluation is similar to the equation (1): we use export growth rate as a dependent variable ($Exp.growth_{it}$): where y_{it} is the export growth rate in country *i* in year *t* and e_{it} is the error terms. Our variables of the interest include the variables of undervaluation ($Underval_{it}$) mineral exports share on total exports ($Mineral\_exp.share_{it}$) or manufacturing exports share on total exports ($Manufact\_exp.share_{it}$) , and interaction term variable with undervaluation and mineral or manufacturing share on total exports ($Underval * Mineral\_exp.share_{it}$) or ($Underval * Manufact\_exp.share_{it}$), and Foreign Direct Investments (FDI_{it}). Thus, we have the following simple export growth equation:

$$Exp.growth_{it} = \alpha_1 + \beta_1 Underval_{it} + \beta_2 Mineral\_exp.share_{it} + \beta_3(Underval * Mineral\_exp.share_{it}) + \beta_5 FDI_{it} + e_{it} \quad (3)$$

It is important to note that we have calculated the undervaluation index from 1986-2012 for 180 countries. We refer to the same estimation methodology which Rodrik (2008) used to calculate his undervaluation index. A detailed explanation for the definitions of the variables and the data sources presented in the Appendix Table 1.

We begin with the pooled ordinary least square (POLS) estimation, and move on to the panel estimation approach (Islam, 1995) to control for the omitted variable bias by estimating either the fixed effect (FE) or random effect (RE) with the Hausman test. To further control possible endogeneity, a system GMM estimation developed by Arellano and Bover (1995) and Blundell and Bond (1998) is also applied. We use the following criteria to evaluate the system GMM estimation model specifications: the Hansen over-identification test and the test for second order serial correlation (AR2) of the residuals in the first differenced equation. The AR2 test also provides additional verifications on the specification of the model and on the legitimacy of the instrumental variables in the differenced equation. We mainly discuss the results and implications using the system GMM results.

4. Empirical Results

Firstly, we use GDP per capita growth rate as a dependent variable to see the effects of exchange rate undervaluation on economic growth in mineral exporting countries and manufacturing export countries. We then use our model to see the long-run and short-run effects using annual panel data and five years average panel data for both samples. We attach the greatest reliability on the system-GMM results for all estimation models.

The results presented in Table 2 show the estimated coefficients for annual panel data regression and five years average panel data regression for mineral sample. Here we only discuss the key variables of interest in our model, according to the results shown in Table 2. The exchange rate undervaluation is negative and significant in all three specifications of POLS, fixed effect, and GMM estimations in mineral sample in the short-run; while it is negative and insignificant in the long-run (five year average regression). Share of mineral exports in total exports shows negative and significant coefficients on growth in the long-run. We add the interaction term variable of undervaluation and mineral exports share of total exports, which show positive coefficients on growth in the short-run and positive and significant in the long run. In addition, our interest variable of FDI varies positively with growth in long-run.

The results presented in Table 3, show the estimated coefficients for annual panel data regression and five years average panel data regression for manufacturing sample. This result implies that undervaluation is not significant for growth in the long run but in the short run the coefficients show negative relations on growth. Meanwhile, we find that manufacturing exports as a proportion of total exports vary negative and significantly with growth, both in the long and short run. FDI coefficient is positive and significant, but only in the short run and for manufacturing countries.

Secondly, we use export growth rate as a dependent variable to see the effects of exchange rate undervaluation on export growth in these two samples. Similar to the growth model, we continue to use our model to see the long run and short run effects on exports. The mineral sample, the results presented in Table 4, shows that undervaluation and mineral exports share have negative and significant coefficients both in the long and the short run. Meanwhile, the interaction term of undervaluation and mineral share of total export shows significant positive coefficient in both long and short run. Furthermore, FDI has a positive and significant coefficient in mineral exporting countries in long and short-run. When it

comes to the manufacturing sample: undervaluation, manufacturing share in total, and interaction term are not significant in both the short run and the long run. Thus, undervaluation shows positive coefficients in the long and short run. In the long run, FDI is significant in manufacture exporting countries. Table 6 presents the descriptive statistics for related variables in the regressions.

Hence, to sum it up, negative coefficients of undervaluation suggest that currency overvaluation is good for mineral exporting countries growth and exports. However, we also find that the undervaluation is not significant for manufacture exporting countries growth and exports, consistent with Lee and Ramanayake's (2015) findings. A negative coefficient of mineral export shares reiterates the need of export diversification for many mineral exporting countries in Latin American and Africa. Moreover, FDI plays a significant role for mineral exporting countries economic and export growth.

Table 2: Mineral sample with GDP per capita growth: long run vs. short run

Mineral export sample (annual)							**Mineral export sample (Five Year)**					
Dep. Variable: **GDP per capita growth rate**	POLS	RE	GMM	POLS	RE	GMM	POLS	RE	GMM	POLS	RE	GMM
ln initial GDP per capita	-3.45***	-3.44 ***	-3.48***	-3.35***	-3.35***	-3.39***	-2.71	-2.72	-3.21 ***	-2.95*	-2.95*	-2.95***
	(-3.52)	(-3.52)	(-3.69)	(-2.89)	(-2.89)	(-2.99)	(-1.62)	(-1.62)	(-3.22)	(-1.79)	(-1.79)	(-2.92)
Population growth	-2.43***	-2.42 ***	-2.43***	-2.32***	-2.32***	-2.33***	-1.87 ***	-1.87***	-2.05***	-1.85***	-1.85***	-1.85***
	(-4.76)	(-4.76)	(-5.08)	(-4.11)	(-4.11)	(-4.56)	(-3.03)	(-3.03)	(-4.97)	(-3.06)	(-3.06)	(5.23)
Human capital (school enrollment)	.02	.02	.02	.03	.03	.03*	.03	.03	.02	.04	.04	.04*
	(1.42)	(1.42)	(1.58)	(1.38)	(1.38)	(1.74)	(0.73)	(0.73)	(0.86)	(0.96)	(0.96)	(1.69)
Physical capital (gross capital formation	.29 ***	.29***	.30***	.26***	.26***	.26***	.17 **	.17**	.16**	0.13	0.13	.13*
	(5.27)	(5.27)	(3.40)	(3.69)	(3.69)	(2.61)	(2.17)	(2.17)	(2.49)	(1.55)	(1.55)	(1.82)
Undervaluation	-4.39 ***	-4.39 ***	-4.43**	-4.10**	-4.10**	-4.12**	-1.22	-1.22	-2.59	-2.15	-2.15	-2.15
	(-2.87)	(-2.87)	(-2.32)	(-2.39)	(-2.39)	(-2.23)	(-0.74)	(-0.74)	(1.20)	(-1.26)	(-1.26)	(-1.21)
Share of Mineral exports on total exports	-.01	-.01	-.01	-.01	-.01	-.01	-.16 **	-.16 **	-0.20 ***	-0.15**	-0.15**	-.15***
	(-0.27)	(-0.27)	(-0.24)	(-0.38)	(-0.38)	(-0.34)	(-2.15)	(-2.15)	(-4.95)	(-2.03)	(-2.03)	(-2.73)
Undervaluation * mineral export share	.02	.02	.02	.02	.02	.02	.16	.14	0.21 ***	.14	0.13	.13*
	(1.01)	(1.01)	(0.95)	(0.83)	(0.83)	(0.85)	(1.63)	(1.63)	(4.24)	(1.37)	(1.37)	(1.82)
FDI (% of GDP)				.05	.05	.05				.12	.12	.12**
				(1.00)	(1.00)	(1.59)				(1. 36)	(1.63)	(2.19)
Constant	12.86***	12.87***	12.99***	12.47**	12.47***	12.57***	9.68**	9.69**	13.33***	11.11**	11.11***	11.11***
	(2.89)	(2.89)	(3.03)	(2.57)	(2.57)	(2.77)	(2.26)	(2.26)	(3.65)	(2.59)	(2.59)	(3.62)
Number of Observation	191	191	191	161	161	161						
R^2	0.27	0.27		0.24	0.24	0.25	0.62	0.63		0.65	0.65	
AR2			0.26			0.25			0.58			0.72
Sargan test			0.04			0.108			0.49			0.48
Number of countries	17	17	17	16	16	16	17	17	17	16	16	16

Note: The dependent variable is GDP per capita growth, annual data during 1986-2012
*Figures in brackets represent t & z ratios - *** Significant at 1%;** significant at 5%;* significant at 10%*

Table 3 : Manufacturing sample with GDP per capita growth: long run vs. short run

	Manufacturing export sample (Annual)						**Manufacturing export sample (Five year average)**					
Dep. Variable: **GDP per capita growth rate**	POLS	RE	GMM	POLS	RE	GMM	POLS	RE	GMM	POLS	RE	GMM
ln initial GDP per capita	-.56	-.54	-.57	-1.49**	-1.57*	-1.46*	-.84	-.85	-1.08*	-1.17*	-1.17*	-1.07**
	(-0.85)	(-0.66)	(-0.64)	(-2.12)	(-1.91)	(-1.72)	(-1.32)	(-1.32)	(-1.86)	(-1.72)	(-1.72)	(-2.04)
Population growth	-.79 **	-.83*	-.78	-.58	-.60	-.47	-1.40***	-1.39 ***	-1.78***	-1.35***	-1.30***	-1.19**
	(-2.23)	(-1.91)	(-1.64)	(-1.55)	(-1.34)	(-1.03)	(-3.21)	(-3.21)	(-3.25)	(-3.11)	(-3.11)	(-2.02)
Human capital (school	-.02	-.02	-.02	-.01	-.01	-.01	-.03	-.02	-.05**	-.02	-.02	-.02
enrollment)	(-1.12)	(-0.84)	(-1.10)	(-0.40)	(-0.26)	(-0.31)	(-1.16)	(-1.16)	(-2.46)	(-0.89)	(-0.89)	(-0.92)
Physical capital (gross capital	.26***	.28***	.27***	.26***	.26***	.26***	.20***	.20 ***	.14 ***	.21***	.21***	.21***
formation	(7.32)	(7.02)	(10.17)	(7.37)	(7.03)	(8.98)	(5.24)	(5.24)	(2.80)	(5.59)	(5.59)	(5.36)
Undervaluation	-.44	-1.38	-.71	-2.53	-2.64	-2.59	-.57	-.57	.50	-1.84	-1.84	-1.94
	(-0.20)	(-0.59)	(-0.42)	(-1.11)	(-1.13)	(-1.37)	(-0.28)	(-0.28)	(0.29)	(-0.90)	(-0.90)	(-1.36)
Share of Manufacturing exports	-.0001	-.01	-.01	-.03	-.03	-.04**	-.02	-.02	-.001	-.05*	-.05*	-.05**
on total exports	(-0.03)	(-0.39)	(-0.40)	(-1.01)	(-0.90)	(-1.99)	(-0.80)	(-0.80)	(-0.05)	(-1.68)	(-1.68)	(-2.15)
Undervaluation * mineral export	.001	.02	.01	.03	.03	.03	.01	.01	-.01	.04	.04	.04
share	(0.11)	(0.50)	(0.42)	(0.88)	(0.82)	(1.40)	(0.41)	(0.41)	(-0.39)	(1.20)	(1.20)	(1.63)
FDI (% of GDP)				.10**	.09*	.10***				.04	.04	.04
				(2.21)	(1.94)	(3.51)				(0.98)	(0.98)	(1.43)
Constant	2.03	2.40	2.15	5.51	5.52	5.26	6.58*	6.58*	10.34**	8.04**	8.04**	7.49**
	(0.58)	(0.62)	(0.48)	(1.49)	(1.37)	(1.20)	(1.93)	(1.93)	(2.41)	(2.31)	(2.31)	(1.96)
R^2	0.63	0.63		0.65	0.65		0.49	0.49		0.53	0.52	
AR2			0.59			0.75			0.78			0.51
Sargan test			0.01			0.01			0.01			0.01
Number of countries	16	16	16	16	16	16	16	16	16	16	16	16

Note: The dependent variable is GDP per capita growth, five years average during 1986-2012
*Figures in brackets represent t & z ratios - *** Significant at 1%;** significant at 5%;* significant at 10%*

Table 4 : Mineral Sample with export growth: long run vs. short run

	Mineral export sample (Annual)						Mineral export sample (Five year average)					
Dep. Variable: Export growth rate	POLS	RE	GMM	POLS	RE	GMM	POLS	RE	GMM	POLS	RE	GMM
Undervaluation	-.66	-.69	-.65 ***	-.60	-.63	-.61***	-1.04 **	-1.01 *	-1.01***	-.84*	-.85	-.84 ***
	(-1.49)	(-1.41)	(-3.09)	(-1.36)	(-1.28)	(-3.10)	(-2.08)	(-1.83)	(-4.15)	(-1.67)	(-1.61)	(-3.76)
Share of Mineral exports on total	-.04	-.04	-.04 **	-.06*	-.06*	-.06***	-.44 ***	-.43 ***	-.44 ***	-.35**	-.35***	-.34 ***
exports	(-1.59)	(-1.36)	(-2.53)	(-1.85)	(-1.79)	(-3.37)	(-3.42)	(-3.41)	(-6.15)	(-2.53)	(-2.58)	(-3.90)
Undervaluation * mineral export	.10***	.10***	.10 ***	.13***	.13***	.13***	.56 ***	.54 ***	.55 ***	.43**	.43**	.43***
share	(3.26)	(3.08)	(5.62)	(3.19)	(3.12)	(3.54)	(3.36)	(3.37)	(5.47)	(2.39)	(2.44)	(3.89)
FDI net inflow (% of GDP)				.27**	.26**	.26 **				.35*	.32*	.35***
				(2.31)	(2.22)	(2.30)				(1.89)	(1.76)	(4.34)
Constant	7.19***	7.03***	7.19***	6.17***	6.16***	6.17***	6.94***	6.92***	6.97***	5.26***	5.36***	5.25 ***
	(7.50)	(6.62)	(6.05)	(5.22)	(4.85)	(4.67)	(7.16)	(6.29)	(6.92)	(4.05)	(4.00)	(5.47)
Number of Observation	251	251	251	198	198	198						
R^2	0.04	0.04		0.07	0.07		0.01	0.01		0.01	0.031	
AR2			0.27			0.37			0.29			0.30
Number of countries	17	17	17	16	16	16	17	17	17	17	17	17

Note: The dependent variable is export growth rate, annual data during 1986-2012

*Figures in brackets represent t & z ratios - *** Significant at 1%;** significant at 5%;* significant at 10%*

Table 5: Manufacturing sample with export growth: long run vs. short run

	Manufacturing export sample (annual)						Manufacturing export sample (five years average)					
Dep. Variable: Export growth rate	POLS	RE	GMM	POLS	RE	GMM	POLS	RE	GMM	POLS	RE	GMM
Undervaluation	1.26	-.77	1.26	1.53	-.95	1.52	2.52	-2.67	8.60	3.50	-3.07	6.43
	(0.30)	(-0.18)	(0.20)	(0.36)	(-0.22)	(0.24)	(0.45)	(-0.52)	(0.77)	(0.61)	(-0.59)	(0.67)
Share of manufacturing exports on	.06	-.002	.05 (1.07)	.07	-.01	.07	.07	-.03	.13	.10	-.04	.15
total exports	(1.19)	(-0.04)		(1.28)	(-0.24)	(1.22)	(0.90)	(-0.45)	(1.14)	(1.27)	(-0.55)	(1.38)
Undervaluation * manufacturing	-.04	-.04	-.04	-.05	-.04	-.05	-.08	-.04	-.17	-.12	-.03	-.16
export share	(-0.78)	(-0.67)	(-0.53)	(-0.88)	(-0.63)	(-0.62)	(-1.04)	(-0.50)	(-1.09)	(-1.32)	(-0.34)	(-1.18)
FDI net inflow (% of GDP)				-.01	.08	-.01				-.17	-.13	-.18***
				(-0.15)	(0.69)	(-0.18)				(-1.66)	(-1.02)	(-3.45)
Constant	6.57*	11.67**	6.57	6.35*	12.15***	6.35	6.44	14.77***	1.66	5.70	15.58***	2.92
	(1.77)	(2.91)	(1.48)	(1.67)	(2.96)	(1.38)	(1.25)	(2.99)	(0.21)	(1.08)	(3.13)	(0.40)
R^2	0.01	0.01		0.01	0.031		0.05	0.03		0.07	0.03	
AR2			0.29			0.30			0.11			0.10
Number of countries	17	17	17	17	17	17	17	17	17	17	17	17

Note: The dependent variable is export growth rate, five years average during 1986-2012,

*Figures in brackets represent t & z ratios - *** Significant at 1%;** significant at 5%;* significant at 10%*

Table 6: Descriptive statistics for all variables in both samples

	Mineral export sample					Manufacturing export sample				
Variable	Obs.	Mean	Std. Dev.	Min	Max	Obs.	Mean	Std. Dev.	Min	Max
Export growth	72	5.38	8.09	-25.24	26.06	103	8.65	5.98	-7.44	31.13
Undervaluation	86	0.30	1.81	-0.60	1.64	102	0.88	0.33	-0.08	1.59
Share of mineral exports or Share of manufacturing exports	76	8.27	16.94	0.01	89.10	96	56.62	24.35	0.20	96.35
FDI net inflow	89	4.18	7.49	-21.95	48.58	106	3.78	5.61	0.01	33.49
GDP per capita growth	92	2.06	3.67	-10.48	13.17	108	3.59	2.41	-1.65	10.95
Log initial GDP per capita	83	3.09	0.51	2.07	3.96	102	3.40	0.58	2.41	4.536
Population growth	96	1.82	1.10	-1.90	5.28	108	1.45	0.70	0.20	3.48
Human capital (School enrollment)	66	73.70	23.03	24.09	99.94	79	83.74	12.26	37.55	99.73
Gross capita formation(physical capital)	87	23.38	8.66	5.90	62.10	108	25.85	6.57	14.52	48.54
Inflation (CP)	66	14.81	17.38	1.41	85.93	102	7.34	6.21	-1.35	41.08

5. Summary and Conclusions

Numerous studies have debated on the effects of currency exchange rate on growth and exports. However, there is no consensus on the results. In fact, there is a huge criticism against currency undervaluation and growth. Rodrik (2008; 2009), in particular, found that undervaluation of the currency stimulates economic growth and export expansion. On the other hand, Aguirre and Calderon (2005) found that large undervaluation would bring in negative growth. A greatly undervalued currency discourages investment and thus hurts economic growth (Williamson 2012). For the middle income countries, it is more difficult to sustain rapid growth with an undervalued exchange rate (Eichengreen et al. 2013). Therefore, this study emphasizes that countries should consider what they export before they set exchange rates policies. In other words, what is exported matters for the country's growth.

The estimation results of our study indicate negative impact of undervaluation on growth and exports in the long-run and the short-run. Combining these estimation results, we suggest, currency overvaluation is beneficial for mineral exporting countries. Moreover, consistent with Lee & Ramanayake (2015), we find that undervaluation does not impact manufacture exporting countries growth and exports. This implies that managing exchange rates alone might not be a solution for long term export and growth in those countries. Mineral exporting countries should try to upgrade and improve their real capabilities associated with productivity and innovation (Lee and Mathews 2012).

Our empirical analysis reveals that share of mineral exports is negatively related to exports and growth in mineral exporting countries. This result indicates the need for export diversification in many Latin American and African countries. Furthermore, this study finds that FDI is a significant factor for both mineral and manufacturing exporting countries; albeit more significant for the former's export growth in the short-run and long-run. Therefore, implementing policies that attract more FDI could be a policy suggestion for mineral exporting countries to achieve higher exports and economic growth.

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References

Aguirre, A. and Calderon, C. 2005. "Real exchange rate misalignments and economic Performance." *Documentos de Trabajo (Banco Central de Chile)*315 (2005): 1-49.

Arellano, M. and Bover, O. 1995. "Another look at instrumental variable estimation of error-component models." *Journal of Econometrics* 68: 29-51.

Arize,A. C.,T. Osang, and D.J. Slottje. 2000. "Exchange-Rate Volatility and Foreign Trade: Evidence from Thirt een LDCs." *Journal of Business and Economic Statistics* 18 (1): 10–17.

Auty, Richard M. 200). "The Political Economy of Resource-Driven Growth," *European E conomic Review* 4 5: 839-946.

Blecker, Robert A., and Arslan Razmi. 2007. "The Fallacy of Composition and Contractionary Devaluations: The Output Impact of Real Exchange Rate Shocks in Developing Countries that Export Manufactures."

Blum, B. and Leamer, E. 2004. "Can FTAA suspend the law of gravity and give Americas higher growth and better income distributions." *Integrating the Americas: FTAA and Beyond*: 539-72.

Blundell, R. and Bond, S. 1998. "Initial conditions and moment restrictions in dynamic panel data models." *Journal of econometrics* 87(1):115-143

Chit, M. M., M. Rizov, and D.Willenbockel. 2010. "Exchange Rate Volatility and Exports: New Empirical Evidence from the Emerging East Asian Economies." *The World Economy* 33 (2): 239–63.

Corden, W.M. and Neary, J.P. 1982 "Booming sector and de-industrialization in a small open economy." *The economic journal 92*(368): 825-848.

De Ferranti, D., Perry, G.E., Lederman, D. and Maloney, W.E. 2002. "From natural resources to the knowledge economy: trade and job quality" Washington, DC: World Bank.

Eichengreen, B. Park, D. and Shin, K. 2012. "When fast growing economies slow down: International evidence and implications for China." *Asian Economic Papers* 11: 42-87

Fosu, A.K. 1990. "Exports and economic growth: the African case." *World Development* 18(6): 831-835.

Gylfason, T. 2002. "Natural Resources and Economic Growth: What is the Connection?." *Fostering Sustainable Growth in Ukraine*. Physica-Verlag HD: 48-66.

Haddad, M. and C. Pancaro. 2010. "*Can Real Exchange Rate Undervaluation Boost Exports and Growth in Developing Countries? Yes, But Not for Long*." World Bank, Washington, DC.

ICMM. 2012. "In Brief The role of mining in national economies." *Mining's contribution to sustainable development*. Available at www.icmm.com.

Islam, N. 1995. "Growth empirics: A panel data approach." *Quarterly Journal of Economics* 110: 1127-1170.

Klein, M.W. 1990. "Sectoral Effects of Exchange Rate Volatility on United States Exports." *Journal of International Money and Finance* 9 (3): 299– 308

Korinek A., and L. Servén. 2010. "Undervaluation through Foreign Reserve Accumulation:

Static Losses, Dynamic Growth." *Policy Research Working Paper* 5250,World Bank, Washington, DC.

Lee, K., and J. Mathews. 2012. "Firms in Korea and Taiwan." In *The Innovative firms in the Emerging Market Economies,* edited by John Cantwell and Ed Amann, Oxford Univ. Press: 223-245.

Lee, K. and S.S. Ramanayake. 2015. "Adding-up problem and wage-productivity gap in Exports of developing countries: A source of middle-income trap*." proceedings of International conference on New Structural Economics held by National School of Development*. Peking University, Beijing.

Leite C. & Weidmann, J. 1999. "Does Mother Nature corrupt? Natural Resource resources, corruption, and economic growth." *Natural Resources, Corruption, and Economic Growth (June 1999). IMF Working Paper* 99/85.

Levy-Yeyati, E., and F. Sturzenegger. 2007. "Fear of Appreciation." *Policy Research Working Paper* 4387: World Bank, Washington, DC

Mckenzie, M. D. 1998. "The Impact of Exchange Rate Volatility on Australian Trade Flows." *Journal of International Financial Markets* Institutions and Money 8 (1): 21–38.

Paldam, Martin. 1997. "Dutch Disease and Rent Seeking: The Greenland Model." *European Journal of Political Economy* 13. No. 1: 591-614.

Pettinger, T. 2011. "What factors determine the price of gold?." *Economics Readers Quest*, http://www.economicshelp.org, Accessed 12th Feb. 2012

Poelhekke, S. and Van der Ploeg, F. 2009. "Foreign Direct Investment and urban Concentration: Unbundling Spatial Lags." *Journal of Regional Science 49*(4): 749-775.

Razmi, A. and Blecker, R. A. 2008. "Developing country exports of manufactures: Moving up the ladder to escape the fallacy of composition?." *Journal of Development Studies,* 44(1): 21–48.

Rodrik, D. 2008. "The real exchange rate and economic growth." *Brookings papers on economic activity*: 365-412.

Rodrik, D. 2009. "The Real Exchange Rate and Economic Growth*."* In *Brookings Papers on Economic Activity*, Fall 2008, ed. D. W. Elmendorf, N. G. Mankiw, and L. H. Summers.Washington, DC: Brookings Institution.

Ruta, M. and Venables, A.J. 2012. "International Trade in Natural Resources: practice and Policy." Available at SSRN 2034883.

Sachs, J.D. and Warner, A.M. 1999. "The big push, natural resource booms and growth." *Journal of development economics 59*(1): 43-76.

Sachs, J.D. and Warner, A.M. 1997. "Sources of slow growth in African economies." *Journal of African economies 6*(3): 335-376.

Sachs, J.D. Warner, A.M. 1995. revised 1997, 1999. "Natural resource abundance and economic growth." w5398, *National Bureau of Economic Research*, Cambridge.

Sauer, C., and A. K. Bohara. 2001. "Exchange Rate Volatility and Exports: Regional

Differences between Developing and Industrialized Countries." *Review of International Economics*, 9 (1): 133–52e

Setterfield, M. ed. 2010. "*Handbook of alternative theories of economic growth*." Cheltenham: Edward Elgar.

Torvik, R. 2001. "Learning by doing and the Dutch disease." *European economic review 45*(2): 285-306.

UNCTAD. 2005. "Transnational corporations and the internationalization of R&D." *World Investment Report.* N.Y. and Geneva: United Nations: 331

Williamson, J. 2012. "Some basic disagreements on development." *Panel at the High-Level Knowledge Forum for Rethinking Development Policy held by KDI and the World Bank in Seoul.*

Appendix

Appendix Table 1: Variable definitions and sources

Variable	Definition
DGP per capita growth rate	Average annual growth for ten years of GDP per capita (Constant US$ 2000). *Source:* World Bank - World Development Indicator
Initial GDP per capita	(Constant US$ 2000) , the period of 86-90 initial GDP per capita of 1986, 91-95, initial GDP per capita of 1991 and 96-00, initial GDP per capita of 1996, 2001-2005, initial GDP per capita of 2001, 2006-2010, initial GDP per capita of 2006, 2011-2012, initial GDP per capita of 2011. *Source:* World Bank - World Development Indicator
Human Capital (School enrollment)	Sum of School enrollment, primary (% gross) and school enrollment, Secondary education (% gross) divided by 2, *Source:* World Bank - World development Indicator
Physical Capital (Gross capital formation)	Gross capital formation (% of GDP), *Source:* World Bank - World development Indicator
Export growth rate	Growth rate of exports of goods and services (constant 2000 US$), *Source:* World Bank - World development Indicator
Undervaluation	The undervaluation data is the same data form Rodrik, 2008's undervaluation index. In brief, undervaluation means the difference between the actual real exchange rate and the Balassa-Samuelson-adjusted rate. Rodrik 2008 defines undervaluation to be comparable across countries and over time. Whenever *Undervaluation* exceeds unity (zero), it indicates that the exchange rate is set such that goods produced at home are cheap in dollar terms: the currency is undervalued. When undervaluation is below unity (zero), the currency is overvalued – Rodrik, 2008: p.372) (For more details see Rodrik, 2008)
FDI net inflow (% of GDP)	*Source:* World Bank - World development Indicator
Mineral export Sample	countries share of mineral exports on total exports higher than 40 percent in 2010; we only considered mineral exports (exclude oil exporters) (Armenia, Botswana, Brazil, Chile, Congo (Dem. Repub.), French Polynesia, Guinea, Jamaica, Mauritania, Mongolia, Mozambique, Namibia, Papua New Guinea, Peru, Suriname, Zambia)
Manufacture export sample	Over 70 percent of manufactured products in total exports (Bangladesh, China, the Dominican Republic, Hong Kong, India, Jamaica, South Korea, Malaysia, Mauritius,

	Mexico, Pakistan, the Philippines, Singapore, Sri Lanka, Taiwan, Thailand, Tunisia and Turkey)
Share of mineral exports on total exports	UNCOMTRADE online database
Share of manufacturing exports on total exports	UNCOMTRADE online database