The Renminbi: A Bane and Boon for the Chinese Economy

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Abstract

This thesis analyzes the costs and benefits of the undervaluation of the Chinese currency, the renminbi. This is an issue that has become highly controversial in recent years. The renminbi is undervalued through government intervention in foreign exchange markets and the sterilization of foreign exchange inflows. These policies result in a persistent current account surplus, as exports exceed imports. This thesis argues that large surpluses are distortive, resulting in the inefficient allocation of capital and substantial opportunity costs. This is demonstrated by the investment in low-yield foreign securities rather than high-yield domestic securities. In addition, maintaining large foreign exchange reserves results in foregone investment and potential losses through valuation changes. These effects dampen growth in domestic consumption. Despite these drawbacks, an undervalued renminbi has positive implications for export industries and the import of FDI. This thesis demonstrates that inward FDI leads to "positive spillover" of advanced technology and managerial practices when accompanied by effective domestic policies. Some examples demonstrated in the China case include mandatory joint ventures and local content requirements, both of which are designed to ensure the absorption of technology and expertise by domestic firms. Empirical data shows that these policies have been successful with regards to increasing the production capacity and sophistication of Chinese industry.

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Table of Contents

Abstract i

Acknowledgements ii

Table of Contents iii

List of Figures iv

List of Abbreviations v

Introduction 1

Chapter 1: Foreign Exchange Intervention and Current Account Surplus 7

1.1 Foreign Exchange Intervention 8

1.2 Current Account Surplus 13

1.3 Foreign Currency Reserves 16

1.4 Sterilization 19

Chapter 2: The Effects of the Exchange Rate on Exports and Inward FDI 26

2.1 Exports and Economic Growth 27

2.2 Inward FDI and Economic Growth 30

2.3 State Policies for FDI Attraction and "Spillover" 37

2.4 Case Studies: Gamesa and Volvo in China 43

Post-Script: Domestic Consumption in China 48

Conclusion 53

Works Cited 56

List of Figures

Figure 1: “Renminbi Appreciation and Import Prices” 11

Figure 2: “China’s Exports to U.S., change from year earlier” 33

Figure 3: “Contributions to Growth, 2000-2013” 50

Figure 4: “Minimum Wage Changes from a Year Earlier” 51

List of Abbreviations

ASEAN	Association of Southeast Asian Nations
FDI	Foreign Direct Investment
GDP	Gross Domestic Product
GNP	Gross National Product
JV	Joint Venture
LCR	Local Content Requirement
NIC	Newly Industrializing Country
OECD	Organization for Economic Cooperation and Development
PBC	People's Bank of China
RMB	Renminbi
R & D	Research & Development
TFP	Total Factor Productivity
TNC	Transnational Corporation
WTO	World Trade Organization
XAN	Xi'an Aircraft Company

Introduction

The rise of China has astounded economists and political observers in recent decades. Since beginning the process of "opening up" its economy in 1978, it has experienced extremely high growth, averaging a real GDP growth rate of 9.9 percent per year over 1979-2011.[1] State intervention in foreign exchange markets has been taken as a significant factor in the growth of Chinese industry, as a weak renminbi (RMB) increases the cost-competitiveness of Chinese exports and incentivizes inward FDI by foreign firms.[2] The RMB is often referred to as "undervalued," meaning that it would be stronger if Chinese monetary authorities refrained from intervention and allowed the market to set the exchange rate.[3] This policy leads to a persistent current account surplus, as Chinese firms export much more in goods than what is imported into the country. The People's Bank of China is able to use this surplus to build up massive foreign currency reserves, much of which is held in US treasury bills. This insulates the country against financial crises as well as giving it status as the world's largest creditor nation.[4]

Despite these benefits, the running of annual surpluses hinders the pace at which living standards can rise, as exports are turned into foreign exchange reserves rather than used to finance imports or public expenditure.[5] In addition, stockpiling reserves and investing in comparatively low-yield foreign debt instruments incurs significant opportunity costs. This

[1] Wayne M. Morrison (2013): "China's Economic Rise: History, Trends, Challenges, and Implications for the United States." *Congressional Research Service*, working paper 4 March 2013: 3.
[2] Yuqing Xing and Guanghua Wan (2006): "Exchange Rates and Competition for FDI in Asia." Journal compilation for Blackwell Publishing: 419-34.
[3] William R. Cline and John Williamson (2011): "Estimates of Fundamental Equilibrium Exchange Rates, May 2011." Peterson Institute for International Economics policy brief #11-5: 8.
[4] Joshua Aizenman and Jaewoo Lee (2005): "International Reserves: Precautionary vs. Mercantilist Views, Theory and Evidence." *Santa Cruz Center for International Economics*, working thesis May 2005: 3.
[5] Thomas I. Palley (2005): "External Contradictions of the Chinese Development Model: Export-led Growth and the Dangers of Global Economic Contraction." *Political Economy Research Institute at University of Massachusetts Amherst*, working paper # 101: 5.

thesis will analyze in depth the effects that the current account surplus has on the Chinese economy, building on the work of scholars such as Lardy,[6] Palley,[7] Ho and McCauley.[8] The other side of the undervaluation of the RMB is increased export volumes and inward FDI. Foreign firms are enticed by the cost-effectiveness caused in large part by a highly competitive exchange rate. Inward FDI when coupled with the appropriate policies leads to significant positive "spillovers" for the domestic economy in the form of technological absorption and "learning by doing." This thesis will attempt to draw a connection between the undervalued exchange rate and improvements in the production capacity and sophistication of Chinese industry, arguing that exports and inward FDI has played a significant role.

This thesis will analyze China as a *crucial case*. While the use of foreign exchange intervention by developing economies as part of a broader growth strategy is not original, no other potential case provides an adequate comparison. China's size, legacy of central planning and the rapidity of its transition from autarky to the largest exporting country in the world makes it exceptional. Other countries which have used a similar a exchange rate policy and have used exports to drive growth such as Japan and South Korea do not share enough similarities with China to make useful comparisons. Rather than compare China to other empirical cases I will analyze it as a crucial case and discuss it within a theoretical framework.

My research is question is: why do Chinese policymakers intervene in foreign exchange markets to maintain an undervalued RMB? My **dependent variable** is the policy of maintaining an undervalued exchange rate. I will test two **independent variables**, the current account

[6] Nicholas R. Lardy (2012): *Sustaining China's Economic Growth after the Global Financial Crisis*. Washington D.C.: Peterson Institute for International Economics; (1995): "The Role of Foreign Trade and Investment in China's Economic Transformation." *The China Quarterly*, No.14: 1065-1082.
[7] Palley (2005).
[8] Corrinne Ho and Robert N. McCauley (2009): "The Domestic Financial Consequences of Reserve Accumulation: Some Evidence from Asia." *Exchange Rate, Monetary and Financial Issues and Policies in Asia*. Edt. by Rajan, Thangavelu and Parinduri. Singapore: World Scientific.

surplus and increased exports and inflows of FDI. Both independent variables are products of the dependent variable. More specifically, I will focus on **process-tracing**, developing a causal chain between independent and dependent variables. I plan to discuss these variables through the lens of two theories: the neoclassical theory of economics[9] and the new theory of endogenous growth.[10] They offer two competing frameworks for China's policy paradigm, with the first emphasizing short-term efficiency and utility maximization and the second emphasizing the role of the state and long-term economic viability, as well as the distributional aspects of trade. A critical analysis of Chinese exchange rate policy can be useful for theory testing. The drawbacks of these policies could preclude the ability of certain theories to explain the Chinese model. Concurrently, the advantages of these policies, if fitting into another theoretical framework, could help explain the persistence of this model. For example, the opportunity cost of maintaining excessive foreign currency reserves and investing heavily in low-yield US treasury bills may indicate that neoclassical economics does not adequately explain China's trade paradigm, as these policies do not appear to maximize absolute gains. Rather, it may indicate that China pursues trade policy within a statist, long-term perspective, emphasizing relative gains and increasing leverage over its rivals. There is also evidence that China's exchange rate strategy, despite all of its inefficiencies, is helping the country move higher up the value-added production chain to produce sophisticated products which can compete on international markets. While eschewing short-term gains in living standards, such a set of policies may be setting the country on the path to long-term prosperity.

[9] Geoffrey Brennan and Michael Moehler (2010): "Neoclassical Economics" in *Encyclopedia of Political Theory*, ed. Mark Bevir. New York: Sage Publications: 946-51.
[10] Robert Gilpin (2001): *Global Political Economy: Understanding the International Economic Order.* Princeton: Princeton University Press: 112-7.

I will rely primarily on two sources: quantitative empirical data and qualitative analyses of empirical data and theory. My quantitative data concerns economic indicators such as exchange rate movements, FDI volumes and their relation to exchange rate movements, current account balance, foreign currency reserves and volume of sterilized domestic currency, share of imports and exports to GDP, and rate of investment in foreign securities as opposed to domestic securities. These data sets are available from such sources as the World Bank, the Organization for Economic Cooperation and Development, and the Bureau of Economic Research. Much of this data will be used to determine the overall success of China's growth model. For example, analysis of foreign exchange markets helps to determine the opportunity cost of maintaining large foreign currency reserves, and analysis of the interest rate on domestically-issued bonds determines the effectiveness of sterilizing operations. Furthermore, comparing the rate of return on foreign and domestic securities, as well as the volume of investment, is useful to determining the efficiency of China's emphasis on investing abroad rather than domestically. Additionally, I will consult regression analysis on particular variables, such as the correlation between exchange rate movements, inward FDI, and export volumes.

There are several limitations which shall be addressed. The first is that, because of lack of time and expertise, a deep econometric analysis of the exchange rate of the RMB was not possible. Rather I relied on literature produced by experts on the topic, including Cline and Williamson[11] and Cheung, Chinn, and Fujii.[12] In addition, this thesis only briefly mentions China's accession to the WTO and its effect on trade policy. Such a complex topic deserves

[11] William R. Cline and John Williamson (2007): "Estimates of the Equilibrium Exchange Rate of the RMB: Is there a Consensus and, If not, Why not?" *The Peterson Institute for International Economics.* Iie.com, "Speeches and Papers," accessed 10 April 2013; (2011): "Estimates of Fundamental Equilibrium Exchange Rates, May 2011."

[12] Ying-Wong Cheung, Menzie D. Chinn, and Eijii Fujii (2007): "The Overvaluation of Renminbi Undervaluation." CESifo working paper #1918.

much more discussion than could realistically be provided here. Lastly, analysis of Chinese policymaking inherently requires a measure of speculation. The Chinese Communist Party and government bureaucracy are notoriously opaque, and reliable, transparent information on decision-making in the upper rungs of the state is difficult to obtain. For this reason I relied on statistical data and literature provided by scholars such as the aforementioned Lardy, and Rodrik.

While existing literature on China's spectacular growth and controversial exchange rate policy is extensive, this thesis takes a unique approach to these issues. The first is by taking a critical stance on foreign exchange intervention and current account surplus, highlighting the detrimental effects that these have on the domestic economy, rather than focusing on how it impacts China's foreign competitors. In addition, this thesis views the Chinese exchange rate, export and FDI policies through a state-centered perspective. Most analysis of the Chinese economy is either through a neoclassical economic lens which lacks long-term perspective,[13] or is conducted through a political lens which fails to make a deep economic analysis and often focuses on how Chinese policy affects its competitors, particularly the United States.[14] This thesis attempts to bridge the gap between these two disciplines, analyzing Chinese economic policy via an integrated approach which considers economic and political factors. In addition, it focuses on the relationship between the exchange rate and long-term economic development, a topic not extensively analyzed.

Chapter one of this thesis analyzes exchange rate policy through a critical lens, highlighting its resulting distortions and inefficiencies. It discusses in depth the first independent variable, the current account surplus. Chapter two focuses on the second independent variable,

[13] Ho and McCauley.
[14] G. John Ikenberry (2008): "The Rise of China and the Future of the West: Can the Liberal System Survive?" *Foreign Affairs*, Vol. 87, No. 1: 23-37.

increases in exports and inward FDI stemming from China's exchange rate policy. It also places these policies within a theoretical framework. In addition, a post-script at the end of this thesis addresses recent questions surrounding China's economic policy, including indicators that policymakers may be allowing domestic consumption to rise at a more accelerated pace.

Chapter 1: Foreign Exchange Intervention and Current Account Surplus

The Chinese government uses a variety of policy instruments in order to boost the competitiveness of its export industries. Each of these is designed to maximize export volumes while keeping import volumes low. This thesis will focus on the most significant tool which policymakers have at their disposal: the exchange rate. While endogenous factors such as China's labor surplus and exogenous factors such as the low U.S. savings rate also contribute to China's export competitiveness and persistent current account surplus, the exchange rate is a highly salient economic tool which is used heavily by monetary authorities.

The maintenance of a weak renminbi (RMB)[15] is integral to the export-led growth paradigm because it makes Chinese goods relatively cheap on the international market. American consumers, for example, can get more for their relatively strong dollars when purchasing goods produced in China. A weak currency also gives an added impetus for multinational corporations to open production in China. As the RMB is competitive in comparison to the domestic currencies of most multinationals, capital purchased in China as well as wages paid to Chinese workers are less expensive in real terms. This keeps FDI flowing in, and capital is funneled into export-oriented industries. In addition, maintenance of a weak exchange rate discourages the import of finished manufactured goods. Just as Chinese goods are cheap on foreign consumer markets, foreign goods are expensive on Chinese consumer markets. This contributes to China's large annual current account surplus, as most imports are low-value

[15] A brief clarification on the proper name of China's currency is needed. "Renminbi" (which literally means "People's Currency") is the formal name most often used by Chinese officials to refer to the currency. The term "yuan" refers to a single unit of currency, similar to "dollar" in American English. The two terms are often used interchangeably. For this thesis, however, I have chosen to use renminbi because of its official use.

commodities and components rather than high-value finished goods. Therefore the value of exports perennially exceeds that of imports.

There are two primary ways in which Chinese policymakers regulate the exchange rate of the RMB. The first is through formal intervention in the foreign exchange market. This means direct purchases of foreign currency in exchange for RMB, essentially raising demand for foreign currency and flooding the market with its own. This is done in order to keep the exchange rate competitive, especially in comparison to the US dollar. The second is a *product* rather than a primary cause of China's current account surplus. That is the sterilization of capital inflows. This involves the purchase of foreign exchange as it flows into the country, again for the purpose of keeping the RMB weak. Specifically, it means printing large amounts of RMB, which are then exchanged for foreign currency. In order to prevent an inflationary boom produced by increased the printing, the People's Bank of China (PBC) issues "sterilization bills," or PBC bills, in order to remove excess RMB from domestic circulation. Both foreign exchange market intervention and sterilization will be discussed at length in this chapter.

1.1 Foreign Exchange Intervention

Foreign exchange intervention is the process by which the PBC maintains an undervalued exchange rate for the purpose of giving its exports an added boost in competitiveness. It does this in two ways. One is direct intervention in foreign exchange markets, buying foreign currency and selling RMB. The other is sterilization, by which the central bank buys up foreign currency flowing into the country in order to flood the market with RMB while at the same time taking measures to control inflation. These measures keep the RMB competitive relative to other

currencies, making Chinese exports relatively cheap for foreign consumers while making exports relatively expensive for Chinese consumers, resulting in a persistent current account surplus. In addition, the competitive exchange rate keeps the rate of inward FDI high compared to other export competitors such as South Korea and Taiwan.

China uses an exchange rate arrangement known as a "basket peg," meaning that it pegs its currency to a weighted basket of foreign currencies. Members of this basket include the dollar, euro, yen and Korean won, among others. It is widely assumed that the dollar carries the most weight of these currencies, as China is invested heavily in dollar-denominated assets and does not want its exchange rate movements to diverge significantly from those of the dollar. The RMB was pegged against the dollar directly until 2005, when the basket peg was announced.[16] A basket peg is a comparably more flexible arrangement than a direct peg because the currency moves against several foreign currencies, rather than one. The exact composition of the basket has never been officially specified. In 2010 the Wall Street Journal speculated that there were at least 12 currencies in the basket, and that "there's no guarantee it will pay much heed to fluctuations apart from those of the greenback in setting the value of its currency, analysts say."[17] Ting Lu, a Bank of America—Merill Lynch economist, estimated that the dollar constituted 40.3 percent of the basket, followed by 16 percent of the euro, 12.3 percent for the Japanese yen, and 8.3 percent for the South Korean won.[18] These statements reflect the preeminence of the dollar in the thinking of Chinese economic policymakers. The 2005 shift to the comparatively

[16] Yumi Kuramitsu and Jake Lee (2005): "China Ends US Dollar Peg, Shifts to Currency Basket." Bloomberg.com. Accessed 13 April 2013.
http://www.bloomberg.com/apps/news?pid=newsarchive&sid=a04ESaRrTpcU.
[17] Chris Oliver (2010): "Chinese yuan likely tracking 15 currencies, Merrill says." The Wall Street Journal, articles.marketwatch.com. Accessed 13 April 2013.
http://articles.marketwatch.com/2010-06-28/markets/30789421_1_currency-yuan-trading-band.
[18] Ibid.

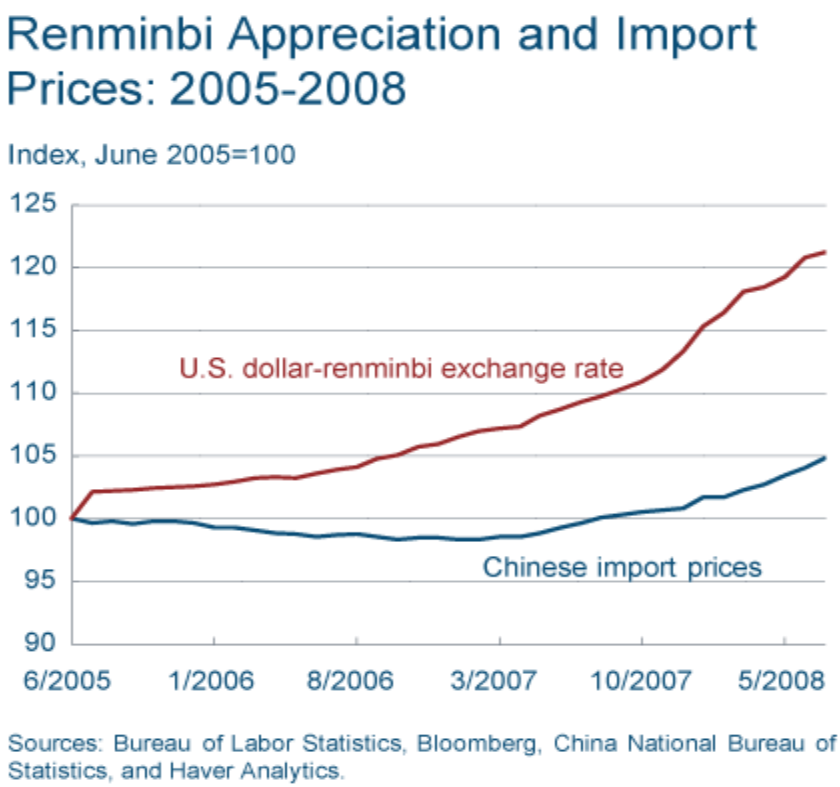
liberalized basket peg corresponded with a 2.1 percent revaluation of the RMB, from 8.27 to 8.11 per dollar. While China did agree to this limited revaluation, the RMB remains extremely competitive on the international market. Furthermore, contrary to the perceptions of some it is unlikely that China chose to revalue in response to external pressure. As of 10 May 2013 the official exchange rate stood at 6.16 RMB per dollar.[19] This represents a substantial nominal appreciation of roughly 25 percent. However, the real exchange rate of the RMB, which will be discussed shortly, has not appreciated as quickly.

Exactly by how much the RMB is undervalued is subject to debate. Estimates range from 10% to 60%, although almost all observers agree that China intervenes in the foreign exchange market in order to keep the RMB undervalued to some degree.[20] Cheung, Chinn, and Fujii run a series of empirical regressions on the precise undervaluation of the RMB. They find that in almost every sample the RMB is undervalued, but in no case is the deviation statistically significant.[21] They find "no evidence supporting the claim that the RMB is significantly undervalued."[22] In July, 2012 the IMF issued a statement calling the RMB "moderately undervalued," backing off from its previous line that it was "substantially undervalued," owing to recent reductions in its current account surplus and a moderate nominal appreciation in the exchange rate.[23] Cline and Williamson find a more substantial undervaluation, however, calling the RMB "radically undervalued."[24] They call for an appreciation against the dollar of between 24.2 and 28.5 percent, arguing that while the RMB has appreciated nominally in recent years, in

[19] "Chinese Yuan." *Tradingeconomics.com*. Accessed 11 May 2013. http://www.imf.org/external/pubs/ft/fandd/basics/current.htm.
[20] Cline and Williamson (2007).
[21] Cheung, Chinn, and Fujii, 1.
[22] Ibid, 33.
[23] Simon Rabinovitch (2012): "IMF says renminbi 'moderately undervalued." Financial Times, ft.com. Accessed 16 April 2013.http://www.ft.com/cms/s/0/370ef804-d62c-11e1-b547-00144feabdc0.html#axzz2Qc6eTKIt.
[24] William R. Cline and John Williamson (2011): 8.

real terms there has been almost no change, owing to the low levels of domestic inflation in China.[25] The real exchange rate is a more useful measure than the nominal rate because it incorporates domestic production costs, a crucial component of export prices. While the RMB nominally appreciated by over 20 percent against the dollar from the announcement of the basket peg and the middle of 2008, the dollar price of Chinese imports in the U.S. rose by less than 5 percent, demonstrating that the RMB remained highly competitive (see figure 1).

Figure 1



Source: Federal Reserve Bank of Cleveland, "Pass-through and the Renminbi's Appreciation"

[25] Ibid.

Xing and Wan find that currency undervaluation has had a significant impact on the competitiveness of Chinese exports. This happens in large part for the aforementioned reason: that a weak currency increases the cost-competitiveness of exports. However, a competitive exchange rate also incentivizes FDI, much of which has come from Japan and the United States. This occurs because a weaker domestic currency reduces production costs for foreign investors, measured in foreign currency.[26] Devaluation reduces the cost of locally purchased inputs as well as the costs of the production process itself, including labor. Foreign investors receive a higher return for their relatively overvalued foreign currency when investing in China because of its higher cost-effectiveness, which comes in part from the competitive rate of the RMB. This topic will be discussed in detail in chapter two.

While shown to increase inward FDI, undervaluation of the RMB has negative effects on domestic consumers. A weak currency makes imports more expensive, hurting purchasing power. More importantly, it means that industries focus production on goods for export to foreign markets, neglecting consumers at home. This is beneficial for the purpose of maintaining a massive annual current account surplus and stockpiling foreign exchange reserves, but it slows the rise in domestic living standards. According to the OECD, at the end of 2011 household final consumption--a measure of the market value of goods and services consumed by households--as a share of GDP stood at only 34 percent, having declined from 42 percent in 2003.[27] This number is slightly more than half that of the United States. Consumption is generally taken as one driver of growth alongside investment and exports (see figure 3, page 40). While consumption has risen in gross terms, it has just kept pace with GDP growth, indicating that

[26] Xing and Wan, 420.
[27] "Household Final Consumption Expenditure." Theworldbank.org. Accessed 11 May, 2013. http://data.worldbank.org/indicator/NE.CON.PETC.ZS?page=1.

China's economy is still heavily oriented toward exports. Firms could increase their profits by producing for the domestic market as well as for export markets. A more balanced exchange rate means not only finished goods but raw materials and components would be cheaper to import as well. Firms could use these cheaper imports as inputs for finished goods for domestic consumers. A revalued exchange rate would also erase the persistent current account surpluses that this thesis argues are wasteful and suboptimal.

1.2 Current Account Surplus

Each year China runs a massive *current account surplus*. Current account balance is defined by the IMF as "the difference between the value of exports of goods and services and the value of imports of goods and services."[28] This is sometimes referred to as *trade balance*. Put simply, a country in current account surplus exports more than it imports. This is partially the product of a growth strategy which emphasizes export volumes. Policymakers attempt to export as much as possible while importing as little as possible. This manifests itself in a persistent state of surplus. The surplus reached 10.1 percent of GDP in 2007.[29] It has declined in the years following the financial crisis, as demand for imports has shrunk in the recession-hit Western economies. However, it was still at a relatively large 2.6 percent in 2012.[30] Palley lists the advantages of the export-led growth paradigm: "export demand comes from outside the economic system and therefore constitutes an injection of demand into the Chinese economy.

[28] Atish Ghosh and Uma Ramakrishnan (2012): "Current Account Deficits: Is there a problem?" *IMF.org*. Accessed 11 May, 2013.
http://www.imf.org/external/pubs/ft/fandd/basics/current.htm/.
[29] "World Bank Data: Current Account Balance." Data.worldbank.org. Accessed 1 May 2013.
http://data.worldbank.org/indicator/BN.CAB.XOKA.GD.ZS.
[30] "China's Current Account more balanced in 2012." Chinadaily.com. Accessed 14 May 2014.
http://www.chinadaily.com.cn/china/2013-02/07/content_16209718.htm.

This demand stimulates production and employment, which in turn generates additional demand from spending out of induced incomes."[31] Exports prop up labor market participation as well as contribute to rising production capacity.[32]

However, most mainstream observers find this practice suboptimal because it does not allow for the efficient allocation of capital, as defined by the funneling of investment toward the highest yielding assets. Policymakers invest much of the massive inflow of foreign currency into securities in export markets, most notably the U.S. This involves the purchase of government as well as private debt instruments. Most of these securities are dollar-denominated. This means that when the PBC buys securities it is putting upward pressure on the dollar, helping to maintain the competitive exchange rate of the RMB. This sustains consumption of Chinese exports through exchange rate imbalance as well as through investment in the U.S. economy itself. The inflow of Chinese capital into the U.S. fuels economic growth, which means more consumption of Chinese imports. Much of the growth in credit in the U.S. goes to the consumption of consumer goods, many of which are produced in China. Thus every year China runs a current account surplus and the U.S. runs a deficit. This results in Chinese investment of its surplus in dollar securities, which reinforces the surplus-deficit relationship. In essence, China finances the U.S.'s persistent current account and fiscal deficit.

This relationship is beneficial for China in that it maintains foreign consumption of Chinese-produced goods. It does result in a suboptimal allocation of capital, however. Dollar-backed securities tend to carry very low interest rates. The prime examples are U.S. Treasury Bills, the debt instrument that the U.S. government uses to finance its fiscal deficit. As of 11

[31] Palley, 13.
[32] An in-depth analysis on the domestic political economy implications of Chinese exchange rate policy is not possible here. However, political scientists place a major emphasis on domestic political factors. For analysis of Chinese politics, please refer to: Tony Saich (2010): *Governance and Politics of China*, New York: Palgrave MacMillan.

April 2013 the yield on 10-year treasury bonds stood at 1.82 percent, the 20-year yield at 2.62 percent, and the 30-year yield at 3.01 percent.[33] These numbers are extremely low compared to the yield the PBC could receive in other countries, or by investing domestically. At the end of March 2013 the annual rate of inflation stood at 1.5 percent in the U.S.[34] This means that the rate of return on 10-year treasury bills is barely positive. As inflation monetizes almost all of the interest earned on the purchase of treasury bills, the PBC's return is essentially negligible when it invests in this instrument. The stability argument is often presented when analyzing China's decision to invest in U.S. treasuries. While they carry a low rate of return, China must invest its surplus somewhere, and these instruments are seen as highly credible.

By contrast, domestic investments in China often carry much higher rates of return. According to neoclassical theory investment should flow to where the rate of return is highest, as investors are rational actors to seeking to maximize personal utility. Capital flows between the U.S. and China are not in line with theory, as capital has been shown to flow to where returns are lowest, not highest. Palley refers to this as an "anomalous situation" where the poor country loans money to the rich country.[35] The average 10-year yield on Chinese treasury bills averaged 3.6 percent over 2005-2013, roughly double that of U.S. treasury bills. In addition to government debt instruments, private investment indicators show significantly higher rates of return in China as well. The PBC's benchmark interest rate as of June 2012 stood at 6 percent.[36]

[33] "Resource Center: Daily Treasury Yield Curve Rates." U.S. Department of the Treasury. Accessed 13 April 2013. http://www.treasury.gov/resource-center/data-chart-center/interest-rates/Pages/TextView.aspx?data=yield.
[34] "Economic News Release: Consumer Price Index Summary." *Bureau of Labor Statistics*. Accessed 23 April 2013. http://www.bls.gov/news.release/cpi.nr0.htm.
[35] Palley, 5.
[36] "PBC Base Interest Rate." Global-Rates.com Accessed 13 April 2013. http://global-rates.com/interest-rates/central-banks/central-bank-china/pbc-interest-rate.aspx.

From 1996 to 2013 average rates stood at 6.44 percent and never dipped below 5.31 percent.[37] By contrast, the Fed's benchmark rate has stood steady at .25 percent since the end of 2008.

This data indicates that the PBC would receive much higher rates of return if it invested China's current account surplus domestically rather than in low-yield dollar securities. The reason that it has chosen not to do so, presumably, is because Chinese policymakers do not want a boom in domestic consumption and imports. Increased investment within China will undoubtedly lead to consumption-enhancing growth, and thus, inflation. Higher wages and prices coupled with upward pressure on the exchange rate would erode the country's competitiveness, putting the viability of export industries in jeopardy.

1.3 Foreign Currency Reserves

Foreign currency reserves are primarily a by-product rather than an objective of the export-led growth paradigm. Persistent current account surpluses manifest themselves as an influx of foreign reserves. Between 1994 and 2012, Chinese foreign currency reserves rose from $36.7 billion to $2.17 trillion.[38] On average, reserves increased by over $266 billion annually. Hu asserts that by the end of 2009 Chinese foreign reserves accounted for 31.9 percent of the world's total reserves.[39] To a certain extent the stockpiling of reserves is an end unto itself, as "high reserves may be viewed as a sign of strength or increased creditworthiness to an

[37] "China Interest Rate." Tradingeconomics.com. Accessed 13 April 2013. http://www.tradingeconomics.com/china/interest-rate.
[38] "Monthly Monetary and Financial Statistics: Reserve assets." Stats.oecd.org. Accessed 15 April, 2013. http://stats.oecd.org/Index.aspx?DatasetCode=MEI_FIN#.
[39] Yu-Wei Hu (2010): "Management of China's Foreign Exchange Reserves: a case study on the state administration of foreign exchange (SAFE)." European Commission, economic paper #421: 5.

economy."[40] This enhances the country's ability to obtain external financing at low rates and provides a "war chest" to maintain a stable exchange rate during a balance-of-payments crisis. This became especially significant for Asian economies after the crisis of 1997-98 when the lack of adequate reserves precluded the defense of exchange rates. There is no doubt that Chinese policymakers consider this when tailoring their strategy toward running current account surpluses.

Despite these advantages, the accumulation of foreign currency reserves entails significant opportunity costs. The risk of *foreign exchange valuation changes* is significant to a country such as China which holds such a large stockpile of reserves. For example, if the dollar depreciates, the value of Chinese assets held in dollars depreciates as well. Holding large reserves in dollars and dollar-denominated securities is only profitable insofar as the dollar is appreciating. According to Ho and McCauley, each 1 percent decline in the value of foreign assets would imply a wealth loss of .4 percent of GDP.[41] This puts even more pressure on the PBC to intervene in foreign exchange markets, as they must keep the dollar strong relative to the RMB in order not to see a depreciation in the value of their assets.

One way in which central banks can hedge against these potential losses is by diversifying their foreign exchange portfolio. By investing in currencies that move against the dollar, a depreciation of the dollar will not cause a significant loss in asset value. If dollar securities lose in value, euro or British pound securities will increase in value. The State Administration of Foreign Exchange, the official body managing China's foreign reserves, does not disclose data on the composition of its foreign reserves. However, Hu asserts that "market

[40] Ramkishen S. Rajan and Sunhil Rongala (2008): *Asia in the Global Economy: Finance, Trade, and Investment*. Singapore: World Scientific: 5.
[41] Ho and McCauley, 135.

consensus is that by type of currency 60-70% of reserves are invested in US dollars."[42] Other currencies significant to the portfolio are the euro and British pound. This means that China's reserves are very heavily invested in the dollar and attempts at hedging are not significant. A dollar depreciation would have serious negative effects on the PBC's balance sheet. This relationship is somewhat of a catch-22, as China must continue to invest in U.S. treasury bills and dollar securities in order to prevent dollar depreciation, which becomes increasingly costly the more heavily China is invested in dollar assets.

Beyond the valuation risk of foreign assets, it should be mentioned again that excessive Chinese investment in dollar-denominated assets does not maximize the rate of return. Neoclassical theory would tell us that economic actors are rational and self-interested, and that free trade occurs out of the desire to maximize absolute gains.[43] Thus capital should flow to where its rate of return in highest. In the China-U.S. relationship the opposite occurs. China does not invest in U.S. securities in order to maximize returns, although dollar assets are viewed as being safer than domestic investments in China. The PBC invests so heavily in dollar assets in order to keep its export machine running. The selling of RMB in exchange for dollars keeps the RMB relatively weak, therefore maintaining competitiveness through exchange rate undervaluation. In addition, Chinese capital investment in the U.S. props up its growth rate. As a major consumer market, U.S. growth is integral to maintaining consumption of Chinese exports.

[42] Hu, 8-9.
[43] Gilpin, 78.

1.4 Sterilization

Maintaining an undervalued exchange runs the risk of accelerating inflation. This occurs because the monetary authorities must print large amounts of domestic currency to maintain its weak exchange rate. According to Ho and McCauley, "even if the nominal exchange rate appreciation is successfully resisted, the real exchange rate would still appreciate as a result of rising inflation…external surpluses expand the domestic money supply, increase spending, and drive up prices until the surpluses disappear."[44] When foreign currency flows into the country the central bank prints money to buy it up. This risks inflationary consequences if the newly printed money is allowed to circulate. Inflation increases domestic consumption and can cause an import surge, both of which are antithetical to China's current growth paradigm. Various measures have been taken by the Chinese authorities to curb inflation: instructing local governments to limit investment in infrastructure, capping the amount that can be loaned by banks, raising reserve requirements to drain liquidity, and undertaking sterilizing operations.[45]

The primary tool used by policymakers to prevent inflation, thereby suppressing domestic consumption, is the *sterilization* of currency inflows. When firms export goods from China they receive foreign currency as payment. Firms then exchange it at the People's Bank of China for RMB. The PBC has a direct interest in buying up this foreign currency, as part of China's growth strategy is maintaining a weak RMB in comparison to competing currencies. Greenwood explains:

> The overall surpluses in the balance of payments require the PBC, China's central bank, to intervene almost daily and buy any excess foreign currency on the Shanghai foreign exchange market in order to hold down the value of the RMB. Based on 250 trading days per year, the PBC's foreign exchange purchases exceeded $1.8 billion per day in 2007. In

[44] Ho and McCauley, 121.
[45] Palley, 8.

> making these purchases, the PBC typically credits the reserve accounts of mainland banks with an equivalent amount of RMB, which in the normal course of events would cause China's money supply to accelerate (as in 2002–03), and this in turn would normally lead to inflation. The inflation—if permitted—would at some point render China uncompetitive at the prevailing exchange rate.[46]

As large amounts of foreign currency pour into the country as a product of the export-led growth model, the PBC issues large amounts of RMB. This is potentially problematic, as expanding the money supply can have inflationary consequences. Higher inflation leads to higher consumption as well as a surge in imported goods. This would diminish China's competitiveness by raising its real interest rate. Both consequences are antithetical to the export-led growth strategy, which involves the running of an annual current account surplus achieved by maintaining competitive advantage over other exporting countries. In order to prevent the inflow of foreign currency from leading to an increase in the rate of inflation, the PBC engages in the process of sterilization.

Sterilization takes RMB out of circulation through the sale of bonds referred to as *PBC bills*. These were first issued in 2003.[47] The PBC sells bonds to domestic investors in exchange for RMB. This has the effect of offsetting the inflationary tendency of foreign currency inflows. By simultaneously issuing RMB and removing RMB from circulation the money supply remains relatively stable. This meets the objective of preventing an inflationary boom in consumption and imports. Chinese inflation averaged less than 2 percent annually from 2002 to 2006.[48] However, consumer price inflation began to accelerate in 2007, and other than in the deflationary year of 2009 has not dipped below 3.3 percent annually since then.[49] This indicates that the

[46] John Greenwood (2008): "The Costs and Implications of PBC Sterilization." *Cato Journal*, vol. 28, 2: 208.
[47] Ho and McCauley, 128.
[48] Ibid, 130.
[49] "World Bank: Inflation, consumer prices." Worldbankdata.org. Accessed 30 April 2013. http://data.worldbank.org/indicator/FP.CPI.TOTL.ZG/countries.

success of operations may be eroding. In addition, sterilization can have potentially negative consequences as well.

The first drawback associated with sterilization is that it can have negative balance sheet effects for the PBC. The PBC pays an interest rate on each bill that it issues. As more and more bills are issued in correspondence with foreign currency inflows, the aggregate interest paid by the PBC increases. Greenwood demonstrates empirically that the level of reserve requirements plus sterilization bills outstanding roughly equal the PBC's foreign exchange holdings: "under current operating procedures the value of sterilization instruments outstanding increases roughly in line with the level of foreign exchange reserves."[50] The annual current account surplus brings more and more foreign exchange into the country. In order to offset these inflows the PBC must take measures to either increase reserve requirements or issue more PBC bills. Raising reserve requirements soaks up excess liquidity, staving off inflation. However, it can constrain growth by limiting the amount of funds that banks have available to loan. By the end of 2010 the required reserve ratio stood at 18.5 percent, up from 6 percent at the end of 2003.[51] Foreign reserve inflow has mostly been offset by PBC bill issuance, the volume of which has had to steadily rise along with current account surpluses. This means that the interest payments of the PBC have risen as well.

Greenwood refers to sterilization as "delaying the process of inflation."[52] He asserts that central banks tend to halt the process of sterilization when the interest rate on sterilization bills increases significantly to the point that the bank is incurring significant losses on its balance sheets. As the foreign currency it absorbs in exchange for the RMB that is in turn sterilized is

[50] Greenwood, 209.
[51] Nicholas R. Lardy (2012): 98.
[52] Greenwood, 211.

mostly invested abroad, the relationship between the interest rate paid on sterilization bills and the yield earnings on foreign assets—mostly U.S. treasuries—is crucial to the maintenance of the process. The rate of return on foreign assets must be higher than the rate of interest paid for operations to be sustainable. Ho and McCauley refer to this as "quasi-fiscal cost," as it can entail the exchange of high-yield domestic assets for low-yield foreign assets, as the foreign exchange purchased by the central bank is invested abroad.[53]

The cost of the process can be determined by subtracting medium-term yields of U.S. treasuries from short-term domestic interest rates. Currently the process has not been costly because the authorities set domestic interest rates at administratively low levels.[54] Lardy finds that at the end of 2010 there were RMB4 trillion outstanding in PBC bills, carrying an average interest rate of 1.692 percent on three-month bills and 2.136 percent on one-year bills.[55] The three-month rate is slightly lower than the current 10-year yield on U.S. treasury bills, which is 1.82 percent, and one-year rate is not significantly higher. This means that as of now the actual loss incurred by the PBC is very small. However, the opportunity cost of forgoing domestic investment is significant. In addition, liberalization of domestic interest rates could cause the average yield on PBC bills to rise. This is coupled with the fact that returns on dollar securities will likely remain stable in the future. If Chinese authorities raise interest rates in order to prevent domestic overheating, the loss incurred on the issue of sterilization bills could rise. At this point the PBC could decelerate sterilizing operations, allowing inflation to rise. The massive amounts of RMB held in reserve, once unleashed, could cause inflation to rise faster than the authorities can control.

[53] Ho and McCauley, 136.
[54] Lardy (2012): 97.
[55] Ibid.

Furthermore, sterilization implies an implicit tax on domestic banks. As demonstrated previously, the interest rate paid by the PBC is extremely low. Banks are required to hold PBC bills, which is one mechanism which prevents losses on the central bank's balance sheet. The implicit tax is the opportunity cost of purchasing these bills, as the rate of return on loans is much higher than that of PBC bills. Lardy demonstrates that the average interest rate on commercial bank loans was 6.11 percent, more than 4 percent higher than the average rate on PBC bills.[56] While one must consider that these instruments are relatively risk-free compared to commercial loans, the loss incurred by forced investment in PBC bills cannot be ignored. Lardy estimates that in 2010 the total opportunity cost incurred by commercial banks was .4 percent of GDP.[57]

Sterilization constitutes an implicit tax on banks in a secondary way as well. The required reserve ratio has been raised significantly since 2003, from 6 percent to 18.5 percent by the end of 2010.[58] Lardy calculates that the opportunity cost associated with the increase in reserve ratios was as much as 1 percent of GDP in 2010.[59] By increasing the reserve ratio, thereby reducing the amount of money available for banks to lend, interest rates are kept low. This allows the PBC to sterilize cheaply. It has negative effects on domestic growth however. Rather than allow banks to loan out their capital stocks, fueling investment, and presumably, consumption, they are forced to keep large amounts of capital with the central bank in the form of sterilization bills and required reserves. This keeps the capital idle, thereby constraining potential domestic growth.

[56] Lardy (2012): 98.
[57] Ibid.
[58] Ibid.
[59] Ibid.

According to Lardy, domestic lending rates would be significantly higher if not for excessive reserve requirements.[60] Fortunately for banks, however, the Ministry of Finance also places a premium on bank profitability. It has found a way to balance this with the maintenance of low domestic interest rates: shift the burden onto the depositor. To quote Lardy, "the ceiling that banks are allowed to pay on deposits is quite low, so low that for one-year deposits the average real interest rate during the years 2004 through 2010 was negative."[61] The interest rate of deposits in 2011 was 3.5 percent.[62] That same year the rate of inflation was 5.4 percent.[63] This means that depositors actually lost on average 1.9 percent of their deposits by placing them in banks, with that being the spread between the rate of inflation and the interest they received. Because of heavy state control over the domestic financial sector citizens have no other option than to place money in local banks. This allows the PBC to sterilize cheaply without jeopardizing the viability of the domestic banking sector. However, it implies an implicit tax on depositors, which are primarily the ordinary citizens which would be drivers of consumption-led growth. This constrains their capacity for future consumption, as they earn a lower rate on deposits than they would under a market-determined interest rate regime.

Thus we see two by-products of China's maintenance of an undervalued exchange rate, both of which constrain domestic growth. The first is the suppressed lending rate caused by excessive reserve requirements and the mandatory purchase of low-yield sterilization bills. This is done to keep interest rates low and allow the PBC to undertake cheap sterilization activities. In order to prevent this from threatening the profitability and stability of the banking sector, interest rates on deposits are held extremely low, to negative real levels. This puts a tax on

[60] Ibid, 97.
[61] Ibid, 98.
[62] "World Bank Data: Deposit Interest Rate." Worldbankdata.org. Accessed 30 April 2013. http://data.worldbank.org/indicator/FR.INR.DPST/countries.
[63] "World Bank Data: Inflation, consumer prices."

depositors, which constrains their ability to consume. These are two very evident ways in which the authorities have sacrificed optimal domestic growth rates and rises in living standards in exchange for maintenance of an undervalued exchange rate, which is integral to the maintenance of high growth in its export industries. A narrow, microeconomic perspective would find serious fault with this set of policies, as they entail opportunity cost and inefficient allocation of capital. By contrast, the next chapter will discuss these policies within a broad perspective, highlighting the benefits of an undervalued RMB, particularly its positive effects on exports and FDI attraction, both of which result in enhanced technology and production capacity in Chinese industry. This result has positive implications for long-term growth.

Chapter 2: The Effects of the Exchange Rate on Exports and Inward FDI

The previous chapter established that the policy tools used by China to conduct its export-led growth strategy result in inefficiencies. According to mainstream economic theory, with its emphasis on absolute gains, perfect competition and efficient outcomes, the results of this policy paradigm are suboptimal. However, a broader perspective can illuminate more positive results. This chapter will analyze in depth our second independent variable: enhanced export industries and FDI. More recent economic theories, particularly those which emphasize technological development and strategic trade policy, are more useful than neoclassical economics for understanding this aspect of the China case. These theories focus on the role of the state and the distributional implications of trade relations, which are especially significant when analyzing trade from an international relations perspective. As China is a late developing country, theories of state-driven "catch-up" growth are highly relevant.

The *New Endogenous Growth Theory* fills a gap in trade theory by incorporating technology and knowledge into the growth model. Whereas liberalism views land, labor and capital as the factors of production, treating technological advances and increased "know-how" as outside the realm of economics; i.e. *exogenous*, endogenous growth theory views this aspect of growth as an additional factor of production. Gilpin points out: "knowledge of how to do or make things can raise the productivity of the other two factors [capital and labor]. Whereas knowledge and technology just happen in the neoclassical model, the new theory assumes that they result from conscious decisions."[64] This theory places a premium on technological

[64] Gilpin, 113.

development. As this development increases the productivity of labor and capital, it can break the trend toward "diminishing returns" that occurs as other factors of production accumulate.

In particular, endogenous growth theory provides a useful lens for viewing Chinese economic policy because it emphasizes the central role of the state in nurturing long-term growth. As markets are often myopic and fail to achieve optimum levels of R &D and technological acquisition, governments can take action to fill this gap. Within this state-centered theoretical framework, Chinese exchange rate and export policy is part of a conscious government effort to increase the technology and knowledge factor of production. **More specifically, one can observe a linear path from undervalued exchange rate to increased export volumes and inward FDI and absorption of advanced technology and managerial practices.** While the export-oriented growth paradigm does not necessarily maximize aggregate national wealth in the short-term, it accelerates the development of China's domestic industrial base. Inward FDI tends to focus on the two sectors specified by Gilpin: manufacturing and high-tech electronics. Chinese economic policy appears to consciously follow a strategy of maximizing industrial and technological development with the purpose of placing the country on a long-term growth trajectory.

2.1 Exports and Economic Growth

Liberal trade theories reject the intrinsic value of exports on a national economy, arguing that they simply provide foreign exchange with which to purchase imports; they are "a means,

not an end."[65] This draws upon the theory of comparative advantage, which argues that absolute gains are maximized when states specialize in their most efficient factor of production. It means that states which lack efficient manufacturing sectors should focus capital on its more efficient sectors, reducing opportunity costs. This is the essence of the theory of comparative advantage. It also states that open trade policies are optimal because they allow "a more efficient use of an economy's resources by enabling imports of goods and services that could otherwise only be produced at home at higher resource costs."[66] The theory's most valuable contribution is that it promotes efficiency, i.e. maximum short-term growth at minimal opportunity cost. The problem is that it is inherently static, ignoring the propensity of states to attempt to alter their abundant factor over time. Concentrating capital into the most efficient factor of production can prevent economic modernization. In other words, it ignores the fact that long-term productivity gains come from moving up the value-added chain into producing more sophisticated, higher value products. This upgrading is generally manifested in the development of viable export industries.

Numerous studies have analyzed the causality link between exports and economic growth. While there is debate on whether exports drive growth or vice-versa, this thesis takes the position that in the case of China exports have been the "engine of growth" in recent decades. Shan and Sun find a bidirectional causal link between exports and industrial output in China in the years 1987-1996.[67] It is *bidirectional* because increased exports create demand for industrial production, but increased industrial production also results in improvements in product quality which increases export viability. Thus the two are positively self-reinforcing. Rodrik finds a positive causal relationship between the productivity level of export goods and growth in GDP

[65] Dani Rodrik (1999): "The New Global Economy and Developing Countries: Making Openness Work." *Overseas Development Council*, policy essay #24: 24.
[66] Ibid.
[67] Jordan Shan and Fiona Sun (1998): "On the Export-Led Growth Hypothesis: The Econometric Evidence from China." *Applied Economics*, vol. 30: 1055.

per capita, demonstrating that in the case of China during the years 1992 and 2003, a doubling in aggregate productivity resulted in an increase in per-capita GDP of roughly 6 percent.[68] In his classical 1978 study of exports and growth Balassa finds that "export growth favorably affects the rate of economic growth over and above the contributions of domestic and foreign capital and labor."[69] His model analyzes the relationship between exports and growth in Korea and Taiwan, two of the world's fastest-growing exporters at the time. If they had experienced export growth rates at the global average (rather than significantly above) over the years 1966 to 1973, their GNPs would have been 37.4 percent and 25.1 percent lower, respectively.[70] This article was written during the time that the import-substituting industrialization model was falling out of favor, and for many countries the expansion of exports appeared to be more conducive to growth.[71] While an in-depth data analysis of exports and growth is not possible in this thesis, I take the stance that exports and economic growth are positively *correlated,* meaning that regardless of causality, when export expansion is present, growth is present as well.

China's exchange rate policy, discussed in depth in the previous chapter, is beneficial to its export industries. An undervalued RMB enhances the cost-competitiveness of finished exports. While the effect on *processing exports* is less pronounced because a weak currency increases the cost of imported components, studies show that currency appreciation has a negative effect on exports overall. As Chinese policymakers have taken steps to prevent appreciation, their exports have maintained viability. According to Ahmed, "if the trade-

[68] Dani Rodrik (2006): "What's so Special About China's Exports?" *National Bureau of Economic Research*, working paper #11947: 13.
[69] Bela Balassa (1978): "Exports and Economic Growth: Further Evidence." *Journal of Development Economics*, Vol. 5: 188.
[70] Ibid, 186-7.
[71] For deeper analysis of the export-led growth's replacement of import-substitution as the dominant global development paradigm, please refer to Robert Gilpin (1987): *The Political Economy of International Relations*. Princeton: Princeton University Press and Dani Rodrik (2010): "Diagnostics Before Prescription," *Journal of Economic Perspectives*, Vol. 24, No. 3: pp. 33-44.

weighted real renminbi had appreciated at an annual rate of 10 percent per quarter since mid-2005, Chinese real exports would have been 30 percent lower today."[72] He goes on to argue that introduction of a more flexible exchange rate would cause significant appreciation, thus "restraining growth of exports."[73]

2.2 Inward FDI and Economic Growth

The ability to attract FDI has been significant to China's economic development in recent decades. As China's legacy of autarky stemming from the Maoist era left the country nearly devoid of capital, investment from abroad has been crucial to putting it on a development path. Inward FDI has risen from almost non-existent levels in the early 1980s to an average of 2.5 percent of GDP over 2005-2010, and comprising 20 percent of all FDI to emerging countries over 2000-2010.[74] FDI results in "spillover" of technology, managerial expertise, and credibility. Technological diffusion, which is in essence "borrowing" technology from more advanced economies, is especially significant to a developing country such as China. Economists have recognized each of these processes as being significant to China's technological upgrading in recent years. According to a 2012 report by the OECD:

> FDI inflows and imported capital goods that embody new technology were crucial for explaining technical change, and technological upgrading and diffusion. It also finds that domestic investments in human capital, promotion of skill-intensive industries and rising investment in R&D supported growth and increased the benefit from rising FDIs.[75]

[72] Shaghil Ahmed (2009): "Are Chinese Exports Sensitive to Changes in the Exchange Rate?" *Board of Governors of the Federal Reserve System*, discussion paper #987: 1.
[73] Ibid, 3.
[74] "Foreign Direct Investment--the China Story." *The World Bank*, Worldbank.org. Accessed 15 May 2013. http://www.worldbank.org/en/news/feature/2010/07/16/foreign-direct-investment-china-story.
[75] Jaejoon Woo (2012): "Technological Upgrading in China and India: What do we know?" *OECD Development Centre* working paper #308: 5.

The added competition also forces local firms to improve their quality and efficiency. These factors improve the performance of domestic firms and industries, especially when foreign firms engage with them in joint ventures (JVs), which are common practice in China. While blanket legislation mandating JVs across the entire economy has never existed, they have been required in certain industries, particularly those producing high-technology products. This is reflection of the experimental nature of Chinese economic policymaking. Some examples include mobile phones and computers[76], shipbuilding, and auto manufacturing.[77] The conscious attraction of FDI appears to be a strategy for upgrading domestic firms, improving China's national productive capacity. According to Xue, joint ventures served three objectives for the Chinese state: "developing industry, upgrading technical expertise and enhancing our management level."[78] Rodrik finds that China has rapidly moved up the value-added chain with regards to the quality of its exports. Many of its export goods are unusual for a country that is still very poor in statistical terms. Rodrik points out:

> China is an outlier in terms of the overall sophistication of its exports: its export bundle is that of a country with an income-per-capita level three times higher than China's. China has somehow managed to latch on to advanced, high-productivity products that one would not normally expect a poor, labor abundant country like China to produce, let alone export.[79]

While Chinese manufacturing stills tends to rely on the country's comparative advantage in labor by producing primarily labor-intensive goods, an increasing amount of technologically sophisticated goods are being produced (see figure 2). Some examples include video recorders

[76] Rodrik (2006): 18.
[77] "Contemplating a China Joint Venture: Issues to Consider." Chinaprimer.com Accessed 14 May 2013. http://www.chinaprimer.com/foreign-investment-china/china-joint-venture.html.
[78] Andrew Hill (2013): "An Odd Corporate Vehicle for Doing Business in China." *Financial Times*, ft.com. Accessed 14 May 2013. http://www.ft.com/cms/s/0/3b7124f8-b7ef-11e2-bd62-00144feabdc0.html#axzz2TFz3rDKq.
[79] Dani Rodrik (2006): 4.

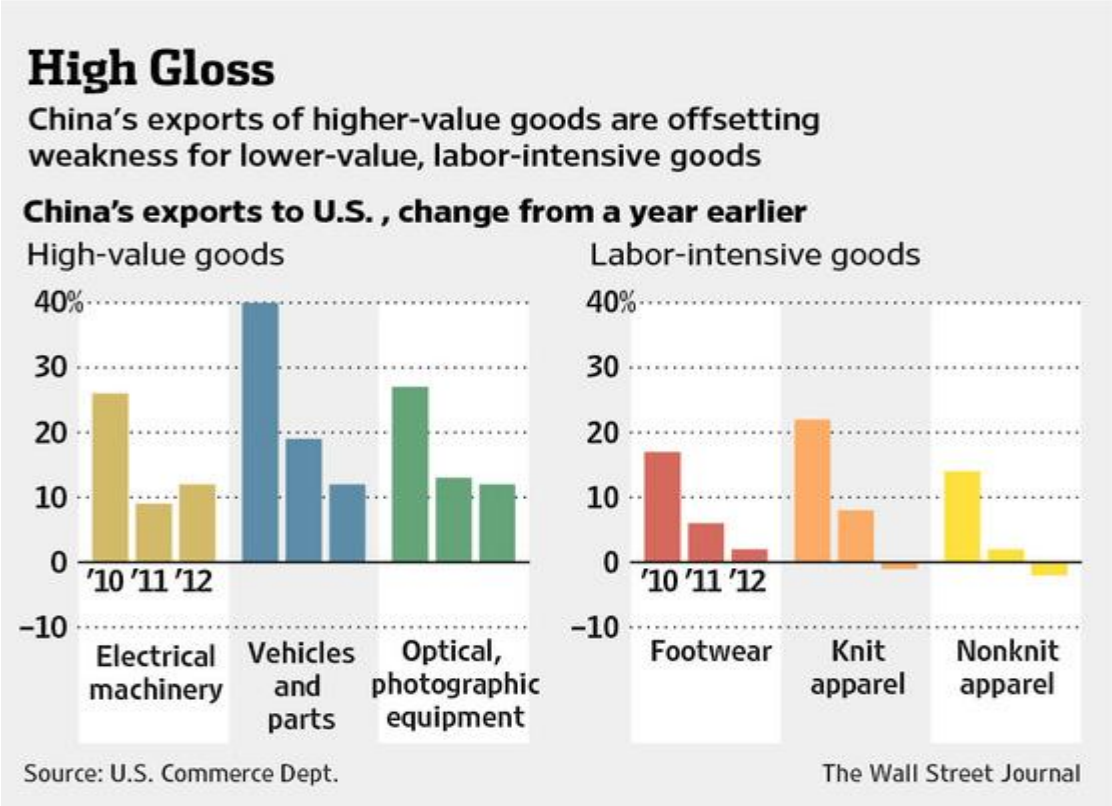
and TV and video monitors,[80] high technology lamps and optical-surgical equipment.[81] Production of high-technology goods is beginning to supplant that of low-technology goods. According to Liu and Daly, the share of low-technology manufactured goods in China's export basket declined from 27.2 percent in 1990 to 19.4 percent in 2008.[82] The definition of low-technology goods follows the OECD classification system.

The OECD classifies industries according to their "technology intensity," defined by relative level of R&D spending. The four categories of industry are high technology, medium-high technology, medium-low technology, and low technology. High technology industries include: aircraft and spacecraft, pharmaceuticals, office, accounting and computing machinery, radio, TV and communications equipment, and medical, precision and optical instruments.[83] According to these criteria, by 2007 China accounted for 15 percent of world exports of high technology goods, the highest share in the world and just ahead of the US and Germany.[84] This is up from only 2 percent in 1995. China also exports a larger share of finished goods than components, with 59 percent to 33 percent as of 2007.[85] Conversely, imports are dominated by components rather than finished goods. Amiti and Freund find that from 1992 to 2005 machinery as a share of exports increased significantly while agriculture and raw materials fell, another indicator that Chinese manufacturing is moving up the value-added chain.[86] Rodrik's model of the aggregate productivity level—which he uses interchangeably with "sophistication"-- in China's export basket finds it to be 50 percent higher than in Bangladesh's basket, a country

[80] Ibid, 12.
[81] Alex Frangos (2013): "Behind China's Switch to High End Exports." *The Wall Street Journal*, wsj.com. Accessed 14 May 2013. http://online.wsj.com/article/SB10001424127887324034804578345551411900878.html.
[82] Kelly Liu and Kevin Daly (2011): "Foreign Direct Investment in China Manufacturing Industry- Transformation from a Low Tech to High Tech Manufacturing." *International Journal of Business and Management*, Vol. 6, No. 7: 15-6.
[83] "ISIC Rev. 3 Technology Intensity Definition." OECD.org. Accessed 26 April 2013. http://www.oecd.org/sti/ind/48350231.pdf.
[84] Woo, 24.
[85] Ibid, 11.
[86] Mary Amiti and Caroline Freund (2010): "The Anatomy of China's Export Growth." NBER working paper: 38.

with a similar set of factor endowments such as labor abundance and capital scarcity.[87] These analyses show that the export-led growth paradigm has been successful in modernizing China's import/export basket.

Figure 2



Source: The Wall Street Journal, "Behind China's Switch to High-End Exports"

Total factor productivity (TFP) is a useful indicator of China's technological advancement. Woo defines TFP as "labor augmenting technological progress."[88] This means development on the technological side of capital, rather than physical factor accumulation, which is less conducive to productivity gains. As previously asserted, capital accumulation on its own

[87] Rodrik (2006): 8.
[88] Woo, 13.

tends to have depreciating marginal returns over time. Advances in technology and human capital, embodied by total factor productivity, have a positive effect on the productivity of capital, preventing the rate of return from diminishing. In 2007 China's average TFP stood at 25 percent of that of the benchmark U.S. rate, indicating that it is still far behind the advanced economies.[89] However, in that year China's GDP per capita at purchasing power parity was only $5,564 compared to $46,349 for the U.S.[90] This means that the gap in TFP was much smaller than the gap in GDP, demonstrating an unusual degree of technological sophistication for a developing country. In addition, the contribution of TFP to output growth has outstripped the contribution of physical capital investment in the past two decades, showing that technological progress is becoming increasingly important. From 2000-2007, the average annual contribution of TFP was 5.23 percent, compared to that of 3.36 percent for physical capital.[91] This is a slight improvement from 1990-2000, when TFP accounted for 5.21 percent and physical capital 3.49 percent per year. The OECD finds that TFP has been more significant to China's rise than that of other Asian economies.[92] Over the entire period 1970-2000 the respective numbers were 2.65 and 2.89 percent, significantly skewed toward TFP when compared to Korea, another main exporting country, which stood at .42 and 3.9 percent.[93] Part of the high rate of growth can be accounted for by China's low initial level of TFP. However, technological upgrading has also been a significant factor.

[89] Ibid, 18.
[90] "GDP Per Capita (PPP)." *The World Bank*, data.worldbank.org. Accessed 22 May 2013. http://data.worldbank.org/indicator/NY.GDP.PCAP.PP.CD?page=1.
[91] Ibid.
[92] Ibid, 10.
[93] Ibid.

Inward FDI accounts for a large degree of China's technological upgrading. From 1995-2009, inward FDI accounted for 9.6 percent of gross fixed capital formation.[94] Over the same period, TFP increased by 2.7 percent annually.[95] I find a positive relationship between FDI inflow and TFP growth. The primary goal of FDI attraction is to promote technology transfer. A developing country such as China lacks the institutions to achieve rapid technological advancements internally. While Chinese investment in R&D has risen significantly, endogenous factors alone are insufficient to make the type of gains necessary to be competitive on international markets for high-technology products. FDI can help fill the technological gap, as foreign firms bring cutting-edge technology into the country. Lardy asserts that foreign capital investment has "contributed significantly to the transfer to China of advanced technology and managerial practices."[96] This occurs through the process of diffusion, whereby foreign technology and practices are absorbed by domestic firms, improving their capacity to produce sophisticated goods.

To be more specific, diffusion occurs through *input-output linkages*. This refers to links between the upstream producer of components, and the downstream producer of finished goods. Backward linkages occur when transnational corporations (TNCs) purchase locally produced components in order to reduce costs. As these firms generally have high technical requirements, they must transfer appropriate techniques to local producers, resulting in the "backward" diffusion of technology from the downstream firm, the TNC, to the upstream firm, the domestic

[94] Ibid, 32.
[95] Yuhan Zhang (2011): "China's economic growth 'miracle' and its outlook by 2020." Voxeu.org. Accessed 3 May 2013. http://www.voxeu.org/article/china-s-economic-growth-miracle-and-its-outlook-2020.
[96] Nicholas R. Lardy (1995): 1073.

producer.[97] In addition, upstream firms compete for the right to produce components for the upstream firms, leading to efficiency gains. An extremely important component of backward linkages is the fact that they require domestic firms to conform to the standards of the TNC, which must meet the standards of global consumers. The ability to produce goods in accordance with these standards is a prerequisite for developing viable export industries. No amount of comparative advantage in labor can overcome the inability to produce goods of sufficient quality.[98] Backward linkages force domestic firms to upgrade in order to meet the demands of foreign consumers, providing a necessary boost to export industries.

Forward linkages occur when the TNC is the upstream producer and the domestic firm is the downstream producer. The TNC provides the local firm with sophisticated inputs which it does not have the capacity to produce itself. The downstream firm must adhere to certain standards, usually in the form of employee training, to serve as a retailer for the multinational.[99] Blake, Deng and Falvey find that these effects can result in positive spillovers from FDI, but they should be accompanied by policies aimed at improving the absorption capacity of local firms.[100] In a similar vein, Ivarsson and Alvstam argue that "learning" occurs primarily through "deliberate exchanges of information and skills," and is not automatic to the production process.[101] Specific policies designed by the Chinese government to accelerate technological diffusion through FDI will be discussed later in this chapter.

[97] Adam Blake, Ziliang Deng, and Rod Falvey (2009): "How Does the Productivity of Foreign Direct Investment Spill over to Local Firms in Chinese Manufacturing?" *The University of Nottingham Research Paper Series: China and the World Economy*, research paper #3: 4.
[98] John Sutton (2005): "The Globalization Process: Auto-Component Supply Chains in India and China," in *Are We On Track to Meet the Millennium Development Goals*, ed. Francois Bourguignon, Boris Pleskovic and Andre Sapir. The World Bank and Oxford University Press: 185.
[99] Ibid, 5.
[100] Ibid, 15-6.
[101] Inge Ivarsson and Claes Goran Alvstam (2005): "Technology Transfer from TNCs to Local Suppliers in Developing Countries: A Study of AB Volvo's Truck and Bus Plants in Brazil, China, India, and Mexico." *World Development*, vol. 33, no. 8: 1326.

2.3 State Policies for FDI Attraction and "Spillover"

The theory of comparative advantage--a crucial component of neoclassical economics--says that a given country will specialize in its most abundant factor of production, as it is most efficient to concentrate its resources on this factor and import goods from countries specializing in other factors. China's abundant factor of production has historically been labor, so according to this theory China should specialize in labor-intensive, low-skill manufactured goods. Much of its growth in the past three decades has been driven by investment in labor-intensive industries. However, the limitation of the theory of comparative advantage lies in its static nature. It argues that a country will specialize in its abundant factor indefinitely, ignoring the role of the state in attempting to alter the abundant factor over time. This does not fit the China case, as policymakers are preoccupied with developing the *capital* factor of production and the state is afforded a large role in engineering this outcome. From the national perspective capital specialization is viewed as more advantageous than land or labor because it is associated with productivity gains. Returns on land and labor-intensive industries tend to be relatively static, whereas capital development implies technological upgrading and the production of more sophisticated, higher-value-added goods. For a labor abundant country specializing in low-skill manufacturing, it must export constantly expanding volumes of goods in order to maintain levels of capital-intensive imports, which increase in value-added, and in price, over time.

The export-led growth paradigm attempts to escape from the trap of labor abundance by taking active policies to increase capital development. This primarily entails developing capital-intensive export industries. Funneling resources toward these industries improves the countries capital stock and technological base, freeing it from dependency on foreign exporters for high-

skill manufactured goods. This is advantageous with regards to the balance of payments position, as higher export revenues can be used to fund imports. In addition, it widens the base of domestically-produced goods available for domestic consumers. While China has not yet made significant progress in domestic consumption, domestic capital accumulation and technological development provides the foundation. Neoclassical economists argue that it makes no difference whether a good is produced domestically or imported from abroad, as it is the utility derived from consumption which counts. Chinese policy, however, reflects the viewpoint that governments desire to reduce their dependency on foreign imports. For this purpose Chinese policymakers use a variety of tools to "move up the value-added chain" by producing more sophisticated, capital-intensive goods. The most important of which involves measures taken to enhance inflows of FDI.

This thesis focuses primarily on China's use of foreign exchange intervention to provide a boost to its export industries. Xing and Wan find that currency undervaluation has had a significant impact on the competitiveness of Chinese exports. This has occurred in large part through the inflow of export-oriented FDI, much of which has come from Japan. Exchange rate movements alter the flow of investments, with FDI tending to flow to countries with more competitive exchange rates. This occurs because:

> Devaluation in the currency of the recipient country reduces production costs, measured in foreign currency, and increases the relative wealth of foreign investors, leading to an increase in FDI inflows…the relative comparative advantage between potential recipient countries is a critical factor when multinational enterprises consider the relocation of facilities or outsourcing production.[102]

Devaluation reduces the cost of locally purchased inputs as well as local production costs, with labor being a significant example. Benassy-Quere et. al. assert that "as a whole, the choice

[102] Xing and Wan, 420.

of locating abroad is motivated by lower costs."[103] They find that a 1 percent appreciation of the exchange rate reduces the stock of FDI by .23 percent, reinforcing the findings of Xing and Wan.[104] Foreign investors receive a higher return for their relatively overvalued foreign currency when investing in China because of lower production costs, providing a strong impetus to move capital there.

Xing and Wan find that China's devaluation of the RMB in 1994 increased its competitiveness relative to the NICs (Hong Kong, South Korea, Singapore, and Taiwan) and ASEAN-4 (Indonesia, Malaysia, the Philippines and Thailand), its major competitors in Asia. At the same time that China's volume of inward Japanese FDI increased greatly that of its competitors declined, implying a zero-sum game in FDI attraction. In a single year, from 1994 to 1995, China's share of Japanese FDI in the Asian manufacturing sectors jumped from 36 percent to 43.1 percent.[105] From 1990 to 1995 the overall increase was from a miniscule 5.3 percent to 43.1 percent.[106] This data demonstrates that the policy of maintaining an undervalued exchange rate—which has been central to Chinese economic policy for the past two decades—has been part of an effective strategy for bringing FDI into the country. Udomkerdmongkol, Görg and Morrissey also find a positive correlation between currency devaluation and FDI inflows.[107] Their study focuses on outward FDI from the U.S., finding that over the period 1990-2002 investment tended to flow to countries which had recently devalued but were viewed as having stable exchange rate arrangements.[108]

[103] Agnes Benassy-Quere, Lionel Fontagne, and Amina Lahreche-Revil (1999): "Exchange Rate Strategies in the Competition for Attracting FDI." *CEPII*, working paper #16: 10.
[104] Ibid, 19.
[105] Xing and Wan, 422.
[106] Ibid.
[107] Manop Udomkerdmongkol, Holger Görg and Oliver Morrissey (2006): "Foreign Direct Investment and Exchange Rates: A Case-Study of U.S. FDI in Emerging Market Countries." University of Nottingham discussion paper #06/05.
[108] Ibid, 1.

China fits this profile perfectly, having devalued its currency in 1994 and pegging it to the dollar directly. The RMB was moved from a direct dollar peg to a peg against a basket of currencies in 2005. This constituted a relatively more liberal arrangement and involved an appreciation of the RMB, however exchange rate movements have been stable and most observers agree that the RMB remains undervalued. China's exchange rate policy has helped shepherd FDI in to the country. According to our theoretical framework, inward FDI is beneficial to a developing economy because foreign firms bring advanced technology and expertise which cannot be developed locally. Through the process of "spillover" these superior methods of production are diffused to local firms, improving the viability of the domestic economy.

While inward FDI has the potential to increase the sophistication and productive capacity of domestic firms, "spillover" does not occur automatically. Measures must be taken to ensure that local producers absorb technology and expertise from foreign firms. Chinese leaders appear to have taken this lesson to heart. Policies such as mandatory joint ventures and local content requirements accelerate the pace by which technology and expertise are absorbed. According to Huchet, "China's technological acquisition strategy is clear: It allows foreign firms access to the domestic market in exchange for technology transfer through joint production or joint ventures."[109] China's huge market and abundant supply of cheap labor makes it extremely attractive to foreign firms. As previously demonstrated, its exchange rate policy augments its already competitive position with regards to FDI attraction. These factors give the government

[109] Jean-Francois Huchet (1997): "The China Circle and Technological Advancement in the Chinese Electronics Industry" in B. Naughton, ed., *The China Circle: Economics and Electronics in the PRC, Taiwan, and Hong Kong*, Washington, DC: Brookings Institution Press.

leverage in dictating the terms on which FDI will be allowed into the country. In this way it is able to ensure that domestic firms benefit from inward FDI.

One of the most effective policies for ensuring positive spillover is requiring foreign investors to engage in joint ventures with domestic firms. Rodrik mentions mobile phones and computers as two examples of high-technology industries wherein joint ventures have been mandated.[110] Some examples of foreign electronics firms entering into joint ventures with Chinese firms include Motorola, Nokia, IBM, Toshiba, Sony and Samsung, among countless others.[111] Each of these TNCs engages in high-technology production, and joint ventures ensure diffusion of technology and expertise by involving local firms directly in the production process. This helps upgrade the production capacity of domestic firms who do not have the internal capabilities to develop high-technology products on their own. Rodrik asserts that in developing countries investors are often faced with a high level of uncertainty which discourages the type of risk-taking behavior which results in innovation and technological advance. This means developing countries are generally lacking in investment and R & D; local markets are insufficiently conducive to "self-discovery."[112] Joint ventures with foreign firms help fill the investment gap, as TNCs tend to have highly developed R & D departments and are successful in innovating new products. When production is conducted jointly with domestic firms, spillover occurs directly. Mandatory joint ventures reflect the leverage that Chinese policymakers hold over foreign investors, as the country provides an attractive enough production locale that firms are willing to share technology directly with domestic producers.

[110] Rodrik (2006): 18.
[111] Ibid, 20.
[112] Ibid, 6.

Another effective policy is the *local content requirement* (LCR). This is designed to ensure the prevalence of backward linkages, as downstream TNCs must purchase components from upstream producers. This policy is most obviously seen in the auto parts industry. The Chinese government typically requires foreign auto manufacturers to achieve 70 percent local content in their finished automobiles within three years of the initial investment.[113] This creates large demand for domestic components, and as the upstream firms must receive technology transfers and employee training to meet the standards of the TNC, positive spillover occurs on a large scale. In addition to direct backward linkage through technology transfer, the productive capacities of Chinese firms is boosted indirectly because they are forced to upgrade in order to meet the standards of the downstream firm. The Chinese wind power industry is another example of a sector which has benefited greatly from the prevalence of LCRs. In 2005 the National Development and Reform Commission announced that wind farms operating in China must contain 70 percent domestically manufactured equipment.[114]

Local content requirements are controversial because they are generally viewed to be in violation of WTO rules, an organization which China joined in 2001.[115] While China relaxed over 7,000 tariffs, quotas and other trade barriers in order to meet the requirements for accession and average tariffs are significantly lower than other developing economies such as India and Brazil, its fellow WTO members often complain that it discriminates against foreign firms.[116] The WTO principle of equal treatment to foreign and domestic producers conflicts with LCRs,

[113] Ibid, 22.
[114] Keith Bradsher (2010): "To Conquer Wind Power, China Writes the Rules." *The New York Times*, Nytimes.com. Accessed 12 May 2013. http://www.nytimes.com/2010/12/15/business/global/15chinawind.html?ref=keithbradsher&_r=0.
[115] A comprehensive analysis of China's entry into the WTO is not possible in this study. However, for more information refer to Deepak Bhattasali, Shangtong Li and Will Martin (2004): *China and the WTO: Accession, Policy Reform, and Poverty Reduction Strategies*, The World Bank and Oxford University Press.
[116] "China's Economy and the WTO: All Change." *Economist.com.* Accessed 11 May 2013. http://www.economist.com/node/21541448.

which explicitly favor domestic producers. However, the questionable legality of LCRs is problematic for policymakers only insofar as foreign firms are willing to take the issue to task with the WTO. To date, the tremendous leverage afforded by China's market size and international influence has prevented foreign firms from mounting any serious challenges. To give an example, in 2010 Japan lodged a complaint with the WTO against Canada arguing that its domestic content requirements for wind and solar energy projects were in violation of WTO rules. Japan has never lodged such a complaint against China despite having LCRs in the exact same industry.[117]

2.4 Case Studies: Gamesa and Volvo in China

There are numerous cases of Chinese industry benefiting from LCRs and JVs through backward linkages. This section will focus on the Spanish machinery firm Gamesa and its investment in the wind power industry, which is subject to LCRs, and the Swedish auto firm Volvo's investment in the bus industry, which required a mandatory JV. Gamesa has invested heavily in China since 2000, accounting for 35 percent of the market for wind turbines by 2005. LCRs required Gamesa to train numerous local suppliers in order to meet the company's requirements. This fueled a substantial degree of positive spillover, as Chinese firms improved their production capacities and in many cases now sell components to domestic producers of finished turbines, rather than solely to Gamesa. By 2005, Chinese producers had seized 85 percent of the market, with Gamesa's share falling to only 3 percent.[118] Despite this, the huge size of the market, the "carrot" dangled by policymakers, means that Gamesa's investment is still

[117] Bradsher (2010).
[118] Ibid.

profitable. While its market share has shrunk substantially, it is producing roughly twice as many turbines as in 2005.[119] This case is an example of policy accelerating the absorption of technology and expertise through backward linkages, as the LCRs required the investing firm to train local producers of components, which in turn began selling components to Chinese firms who compete directly with the foreign investor.

Volvo established a 50/50 joint venture with the Chinese state-owned firm Xi'an Aircraft Company (XAC) in 1994.[120] The joint company, "Volvo Silverbus," produces large buses for sale in the domestic market. Some vital parts are produced in Sweden then sent to China for assembly of the finished vehicle. However, according to Ivarsson and Alvstam, roughly two-thirds of the gross value added is accounted for by local content.[121] This is driven in part by local-content requirements, wherein Volvo must purchase local components. XAC holds a privileged position as the preferred supplier, providing over 40 percent of locally sourced content.[122] However, Volvo has business relationships with 73 Chinese suppliers. What is of particular importance to our study of the relationship between policy and diffusion is that the agreement between Volvo and XAC stipulated that the former transfer technology to the latter.[123] Volvo's agreements with suppliers in India, Brazil and Mexico contained no such clauses, indicating the powerful position that Chinese policymakers hold in forging deals with TNCs.

Technology transfer played a significant role in backward linkages between Volvo and its suppliers in China, XAC in particular. Ivarsson and Alvstam find that Chinese suppliers received assistance in "product technology, especially through the provision of product designs and technological specifications and regular feedback on product performance…all suppliers in

[119] Ibid.
[120] Ivarsson and Alvstam, 1330.
[121] Ibid, 1331.
[122] Ibid, 1333.
[123] Ibid, 1333.

India and China were given support to improve existing production technology."[124] According to a poll of local Volvo managers, 82 percent of Chinese suppliers "have substantially improved their operations through technological assistance from Volvo."[125] This figure is significantly higher than that of Brazil, India, or Mexico. This indicates that diffusion through backward linkages, particularly in the technological sphere, have greatly improved the capacity and performance of Chinese firms. Most Chinese suppliers involved in the industry had very limited experience in providing products for international customers. In addition to direct transfer of technology, Volvo provided the impetus to upgrade through higher product standards.[126] All in all, Volvo's FDI in the Chinese bus industry has helped make local firms more technology advanced, efficient, and productive through the process of diffusion through backward linkages.

These cases serve as microcosms of Chinese strategy with regards to FDI. Foreign firms are given access to China's labor and product markets for the purpose of transferring technology and expertise to domestic firms. Policies such as LCRs and mandatory JVs accelerate the process of diffusion. This has improved the technological base and production capabilities of China's industrial sector. The policies of maintaining an undervalued exchange rate and suppressing domestic consumption increase the rate of FDI. A competitive exchange rate increases the purchasing power of foreign firms. Suppression of domestic consumption keeps prices and wages low, preventing increases in production costs. While the RMB has appreciated nominally in recent years, this thesis takes the position that it is weaker than it would be in the absence of foreign exchange intervention on the part of monetary authorities. In the words of Xing and Wan, "a devaluation in the currency of the recipient country reduces production costs,

[124] Ibid, 1335.
[125] Ibid, 1339.
[126] Ibid, 1339.

measured in foreign currency, and increases the relative wealth of foreign investors, leading to an increase in FDI inflows."[127] While their study finds that devaluation has a stronger effect on export-oriented FDI than non-export--which Gamesa and Volvo's ventures in China are--they also find, along with Udomkerdmongkol, Görg and Morrissey,[128] that devaluation helps attract non-export oriented FDI. Gamesa and Volvo in China demonstrate the linear progression from an undervalued exchange rate to increased FDI and the absorption of advanced technology and practices.

The approach of the Chinese state toward these two firms fits snugly into the new theory of endogenous growth. This is an example of state power being used to increase national technology and knowledge. However, it occurs not through internal investment in R & D but through "borrowing" it from abroad in a series of backward linkages. Requiring Gamesa and Volvo to purchase locally-manufactured components improves domestic human capital, as Chinese firms and workers gain experience producing products to be sold on the global market in accordance with rigid quality standards. This is a positive spillover from FDI referred to as "learning by doing." Furthermore, the agreements by which Gamesa trains local workers and Volvo transfers advanced technology to its suppliers benefits the Chinese economy as well. This increases the technological capacity of domestic firms, which over time makes them better able to compete with foreign firms on global markets. According to the new theory of endogenous growth, this can lead to a higher sustained rate of economic growth because China can produce increasingly sophisticated products for sale all over the world.

This chapter demonstrates the links between the exchange rate of the RMB to Chinese export industries, inward FDI, and absorption of technology and expertise. While the

[127] Xing and Wan, 420.
[128] Udomkerdmogkol, Görg, and Morrisey (2006).

undervalued currency causes numerous inefficiencies and distortions, it is part of a conscious policy to increase the viability of Chinese industry, particularly, though not exclusively, in the export sector. Policies such as mandatory joint ventures and local content requirements help domestic firms absorb positive spillovers from foreign firms. Empirical data shows that these developments have led to the production of increasingly sophisticated goods. The next chapter will discuss recent indicators that Chinese leaders may have begun responding to pressure to allow domestic consumption to expand at a faster rate.

Post-Script: Domestic Consumption in China

The previous chapters demonstrated the costs and benefits of China's exchange rate policy. In short, an undervalued RMB prioritizes exports and inward FDI over domestic consumption. This can be interpreted as trading immediate-term advances in living standards for long-term, sustained growth. However, the inefficiencies discussed in the first chapter, such as the rising cost of sterilizing capital inflows and the opportunity cost of maintaining excessive foreign currency reserves, appear to be putting pressure on policymakers to rebalance the economy by allowing domestic consumption to rise. In addition, stagnant growth in traditional consumer economies such as the U.S. and the European Union means that the capacity to absorb Chinese imports is unlikely to expand. While the economy remains tightly controlled and heavily biased toward exports, some indicators of a shift toward domestic consumption are observable. A report by the Economist pointed out that in the first three quarters of 2012 domestic consumption (including both household and government) accounted for 55 percent of aggregate growth, outstripping investment and net exports (see figure 3).[129] This mirrored the consumption/investment ratio of 2011, the first year since 2001 in which consumption exceeded investment. The Financial Times reported that retail sales in the first nine months of 2012 were up 12 percent over the same period one year earlier.[130] This figure does no include household purchases of services, meaning that actual consumption could be significantly higher.

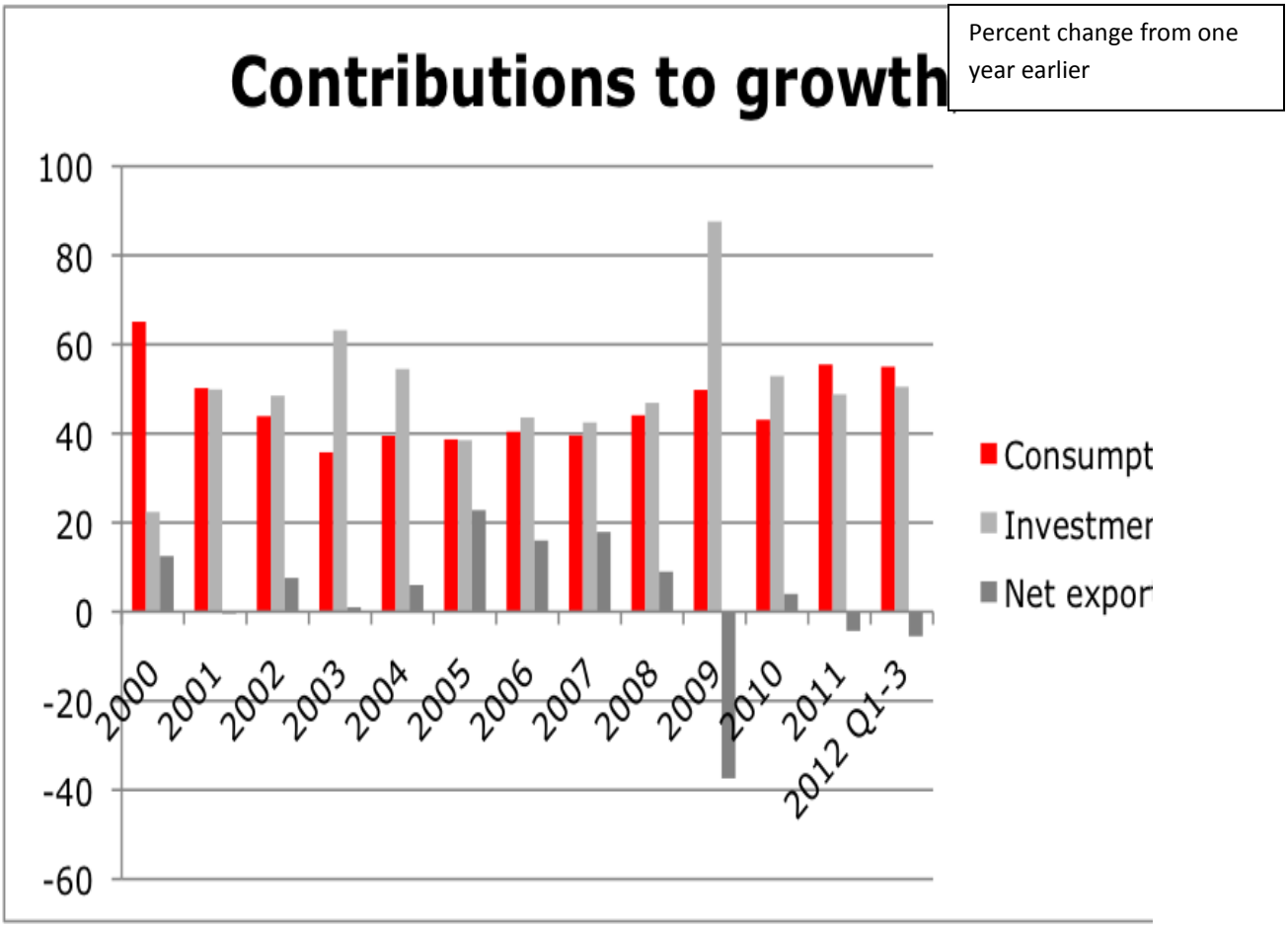
[129] "Rebalancing China: China's Consumer-led Growth." *The Economist*, economist.com. Accessed 14 May 2013. http://www.economist.com/blogs/freeexchange/2012/10/rebalancing-china.
[130] "China GDP—Decimal Points." *Financial Times*, ft.com. Accessed 14 May 2013. http://www.ft.com/intl/cms/s/3/b2290ea4-1929-11e2-af88-00144feabdc0.html#axzz29nOUu5or.

The reported shift in favor of consumption is caused by a number of factors. One is that the nominal exchange rate of the RMB has appreciated, from 8.27 per dollar in 2005 to 6.16 currently (see pages 7-8). While Cline and Williamson argue that the real exchange rate remains "radically overvalued," this appreciation, albeit moderate, is a step toward a more liberalized arrangement. [131] Another factor is that domestic wages have risen. A poll of manufacturers in the densely urbanized Pearl River Delta region predicted that manufacturing wages for migrant workers will rise by 9.2 percent in 2013, up from 7.6 percent in 2012 (see figure 4).[132] Much of this can be accounted for by rises in productivity stemming from the increasing sophistication of Chinese industry. This is an indicator that the strategy of using policy to induce technological advancement and production capacity through inward FDI has been successful. On the other hand, it is an indicator that China's labor surplus, which has been so instrumental to its astonishing growth in recent decades, has begun to dry up. The size of the working-age population shrunk by 3.5 million in 2012, a figure which the Wall Street Journal refers to as "the beginning of a long-term decline."[133] As the labor supply shrinks, workers will command higher wages. A total of 25 provinces adjusted their minimum wages upward last year, in many cases to coax workers out of the countryside and into urban industrial centers.[134] This refers to the "Lewis Turning Point," whereas agriculture surplus labor is exhausted, pushing up wages in the industrial sector and thereby squeezing profits.[135] This would mean that increases in TFP, which

[131] Cline and Williamson (2007).
[132] "China: factory wages to rise 9%, survey." *Financial Times*, ft.com. Accessed 14 May, 2014. http://blogs.ft.com/beyond-brics/2013/03/14/china-factory-wages-to-rise-9-survey/#axzz2TGx8AQxA.
[133] "China: The Jobs Report." *The Wall Street Journal*. Wsj.com. Accessed 14 May 2014. http://blogs.wsj.com/chinarealtime/2013/03/15/china-the-jobs-report/.
[134] Ibid.
[135] Matali Das and Papa N'Diaye (2013): "Chronicle of a Decline Foretold: Has China Reached the Lewis Turning Point?" IMF working paper #13/26: 3.

have already been significant to Chinese export growth in recent years, will have to improve even more rapidly for firms to maintain profitability.

Figure 3

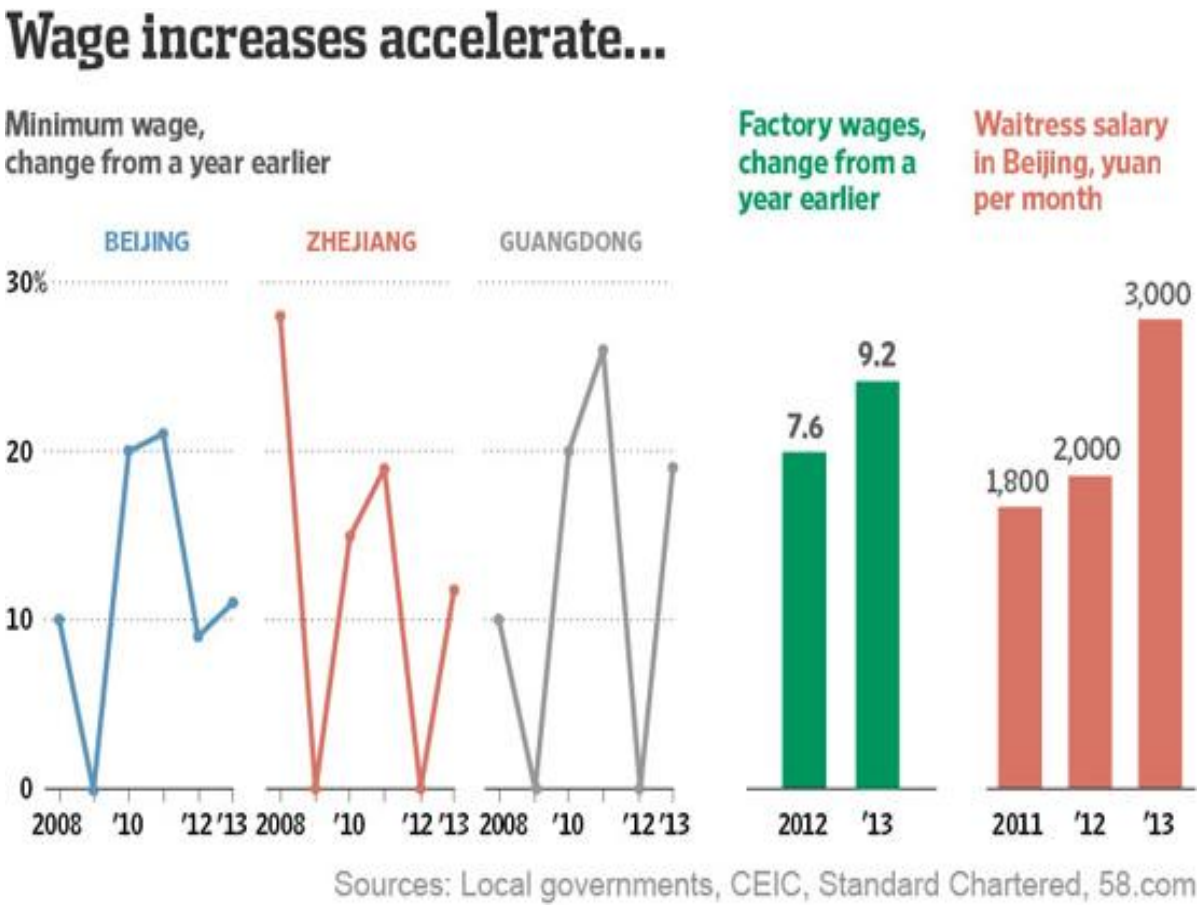


Source: The Economist, "Rebalancing China"

Increased wages also result in additional demand for imports. As China has low tariff rates, imports can only be held down by a weak exchange rate and low household incomes. As both of these trends show signs of shifting, higher consumption of imports can be expected.

Monthly imports topped $183 billion in April 2013, the highest number on record.[136] While gross exports have continued to expand, China's current account surplus fell from 2.8 percent in 2011 to 2.6 percent in 2012, significantly down from its peak of 10.1 percent in 2007 (see page 11).[137] If sustained, this development will erase some of the aforementioned distortions and inefficiencies caused by persistent surpluses. This means allowing living standards to rise more in line with aggregate growth. As data indicates that consumption is rising, they may be already.

Figure 4



Source: The Wall Street Journal, "China: The Jobs Report"

[136] "China Imports." tradingeconomics.com. Accessed 14 May 2014. http://www.tradingeconomics.com/china/imports.
[137] "China's Current Account more balanced in 2012."

While relevant, these statistics should not be overestimated. China is still the world's largest exporter, the RMB is still undervalued, and Chinese labor is still highly cost-competitive. Exports will continue to be a main driver of economic growth for the foreseeable future. What this data can tell us is that Chinese policymakers are beginning to move toward rebalancing the economy. The distortions caused by running persistent, massive current account surpluses are becoming more problematic, and weak demand in Western economies means that the market for Chinese imports is unlikely to expand. In order to maintain growth and employment, a gradual shift toward balanced growth not overly dependent on the export sector will be needed. After years of paying lip-service to rebalancing, it finally appears as if Chinese policymakers are becoming serious about undertaking reforms.

Conclusion

This thesis analyzed Chinese exchange rate policy and its effect on foreign trade and inward FDI. It demonstrated that the dependent variable, an undervalued renminbi, privileges exports over imports, preventing living standards from rising as quickly as they could otherwise and resulting in persistent current account surpluses, the first independent variable. These are wasteful because they cause an excessive buildup of foreign exchange. As Chinese policymakers do not want an inflationary boom or import surge they invest this surplus abroad, primarily in dollar securities. Dollar securities tend to carry lower interest rates than domestic financial instruments, resulting in opportunity cost. In addition, large foreign currency reserves run the risk of *foreign exchange valuation changes*, meaning that the People's Bank of China (PBC) must continue to finance the U.S. current account deficit lest the dollar depreciates, thus robbing their assets of value.

In order to prevent foreign currency inflows from putting upward pressure on the exchange rate, the PBC *sterilizes* them. This means printing RMB and exchanging it for foreign exchange, then in turn issuing bonds to remove excess RMB from domestic circulation. This has the dual effect of keeping the RMB competitive while preventing a spike in inflation. While these operations have been successful to date, increasingly large issuance of PBC bills becomes costly over time. In addition, rising inflation indicates that sterilization may be losing its efficacy. While keeping the RMB competitive, this thesis effectively demonstrated that these policies are inefficient and have detrimental effects on the domestic economy.

This thesis also demonstrated, however, that an undervalued RMB also gives a boost to export industries and helps attract inward FDI, the second independent variable. Exports and FDI were shown to be conducive to long-term economic growth and technological upgrading. Chinese industry has proved increasingly able to produce high-value, sophisticated goods, in large part because of imported foreign capital and expertise. Crucial to the domestic economy benefiting from FDI are policies to foster positive "spillovers" from foreign investment. Examples include mandatory joint ventures (JVs) and local content requirements (LCRs), both of which result in backward linkages which benefit domestic producers. While not uniformly mandatory, many high-technology industries require foreign investors to enter into JVs with domestic firms, in many cases sharing technology and training employees. On the other hand, LCRs mean that foreign investors must purchase components from local producers. In order for these producers to meet the standards of the foreign firm they often must receive technology transfers and training. The wind turbine firm Gamesa and the Swedish automaker Volvo serve as case studies of firms who have invested in China with positive spillovers for the domestic economy.

While neoclassical economic theory rejects putting special emphasis on exports and running current account surpluses, thus precluding such a set of policies, other theories can better explain the China case. This thesis analyzes China through the *new theory of endogenous growth*, which treats technology and know-how as a separate factor of production, rather than as exogenous to the economy. Advances in this factor increase the productivity of capital and labor, potentially offsetting the diminishing marginal rate of return on capital that is predicted by neoclassical theory. China's policy of privileging exporters and attracting foreign investors is done with the objective of acquiring advanced technology and expertise from abroad, thereby

enhancing the capacity of domestic firms to produce sophisticated products for the world market. According to empirical data presented in this thesis, this set of policies has been successful. Chinese production capacity and sophistication have increased dramatically.

Lastly, this thesis briefly addressed recent indicators that domestic consumption is on the rise and current account surpluses are shrinking. In 2011 consumption (household and government combined) surpassed investment for the first time since 2001. In addition, retail sales and manufacturing wages have risen significantly as well, with 25 provinces adjusting the minimum wage upward in 2012. While these figures should not be overestimated, the fact that policymakers are allowing consumption and wages to rise, thereby potentially eroding the cost-competitiveness which has been crucial to growth in recent decades, cannot be ignored. China's leaders may be finally feeling the ill-effects of persistent current account surpluses, and are becoming willing to undertake reforms to rebalance the economy.

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