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The U.S.-China Trade Imbalance and the Theory of Free Trade: Debunking the Currency Manipulation Argument

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Abstract

The U.S.-China trade imbalance is commonly attributed to a Chinese policy of currency manipulation. However, empirical studies failed to reach consensus on the RMB misalignment. We argue that this is not a consequence of poor measurement but of theory. At the most abstract level the conventional principle of comparative cost advantage suggests real exchange rates will adjust so as to balance trade. Therefore, the persistence of trade imbalances tends to be interpreted as arising from currency manipulation facilitated by foreign exchange interventions. By way of contrast, the absolute cost theory explains trade imbalances as the outcome of free trade among nations that have unequal real costs. We argue that a disparity in real costs is the root cause of the U.S.-China trade imbalance.

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1 Introduction

The history of globalizing capitalism shows the re-occurrence of lasting trade imbalances under different monetary regimes (Bordo, 2005). Large trade imbalances accumulated again on the eve of the 2008 global economic crisis with the U.S.-China imbalance being the most drastic case (Figure 2). This reversed position of the U.S. and Chinese external imbalances is reflected in their bilateral trade balance. In the period leading up to the crisis, China increased its share in the U.S. trade deficit from around one fifth in 2002, the first year after China's accession to the World Trade Organisation (WTO), to about one third in 2008. Ten years after the crisis, global trade continues to be unbalanced even though China's current account surplus has sharply decreased to 0.4 per cent of its GDP (IMF 2019a, p. 2), while the US deficit with China has reached another record in 2018 at USD 419 billion (U.S. Department of the Treasury, 2019, p. 1).

Reducing the U.S. trade deficit is at the top of the Trump Administration's foreign economic policy goals. In 2019 the U.S. President imposed substantial tariffs on Chinese goods and is threatening to raise them even further. U.S. authorities have long been concerned with trade imbalances, and administrations of different political orientations have consistently attributed the U.S. trade deficit to currency manipulation by their trade partners. The 1988 Omnibus Trade Act requires the U.S. Treasury to conduct semi-annual evaluations of unfair exchange rate devaluations by major trading partners. Trade surplus countries including Japan, Korea, Germany, Switzerland, China and India, are on the Treasury's 'Monitoring List' which has been expanded to include 21 countries (U.S. Department of the Treasury, 2019a, p. 3). In 2019, the Treasury officially designated China as a currency manipulator in "violation of China's G20 commitments to refrain from competitive devaluation" and pledges to take action (U.S. Department of Treasury, 2019b).

Many leading economists perceive global imbalances as a threat to the world's economic stability and as a root cause of the 2008 global economic crises (e.g. Obstfeld & Rogoff, 2009; Obstfeld & Rogoff, 2005; Lin, Dinh & Im, 2010). The most widespread explanation for the accumulation of large external imbalances on the eve of the crisis, specifically the large trade surplus of China with respect to the U.S., is that they were due to Chinese currency manipulation. According to this argument, the Chinese government reduced the value of the Renminbi (RMB) through exchange rate interventions. This lowered the costs of China's exports to the United States and raised the costs of U.S. imports to China, thereby *artificially* causing the tremendous trade imbalance between the two countries. This view deems a Chinese "beggar-thy-neighbor devaluation" (Krugman, 2009) to be the "single largest cause of the

U.S. trade deficit and of unemployment" (Scott, Jorgensen, & Hall, 2013, p. 3). It follows from this logic, that in order to accelerate growth and restore full employment, the United States would have to reduce its large trade deficit. It is claimed that this could be done at no cost to the U.S. budget, if the United States prevented other countries, primarily China, from manipulating their currency and allow the Renminbi to return to a "competitive" level (Bergsten & Gagnon, 2012).

Proponents of the currency manipulation hypothesis point to China's massive accumulation of international exchange reserves as evidence for undervaluation (Bergsten & Gagnon, 2012; IMF, 2010, p. 19; Bergsten, 2006; Bergsten, 2007; Bergsten, 2010; Krugman, 20; Bergsten & Gagnon, 2012). China is indeed accumulating international exchange reserves at a high rate (see Figure 3 in the Appendix). The total of Chinese international exchange reserves increased almost 17-fold from 2000 to 2010. By 2013, the Chinese reserves had reached a level of USD 3.6 trillion, 60 percent of which was estimated to be held in dollar-denominated assets, making China the biggest creditor of the U.S. at the time (Chinn, 2013).

However, the link between China's supposed degree of undervaluation of the Renminbi (RMB) and its current account surplus is not established directly. Instead, the vast literature bases itself on the standard assumption of international trade theory that in unfettered exchange, trade would automatically balance. This assumption in turn underpins the various attempts to estimate the undervaluation of the Chinese RMB that presumably account for its persistent trade surplus. We show in this paper that such attempts have failed to achieve any consensus. Estimates of the degree of misalignment vary widely and some studies even find that the RMB is overvalued (Cheung & He, 2019; Cheung, 2012; Cheung, Chinn, & Fujii, 2010a; 2010b; Dunaway & Leigh, 2006; Cline & Williamson, 2007).

This paper argues that the great unity across the political spectrum with regard to currency manipulation as the cause of trade imbalances is rooted in a shared Ricardian outlook on international trade. We analyze the Ricardian Comparative Cost Theory (CCT) underpinnings of the currency manipulation argument and present an Absolute Cost Theory (ACT) of trade as an alternative view, initially at the *same* level of abstraction as the Ricardian one so as to highlight the fundamental differences. Ricardian trade theory predicts that trade naturally balances through automatic exchange rate adjustments. Trade imbalances are therefore often interpreted as the result of various interventions that impedes this adjustment (see Section 5). In contrast, the ACT from Smith and Harrod predicts

that trade imbalances will be persistent and that trade surplus countries will end up as international creditors and trade deficit countries as international debtors – all through the workings of free trade.

The paper is structured in the following manner. The next section presents the two opposing theories of free trade beginning at the same level of abstraction as Ricardo's and then moving to more concrete considerations. The third section briefly reviews the central position that the currency manipulation argument has occupied in U.S. foreign economic policy over the last three decades. The fourth section evaluates the empirical studies that estimate the degree of exchange rate misalignment based on the *extended purchasing power parity* (PPP) and the *macroeconomic fundamentals approach* and analyzes the CCT foundation of these models. Section 5 discusses a variety of alternate CCT-based explanations for trade imbalances, and contrasts their explanatory power with that of the ACT. The final section summarizes the opposed perspectives on the U.S.-China trade imbalance arising from the two basic theories of international trade.

2 Comparative and Absolute Cost Theories of Free Trade

Since the times of the classical political economists, two alternative theories of free trade have competed: The Comparative Cost Theory (CCT) and the Absolute Cost Theory (ACT). The ACT was employed by Adam Smith (1904) and revived by Roy Harrod (1957).[1] The CCT, on the other hand, is rooted in David Ricardo's (1951) challenge[2] to Smith's theory and continues to be the foundation of the neoclassical standard theories of international trade as well as the currency manipulation argument.[3] The two competing theories lead to fundamentally opposed outlooks on the outcomes of free trade: CCT predicts trade to balance automatically, while ACT predicts that free trade under conditions of unequal cost competitiveness results in persistent trade imbalances. From the point of view of CCT, persistent large trade imbalances like those of the last two decades appear to be the result of policy intervention. From the point of view of ACT, these imbalances are the outcome of free trade itself.

[1] Keynes also rejects the theory of comparative advantage (Milberg, 1994, Milberg, 2002).

[2] Essay 2 shows how Ricardo's arguments were developed in debate with Thornton. Thornton's theory presents some kind of a middle ground between ACT and CCT but cannot be clearly located due to the lack of a value theory in his work.

[3] Marx (1961) in Chapter 2, Section C, of *A Contribution to the Critique of Political Economy* discusses James Steuart and Thomas Tooke as presenting arguments similar to what is identified here as ACT and supports the validity of their arguments against those presented by Montesquieu, Hume, Ricardo and Mill all broadly in line with what we call CCT. Marx (1975) continues his discussion of currency circulation and trade in Chapter 34 of Capital Volume III with an abundance of historical detail on the English 1844 Bank Law. In this discussion Marx articulates his support for ACT but does not present a theory of his own.

The CCT and ACT differ in some of their basic assumptions. They share the assumption that labor is not mobile internationally. CCT also assumes that capital is not mobile and hence the capital account is zero. The trade balance is assumed to be determined by nominal costs of production. If there is a trade imbalance, a money flow covers the balance of payment. This money flow adjusts the relative nominal costs such as to balance trade and closes the system. In contrast, ACT assumes that capital is mobile internationally and that the trade balance is determined by real costs. The balance of payment is covered by an interest rate-differential induced capital flow and real costs remain unaltered. This capital flow from the surplus to the deficit country closes the system and trade continues to be unbalanced.

The key difference between CCT and ACT has to do with the *long run* relation of the nominal exchange rate to the real exchange rate. In CCT, in the case of fixed exchange rates the money outflow induced by a trade deficit lowers the money supply. On the supposition of the Quantity Theory of Money, this will lower the price level. In the case of flexible exchange rates, the money outflow will depreciate the exchange rate without changing the price level. In either case, a trade deficit lowers the terms of trade (the real exchange rate), and assuming appropriate elasticities, this improves the trade balance. The deficit country becomes more competitive as its prices fall (fixed exchange rate) or as the exchange rate depreciates (flexible exchange rate), while the surplus country becomes less competitive. In either case the real exchange rate adjusts. *In the Comparative Cost argument, the nominal exchange rate regulates the terms of trade*. These processes continue until the trade deficit disappears, i.e. until trade is balanced. As Ricardo (1951) points out, this adjustment mechanism would negate any initial differences in absolute costs of production (Shaikh, 2016, pp. 491-510).

The ACT differs in three key aspects from the CCT as regards the long-run relation between the nominal and the real exchange rate. First, the long-run nominal exchange rate is unaffected by the trade balance. Second, the terms of trade are not affected by a change in the nominal exchange rate. Third, long-run real wages are determined by the political balance between workers and capital not by the nominal exchange rate. Let us demonstrate these points.

First, a country with higher absolute costs will run a trade deficit[4], and the resulting money outflow will initially depreciate the nominal exchange rate of the deficit country. But unlike in CCT this is only a transitory effect in ACT, since the same money outflow will reduce liquidity in the trade deficit

[4] This is precisely the proposition that orthodox economists such as Krugman and Obstfeld (1994) have long dismissed as a "myth" because they adhere to the theory of comparative cost.

country and raise the interest rate.[5] In the trade surplus country, the money inflow will raise liquidity and lower the interest rate. Short-term capital will then flow from the trade surplus (low interest rate) country to the trade deficit (high interest rate) country, reducing the interest rate differential and re-appreciating the nominal exchange rate of the deficit country. These countervailing capital flows will continue until risk-adjusted interest rates are equalized at a point where the capital flow in each country offsets its trade imbalance, i.e. until the trade and capital flows offset each other, and the nominal exchange rate returns to its initial level – *all through the workings of capital markets under free trade.* Hence, from the perspective of ACT the trade deficit does *not* need to affect the nominal exchange rate on which Ricardo's balancing mechanism depends over the medium run.

The second thing that distinguishes ACT from CCT is the argument that even if there was a persistent depreciation of the nominal exchange rate, say through government policy (see Section 5 of this paper), *the terms of trade would still not fall.* Consider the relative prices of exports and imports (p_x, p_m) on the assumption that mobility of real capital equalizes international profit rates (r). Let $k_x \cdot e$ be the nominal unit costs of Chinese exports expressed in dollars through the exchange rate e (dollars/yuan), so that the unit price of Chinese exports expressed in US dollars is $p_x \cdot e = k_x \cdot e(1+r)$.[6] Let real costs of Chinese exports be $k_{x_r} = \frac{k_x}{p_c}$, relative to (say) Chinese consumer prices p_c. Then the price of Chinese exports is $p_x \cdot e = k_x(1+r)p_c \cdot e$. At the same time, the price of Chinese imports expressed in US dollars will be the dollar price of US exports $p_{x^*} = k_{x^*}(1+r)p_{c^*}$. It follows that the terms of trade of China will be $\frac{p_x \cdot e}{p_{x^*}} = \frac{k_{x_r}(1+r)}{k_{x^*_r}(1+r)}\left(\frac{p_c \cdot e}{p_{c^*}}\right)$. If we assume that the prices of consumer goods are internationally equalized and that both countries have the same basket of goods (see Section 4 on PPP), as Ricardo does at this level of abstraction, then $\frac{p_c \cdot e}{p_{c^*}} \approx 1$, so $\frac{p_x \cdot e}{p_{x^*}} = \frac{k_{x_r}(1+r)}{k_{x^*_r}(1+r)}$, i.e. *the terms of trade will depend solely on relative real costs.* If some consumer goods are not internationally traded, then we may amend the consumer goods term in the terms of trade equation to distinguish between tradable and

[5] Marx makes this point in Volume III of Capital.
"If gold is exported, then, according to this Currency Theory, commodity-prices must rise in the country importing this gold, and thereby the value of exports from the gold-exporting country on the gold-importing country's market; on the other hand, the value of the gold-importing country's exports would fall on the gold-exporting country's market while it would rise on the domestic market, *i.e.*, the country receiving the gold. But, in fact, a decrease in the quantity of gold raises only the interest rate, whereas an increase in the quantity of gold lowers the interest rate; and if not for the fact that the fluctuations in the interest rate enter into the determination of cost-prices, or in the determination of demand and supply, commodity prices would be wholly unaffected by them." (Marx, 1975, p. 547)
[6] For simplicity in exposition, this abstracts from fixed capital.

nontradable goods, so that $\frac{p_x \cdot e}{p_{x^*}} = \frac{k_{x_r}(1+r)}{k_{x^*_r}(1+r)}\left(\frac{p_c \cdot e}{p_{c^*}}\right) = \left(\frac{k_{x_r}(1+r)}{k_{x^*_r}(1+r)}\right)\left(\frac{p_{c_{NT}} \cdot e / p_{c_T} \cdot e}{p_{c^*_{NT}} / p_{c^*_T}}\right)\left(\frac{p_{c_T} \cdot e}{p_{c^*_T}}\right) \approx \left(\frac{k_{x_r}(1+r)}{k_{x^*_r}(1+r)}\right)\left(\frac{p_{c_{NT}} \cdot e / p_{c_T} \cdot e}{p_{c^*_{NT}} / p_{c^*_T}}\right)$ on the assumption that international trade equalizes the price of some common basket of goods. This incorporates the Balassa-Samuelson effect $\left(\frac{p_{c_{NT}} \cdot e / p_{c_T} \cdot e}{p_{c^*_{NT}} / p_{c^*_T}}\right)$ into the determination of the terms of trade via relative real costs (Shaikh 2016, pp. 509-519). With the long run terms of trade pinned by relative real costs, trade imbalances will be persistent. These arguments are borne out by empirical evidence showing persistent trade imbalances and the long run gravitation of real exchange rates around relative real costs (Shaikh 2016, pp. 508-516, 528-532 and Figures 1.4-11.7).

Finally, since real costs depend on real wages and productivity, it is certainly possible in the short run that workers may not be able to raise their nominal wages to compensate for a rise in import prices arising from a Chinese exchange rate depreciation. Then Chinese real wages may fall, which will improve its terms of trade. However, if workers have achieved a defensible standard of living, then real wages will rise back up and the terms of trade will revert to their previous levels. The real issue here is whether real wages can be pushed down by *any* means, not just by exchange rate depreciation. The long-run real wages depend not on the state's exchange rate policy but on the level of class struggle and the relative bargaining power of workers and capital. Note that the ACT argument is also perfectly consistent with the existence of value-chains since each national link in the chain is subject to the forces of real costs. In fact, these links are key in pinning the real exchange rate to competitive costs.

From the perspective of ACT, real unit labor costs are key to explaining the US-China trade imbalance. In 2016, the average real manufacturing wage in China was about a quarter of that in the US[7], while in 2009 Chinese productivity was 12 times higher and China's relative unit labor cost range between 33 and 68 percent of the US in 2009 (Ceglowski and Golup 2012, 12).[8] Chinese productivity benefits

[7] The average wage of a US manufacturing worker was $26/hr. while that of a Chinese worker was $3.60/hr. (Mohiuddin 2017; Bureau of Labor Statistics, 2019). At roughly the same time, the cost of living in the US was 1.8 times higher than in China (Numbeo.com).

[8] The findings by Ceglowski and Golup (2012) are consistent with those by Furgerson and Schularick (2011). Ceglowski and Golup (2012, 15) also show that China's relative unit labor costs are lower than that in South-Korea, Japan, Mexico, and the EU. The breakdown of unit labor costs in terms of real wages and real output used by Ceglowski and Golup (2012) is consistent with our foregone analysis. They use producer prices but suggest that consumer prices would be preferable. The only difference is that they assume that PPP holds in general whereas we suggest to limit this to tradable goods which gives rise to our incorporation of the Balassa−Samuelson effect.

from economies of scale and scope: China has a large supply of engineers and skilled workers, an integrated supply chain for many parts of manufacturing goods, and an ability to change production methods very rapidly in comparison to US factories. China's cost competitiveness is increasingly strengthened by advanced and improving infrastructure and high and rising R&D and skill levels (Mohiuddin 2017). It should be added that these cost advantages need not be permanent: Chinese unit labor costs have risen faster than those of the US, so China's overall cost advantage has diminished despite increasing productivity, and in some industries has even reversed (Hou et al., 2017, pp. 5, 7, 40).

The Absolute Cost approach also provides an alternate route to Thirlwall's Law. This law is an empirical proposition that the growth rate of national output (g_Y) is roughly equal to the growth rate of exports (g_X) divided by the elasticity of imports (ε_M): $g_Y = \frac{g_X}{\varepsilon_M}$. Thirlwall bases himself on a Keynesian foundation, in which exports are an autonomous element of demand, so that the law is taken to mean that export growth drives output growth. On the further assumption that international trade is balanced $\left(\frac{X}{M} = 1\right)$ and the real exchange rate is constant, this defines a balance of payments constraint. The empirical strength of the original formulation, despite its assumption of balanced trade and a constant real exchange rate, initially led the author to believe that capital flows were relatively unimportant and that the real exchange rate played a minor role in balance of trade adjustments (Thirlwall and Hussain, 1982, p. 498). However, subsequent elaborations of the model extended the Thirlwall result to the case of persistent trade imbalances covered by capital flows and slowly changing real exchange rates (Thirlwall, 2011, pp. 335, 339-340). The latter two assumptions are *exactly* the ones implied by ACT and applicable to the US-China case: absolute cost differences lead to persistent trade imbalances, and long run real exchange rates are regulated by slowly changing relative real costs of exports and imports. This also implies that capital flows and nominal exchange rate changes do not affect the long run real exchange rate, and hence do not affect the balance of trade in a persistent way.

Our presentation of the ACT has addressed the same basic issue as the CCT at comparable levels of abstraction, so as to bring out the theoretical and empirical differences. Orthodox economists themselves have long noted that the standard theory fails at an empirical level. This failure has given rise to a large number of models that often contradict each other and seldom test well. Yet the basic logic of the CCT continues to dominate economics and to have a major influence on economic policy.

3 Monitoring Currency Manipulation – An Integral Element of U.S. Foreign Economic Policy

The accusation against China for manipulating its currency, rooted in the CCT perspective on international trade, is central to Trump's belligerent foreign trade policy. At the Republican convention at which Trump was nominated as the candidate, he pledged he would stop China's "devastating currency manipulation" and added "they are the greatest currency manipulators ever!" (Rauhala, 2016). President Trump's Director of Trade and Industrial Policy, Peter Navarro (2011), proclaims "Death by Currency Manipulation": "China's manipulation of its currency, the yuan, is the tap root of everything wrong with the U.S.-China trade relationship." (p. 67). This culminated in the designation of China as a currency manipulator in 2019 by the U.S. Treasury as part of the escalation of the trade war (2019b), ironically at a time when many economists (e.g. Setser 2019; Summers 2019) found that China is no longer manipulating the RMB and the IMF reported that China's external position is in line with fundamentals (2019b, p. 28)).

The rhetoric of Trump and his advisors represents a new level of aggression, yet the claim of currency manipulation has long been a central concern of U.S. governments. Since the 1988 Omnibus Trade Act the U.S. Treasury issues semi-annual reports to "consider whether countries manipulate the rate of exchange between their currency and the U.S. dollar for purposes of preventing effective balance of payments adjustments or gaining unfair competitive advantage in international trade" (Section 3004). A general pattern emerges from the U.S. Treasury reports over the last three decades: The U.S. government exerts continues pressure by threatening to accuse the East Asian surplus economies of currency manipulation and demands that they enter into bilateral negotiations on a wide array of market liberalization policies.[9] Initially the reports targeted the Asian Newly Industrialized Economies (NIE) (i.e. Korea, Taiwan, Hong Kong and Singapore), with whom the U.S. was running increasing trade deficits (U.S. Department of the Treasury, 1989, p. 12). China has been on the monitoring list since 1991 but after 1994, when China unified its dual-track exchange rate, the Treasury had not found the legal criteria for currency manipulation fulfilled until 2019 (U.S. Department of Treasury, 2019b).

In the aftermath of the 2008 crisis, the tensions between the U.S. and China over the question of currency manipulation had reached a new height under the presidency of Barack Obama. Obama followed the logic of currency manipulation when he warned in 2010: "One of the challenges that

[9] For example, the 2019 report the Treasury urges China to pursue "meaningful structural reforms to reduce the role of the state in the economy" and to "permit a greater role for market forces" (U.S. Department of the Treasury, 2019a, p. 23).

we've got to address internationally is currency rates and how they match up to make sure that our goods are not *artificially* inflated in price and their goods are *artificially* deflated in price. That puts us at a huge competitive disadvantage." (Weaver, 2010, emphasis added). The Obama administration enacted the Trade Facilitation and Trade Enforcement Act of 2015 in addition to the 1988 Act to strengthen the U.S. ability to take action against currency manipulation. Yet, all subsequent Treasury reports including that in 2019 were unable to establish that China was manipulating its currency.

4 Measuring the RMB Misalignment

Despite great attention attributed to the RMB misalignment by policy makers, the degree of adjustment needed to reduce the Chinese current account surplus to a certain target level remains highly contested. The logic of the currency misalignment argument assumes that if there were no market distortions, the real exchange rate would converge to a certain *equilibrium level* that would bring the current accounts in line with selected *macroeconomic fundamentals*. However, several literature reviews have demonstrated that there is no consensus on how to determine the equilibrium exchange rate that brings about this external balance nor on the level of adjustment needed (Cheung & He, 2019; Cheung, 2012; Cheung, Chinn, & Fujii, 2010a; 2010b; Dunaway & Leigh, 2006; Cline & Williamson, 2007). Since currency misalignment is defined as the deviation of the real exchange rate from its equilibrium level, there is consequently also no common measure of the currency misalignment (Cheung, 2012). While there was a proliferation of studies aiming to estimate the RMB misalignment in the decade following China's accession to the WTO in 2001 and the analysis in this section focuses on this period, "the search for a consensus on whether the Renminbi is undervalued continues" (Almås et al., 2017, p. 19).

This lack of consensus results from the current state of exchange rate economics. There is no generally accepted exchange rate model (Cheung, Chinn, & Fujii, 2010b). Most widely applied are various incarnations of the Purchasing Power Parity (PPP) and the macroeconomic fundamentals approaches (Ahmed, 2009; Cheung, Chinn, & Fujii, 2010a; Cheung, Chinn, & Fujii, 2010b; Dunaway & Leigh, 2006; Cline & Williamson, 2007). Both leave considerable room for judgment with regard to the model specifications (Cheung, 2012; Dunaway & Leigh, 2006). Consequently, studies using these approaches in order to estimate the misalignment of the RMB yield widely varying results. The following two sections analyze the PPP and the macroeconomic fundamentals approach on a theoretical level and provide an overview of the estimation results by studies conducted since China's accession to the WTO in 2001.

4.1 The Purchasing Power Parity (PPP) Approach

The PPP approach derives the equilibrium exchange rate directly from a comparison of price levels and estimates the degree of misalignment as the deviation of the actual real exchange rate from this equilibrium level, which also indicates the adjustment needed to overcome the current account imbalance. The PPP hypothesis is based on the law of one price (LoP), which states that in the absence of trading barriers and transaction costs *competition equalizes the prices of similar bundles of tradable goods across economies*. If e is the nominal exchange rate, P^* the foreign price index and P the domestic price index, then with no misalignment, the same bundle of goods would have the same price across countries denominated in a common currency[10]:

1) $$e\,P^* = P$$

Since price level data is generally in terms of index numbers, this implies that the real exchange rate (Q) converges to a *stationary* value[11]:

2) $$Q = \frac{e\,P^*}{P} = \text{constant}$$

The nominal exchange rate is expected to move so as to adjust the price levels so that their ratio is constant in the long run. If currencies are 'misaligned' by PPP standards, the real exchange rate as defined above will be non-stationary. According to standard trade theory, this might be either due to market interventions that prevent the equalization of prices or to currency interventions that hinder the nominal exchange rate from adjusting. The crucial challenge for an empirical evaluation of PPP is to find price indexes that represent comparable basket of goods in the countries of comparison (Shaikh & Antonopoulos, 2012; Shaikh 2016, pp. 528-535)[12]. Another fundamental obstacle to the PPP approach in the context of the debate over the RMB-dollar misalignment is that the United States can never be blamed for over- or undervaluation, as the dollar is the numeraire with an exchange rate always equal to the market rate (Cline & Williamson, 2007).

PPP hypothesis has been found to be very weak empirically because real exchange rates do not converge to any stationary level (Rogoff, 1996; MacDonald & Ricci, 2001)[13]. Therefore a number of

[10] Note that the composition of goods as well as the ratio of tradables to nontradables must be the same in both price indexes P^* and P. Also see discussion in Section 2.

[11] See Shaikh (2016, pp. 517-527) for a detailed discussion of this point.

[12] The simplest and methodologically most questionable PPP approach is the Big Mac index, compiled by *The Economist*. It tries to get around the problem by using a basket containing just one good, the Big Mac.

[13] The real exchange rate is not stationary over the short run (Isard, 1995, pp. 63-65)(Isard, 1995). It does revert to a "target level" over runs of 10-20 years, but this is not the PPP level (Engel, 2000, p. 21). Even if there was a reversion to a non-stationary mean, the "speed

extensions have been suggested in hope of a better specification of the trade balancing equilibrium exchange rate. These are usually classified as extended PPP approaches (Dunaway & Leigh, 2006) or enhanced PPP approaches (Cline & Williamson, 2007). We refer to them as *extended PPP approaches*. Most common is the introduction of the Balassa-Samuelson effect to accommodate the deviation of the real exchange rate from purchasing power parity (Bosworth, 2004; Dunaway & Li, 2005).

The ACT argument is different from that of the PPP. The latter takes the Law of One Price (LOP) to imply that real exchange rates, adjusted for the Balassa-Samuelson effect, will be stationary over the long run -- on the assumption that baskets of goods are roughly similar in both countries. As noted, the PPP hypothesis performs very poorly at an empirical level because real exchanges are is decidedly not stationary, even over very long periods. The ACT argument is that the real exchange rate will track relative real cost, and since the latter can change over time, the real exchange rate should not be stationary. From this point of view, differences in relative real costs are an expression of differences in production "baskets", so in order to adjust for differences in baskets we should look to see if the ratio of the real exchange rate to the underlying real production costs is stationary – which is exactly what the empirical evidence shows (Shaikh 2016, pp. 519, 531 text and Figure 11.6).

4.2 The Macroeconomic Fundamentals Approach

The *macroeconomic fundamentals* approach attempts to arrive at various alternate specifications of the degree of real exchange rate "misalignment" (e.g. Ahmed, 2009; Borowski & Couharde, 2003; Chinn & Prasad, 2003; Cline, 2007; Cline & Williamson, 2007, 2010; Dunaway & Leigh, 2006; Dunaway & Li, 2005). The so-determined exchange rates are often called behavioral effective exchange rates (BEER) (Cline & Williamson, 2007).[14] We base our analysis on the influential standardization of this approach by the IMF (2006). There are three branches here: the macroeconomic balance (*MB*) approach; the equilibrium real exchange rate (*ERER*) approach; and the external sustainability (*ES*) approach.

The *MB* approach relies on a smoothed pooled sample of many countries spanning decades to econometrically "explain" the sample current account through variables such as the fiscal balance, population growth, output growth, relative GDP, economic and banking crises, etc. The estimated sample coefficients are then applied to individual countries in light of their own levels of the

of convergence is extremely slow" (Rogoff, 1996). For a more detailed discussion see Shaikh and Antonopoulos (2012) and Shaikh (2016, pp. 522-527).

[14] The IMF calls a similar approach "reduced form equilibrium real exchange rate" in its "Methodology for CGER Exchange Rate Assessments" (2006). Ahmed (2009) subsumes what Cline and Williamson (2007) call BEER under the label extended PPP approaches.

explanatory variables in order to estimate the current account which should obtain in the country, its "CA norm". Finally, previously estimated elasticities of imports and exports are used to estimate the "equilibrium" real exchange rate which would be needed to make a country's existing CA equal to its imputed norm. The difference between the actual real exchange rate and its MB equilibrium rate is the degree of its misalignment.

The reduced-form equilibrium real exchange rate (*ERER*) follows a similar approach but focuses directly on estimates of model-justified exchange rates. Panel regressions are used to estimate the relationship between real exchange rates and a set of fundamentals such as net foreign assets, productivity differentials, the terms of trade, trade restrictions, etc. The resulting cointegrating relation is used along with country-specific levels of the fundamentals to define ERER equilibrium real exchange rates, and the gap between these and actual exchange rates is deemed to be the degree of misalignment (IMF, 2006, pp. 13-18).

Finally, the external sustainability (*ES*) approach focuses on the sustainability of a country's CA. For each country this approach estimates a CA/GDP ratio which would be stabilize its net foreign assets (NFA) at some "benchmark" levels in light of its estimated growth rate, inflation rate, and rates of return on external assets and liabilities. This leads in turn to an estimate of the ES real exchange rate needed to bring the actual current account into line with the estimated sustainable one. Once again, the difference between the actual exchange rate and the estimated equilibrium rate is the former's putative degree of misalignment (IMF, 2006, pp. 18-23).

4.3 The Unreliability of Estimates of Exchange Rate Misalignment

Given the challenges in measuring exchange rate misalignment, it is hardly surprising that there is no agreement on the degree of misalignment. Indeed, there is not even a consensus on whether the RMB is overvalued or undervalued. The estimates of RMB misalignment in percent for the period of 2000 to 2011 as collected in the four literature reviews (Cline & Williamson, 2007; Dunaway & Li, 2005; Cheung, Chinn, & Fujii, 2010a; Cheung, 2012) are plotted in Figure 4 and Figure 5 for estimates based on the extended PPP and the macroeconomic fundamentals approach separately. All PPP approaches that go beyond a simple PPP-based analysis are classified as extended PPP (including Penn effect, and various versions of BEER approaches). All approaches that follow the procedure sketched above as macroeconomic fundamentals approach are labeled as such (including FEER). As demonstrated in earlier literature reviews, similar approaches yield a wide range of results even for the same year of

estimation and even if conducted by the same authors. For example, MacDonald and Dias (2007) using the same BEER approach estimate a required appreciation of the RMB ranging from 27.3 to 46.6 percent depending on the definition of the trade balancing scenario.

All literature reviews point to the fact that the estimation of currency misalignment is highly sensitive to the choice of variables, the equation specification, the sample period and country sets in the panel econometric estimations. For example, Cheung, Chinn, and Fujii (2010a) show that for 2009 an undervaluation of RMB varying from 1.6 to 38 percent can be generated using the same extended PPP approach while altering the sample period from 1990-2009 to 1980-2009 respectively. Further, sensitivity tests for the extended PPP approach suggest that China's real equilibrium exchange rate can vary widely when dropping one country from the panel or changing the proxies, because the estimated coefficients for explanatory variables change (Dunaway, Leigh, Li 2006). Authors who have used the same methodology and similar specification when applying the macroeconomic fundamentals approach also deliver estimates of substantial variation (Dunaway & Leigh, 2006; Bénassy-Quéré, Duran-Vigneron, Lahrèche-Révil, & Mignon, 2004; Cline & Williamson, 2007; Cheung, Chinn, & Fujii, 2010b). For example, Wang (2004) finds only a slight undervaluation whereas Goldstein (2004) estimates the RMB to be undervalued by between 15 and 30 percent. We share the conclusion of Schnatz (2011) that the methodologies used for assessing the 'fair value' of a currency vary significantly with the specific assumptions chosen by the modeler.

One crucial challenge is to define the trade elasticities, which determine the claimed link between the exchange rate appreciation and the current account. For example, Ahmed (2009) finds that a 20 percent appreciation of the RMB induces a USD 400 billion decrease in the Chinese exports after four years. Cheung, Chinn and Fujii (2010a), on the other hand, only find an impact of USD 50 billion for the same appreciation. Consequently, the robustness of estimations of the equilibrium RMB exchange rate is very weak (Dunaway & Leigh, 2006, p. 3; Cheung, Chinn, & Fujii, 2010b). This causes serious problems of statistical significance. Cheung, Chinn, Fujii (2007) concludes: "One general observation is that, when one implements the standard operating procedure of accounting for sampling uncertainty in making inferences, there is no evidence supporting the claim that the RMB is substantially undervalued, using conventional significance levels." (p. 20). The IMF (2006), for example, states: "While the econometric model captures the broad trends in real exchange rate behavior, estimates of equilibrium exchange rates are unavoidably subject to significant uncertainty." (p. 18)

We argue that the failure of the various PPP and macroeconomic fundamentals approaches to capture the alleged RMB misalignment (see Section 4) is not simply a matter of measurement, but of substantive theory. The presumption of CCT underlies the ways in which PPP and the macroeconomic fundamentals approach are utilized to estimate exchange rate misalignments.

For the case of PPP, the Ricardian assumption of automatically balancing trade is imputed even though this is not required by the LoP. The LoP only says that prices of internationally traded goods will be roughly the same in different countries. This is perfectly consistent with unbalanced trade, because one country's exports can be different from its imports, even if every commodity in both sets has the same international price. The LoP in turn implies PPP only if countries have the same basket of internationally traded goods, which they assuredly do not. Since the LoP does not imply balanced trade, neither does PPP. It follows that one cannot use PPP as a proxy for a trade-balancing equilibrium exchange rate, as is done in the currency manipulation argument. Extended PPP also assumes a stationary equilibrium of balanced trade in the long run, but accounts for existing imbalances via various supposed macroeconomic fundamentals – on which basis it estimates the currency re-alignment needed for trade balance. Neither approach considers structural differences in cost competitiveness as the cause of persistent trade imbalances.

All three branches of the macroeconomic fundamentals approach discussed in the previous section share the conclusion that actual exchange rates are misaligned or even manipulated because the observed current account adjusted for full capacity utilization does not match some theoretically expected one. And all three conclude that the putative current account gap can be closed through an appropriate adjustment of the real exchange rate which would occur if governments would abstain from exchange rate interventions. These are CCT assumptions to the core.

CCT not only underlies the PPP and macroeconomic fundamentals approaches, it is also the foundation for several other explanations of the US-China trade imbalance.

5 Other Comparative Cost Explanations of the U.S.-China Trade Imbalance

ACT implies that real cost differences give rise to trade imbalances covered by endogenous capital flows. This is consistent with the US-China trade relation. On the other hand, CCT implies balanced trade, in which case various exogenous factors must account for the observed trade balance: foreign exchange intervention, the role of the dollar as international reserve currency, neo-mercantilist

development policy, or a global savings or money glut. This section shows how all these strands of literatures on persistent trade imbalances are ultimately rooted in the logic of CCT.

5.1 Foreign Exchange Intervention Theory

One explanation of the current account deficit in the US is that it arises from various state interventions in China and elsewhere (e.g. Gangnon 2017). The foreign exchange intervention theory often assumes that capital inflows can be sterilized because they represent temporary "shocks" to the system. For example, Bayoumi et al. (2015, pp. 147-150, 172) begin with the standard CCT assumption that in the absence of private financial capital flows, a net official outflow will cause a current account surplus in China and hence a deficit in the US. However, the Chinese official capital outflow will decrease its capital stock and raise the marginal product of capital, which will in turn stimulate a private capital inflow into China until it just offsets the net official outflow. It follows that in "a world with efficient markets and perfect capital mobility flows", China's net official outflows designed to sterilize a current account surplus will have no effect on the current account because they are fully offset by private flows[15]: sterilization will not affect the current account surplus. On the other hand, "when capital mobility is imperfect", a net official outflow from a country will not be fully offset and will therefore give rise to a current account surplus. On this CCT reasoning, China's trade surplus, and hence the US trade deficit, is *caused* by China's net official outflow to the US. This is their explanation for a variety of empirical findings, including their own, of an association between net official flows and the current account balances. It follows that "a policy change to cease net official flows and allow the exchange rate to appreciate would lead to a significant decline" (p. 172) in China's current account surplus.

In our argument, the absolute cost disadvantage of the US gives rise to a trade deficit offset by covering endogenous capital inflows. From this starting point, a net official flow from China into the US will raise the nominal exchange rate of the USD. The inflow will also increase liquidity in the US and reduce its interest rate below the bilateral arbitrage equality level. The appreciation of the nominal exchange rate will only have short-term effects on the US cost disadvantage, so the US trade deficit will revert. On the other hand, the reduction in the US interest rate will inhibit some of the endogenous capital

[15] Various studies have found that sterilization is "difficult to execute and sometimes even self-defeating", and that "when capital is highly mobile, attempts at sterilization … cannot work for long if the capital inflows persist" (Jang-Yung Lee, 1997).

inflow from China. The exogenous capital inflow will therefore *crowd out* the endogenous one until the net capital inflow covers the trade deficit, with the US interest rate now below that of China – as has been observed over the period in which the bilateral trade imbalance rose significantly (IMF 2019c). This explains the previously cited empirical associations between net official flows and current account imbalances. Notice that this ACT result follows from the US cost disadvantage, not from imperfections in capital markets as in the CCT explanation.

The foregoing argument has been predicated on the free movement of Chinese short-term capital. However, China's outbound capital account had been liberalized only to a very limited extent in the first decade after the WTO accession in 2001 (He, Cheung, Zhang, & Wu, 2012, p. 1). Consequently, the free market short-term capital outflows needed to counterbalance the trade surplus is limited by capital controls. The increase in official reserves we have observed is necessary to close the gap. In this sense, Chinese foreign exchange intervention could be viewed as a *surrogate* for a market mechanism, rather than a market distortion (Harrod 1957, pp. 85-6).

5.2 Dollar as international reserve currency

An alternate claim is that the US trade deficit is due to the role of the USD as an international reserve currency (e.g. McKinnon, 2001; Bergsten, 2009). This "Triffin Paradox" says that the reserve currency role of the USD generates exogenous capital inflows into the US as foreigners seek to acquire dollars, which appreciates the US currency above its trade-balanced value and gives rise to a US trade deficit. At the same time, it depreciates the RMB below its own corresponding value and gives rise to a Chinese trade surplus – all through the workings of international financial markets (Bordo and McCauley, 2018). Once again, the underlying assumption is the CCT notion that exogenous capital inflows cause the US trade deficit (Bergsten 2009, p. 20). Our own argument is that an exogenous capital inflow will crowd out the endogenous one without eliminating the current account deficit, as laid out in the preceding discussion of foreign exchange intervention theory. Here, we only add the observation that the US ran a trade *surplus* from 1960-1970 despite the fact that the dollar was a reserve currency (Shaikh 2016, p. 534, Figure 11.7; McKinnon, 2001), which is further evidence against the reserve currency hypothesis.

5.3 Neo-mercantilist development policy

While the currency manipulation argument blames China for distorting international trade flows and undermining the stability of the global economy, a contemporary version of the mercantilist theory sees the same RMB misalignment as part of an export-oriented development strategy inherent in the initial and revived Bretton Woods system (see e.g. Dooley et al., 2003; 2004; 2009). This only differs from the currency manipulation theory on the question of motivations: the currency manipulation argument claims that China misaligns its currency in order to create a trade surplus, the neo-mercantilist perspective says China does it in order to foster export led growth. Both arguments are rooted in the CCT claim that China's trade surplus is due to its interference in free trade, as opposed to the ACT claim that it is rooted in an absolute cost advantage. We might also ask, if currency manipulation has supposedly enabled some East Asian countries to achieve export-led growth on the unprecedented scale, why is it that large parts of the developing world – in particular in Africa, South- and Southeast Asia, and Central America – continue to run substantial trade deficits (UNCTAD 2018 p. 17) instead of simply depreciating their currencies in order to gain export competitiveness? From our perspective, this is because building up high productivity export-oriented industries is a slow and expensive process of industrialization and infrastructure building. Low wages are not sufficient: Despite low wages in Sub-Saharan Africa, unit labor costs there continue to be higher than in China, and their trade deficits have been persistent (Golup et al., 2018).

5.4 Global Saving and Money Glut Hypotheses

Neoclassical theory supposes that savings will flow downhill from capital-rich countries to capital-poor ones. In this light, the net capital flows from China to the US, i.e. that capital flows "uphill", is a paradox (Lucas 1990; Skidelsky 2018, p. 336). The savings glut thesis of Ben Bernanke (2005) claims that it is an increase in net savings abroad – especially in China – which led to net capital exports to the U.S. and thereby caused its current account deficit. This saving glut supposedly flowed into the U.S. rather than other developed countries because of the "special international status of the USD" as a reserve currency. From this point onward, the argument is the same as the previously discussed reserve currency one, and needs no further elaboration.[16]

[16] It should be noted that the source of the alleged saving glut is contested: Ferguson and Schularick (2011) point to studies by Kuijs (2005) and Wolf (2009) that the increase in Chinese savings came from retained corporate earnings of private and state enterprises, not from households as Bernanke would have it. This finding is perfectly consistent with the ACT: If Chinese cost competitiveness results in a trade surplus we would expect an increase in corporate savings.

Skidelsky (2018) argues that the savings glut hypothesis is "pseudo-Keynesian" because in "Keynesian theory, 'excess saving' is the result of under-investment, not an independent factor" (p. 331). His own 'money glut' thesis[17] is that it was **"**American over-spending on consumption and speculation in real estate that forced the Chinese to run a surplus. The structural problem lay with the US not the Chinese economy" (p. 340). What ties the savings and money glut arguments together is their reliance on CCT claim that capital flows cause current account imbalances. ACT proposes the reverse causation.

6 Conclusion

The currency manipulation argument remains a main point of reference for policy makers in the U.S. despite the fact that the link between foreign exchange market interventions, exchange rate devaluation and current account imbalances has not been established empirically. Most studies focus on the estimation of exchange rate undervaluation approximated with respect to a statistically derived equilibrium exchange rate. However, there is no consensus on the degree nor the direction of misalignment.

Standard trade models trying to estimate the RMB misalignment are rooted in the Ricardian notion of comparative advantage. This holds true for the extended PPP and the macroeconomic fundamentals approaches, the most widely used ones the estimation of currency misalignment. The currency manipulation argument and the misalignment measurements rely on the CCT assumption that in the absence of market interventions real exchange rates would change such as to make the trade balance adjust to the capital account. The same assumption underpins other explanations of the US-China trade imbalance such as the savings or money glut thesis, as well as those that see the US deficit as a result of the USD's role as international reserve currency.

Some economists who had previously argued vigorously that it would be vital for the U.S. economy to prevent China from manipulating its currency, have recently come to take a more cautious stance. For example, Paul Krugman who in 2010 laid out the currency manipulation argument and called for "Taking on China and its Currency" has come to downplay the importance of the trade deficit with China (Krugman, 2018). The fact that actual patterns of trade are so different from those derived from orthodox trade theory has become a pressing concern and we share with many economists the goal of showing why this is the case. But we think that the problems cannot be solved when staying within the framework of the theory of comparative cost.

[17] This is similar to what Bernanke (2005) calls the "made in the USA" thesis.

Absolute Cost Theory (ACT) based on real cost differences expects persistent trade imbalances even in the context of free international competition. Trade imbalances tend to cause interest rate differentials that induce short-term capital flows in the opposite direction to the net trade flow, thus clearing the balance of payments. Persistent trade imbalances themselves arise from differences in real costs of production: countries that have higher absolute real costs will tend to run a trade deficit and become international debtors. The opposite happens to countries with superior price competitiveness. Exogenous capital flows and foreign exchange interventions can temporarily change the nominal exchange rate, but not the long run real exchange rate and the trade balance, both of which remain tied to real cost competitiveness.

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APPENDIX

Figure 1

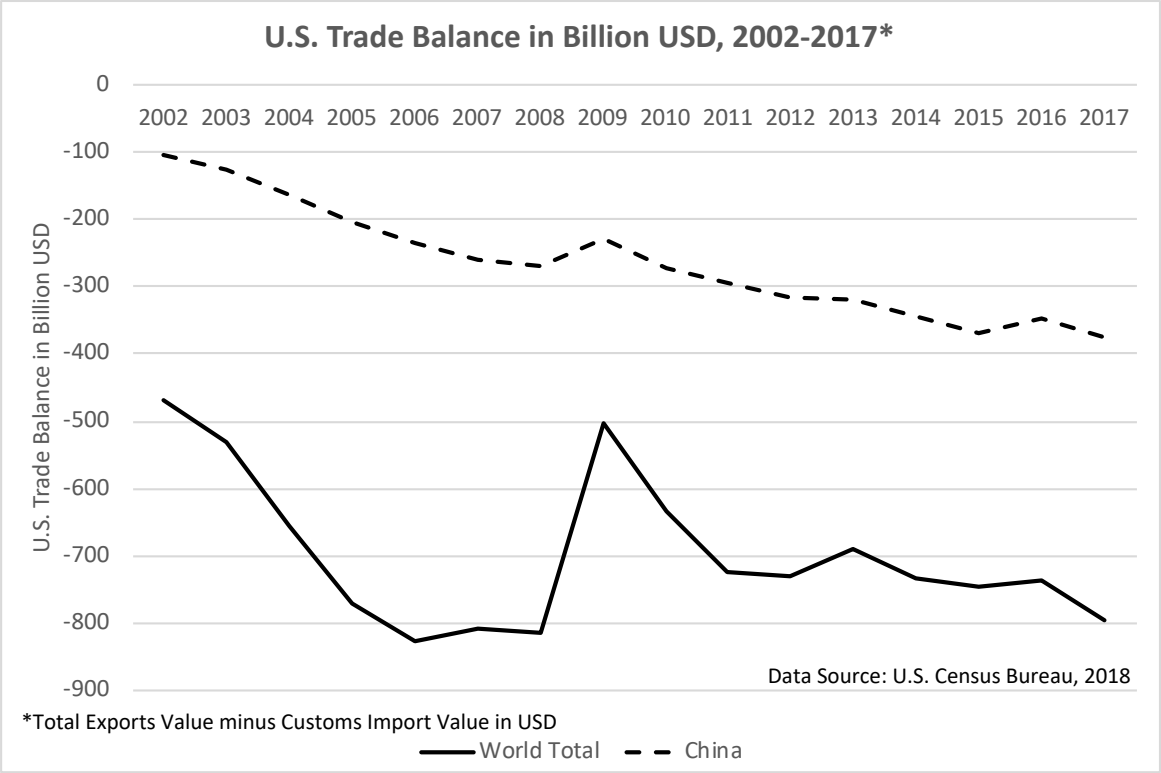


Figure 2


China Current Account Balance, 1997-2017
Billion USD
Percentage
450
400
350
300
250
200
150
100
50
0
12
10
8
6
4
2
0
Data Source: IMF, 2018
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
China Current Account Balance in Billions USD
China Current Account Balance in Percent of GDP

Figure 3

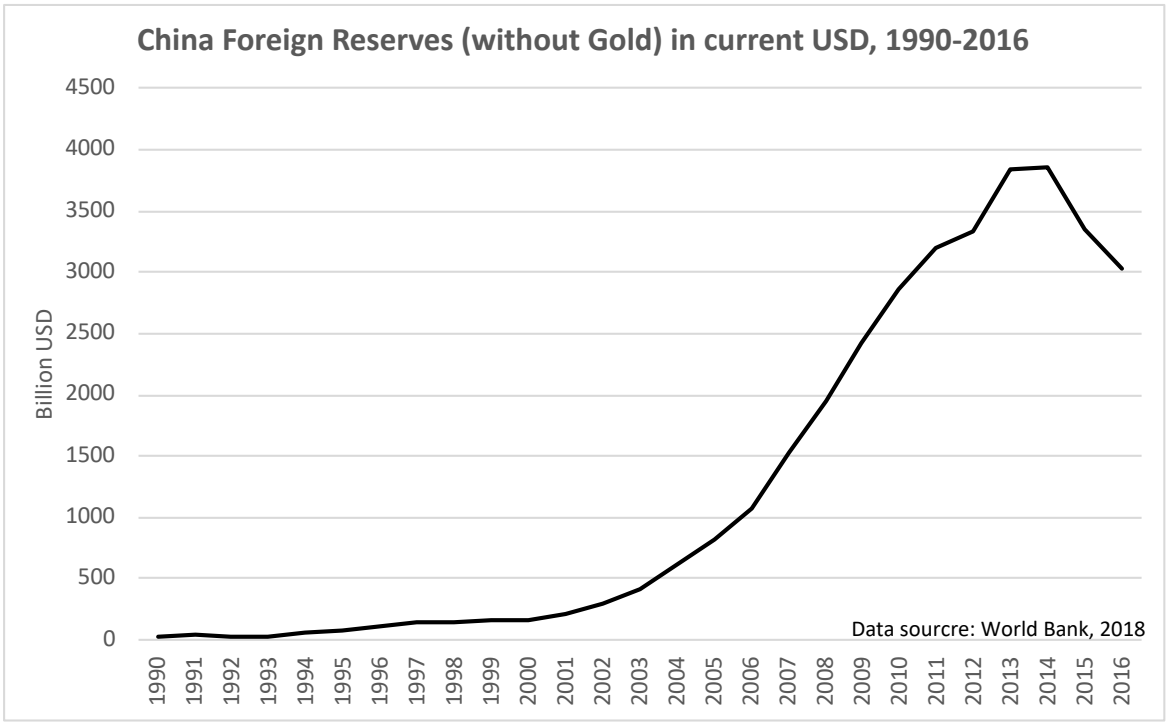
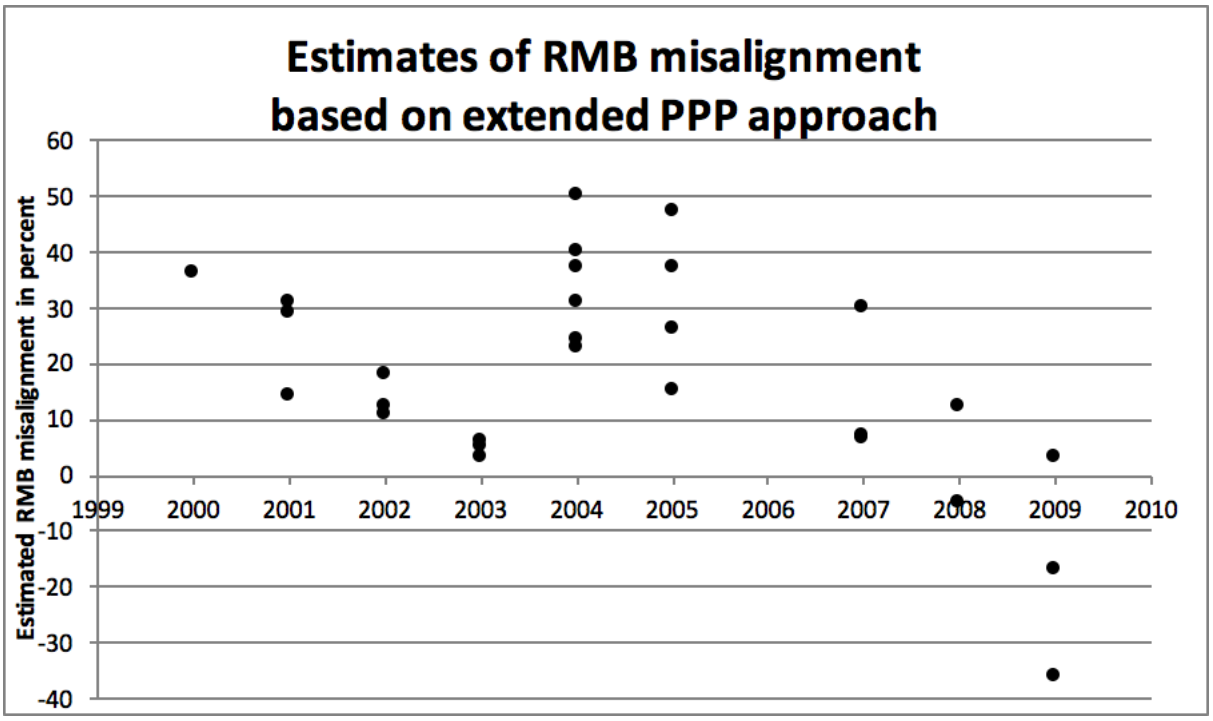
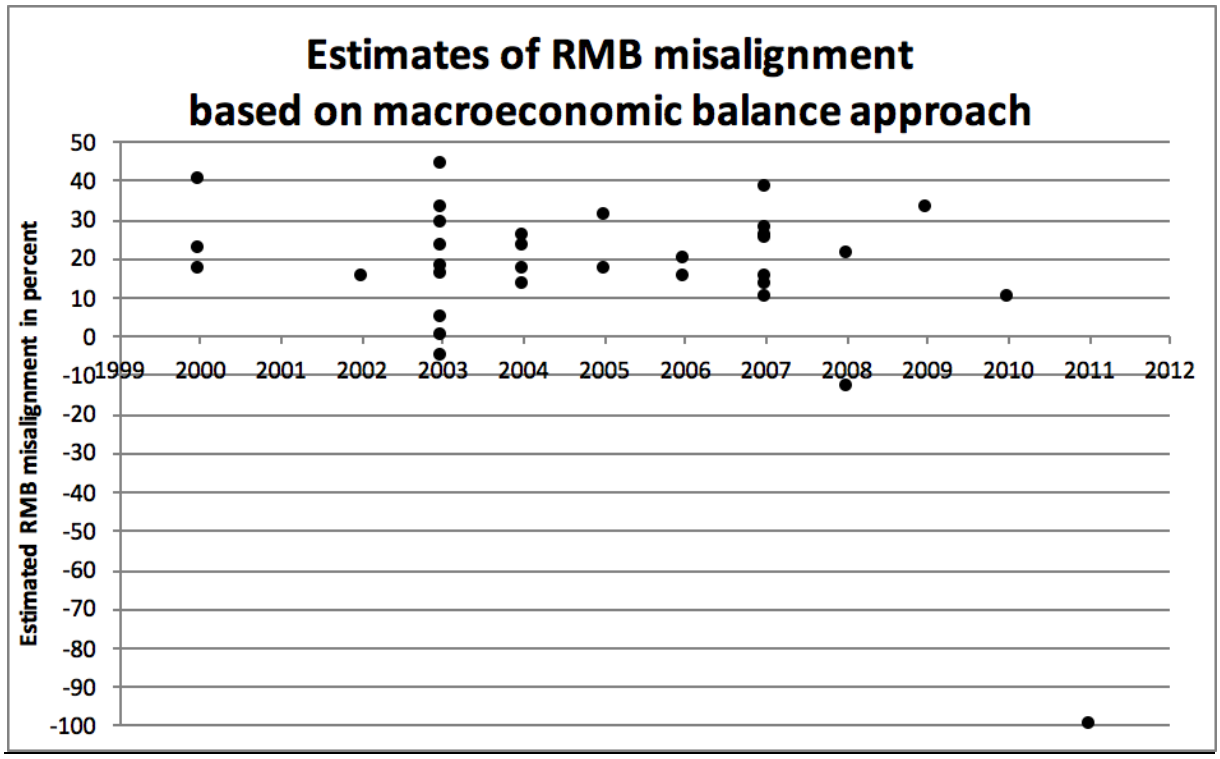

China Foreign Reserves (without Gold) in current USD, 1990-2016
Billion USD
4500
4000
3500
3000
2500
2000
1500
1000
500
0
Data sourcre: World Bank, 2018
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016

Figure 4[18]



[18] Figure 4 and Figure 5 are compiled based on the selection of studies contained in the four literature reviews (Cline & Williamson, 2007; Dunaway & Li, 2005; Cheung, Chinn, & Fujii, 2010a; Cheung, 2012). If a source reported more than one estimate of the RMB misalignment, each estimate was treated as a separate data point in the scatter plots. If the estimate of the RMB misalignment is reported as a range, the maximum and minimum value are reported in the scatter plots as two separate estimates.

Figure 5[19]



[19] See footnote 12.