Chapter 1
The China-US Trade Imbalance: Evaluating Remedial Macroeconomic Measures

Anthony J. Makin

Abstract This paper addresses the most contentious issue in China-United States economic relations, their bilateral trade imbalance. After highlighting key features of the trading relationship, a straightforward international macroeconomic framework is introduced to analyze the main influences on the external imbalance. From an output-expenditure perspective, it examines real exchange rate valuation, the effects of tariffs and subsidies, higher Chinese consumption, and increased foreign direct investment. It concludes that protectionist measures are ineffective in reducing the trade imbalance and negatively affect macroeconomic welfare, broadly defined, in both countries. Meanwhile, real exchange rate adjustment, increased Chinese private consumption, and relaxation by China of restrictions on US foreign investment would all contribute to balancing the external accounts, with lower Chinese saving and more US FDI in China also improving macroeconomic welfare in both countries.

Keywords China-US trade imbalance · Real exchange rate · Protection · Consumption · FDI

JEL Codes F32 · F33 · F43

1 Introduction

While the United States is the world's largest economy, China is the world's largest exporter and replaced the United States as the world's largest manufacturing nation a decade ago. Since then, the China-US trade imbalance has been the key source of economic tension between the two superpowers, stretching back to concerns raised by the Bush and Obama administrations. Members of the European Union have had

A. J. Makin (✉)
APEC Study Centre, Griffith Asia Institute, Griffith University, Brisbane, QLD, Australia
e-mail: t.makin@griffith.edu.au

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similar concerns about their trade imbalances with China. Yet, policy debate on this issue has centered on the nature of bilateral export and import flows, to the neglect of macroeconomic factors influencing those flows, which this paper aims to redress.

In the United States, since the turn of the century, the demise of manufacturing firms unable to compete against low-priced Chinese imports has repeatedly sparked calls for retaliatory action by the US government against China. Given the impact exchange rates have on international competitiveness and trade flows, the value of the CNY/$US exchange rate has also been raised in the ongoing China-US dialogue on the trade imbalance. From the mid-2000s, the US government has pressed China to revalue its currency on the grounds that its undervalued currency boosted the competitiveness of China's manufacturing sector and contributed to the bilateral trade imbalance. For related discussion, see Congressional Research Service (2008).

While the CNY/$US exchange rate has strengthened significantly over the past decade, somewhat paradoxically, China's trade deficit with the United States has continued to widen from a deficit of near $80 billion in 2000 to close to $400 billion in 2018. Under the Trump administration, direct action has been taken to reduce this trade imbalance by imposing tariffs on Chinese imports to the United States, beginning with tariffs on steel and aluminum and extended to solar panels and household appliances. China has retaliated by imposing tariffs on American chemicals, coal, medical equipment, and soybeans. These protectionist measures directly affect the targeted industries but also have macroeconomic effects, as evidenced from the escalation of US tariffs during the Great Depression (see Crucini and Kahn 1996).

The China-US trade imbalance has routinely been interpreted as the difference between export and import flows between the two countries, with protectionist measures aimed directly at influencing these flows. However, trade imbalances are also macroeconomic phenomena, reflecting discrepancies between an economy's output, or aggregate supply, and its expenditure, or aggregate demand, as highlighted by Alexander's (1952) absorption approach. In what follows, this much neglected perspective provides a novel basis for examining the interrelationship between the China-US trade imbalance, the CNY-$US real exchange rate, and the macroeconomic impact of policy measures, including subsidies, tariffs, countertariffs, increased Chinese consumption, and increased foreign investment flows.

The remainder of the chapter is structured as follows: Section 2 summarizes recent trends in Chinese and US growth, bilateral balance of payment trends, and protectionist measures. Section 3 advances a simple international macroeconomic framework based on the output-expenditure distinction. Section 4 adapts this framework to analyze how discrepant economic growth, exchange rate management, protectionism, higher Chinese consumption, and higher US foreign direct investment in China influence the trade imbalance and macroeconomic welfare. Section 5 concludes the paper and draws policy implications, emphasizing that a protectionist response is not only an ineffective means of reducing the trade imbalance but also reduces macroeconomic welfare in both countries.

2 Bilateral Trade, Exchange Rate, and Balance of Payment Trends

China's transition to an economic superpower arose from persistently high economic growth rates that began in the early 1980s at rates three to four times those of its trading partners, the United States being the most significant. See Fig. 1.1.

Exports have been a major contributor to China's stellar economic growth, combined with foreign direct investment (FDI) in electronics and manufacturing, enhanced domestic labor mobility, improved education, high domestic saving, entrepreneurship, and positive investment conditions for the private sector. See World Bank (2012) for related discussion.

Based on the proportion of exports and imports to its GDP, China is a highly open economy in terms of goods and, to a much lesser extent, service flows. As a share of GDP, China's exports plus imports of goods and services are around 75%, well above comparable ratios for the United States and major advanced economy export nations Japan and Germany. Yet, China is relatively closed financially with heavy restrictions on short-term international capital flows, although has encouraged selective foreign direct investment in certain sectors, subject to conditions governing intellectual property rights. In view of the extensive capital controls in place, recorded capital flows have, therefore, been mostly in the form of foreign direct inward and outward investment (FDI) and purchase of US government debt instruments.

The wider China-US trade surplus and corresponding US trade deficit, depicted in Fig. 1.2, have been the most notable aspect of China's international trade since the turn of the century. The US trade deficit grew strongly after China joined the WTO in

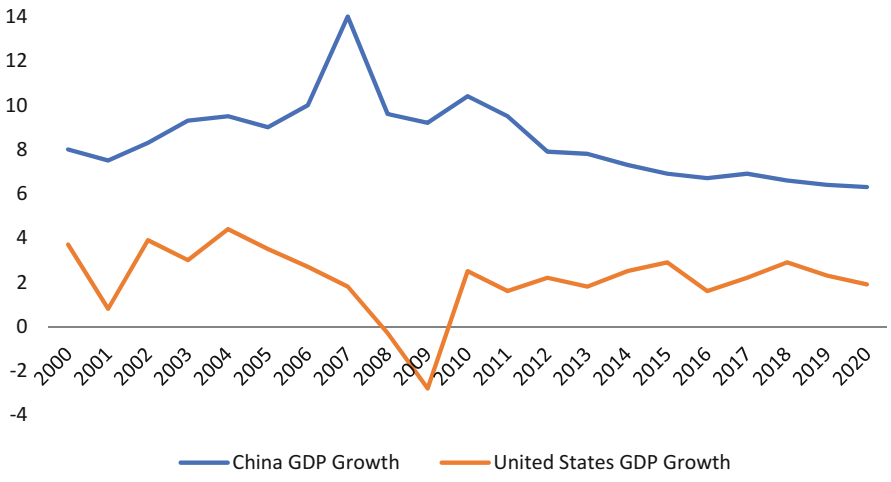

Fig. 1.1 GDP growth (%): China and the United States, 2000–2018. (Source: Based on IMF data)

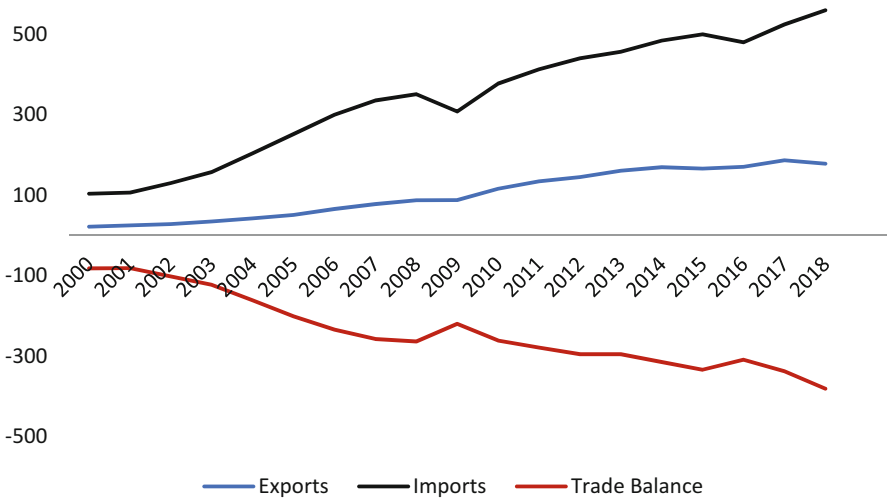

Fig. 1.2 US-China trade: Exports, imports, and trade deficit, 2000–2018. (Source: Based on US Census Bureau data)

2001, although China's export capability began expanding at least a decade earlier, assisted by China's plentiful low-cost and more mobile workforce that provided a competitive edge for a burgeoning manufacturing sector.

Figure 1.2 reveals that US imports from China rose relatively quickly from 2002 until 2008. During the 2008–2010 Global Financial Crisis (GFC), US imports from China fell sharply though soon recovered their upward climb. Bilateral trade in goods dominates trade in services and attracts the most attention. US merchandise imports from China, mainly in the form of computers, phones, electronics, other electrical equipment, machinery, metals, furniture, apparel, and footwear, are over three times the value of US merchandise exports to China, mainly commercial aircraft, electronics, chemicals, oil and gas, soybeans, and motor vehicles.

2.1 Exchange Rate Management

After a lengthy period of explicitly pegging against the $US, China's exchange rate system changed in 2005 to set its value against a basket of currencies in which the US dollar still predominates (see Das 2019). The CNY/$US exchange rate subsequently appreciated from over 8 yuan to the dollar and has ranged between 6 and 7 yuan to the dollar since the Global Financial Crisis.

Given the importance of the $US in China's effective exchange rate index, and the absence of major differences in price level behavior, movement in the nominal

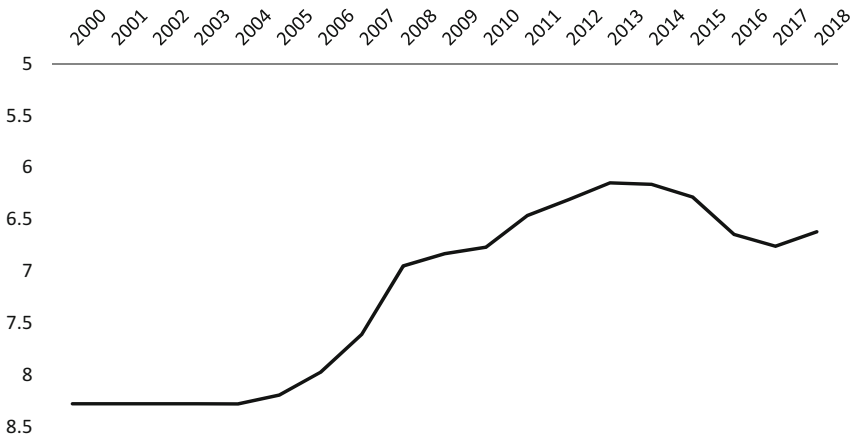

Fig. 1.3a Chinese Yuan – US dollar exchange rate, 2000–2018. (Source: Based on BIS data)

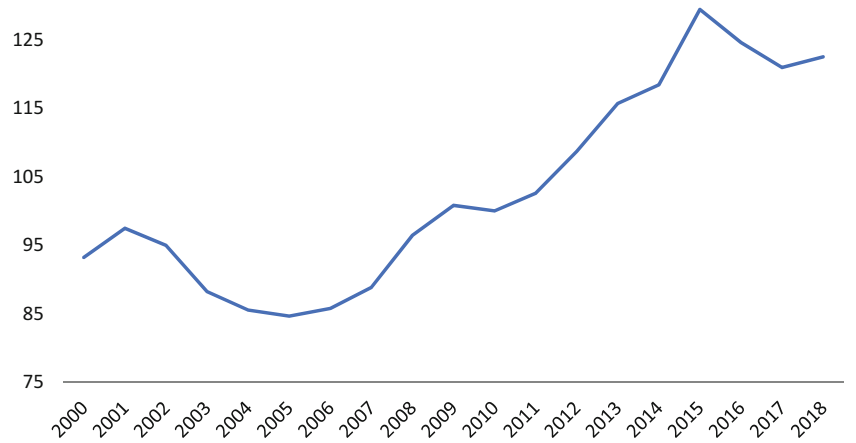

Fig. 1.3b Chinese real exchange rate, 2000–2018. (Source: Based on BIS data)

bilateral exchange rate is largely mirrored in the behavior of China's real exchange rate over this time. See Figs. 1.3a and 1.3b.

In the absence of a fully developed financial system, China's exchange rate system provides a measure of financial stability and an anchor for monetary policy, though contrasts with relatively more flexible exchange rate regimes adopted by most developing and emerging economies with which many industrial economies trade.

By running sizeable trade and current account surpluses since the turn of the century, China's exchange rate settings against the US dollar have enabled its central bank, the People's Bank of China, to accumulate large holdings of foreign exchange

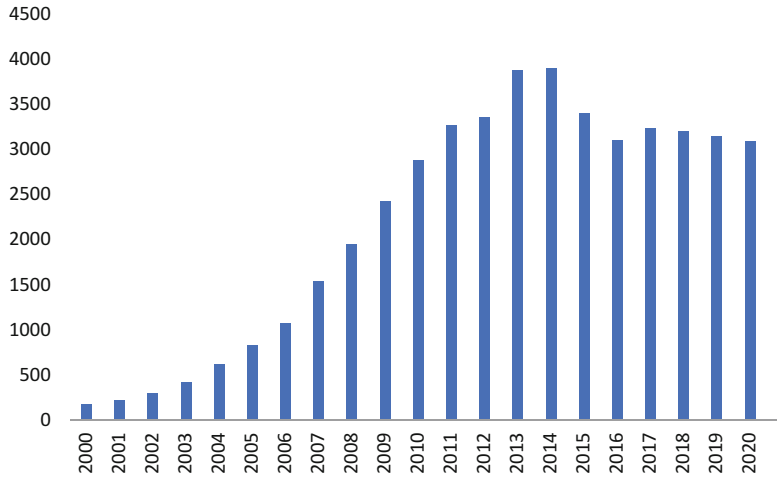

Fig. 1.4 China's gross foreign exchange reserves 2000–2020 ($US billion). (Source: Based on IMF data)

reserves. These peaked at close to $4 trillion in 2014 falling to around $3.0 trillion more recently, still the highest $US reserves of any economy in the world. See Fig. 1.4.

There are several approaches to evaluating whether any country's exchange rate is appropriately valued. For instance, there is the Fundamental Equilibrium Exchange Rate (FEER) pioneered by Williamson (1993) which calculates real exchange rate values consistent with macroeconomic equilibrium. According to the FEER perspective, China's exchange rate was significantly undervalued in the early 2000s but revalued substantially against the US dollar from 2005 (Cline and Williamson 2012). Other studies focusing on the relationship between China's exchange rate and its international trade flows include inter alia, Goldstein and Lardy (2009), Frankel and Wei (2007), and (Zhang 2001) which employ a range of different theoretical and estimation techniques.

With the above as background, we now model the interrelationship between aggregate expenditure and national income levels in both countries, the CNY/$US real exchange rate, and the China-US trade imbalance. A basic framework is first developed, before examining the impact of a range of policy options on both the trade balance and macroeconomic welfare, defined broadly with reference to national income and private consumption (as an indicator of the standard of living).

3 The China-US Trade Imbalance: An International Macroeconomic Framework

This section advances a two-country international macroeconomic framework for examining the China-US trade imbalance centered on respective national output, national expenditure flows, and the real exchange rate. Inspired by Alexander's (1952) absorption approach, it assumes the two economies only trade with each other and that the bilateral trade imbalance reflects discrepancies between their respective aggregate outputs and aggregate expenditures. By changing competitiveness, the real exchange rate directly affects these aggregates and hence the trade balance.

China's real bilateral exchange rate with the United States is defined as

$$R = {}^{eP^C}/_{P^{US}} \tag{1.1}$$

where e is the nominal *CNY/$US* exchange rate, P^C is China's domestic price level, and P^{US} is the US price level. Given little difference in price level behavior of China and the US post GFC, nominal exchange rate variation mostly accounts for short-term real exchange rate fluctuation. The US real exchange rate is defined as the reciprocal of *R*.

A rise (fall) in the real exchange rate, R, for China (US) denotes a real depreciation (appreciation) and improved (worsened) competitiveness. The weaker (stronger) the real exchange rate, the greater the supply (demand) of goods and services. In sum, total output (expenditure) includes exports (imports) of goods and services and so is positively (negatively) related to competitiveness.

Aggregate output functions for both economies are specified as

$$AO^C = AO\left(R(e); \varsigma, L^C, K^C, L^C, T^C\right) \tag{1.2}$$

$$AO^{US} = AO\left(R(e); L^{US}, K^{US}, L^{US}, T^{US}\right) \tag{1.3}$$

where *L*, *K*, and *T* are the factor inputs labor, capital, and technology used to produce national outputs and ς is Chinese government subsidies.

Exchange rate depreciation improves competitiveness, encouraging short run production and increased exports of goods and services (see Sarno and Taylor 2002; Feenstra and Taylor 2015). Hence, an upward (downward) sloping aggregate output schedule AO^C (AO^{US}) for China (United States) can be drawn in real exchange rate-output space, as shown in the left (right) panel of Fig. 1.5.

On the aggregate expenditure side,

$$AE^C = AE\left(R(e); C^C, I^C\right) \tag{1.4}$$

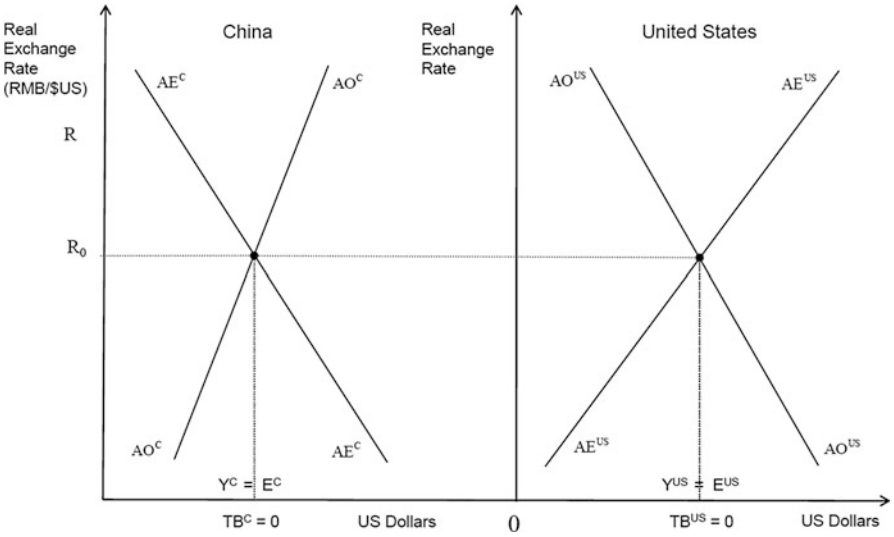

Fig. 1.5 Output, expenditure, and real exchange rate: A two-country framework

$$AE^{US} = AE\left(R(e); \tau, C^{US}, I^{US}\right) \tag{1.5}$$

where AE is expenditure by resident entities on goods and services including imports, or absorption, C is private and public consumption, and I is private and public investment and τ is US tariffs on Chinese imports.

With absorption defined as $C + I = AE$, and as $C + I + X - M = AO$, the trade imbalance, $(X - M)$,is the output-expenditure difference, such that

$$AO - AE = AO - (C + I) = X - M \tag{1.6}$$

Hence for China and the United States,

$$AO^C - AE^C = \left(AO^C - C^C\right) - I^C = \left(S^C - I^C\right) = TS^C \tag{1.7}$$

$$AE^{US} - AO^{US} = I^{US} - \left(AO^{US} - C^{US}\right) = \left(I^{US} - S^{US}\right) = TD^{US} \tag{1.8}$$

$$TS^C = TD^{US} \tag{1.9}$$

where S is national saving, TS is the trade surplus, and TD is the counterpart US trade deficit. Moreover, because a trade surplus must be matched by net outward foreign investment and a trade deficit by net inward foreign investment,

$$TS^C = -NFI^C = TD^{US} = NFI^{US} \tag{1.10}$$

where NFI is net foreign investment.

The US real bilateral exchange rate is the inverse of China's, so that depreciation of the CNY is an appreciation of the $US. Hence, as shown in the left (right) panel of Fig. 1.5, a downward (upward) sloping aggregate expenditure schedule AE (AE∗) for China (US) can be drawn in exchange rate-expenditure space. In other words, the output-expenditure schedules for China in the left panel have the opposite slopes to those for the United States in the right panel. The trade accounts of China and the United States balance when aggregate supply and demand schedules intersect in both panels at real exchange rate, R.

When China has a trade surplus, this reflects its excess production over expenditure, matched by a US trade deficit conveying its excess expenditure over production. Output-expenditure differences manifest not only as trade imbalances but also as excess demand or supply of foreign currency, in this case $US. In the absence of capital flows, the real exchange rate equilibrates national output and national expenditure ensuring a balanced trade account.

4 Policy Options for Reducing the Trade Imbalance

With these foundations, we can examine several policy options for addressing the China-US trade imbalance, including real exchange rate adjustment, protectionist measures, increased (reduced) Chinese (US) consumption, and increased foreign inward (outward) direct investment to China (from the United States).

Consider first, however, China's rapid development relative to the United States up until the 2008–2009 Global Financial Crisis as depicted earlier in Fig. 1.1. As conveyed in Fig. 1.6, rapid expansion of low-cost manufacturing for export resulted in China's, mainly manufacturing, output growing at a multiple of US growth. Hence, China's AO schedule in the left panel of

Figure 1.6 shifts rightward, as does the US AE schedule in the right panel, reflecting increased consumption of cheap Chinese-made manufactures by US households and firms. In other words, output in China outpacing its expenditure equates to additional exports from China to the United States, which corresponds to higher imports to the United States from China reflecting US expenditure outpacing its production.

4.1 Real Exchange Rate Adjustment

Other things equal, China's relatively stronger economic growth and exports strengthen China's exchange rate in real terms from R_0 to R_1 and weaken the $US accordingly. Abstracting from FDI flows, with a fully flexible nominal CNY/$US exchange rate, the real exchange rate also appreciates, ensuring the bilateral trade account eventually balances.

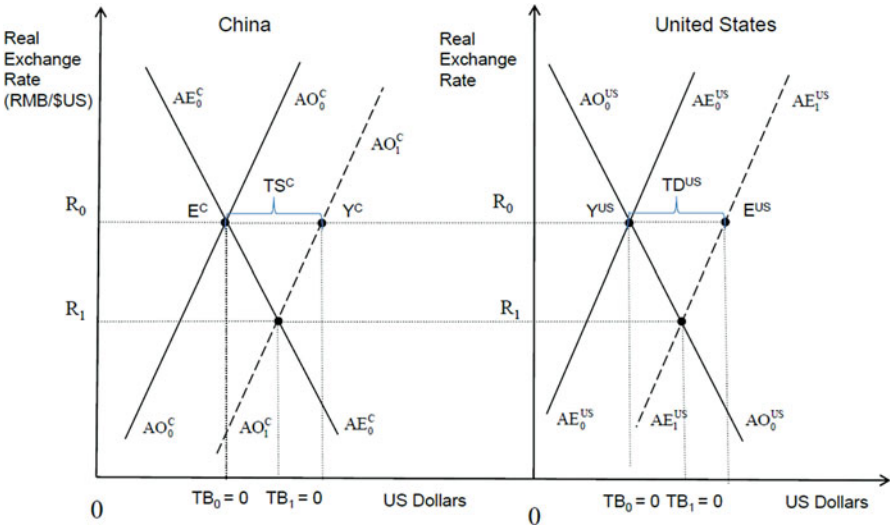

Fig. 1.6 The China-US trade imbalance and real exchange rate misalignment

However, nominal appreciation harms China's international competitiveness, and to prevent that, the central bank, the People's Bank of China (PBC), has heavily bought $US. The $US acquired is invested in $US bonds which add to the PBC's foreign reserves. While PBC purchases of $US reduce the US money supply in the first instance, other things equal, immediately investing those dollars in $US denominated bonds means the US money supply is unaffected.

When the PBC buys US bonds with the proceeds of its foreign exchange market intervention, it effectively generates excess Chinese saving over investment to fund excess investment over saving in the United States. Capital outflow from China also allows lower US interest rates that sustain excess US expenditure over output. China's national income is supplemented by interest income on its US bonds, while US national income is reduced by interest paid by the PBC on these bonds.

Figure 1.6 also shows important, though hitherto neglected, macroeconomic consequences of pegging the CNY/$US exchange rate. In particular, by managing an undervalued exchange rate, China's output and exports are higher than had the CNY/$US exchange rate appreciated. Therefore, the managed exchange rate has been instrumental to China achieving higher output growth than otherwise, as shown in Fig. 1.7, where the level of output of Y^C under a managed exchange rate exceeds that when the trade account balances. Accordingly, China's pegged exchange rate policy has acted as a form of trade protection for its manufacturing sector and can be termed "exchange rate protection" (see Makin 2009 for related discussion).

The earlier Fig. 1.3a and 1.3b shows that when China's relative economic growth surged, the CNY/$US exchange rate did strengthen significantly, especially in the years leading up to the GFC. Yet the model suggests further real appreciation is

necessary to eliminate the significant ongoing bilateral trade imbalance. Meanwhile, with a stronger real exchange rate, higher Chinese expenditure, including on US imports, implies the living standards of Chinese households would be higher to the extent there is increased consumption of cheaper US imports.

4.2 Subsidies, Tariffs, and Countertariffs

In recent years, US policy concern has shifted to the subsidies the Chinese government provides to its state-owned enterprises via direct subsidies for exports, production inputs, or concessional finance. State subsidies in any of these forms imply higher Chinese output than otherwise. Again, with reference to Fig. 1.6, this implies a rightward shift of China's AO schedule, further widening of the trade imbalance in China's favor in the absence of further CNY appreciation against the $US.

To counter this, as discussed earlier, the US has imposed hefty tariffs on a range of Chinese goods, which, other things equal, curbs Chinese imports and total US spending. As Fig. 1.7 shows, this shifts the US AE schedule leftward (starting from a post-subsidy equilibrium), offsetting the output effect of China's subsidies, which puts Chinese exporters under pressure as US sales fall. The extent to which Chinese production also falls depends on how much the US tariffs are absorbed in Chinese pricing.

Either way, the profitability of Chinese firms is dented by the US tariffs, and relocating production to third countries for export to the United States becomes an

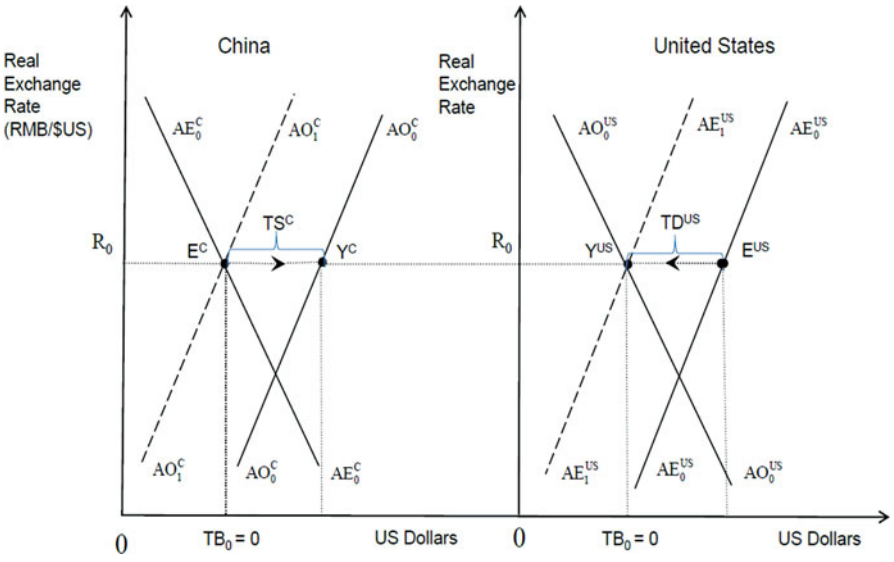

Fig. 1.7 Chinese subsidies, US tariffs, and the trade imbalance

option. Meanwhile, countervailing tariffs imposed by China on US imports reduces US output relative to its expenditure and lowers China's expenditure relative to its output, reversing any effect the US tariffs may have had on the trade imbalance.

4.3 Increased Consumption

A nonprotectionist option for reducing the trade imbalance is to encourage greater Chinese household consumption of US goods and services. In other words, induce a behavioral shift toward lower private Chinese saving. This policy measure is consistent with an objective of China's 12th 5-Year Plan to reorient the economy more toward consumption and away from exports. As shown in Fig.1.8, an autonomous rise in Chinese household consumption increases aggregate spending relative to output, shifting the AE schedule in the left panel rightward.

This narrows China's trade surplus, other things equal, at the same time bolstering Chinese demand for US output, shifting the US AO schedule in the right panel rightward. Hence, without affecting China's output, living standards there increase as consumption rises, whereas in the United States, output rises leaving expenditure unchanged. Alternatively, the trade imbalance may be corrected as a result of US saving increasing, though this would reduce China's output and, other things the same, lower US living standards.

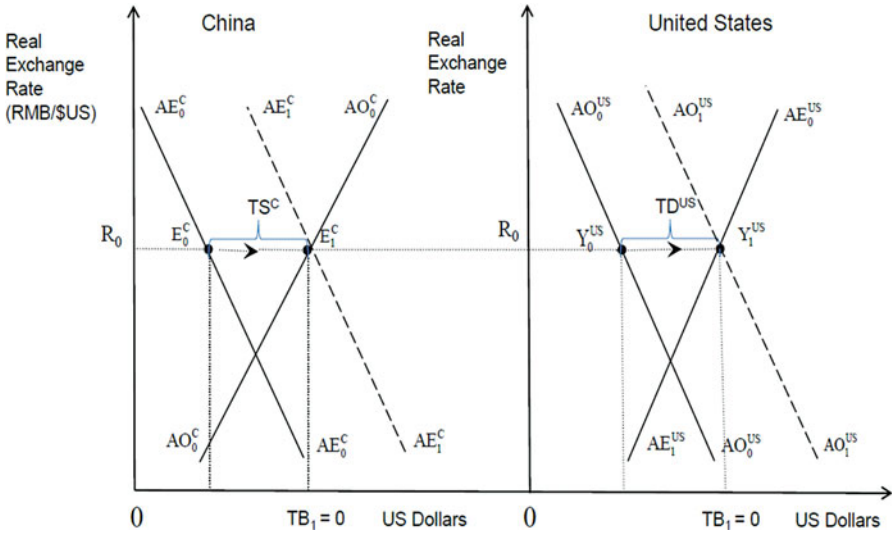

Fig. 1.8 Increased Chinese consumption and the trade imbalance

4.4 Increased Foreign Direct Investment

The final policy option to consider focuses not on the trade imbalance per se but on increasing foreign direct investment (FDI) flows. From balance of payments accounting and in the absence of indirect capital flows, direct foreign capital inflow must equate to the difference between exports and imports, as defined above. Though China has encouraged selective inward FDI from the outset of the reform era that began in the early 1980s, a host of foreign investment restrictions and prohibitions remains. Specific government approval is needed for all foreign investment projects, with regulations and restrictions, that are frequently subject to variation, differing across sectors and locations.

Figure 1.9 illustrates that extensive Chinese liberalization of existing controls over inward FDI increases private investment in China from the United States and, hence, China's expenditure, shifting the AE schedule rightward. Meanwhile, domestic US investment diverted to China shifts the US AE schedule leftward. As suggested by neoclassical foreign investment theory (see, for instance, McDougall 1960; Makin 2004; Razin and Sadka 2007; Chowdhury and Mavrotas 2006 and Mah 2010), if the rate of return on capital in China exceeds that in the United States, FDI outflow from the United States to China unambiguously raises national income in both economies, where national income is defined to include profits from abroad. This happens as a larger capital stock also subsequently raises Chinese and US national income.

Increased foreign investment also bestows productivity benefits by spurring greater competition domestically and exposing host economies to international best management and product development practices. Makin and Chai (2018) elaborates.

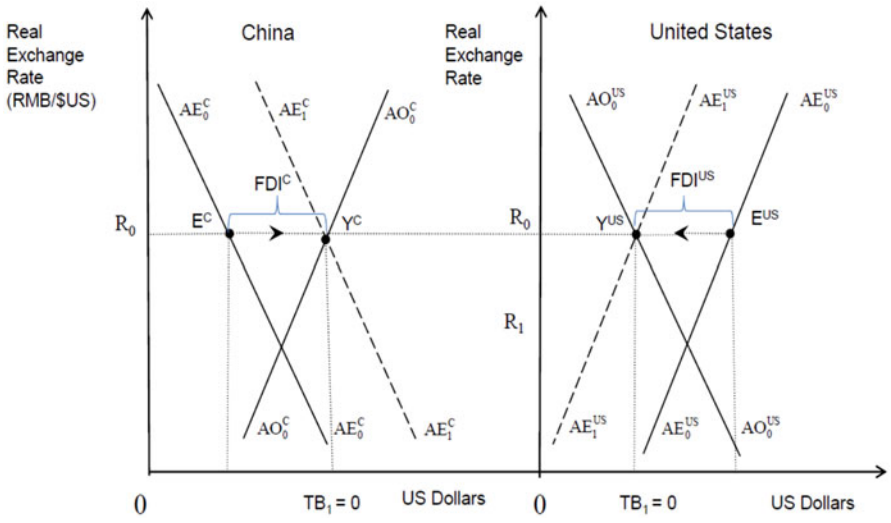

Fig. 1.9 Increased US FDI and the trade imbalance

Liberalizing FDI flows from the United States in China would allow real capital to flow to where it can be most productively used. This would confer macroeconomic welfare gains in addition to those bestowed by expanding goods and services trade with the United States, suggesting a complimentary yet potentially stronger means of raising Chinese living standards.

5 Conclusion

This paper has examined the China-US trade imbalance from an international macroeconomic perspective and has evaluated several policy options for narrowing it by adapting a two-country output-expenditure framework. Table 1.1 summarizes the results of the analysis. Bearing in mind that private consumption has long been considered the end goal of economic activity, macroeconomic welfare improves if either an economy's national income rises, enabling higher consumption possibilities, or if its private consumption rises autonomously.

The above analysis has examined the impact on macroeconomic welfare defined this way of four major policy options – real exchange rate adjustment, higher US tariffs in response to Chinese subsidies (along with Chinese countertariffs), higher Chinese private consumption, and foreign investment liberalization.

Firstly, the framework shows that allowing the CNY/$US exchange rate to appreciate sufficiently would close the trade imbalance, likely with a lag (see IMF 2019), other things equal. Yuan appreciation would curb China's exports to the United States, reducing its national income, while increasing expenditure on US imports, including consumption goods and services. This would narrow the imbalance, but suggests an ambiguous effect on macroeconomic welfare, with the impact on national income offsetting the impact on consumption. Meanwhile, the opposite occurs in the United States, yielding an ambiguous effect on macroeconomic welfare there as well since national income rises and private consumption falls.

Secondly, the impact of US tariffs in response to Chinese subsidies, followed by Chinese countertariffs, was shown to unambiguously worsen macroeconomic welfare in China and the United States via both the national income and consumption channels, without narrowing the external imbalance. Hence, this measure fails on

Table 1.1 Policy options for narrowing the China-US trade imbalance

	Macroeconomic welfare		*Trade imbalance*
Effect on	China	US	
Policy measure			
Real exchange rate adjustment	?	?	↓
Higher US tariffs	↓	↓	?
Higher Chinese consumption	↑	↑	↓
Chinese foreign investment liberalization	↑	↑	↓

both counts and should be denied as a policy option for either narrowing the imbalance or improving macroeconomic welfare in either or both countries.

Thirdly, and alternatively, policy initiatives that encourage higher private consumption in China, for instance, by improving the social safety net, would increase Chinese expenditure relative to output, lower private saving, and narrow the trade imbalance. This option, consistent with the aim of China's 12th 5-Year Plan to reorient the economy more toward consumption, also improves Chinese macroeconomic welfare in terms of living standards. At the same time, increased private consumption in China would induce greater US production for export to China, thereby increasing US national income and US macroeconomic welfare.

Finally, liberalizing restrictions on US FDI in China would increase total investment and hence expenditure in China relative to its short run output, thereby narrowing the external imbalance. By enlarging China's capital stock, higher foreign investment also subsequently generates higher Chinese national income. Meanwhile, additional US investment in China generates higher US national income to the extent the return on US capital invested in China exceeds the return on that capital otherwise invested in the United States, consistent with neoclassical foreign investment theory. Hence, increased US FDI in China unambiguously narrows the bilateral imbalance while generating mutual macroeconomic welfare gains for both countries.

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