

Current Accounts and National Savings: Rebalancing Demand in China and the United States

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Abstract: The persistence of global current account imbalances in the last decade has highlighted the importance of examining and understanding the causes of imbalances. Although generally studied as a macroeconomic phenomenon, changes to the current account may have effects on the microeconomy that warrant examination. This paper uses an applied microeconomic general equilibrium model to examine changes to current account imbalances existing between the U.S. and China. The microeconomic effects of a rebalancing of domestic demand in China that lessens the current account surplus and generates a real appreciation of the renminbi are analyzed. The U.S. current account deficit narrows in response to the real appreciation of the renminbi, but the economy contracts by a small amount. Further analysis demonstrates a reduction in the rate of consumption in the U.S. also results in a narrowing of the current account deficit and suggests that consumption fuels both the current account deficit and economic growth. The analysis has implications for global current account imbalances, as the importance of domestic structural adjustments in reducing imbalances is highlighted.

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1. Introduction

The persistence of global current account imbalances in the last decade has highlighted the importance of examining and understanding the causes of imbalances. Although generally studied as a macroeconomic phenomenon, changes to the current account may have effects on the microeconomy that warrant examination. This paper uses an applied microeconomic general equilibrium model to examine changes to current account imbalances existing between the U.S. and China. The use of a microeconomic model is different than standard macroeconomic techniques of analyzing the current account, such as vector autoregression (VAR) or dynamic stochastic general equilibrium (DSGE) macroeconomic models.

In this paper, causes underlying imbalances between the U.S. and China are discussed and the microeconomic effects of a rebalancing of domestic demand in China that lessens the current account surplus are analyzed. The analysis suggests a rebalancing of demand in China will be accompanied by a real appreciation of the renminbi and microeconomic structural adjustments. The U.S. current account deficit narrows in response to the real appreciation of the renminbi. Further analysis reveals the U.S. current account also responds to a reduction in the rate of consumption in the U.S., highlighting the role of consumption in fueling both the current account deficit and economic growth.

This paper is structured as follows. Section 2 develops a rationale for an analysis of current accounts in a microeconomic framework. Section 3 provides an overview of unilateral and bilateral imbalances in the U.S. and China. Section 4 highlights the prospects for rebalancing of demand in China. Section 5 introduces the applied general equilibrium framework. Sections 6 and 7 examine the effects of a rebalancing of demand in China on the Chinese and U.S. economies. Section 8 provides further analysis on the U.S. current account deficit and implications for lessening global imbalances. Section 9 concludes.

2. A Microeconomic View

The application of microeconomic theory to an analysis of current accounts allows for an examination of the effects of current account movements on firms and consumers and suggests structural or microeconomic changes necessary to lessen imbalances. This paper examines detailed microeconomic effects in the U.S. and China of macroeconomic changes. The applied general equilibrium approach in this paper is different from standard macroeconomic methods of current account analysis for several reasons. First, the use of general equilibrium ensures that a range of

possible contributing factors are taken into account based on theoretical relationships. A drawback to the use of VAR models is the need to specify the current account as either the trade balance or the difference between savings and investment, limiting the set of contributing factors analyzed, as noted in Hung and Gamber (2010). Second, a general equilibrium model built on neoclassical assumptions of profit and utility maximization and adjustment of prices and wages provides a frame of reference for a macroeconomic question that is different from assumptions in DSGE models for macroeconomic policy analysis. The New Keynesian and sticky price and wage assumptions underlying these models are meant to reflect short term economic conditions. Neoclassical general equilibrium allows for an analysis of long term structural effects on the microeconomy that may result in response to a macroeconomic policy change. An applied general equilibrium model, like the one used in this paper, may be a complement to either a DSGE model where intertemporal optimization determines current account outcomes or a VAR approach where relationships are estimated directly by allowing the microeconomic effects of macroeconomic changes to be observed.

Third, the use of microeconomic theory to explicitly model detailed microeconomic agents allows for heterogeneous effects among consumers, firms and different sectors of the economy. Microfounded macroeconomic models may provide an analysis of aggregate conditions as the result of actions by micro-agents, but microfoundations as modeled generally do not run deep into the microeconomic structure of an economy. These models incorporate certain microeconomic principles, including rational expectations, constrained optimization and agents such as firms and households, but sectors of the economy are more aggregated than in a detailed microeconomic model and interactions between sectors are lost. Because macroeconomic policy changes may contribute to long term structural microeconomic changes, an understanding of the heterogeneous effects on different sectors or households may be useful in policy analysis.

The ability to extend an analysis of current accounts to include detailed microeconomic effects provides a rationale for examining current accounts in an era where persistent imbalances in sound and growing economies are the norm. Imbalances may be simply a benign result of a global economic system driven by the availability of credit and the allocation of risk. An examination of macroeconomic changes, however, may reveal effects on the microeconomic structure of an economy worth analyzing. A microeconomic view of the current account also provides a new perspective on determinants of persistent imbalances, which may suggest changes to microeconomic and structural factors necessary to lessen imbalances. Fluctuations in current account balances are

generally linked to macroeconomic factors that influence international trade or financial flows, such as changes in exchange rates, the terms of trade, interest rates or domestic or foreign demand. Although current accounts are sensitive to cyclical conditions, structural factors that bias international financial and trade flows play a large role in sustained imbalances. Bracke et al. (2008) identify distortions in financial markets and macroeconomic management as structural factors contributing to sustained global imbalances. A view of imbalances as arising from underlying economic or financial distortions as in Obstfeld (2012) and Blanchard and Milesi-Ferretti (2010, 2012) suggests identifying and addressing the micro and macroeconomic structural factors contributing to imbalances is essential in reducing current account imbalances and indicates imbalances resulting from distortions may not be benign. A slowdown or reversal of growth in the presence of imbalances, or the outbreak of a crisis, could indicate distortions are negatively affecting economic activity. Finally, Mian and Sufi (2010) use micro data to examine the link between household finance and the real economy in an analysis of the Great Recession, demonstrating that a microeconomic view may be useful in interpreting macroeconomic trends.

3. Unilateral and bilateral imbalances in the U.S. and China

In 2011, the U.S. trade deficit with China reached an all time high, despite a decline in the overall Chinese current account surplus. A U.S. current account deficit has persisted for decades, with large deficits in the 1980s and the largest deficits in the 2000s. The U.S. is a net services exporter, but imports capital in order to finance its large goods deficit and high level of domestic investment. The current account deficit has been tied to certain macroeconomic structural factors such as the high rate of consumption in the U.S., the overvaluation of the dollar and sustained fiscal imbalances. While some argue that a reduction in the current account deficit necessitates an adjustment of the real exchange rate and a shift in demand from deficit countries like the U.S. to surplus countries (see Krugman (1987), Obstfeld and Rogoff (2000), and Obstfeld and Rogoff (2005)), others point to the need to correct fiscal imbalances (see Summers (1986), Roubini and Setser (2004), Caballero et al. (2005), Chinn and Ito (2008), Abbas et al. (2010), Bluedorn and Leigh (2011), and Chinn, Eichengreen and Ito (2011)). Persistent fiscal deficits result in the issuance of debt. The steady net inflow of capital resulting from foreign purchases of debt finances the large U.S. goods deficit, and continued external demand for U.S. debt allows fiscal deficits to be financed at low interest rates. The resulting increase in the stock of debt has become a contentious political issue. Easy credit conditions in the U.S., fueled by a housing market bubble in the mid-2000s, allowed for high levels

of consumption by households and firms, resulting in low private savings and high levels of debt for many consumers. This microeconomic structural aspect of the economy is pervasive enough to influence macroeconomic outcomes; aggregate private savings is low and national debt levels are high.

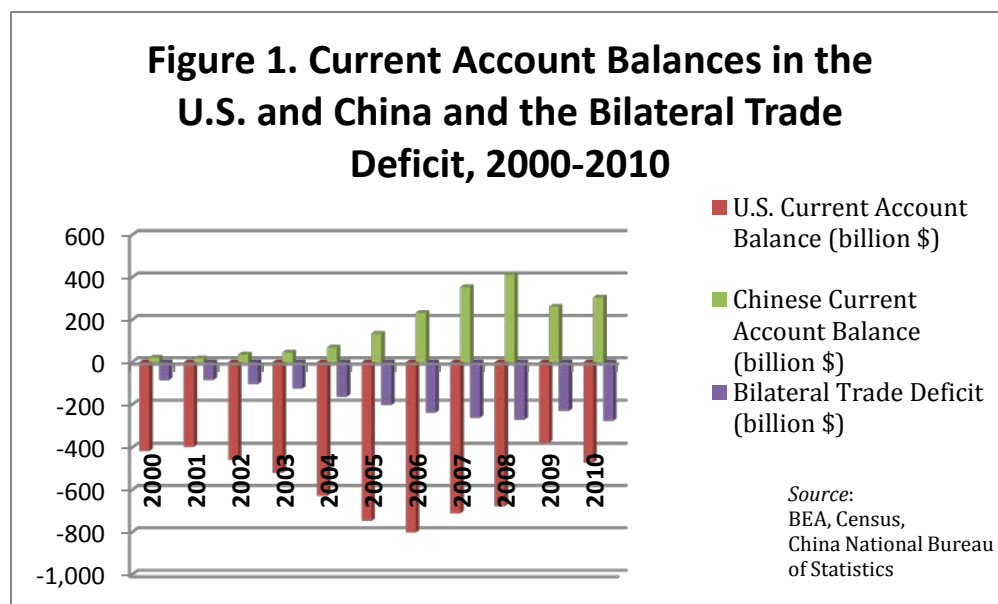
Chinese current account imbalances grew steadily throughout the 2000s. Across Asia, current account surpluses rose concurrently with savings, driving explanations of high national savings as a contributing factor to current account surpluses. In China, macroeconomic structural factors such as precautionary household saving, a shallow financial system and low real interest rates resulted in a large supply of savings and a position as a net lender in international capital markets. High savings resulted in a net outflow of capital and weak domestic consumption, contributing to the large current account surplus. The global savings glut has been advanced as an explanation for Chinese current account imbalances (see Bernanke (2005), Chinn and Ito (2008)). A view of imbalances as a result of a global banking glut in developed countries (see Shin (2011)) has emerged in opposition.

An export-oriented economy in China also has contributed to the large surplus. The renminbi, pegged to the dollar from 1997 to 2005 and again from 2008 to 2010 during the height of the financial crisis, is now managed against a basket of currencies. The exchange rate policy throughout this period has drawn criticism from the international community for limiting the appreciation of the renminbi and allowing prices of Chinese exports to remain competitive. A positive link between exports and low nominal values of the renminbi exist (see Ahmed (2009) and Cline (2010)). The exchange rate regime has resulted in a large accumulation of foreign reserves, a large portion of which are U.S. debt, to relieve upward pressure on the renminbi. China is the largest holder of U.S. debt, with dollar reserves totaling over \$3 trillion in 2010.² Export competitiveness is also the result of a number of microeconomic structural factors. State investment in heavy manufacturing sectors encourages production and exporting in these sectors, while policies that keep wages and costs of other factor inputs such as land, energy and capital low allow for competitive costs of production (Lardy (2007), IMF (2011)).

Figure 1 shows the overall current account in the U.S. and China and the bilateral trade balance from 2000 to 2010. The U.S. current account deficit grew steadily, peaking at \$801 billion in 2006. The Chinese current account surplus remained well under \$100 billion until 2005. The surplus grew

² IMF.

dramatically, peaking at \$412 billion only three years later in 2008. Overall current account imbalances in the U.S. and China have been lower in the recession-era due to depressed import demand in the U.S. and other advanced economies. The bilateral trade deficit grew steadily throughout the 2000s. The recession caused only a slight dip in the value of the deficit. The 2011 bilateral trade deficit of \$295 billion, not pictured, is the largest ever.



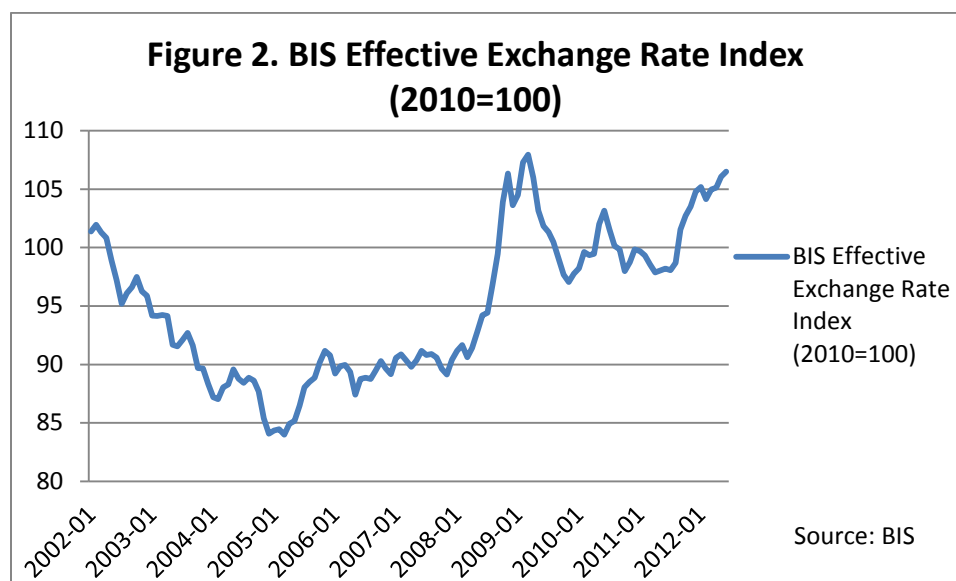
4. Prospects for rebalancing in China

The recognition for structural reform and recent developments in loosening the exchange rate regime indicate the Chinese government may be taking steps to promote a structural rebalancing of its economy as global economic conditions foster a cyclical rebalancing. The twelfth five-year plan in China outlines a number of measures to rebalance domestic demand, including financial sector reform and a focus on increasing disposable income through greater government spending on social safety net programs, public services and the income distribution system to reduce the incentives for households to save.³ A reduction in household precautionary savings due to rising government social spending would lower the national savings rate in China, as would reform that deepens the financial sector and reduces borrowing constraints so that consumption may rise. As previously noted, a combination of factors contributes to distortions in domestic demand and production in the Chinese economy. One factor, the exchange rate, receives a large amount of attention for its export-promoting

³ See “Boosting domestic demand a long-term strategy: Chinese Premier”
http://news.xinhuanet.com/english2010/china/2010-10/28/c_13580478.htm

effects. In its semi-annual Report to Congress on International Economic and Exchange Rate Policies, the U.S. Treasury notes the Chinese current account surplus has fallen from 9.1 percent of GDP in 2008 to 2.8 percent in 2011, in part due to structural changes in the economy and the effect of an appreciation of the renminbi. Cyclical factors, including weak external demand, have played a role in the decline of the current account surplus. The report finds the renminbi has appreciated against the dollar by 8.0 percent (12.5 percent on a real, inflation adjusted basis) since June 2010 when the People's Bank of China (PBOC) began a gradual move towards a value of the renminbi more consistent with market forces. The real effective exchange rate has appreciated by 27.4 percent since currency reforms in 2005 were first implemented, with a total appreciation of 6.2 percent in 2011.⁴

Figure 2 plots the path of the real effective exchange rate from 2002 through mid-2012, showing that the renminbi has appreciated on a real effective basis since its lowest value in 2005. Rapid appreciations were seen in 2008 and the last half of 2011. The pace of appreciation appears to have slowed in 2012.



The potential for further real appreciation, structural reform and a rebalancing of demand in China raises several questions on the effects of these changes. The use of a microeconomic model provides

⁴ U.S. Department of Treasury, "Report to Congress on International Economic and Exchange Rate Policies," May 2012.

insight into the microeconomic effects in China of a rebalancing of demand. The observed microeconomic effects in the U.S. provide insight into how the economy will adjust to a macroeconomic change in China, including whether the U.S. current account deficit or the bilateral trade deficit responds to a real appreciation and rebalancing of demand.

5. Framework of analysis

This paper simulates a macroeconomic change, a decline in the national savings rate in China, in a multi-region, multi-sector comparative static general equilibrium model.⁵ The model provides the ability to observe microeconomic structural changes that may result from changes in macroeconomic variables. In each of 57 goods and services sectors, firms combine primary factors and intermediate inputs from other sectors, both imported and domestic, in production of a single good or service that is tradable across borders. Primary factors of production, including skilled and unskilled labor, land, capital, and natural resources, are nontraded between economies. Firms substitute between primary factors of production according to a sector-specific elasticity of substitution. The model captures intersectoral linkages between all goods and services sectors based on input-output relationships. Intermediate inputs to production may be imported or domestic. Firms substitute a primary factor composite with a bundle of imported and domestic intermediate inputs according to a constant elasticity of substitution (CES) function.

Households use income earned from factor payments and government transfers to consume goods and services, both imported and domestic. All income accrues to a regional household, and regions choose to spend income on private consumption, government consumption or savings through a Cobb-Douglas utility function. The simulated reduction in the national savings rate allows the national income shares of government and private consumption to expand at the expense of public and private savings. Correspondingly, an increase in private and public savings in the U.S. is implemented through an increase in the national savings rate in the U.S., forcing the shares of national income of private and government expenditure to decline.

The real internal exchange rate is an endogenous variable and observed as an index of the changes in prices of nontradable factors of production. Returns to factors of production adjust to ensure full

⁵ The computable general equilibrium Global Trade Analysis Project (GTAP) model, documented in Hertel (1997), is used in this paper. An aggregation of version 8 of the GTAP database is used that keeps the detail of the standard 57 goods and services sectors, but aggregates countries into several key regions that include the U.S. and China.

employment of factors as prices of tradable goods and services change to equilibrate those markets. Thus, the price of nontradables is observed relative to the price of tradables.

Firms and households are sensitive to changes in prices, and the adjustment of prices to clear goods and factor markets drives changes in firm and consumer behavior. Changes in output, private and government consumption, and the use of intermediate goods and factors of production are determined at the sector level. In the resulting equilibrium, internal and external balance, defined as full employment of factors of production and the equilibration of the trade balance with the savings and investment balance, respectively, are achieved in all economies in the model. External macroeconomic changes, such as the decline in national savings in China, generate an adjustment of the real internal exchange rate. The adjustment is reflected in the movements of prices and wages. An appreciation of the renminbi would necessarily imply a rise in the costs of labor, capital, factors of production and intermediate inputs relative to the price of goods and services consumed domestically. Micro agents respond to price changes and induce microeconomic structural adjustments in response to the macroeconomic change. Because the adjustment of prices means that monetary variables have no effect on real variables in the resulting equilibrium, the simulation results provide long run effects used for analyzing structural causes and consequences of global imbalances, rather than cyclical or external conditions.

The effects of a rebalancing of domestic demand in China can be observed for China and other economies in the model, including the U.S, which are linked through trade and respond to external shocks through domestic adjustments. Trade changes are determined in part by import demand elasticities that govern the substitutions of imports from different sources and imports and domestic goods. The effects on the Chinese and U.S. economy from the simulated decline in Chinese savings are analyzed in this paper. A further simulation compares the adjustment of the U.S. current account resulting from a decline in savings in China with the current account adjustment resulting from an increase in U.S. national savings. A third simulation implements changes to savings in the U.S. and China, providing insight into reducing global imbalances.

6. Effects of a rebalancing of demand on the Chinese economy

The simulated macroeconomic change, a decline in national savings, is similar to what may occur with rising government social spending and financial sector deepening in China that reduces the national savings rate and expands domestic demand. The simulation reduces national savings from 39 percent of GDP to 34 percent, a decline in the value of savings of 9.2 percent. The fall in savings

results in a rise in government spending of 13.4 percent and induces private consumption to increase by 12.8 percent. The increase in consumption represents a rebalancing of domestic demand in China. The current account surplus declines by \$146 billion, a reduction of almost 50 percent. In response to a fall in the value of savings, exports and imports adjust to reduce the trade balance and bring the current account in line with the smaller savings and investment balance.

Table 1. Simulated macroeconomic changes in China due to a decline in national savings

	Initial value, 2007 (billion \$)	Change in value (billion \$)	Change in value (percent)
National savings	1,377	-127	-9.2
Private Consumption	1,299	166	12.8
Government Consumption	488	66	13.4
Current Account	295	-146	-49.5
Nominal GDP	3,494	111	3.2

Source: GTAP database, version 8, and simulation results

The adjustment of exports and imports is the result of a series of microeconomic structural adjustments that occurs in response to a real appreciation of the renminbi. The renminbi appreciates by 3.2 percent vis-à-vis all other currencies. Microeconomic agents respond to the decline in savings and real appreciation, inducing changes to the structure of consumption and production in China that affect its trade patterns. The decline in savings results in an increase in disposable income.

Consumption of domestic and imported goods rises and increases at a larger rate in income elastic services sectors than in manufacturing or agricultural sectors. The expansion of domestic demand raises prices in China and ultimately increases costs of production. Wages increase for skilled and unskilled labor by 6.6 and 3.0 percent, respectively, and returns to capital, land and natural resources used in production also rise. The overall cost of production in China rises by 2.1 percent. With increased costs of production, the existing structural bias towards an export-led economy that stems from low factor and input costs and heavy state investment is lessened. Exports produced in China are less competitive and decline by 10.4 percent, falling from 34.1 percent of GDP to 29.7 percent of GDP. Imports expand by 2.6 percent in response to increased demand.

The structure of production shifts in China in response to the real appreciation that raises costs of production. The greatest declines in production are seen in manufacturing sectors. Lower levels of domestic investment result in less domestic capital formation for capital intensive manufacturing

sectors. Resources, including capital, move from declining manufacturing sectors into services and certain agricultural sectors. Services sectors, including financial and public services, see the greatest increase in real demand and expansion of output, owing to relatively elastic demands with respect to income in China. Government spending, largely concentrated in services, generates additional demand in domestic services sectors. A combination of relative price changes and relatively more elastic demands cause an expansion of real demand in certain sectors. As Chinese consumers switch towards these goods, domestic or imported, real demand for domestic goods declines in other sectors.

The changes in the structure of production in the economy, in combination with the decline in the competitiveness of Chinese exports and the rise in imports, result in changes in sectoral export and import patterns. Table 2 presents changes in exports and imports for aggregate sectors of the economy. Manufactured goods experience the largest decline in exports, as the competitiveness of Chinese manufacturing exports is eroded by higher prices of capital, labor and energy inputs. Imports of services increase at the highest rate. Higher income allows Chinese consumers to spend more on imported services.

Table 2. Changes in Chinese exports and imports due to a decline in national savings

Sector	FOB			CIF	Change in	
	exports, 2007 (million \$)	Change in exports (million \$)	Change in exports (percent)	imports, 2007 (million \$)	imports (million \$)	Change in imports (percent)
Agriculture and food						
products	41,150	-3,889	-9.5	157,638	231	0.1
Manufactured goods	1,086,394	-114,866	-10.6	678,893	16,829	2.5
Services	46,828	-3,762	-8.0	61,147	6,392	10.5
Total	1,174,372	-122,517	-10.4	897,678	23,452	2.6

Source: GTAP database, version 8, and simulation results

The decline in national savings results in trade changes that induce a narrowing of the current account surplus, but this effect is due to structural changes in the economy. The real appreciation does not cause a large shift in firm or consumer demand from domestic to imported products. Rather, the appreciation of the real exchange rate has a greater effect on the supply side of the economy through increased costs of production than the import demand side through lowering the cost of imports. The lack of a large demand side effect from the real appreciation suggests that domestic structural factors will be important in allowing the renminbi to appreciate on a real basis.

The simulated effects reveal a decline in national savings is effective at generating a current account adjustment in China and suggest changes in the economy that will result from a rebalancing of demand and real appreciation of the renminbi. Alternative simulations reveal that larger declines in national savings, i.e. greater increases in public spending and private consumption, result in greater reductions of the Chinese current account surplus and a larger real appreciation of the renminbi. The long run growth in nominal GDP due to increased private and public expenditure is small, 3.2 percent, as the decline in national savings results in less domestic investment to fuel economic growth. The low rate of growth suggests a long-known fact about the Chinese economy, a rebalancing of demand towards domestic consumption will result in smaller rates of growth than an economy dependent on foreign demand and domestic investment.

7. Effects of a rebalancing of demand in China on the U.S. economy

The real appreciation of the renminbi results in changes in trade flows between the U.S. and China that occur in conjunction with changes in overall U.S. exports and imports. The trade changes are prompted by a series of internal adjustments in the U.S. as the economy responds to the real appreciation of the renminbi. The bilateral trade deficit with China declines by \$35.2 billion, from \$241 billion to \$206 billion, but remains large. The narrowing of the bilateral deficit is driven by the loss in competitiveness in China, which results in a decline in U.S. imports from China of \$31.6 billion, or 10.0 percent. U.S. exports to China are affected first by an increase as Chinese demand rises, but the overall effect of the appreciation on U.S. exports to China is driven by a decline in the price of products exported to China. The real appreciation lowers the price of all imports in China, and U.S. firms adjust with lower prices in order to compete with other exporters. Despite a small increase in export volume, U.S. firms exporting to China see the price of their products decrease in China and the value of exports experiences only a slight increase from \$73.9 billion to \$77.5 billion.

The real appreciation of the renminbi induces U.S. firms to adjust to changing conditions in China through changes in U.S. production. The least competitive sectors release workers and capital as firms make necessary adjustments, lowering economy-wide wages and costs of inputs to production. The decline in costs of production in the U.S. results in lower, more competitive prices for U.S. exports and reflects an internal depreciation of the dollar. The real depreciation of the dollar is modest, boosting total exports by \$16.2 billion, or 1.3 percent, but has two important implications for the U.S. economy. First, sharpening U.S. real competitiveness through a decline in real wages and

costs of production will boost U.S. exports. Second, a decline in wages and other costs of production in the U.S. may be a necessary long run adjustment to a real appreciation of the renminbi.

The boost to U.S. exports is small, and the effect on the overall economy in the long run is driven by the decline in costs of production. Lower payments to factors of production reduce national income over time, depressing consumption of domestic and imported goods and decreasing the value of savings. The real depreciation of the dollar occurs as the economy adjusts to the reduction in income in the long run by equilibrating a narrowing savings and investment balance with a narrowing of the current account balance. The decline in income in the U.S. resulting from the simulated reduction in savings in China is small, 0.37 percent, and driven by the reduction in U.S. prices that accompanies that real depreciation. As demand in the U.S. contracts by this modest amount, overall imports decline by \$19.1 billion, 1.0 percent. The current account deficit in the U.S. narrows by \$35.0 billion, a decline of 5 percent, but a small change when compared to the initial deficit of \$690 billion.

Table 3. Simulated macroeconomic changes in the U.S. due to a decline in national savings in China

	Initial value, 2007 (billion \$)	Change in value (billion \$)	Change in value (percent)
National savings	710	-3	-0.38
Private Consumption	9,855	-37	-0.37
Government Consumption	2,237	-8	-0.38
Current Account	-690	35	5.08
Nominal GDP	14,062	-51	-0.36

Source: GTAP database, version 8, and simulation results

Table 3 presents macroeconomic effects on the U.S. economy. The responses of macroeconomic variables in the U.S. to the changes in China are small, and the negative effects are driven by the loss in national income. Private and public expenditures changes are driven by the decline in income, and reduced consumption results in a decline in nominal GDP of 0.36 percent. Real GDP experiences a smaller loss of 0.01 percent, suggesting a mostly neutral effect on overall U.S. output. The change in the current account is larger than changes in other macroeconomic variables, reflecting the channel through which the changes in China affect the U.S. economy, international trade and investment.

The lower prices of U.S. exports resulting from adjustments in domestic production generate greater foreign export demand for U.S. products in addition to boosting domestic demand in sectors where demand is relatively income inelastic. Certain industries experience a small increase in output due to

rising domestic and foreign demand. The largest increases in output are in manufacturing, the sector where price competitiveness has increased the greatest. Output in the services sectors declines by a small amount, as U.S. consumers, faced with less disposable income, shift consumption away from services. Capital and labor, particularly skilled labor, are released at a small rate from services sectors and are reemployed in manufacturing sectors, such as electronics, chemical manufacturing, and textiles. Increases in agricultural production in the U.S. are fueled by rising demand for meat, dairy and other food products in China, but the increase in production and exports of U.S. agricultural products is small.

Table 4 provides the simulated changes in U.S. exports and imports for aggregate sectors in the economy. The change in overall exports is almost entirely due to increases in exports of manufactured goods, while imports of manufactured goods decline by a large amount. The large increase in manufacturing exports relative to exports in other sector indicates the manufacturing sector will experience the greatest increase in competitiveness resulting from an internal devaluation. This result also suggests it is the sector requiring the greatest structural adjustments.

Table 4. Changes in U.S. exports and imports due to a decline in national savings in China

Sector	FOB			CIF	Change in	
	exports, 2007 (million \$)	Change in exports (million \$)	Change in exports (percent)	imports, 2007 (million \$)	imports (million \$)	Change in imports (percent)
Agriculture and food						
products	107,164	1,151	1.1	253,825	-404	-0.2
Manufactured goods	890,348	14,001	1.6	1,489,528	-17,585	-1.2
Services	259,122	1,094	0.4	232,955	-1,094	-0.5
Total	1,256,634	16,247	1.3	1,976,308	-19,082	-1.0

Source: GTAP database, version 8, and simulation results

The simulated changes in production patterns in the U.S. suggests certain structural reforms that will be necessary to generate an increase in the competitiveness of U.S. exports, namely adjustments in the manufacturing sector that result in lower wages and costs of productions and produce an internal devaluation of the dollar. The increase in competitiveness of U.S. exports does not result in a large decline in the current account deficit, despite a modest rebalancing of demand in China and a real appreciation of the renminbi. Alternative simulations that reduce national savings in China by a

larger value and result in a larger appreciation of the renminbi find larger effects with respect to the U.S. current account. The magnitude of the adjustment of the U.S. current account is small relative to the magnitude of the adjustment of the Chinese current account. This suggests a rebalancing of demand in China, complemented by a real appreciation, may have an effect on the U.S. current account when the degree of real appreciation is large enough in China. A rebalancing of demand in China and a real appreciation of the renminbi, however, may not in itself result in a substantial reduction in the U.S. current account deficit. The next section provides further analysis on adjustment of the U.S. current account.

8. Further analysis and policy implications

The previous two sections explored the microeconomic effects in China and the U.S. of a decline in national savings in China that induces an appreciation of the real exchange rate vis-à-vis all other currencies, as may happen with the implementation of the twelfth five-year plan. A lessening of micro and macroeconomic structural factors contributing to high savings, such as shallow financial markets, incentives for precautionary savings, and existing export biases also may produce a similar decline in national savings. As savings in China declined, the U.S. economy experienced a lessening of the bilateral trade deficit and the overall current account deficit, but a nominal contraction driven by smaller private consumption. As noted previously, structural factors contributing to imbalances in the U.S., such as persistent high fiscal deficits and low household savings rates, result in high consumption and low national savings.

An increase in national savings in the U.S. is simulated in order to examine how a decline in public and private consumption affects the U.S. economy. Table 5 gives the macroeconomic effects resulting from an increase in U.S. national savings from 5 percent of GDP to 6 percent, an increase in the value of savings of 17 percent. The increase in national savings has a contractionary effect on nominal GDP of 1.3 percent, largely due to smaller private consumption. A decline in consumption results in a narrowing of the current account deficit narrows by \$131 billion, a decline of nearly 19 percent. The simulated current account adjustment in the U.S. confirms that a reduction in consumption will reduce the current account deficit, but suggests the loss of demand will result in a nominal contraction. The mechanism through which the current account declines in response to an increase in national savings is similar to the response of the U.S. economy to a rebalancing of demand in China. As domestic savings increases, disposable income must decline, reducing consumption of imported and domestic goods and shifting consumption away from income elastic

sectors. Reduced demand generates adjustments in U.S. production. A real depreciation of the dollar increases the competitiveness of U.S. exports and facilitates the current account adjustment. The effect on the Chinese current account surplus from an increase in national savings in the U.S. is small.

Table 5. Simulated macroeconomic changes in the U.S. due to a rise in national savings in the U.S.

	Initial value, 2007 (billion \$)	Change in value (billion \$)	Change in value (percent)
National savings	710	121	17.0
Private Consumption	9,855	-241	-2.4
Government Consumption	2,237	-55	-2.5
Current Account	-690	131	18.9
Nominal GDP	14,062	-187	-1.3

Source: GTAP database, version 8, and simulation results

Table 6 provides a comparison of current account adjustments in three scenarios. Scenario 1 is the simulation explored in depth in this paper, a decline in national savings in China. Scenario 2 is the simulation just introduced of an increase in U.S. national savings. Scenario 3 combines the simulated changes in national savings rates in Scenarios 1 and 2. Current account imbalances experience their largest reduction in both the U.S. and China in Scenario 3 where a decline in the national savings rate in China is met with an increase in U.S. savings. In Scenario 3, a significant portion of the change in current account balances can be attributed to adjustments induced by the domestic macroeconomic change. A lessening of external demand and consumption asymmetries helps to reduce current account imbalances by more than in Scenarios 1 or 2.

The results presented in Tables 5 and 6 highlight three important implications. First, a small rise in U.S. national savings, from 5 to 6 percent of GDP, generates a large current account adjustment. Although the bilateral trade deficit is large, the simulated changes in savings in China and the U.S. affect each country's overall current account to a greater extent than the bilateral trade balance. This suggests domestic micro and macroeconomic structural adjustments have a larger role to play in global rebalancing than external macroeconomic, financial or cyclical conditions. Second, although the U.S. current account deficit declines in Scenarios 1 and 2, nominal GDP contracts. Private consumption represents a high share of GDP in the U.S. and fuels both economic growth and the current account deficit. Third, results from Scenario 3 demonstrate a significant reduction in current

account imbalances between the U.S. and China results from adjustment in both countries, suggesting policies designed to address the micro and macroeconomic structural factors contributing to imbalances in both deficit and surplus countries may act in a complementary way to reducing imbalances.

Table 6. Current account changes in the U.S. and China resulting from alternative scenarios

	Decline in Chinese national savings rate (Scenario 1)	Increase in U.S. national savings rate (Scenario 2)	Decline in Chinese national savings rate and increase in U.S. national savings rate (Scenario 3)
Change in U.S. current account balance (million \$)	35,054	130,628	164,745
Change in Chinese current account balance (million \$)	-146,129	-8,613	-155,291
Change in U.S. trade deficit with China (million \$)	35,224	12,751	47,507

Source: Simulation results

Note: A positive number indicates a reduction of a trade deficit, while a negative number indicates a reduction of a surplus.

9. Conclusion

This paper analyzes imbalances between the U.S. and China in an applied general equilibrium model. The use of a microeconomic model in an analysis of current accounts provides several benefits over standard macroeconomic techniques of current account analysis: general equilibrium captures all contributing factors, neoclassical assumptions allow for an examination of long run microeconomic structural changes and detailed microeconomic effects resulting from macroeconomic changes can be observed. Additionally, the examination of microeconomic effects of macroeconomic changes may provide important policy considerations at a time when large persistent imbalances are the norm.

This paper implements a decline in national savings in China in order to demonstrate how a macroeconomic change may have microeconomic structural effects and draw implications for global imbalances. In China, a decline in savings leads to a real appreciation, and the current account

surplus declines. The U.S. economy current account deficit declines. Further analysis shows the U.S. current account deficit declines in response to a small increase in national savings. In both simulations, nominal GDP in the U.S. declines, highlighting the links between high consumption in the U.S. and the current account deficit and growth – a current account adjustment stemming from reduced consumption will also result in less domestic consumption to fuel economic growth.

The paper focuses on U.S. and Chinese imbalances, but the results suggest several broader conclusions about the nature and analysis of global and intra-European current account imbalances. The simulation results indicate domestic micro and macro structural adjustments are important in generating sustained current account reductions and suggest that actions by both deficit and surplus may be necessary to reduce global imbalances. The focus on structural rebalancing and the contribution of U.S. sovereign debt to U.S. imbalances parallel the debate over austerity, sovereign debt and structural reforms in reducing intra-European imbalances. It follows that a solution to intra-European imbalances may rest on action in both surplus and deficit countries to identify and address existing demand, consumption and production asymmetries within Europe. The prominence of financial factors in contributing to modern global imbalances is evident both in the interactions between the European Central Bank and euro member governments and private banks and in the financial sector boom in the U.S. and other developed nations. The current global slowdown indicates not only that the channels through which monetary policy and the financial sector affect the real economy are unclear, but that improvements must be made in standard methods for analyzing imbalances. Future current account analysis must take into account the micro level effects of credit on firms and consumers to consider how microeconomic agents, and the resulting macroeconomy, are affected by macro-financial turmoil and the use of unconventional monetary policy. Future research should link microeconomic relationships with macroeconomic and financial conditions to provide a more well-rounded analysis of the economic interactions driving global imbalances.

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