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Abstract

This paper examines an anomaly in China's current account: its large and rapidly growing travel expenditure. Drawing evidence from counterparty data, Chinese international arrival statistics, and gravity equation models extended to travel trade, I find that a significant amount of China's travel spending in the period 2014-2016 could not be explained by accounting factors or economic fundamentals. The unexplained travel imports are inversely associated with domestic growth and positively associated with renminbi depreciation expectations against the dollar, suggesting that they are less likely to be consumption of goods and services abroad than domestic residents' acquisition of foreign financial assets. Adjusted for these potential disguised outflows, China's current account balance could be higher than reported by around 1 percent of GDP in 2015 and 2016, a period when the Chinese economy slowed noticeably as it shifted away from investment-driven growth (i.e. "internal rebalancing"). These results suggest that Chinese households, through the travel channel, have in part replaced the official sector in directing domestic surplus savings abroad in recent years. While the official sector preferred liquid foreign government assets, Chinese households appear to prefer private foreign assets.

1. Introduction

In the years following the Global Financial Crisis, China's current account surplus fell from a peak of 10 percent of GDP in 2007 to its lowest level at below 1.5 percent of GDP in 2013. Since then, a growing service trade deficit has kept China's current account surplus below 3 percent of GDP. The IMF forecasts China's surplus to further fall below 1 percent of GDP by 2022 (IMF World Economic Outlook, 2017). By these numbers, China appears to have achieved what global leaders have called for in the G20 summit in 2010, that countries adopt policies conducive to "reducing excessive imbalances and maintaining current account imbalances at sustainable levels." The days of colossal current account surpluses in China appear to be a distant memory.

This paper provides evidence suggesting that China's official current account balance in recent years has been distorted to some extent by large financial outflows disguised as services trade transactions, which likely inflated the services deficit. This paper documents the anomalies in China's travel imports statistics, and shows that a preferred channel of capital flight by Chinese households is to acquire foreign financial assets through cross-border activities that tend to be recorded as current account rather than financial account transactions. Two broad empirical approaches are taken to construct alternative measures of Chinese travel imports. The first is the mirror approach, a procedure that has been used extensively to estimate the degree of goods trade mis-invoicing by comparing officially reported trade data of the source country to that reported by the destination country. The second approach relies on econometric models to generate predicted patterns of international travel spending based on economic fundamentals. The first type of models I employed is a gravity equation similar in specification to that in the goods trade literature, but augmented with travel related explanatory variables. The second model seeks to predict aggregate travel spending growth using tourism arrivals data and economic fundamentals variables. The "abnormal" travel imports are then estimated by taking the gap between the reported official travel

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imports and that constructed by the methods just described.

The key result is that the financial outflows concealed as travel imports are large and significant, growing to around 1 percent of China's GDP in 2015 and 2016, and account for a quarter of recorded net private financial outflows. These improbable travel transactions respond to economic forces in ways that are opposite to what would be expected of traditional goods and services imports—they increase when growth falters as well as when the domestic currency depreciates. As such, they are more likely to be financial outflows than consumption of goods and services. In contrast, Chinese travel imports were most likely understated before 2014 due to methodological reasons, rather than hidden financial flows.

A correction for these distortions reveals a more nuanced narrative of the evolution of China's current account than the official data. China's current account surplus was likely lower than reported throughout the 2000s, particularly in the years immediately after China's investment stimulus-drive in in 2009, and fell to its lowest level in 2011 rather than in 2013 as suggested by official data. In other words, external rebalancing of China during this period was deeper than official data would suggest. But the current account surplus also increased more sharply in 2014 and 2015, a period when the Chinese economy slowed noticeably. And though the current account surplus fell in 2016, in part due to renewed government stimulus, the decrease was most likely smaller than the reported statistics.

This paper supplements the existing literature on channels for capital flight. Studies on hidden capital flows from emerging market economies or specific to China typically examine capital flight through goods trade invoicing (Bhawahti 1974; Claessens and Naude, 1993; Cheung, Steinkamp, Westermann, 2015; Kar and Freitas, 2012). To my knowledge, Simon (1960) is the only academic study that systematically examined the travel account in the context of quantifying the mismeasurement in the current account, with an application to the U.S. balance of payments for the

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period 1861-1900. Otherwise, the travel channel has not received as much attention in the capital flight literature, more likely due to the paucity of services trade data rather than lack of real world examples.[3] Anecdotes aside, this paper is apparently the first systematic study in recent years to document and quantify capital flight through the travel channel. The large magnitude of the Chinese household outflows through the travel channel found in this paper confirms that household capital flight can be an important part of capital outflows in an emerging market with capital controls.

The second strand of literature that this paper relates to is the measurement of current account and global imbalances. Because the current account balance has often been used as a gauge for external rebalancing (Chinn, 2015), having an accurately measured current account is instrumental in formulating international economic policies. Citing the fall in China's current account surplus since 2008, Zhang (2016) concludes that external rebalancing has advanced well. But in one of the risk scenarios she presents, she posits that external imbalances would increase again if saving rate falls less than expected due to either policy inaction or a smaller than estimated demographic impact while investment adjustment continues. This paper provides some evidence that the scenario might have materialized during the most recent period of investment slowdown in China. Setser (2016) suggests that China's current account balance may be higher than suggested by official data due to inflated services deficit. This paper quantifies and confirms Setser's hypothesis.

The remainder of this paper is organized as follows. Section two reviews recent developments in China's current account and documents the anomalies in China's official travel imports data. Section three discusses a methodology to estimate capital outflows misplaced as travel

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[3] Argentina's experience of capital flight during in the period 2010-2015 provides such an example. Capital flight by Argentine households started driving capital outflows in 2011 as they perceived an increased likelihood of peso devaluation (Gaggero, Gaggero, and Rua, 2015). In response, the newly re-elected President Cristina Fernandez de Kirchner imposed a string of currency controls, among which are limits on the purchase of foreign currency for tourism (IMF, 2011). Nonetheless, demand for foreign currency for the purpose of tourism and travel surged in Argentina after these measures, as Argentines were able to exploit loopholes to obtain dollars abroad, such as travelling to Uruguay and using debit or credit cards there. (The Economist, "A Vacation from Inflation," May 16, 2013.)

imports. Section four presents and discusses the results. Section five concludes with policy implications of the results.

2. Motivating Facts

A look at the components of China's current account reveals that a widening service deficit is the driving force behind its recent decline (Figure 1). The goods trade surplus, in dollar terms, has in fact been increasing steadily and reached a new height in 2015. The widening in the services trade deficit was in turn mostly due to travel – or the rapid growth in Chinese travel imports or spending (Figure 2).[4]

The IMF Balance of Payments Manual, 6th Edition (BPM6), defines travel imports as "goods and services for own use or to give away acquired from other economies by residents during visits to these other economies." Indeed, anecdotal stories abound of spending splurges by Chinese tourists. Reported examples include Chinese tourists spending thousands of dollars on big-ticket jewelry in Hong Kong; Chinese tourists who would stock up on eye drops and other health care products in Japan or baby food in Germany, and the proliferation of billboards and signs in Chinese characters as seen in popular tourism sites all around the world.[5] Many countries have relaxed visa requirement for Chinese tourists or developed special agreement with China to accommodate Chinese tourists, as China has over the years also incrementally expanded the spending limits of its own citizens abroad. Private sector reports exude optimism about Chinese tourism (Goldman Sachs,

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[4] At the end of March 2017, SAFE revised down travel imports; but the net travel trade deficit for 2016 remained about the same and even slightly larger for 2014 and 2015 after the revisions because travel exports were also revised downwards. In a short press release on the revisions, SAFE explained that they have reassigned the financial transactions in the travel trade statistics to the financial account. Although the latest revisions reduced the degree of inflation in the travel imports due to disguised outflows, the revisions also introduced new puzzles regarding travel exports. Ultimately, these revisions do not change the main conclusions of this paper, which is that substantial household outflows occurred through the travel channel and that the trade deficit conceals household outflows. The travel imports data used in the rest of paper corresponds to the version before the March 2017 revisions and that published in the UN World Tourism Organization compendium of tourism statistics (2017). Appendix A discusses the various version of China's travel statistics, the implications of the revisions, and why this paper used the version of data as it did in further details.
[5] "Chinese Tourists Continue to Spend Despite Economic Turmoil", Wall Street Journal (September 4, 2015)

2014). The evidence for the spending prowess of the Chinese tourist is apparent, and seems to corroborate the growing travel deficit in the reported balance of payment statistics.

But on examination of Mainland Chinese travel patterns, one can find several anomalies that call into question whether all of the reported travel imports are indeed consumption goods and services acquired from abroad.

First, China's travel expenditure as a share of GDP has become anomalously high relative to GDP per capita starting in 2014, while it was roughly in line with international norms prior to that (Figure 3a and 3b)[6] China's travel expenditure as a share of GDP was even higher than the United Kingdom's in 2014, even though UK's GDP per capita was seven times that of China's; in 2015, China's travel expenditure share of GDP further rose to just below that of Denmark, a country with ten times the GDP per capita of China. The other emerging market economy that also has an abnormally high travel expenditure as a share of GDP was Russia.

Second, the growth of travel imports as reported in China's balance of payment has greatly exceeded the growth in the number of outbound Chinese tourists since 2013 (Figure 4). [7] The two data series also diverged significantly during the Global Financial Crisis in 2008-2009 and during 2012, but not nearly as much as they had in 2014-2016, when travel expenditure grew four times as fast as the number of outbound Chinese travelers in 2014 and twice as fast in 2015. This divergence pattern is an anomaly because expenditure and departure growth tend to move in sync with each other in other countries. [8] For example, Korea, where outbound international travel was restricted

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[6] The outliers are Japan and the United States, whose travel expenditure as a share of GDP is lower than would be predicted by their GDP per capita level—not surprising given that Japan and the United States have the least number of paid holidays among OECD countries (Ray, Sanes, and Schmitt, 2013).

[7] The number of outbound Chinese tourists is calculated by arrivals of Chinese tourists as recorded by China's top tourist destinations which account for 90 percent of outbound tourists.

[8] A potential explanation for this pattern is that departures are used as an input in estimating travel imports in some countries. A regression is estimated on quarterly data from 1986Q1-2016Q1 for the UK and 1996Q1-2016Q1 for the US, with growth in travel imports as dependent variable and change in departures as explanatory variable. Both regressions yield coefficients of 0.9, which are statistically indistinguishable from 1.

before 1987, saw annual travel expenditure grew at about the same rate as number of outbound travelers from 1990 and thereafter (Figure 5).

Another way to interpret the anomaly in Figure 4 is through the lens of average expenditure per Chinese traveler. That expenditure growth greatly outpaces growth in outbound traveler numbers implies rapid growth in average expenditure per traveler. Indeed, the average expenditure of a Chinese traveler almost doubled from $1300 (U.S. dollars) in 2013 to $2300 in 2015 and $2600 in 2016, which is substantially higher than reported in some travel expenditure surveys of Mainland travelers.[9] The sharp increase is dubious as it occurred at a time when several popular destinations for Chinese tourists reported decreased average spending per Mainland traveler,[10] and it also coincided with reports of a decline in global sales of some global luxury brands for which Chinese buyers make up a sizeable portion.[11] Moreover, the rapid increase in the number of Chinese outbound travelers during this period in large part reflects first time Chinese travelers who are more budget conscious than existing travelers, and should on the whole exert downward pressure on average spending.

What could account for the sudden surge in reported Chinese travel expenditure and spending per capita of Chinese tourists? A structural break in the travel expenditure data explains part of the sharp upturn in 2014. Starting for data in 2014, China's State Administration for Foreign Exchange (SAFE)—the Chinese agency that is responsible for compiling China's balance of

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[9] A report by China Luxury Advisors reported that Chinese travelers spent an average of $1677 USD in overseas trips in 2015 and $1783 USD in 2016, based on a survey of 877 Chinese travelers. Also, given that travel spending is also correlated to the number of traveling days, it is odd that so much would be spent by citizens of a country among those with the fewest paid workdays.

[10] These destinations include Hong Kong, Taiwan, Singapore, Japan, France, Italy, UK, and Germany. An example from Japan Times (September 19, 2016): "It has also been reported that the aggressive shopping spree by Chinese tourists, who typically bought expensive household electronics products, jewelry and cosmetics in large volumes, has run its course. Spending by the average Chinese tourist in the April-June quarter fell 23 percent."

[11] Prada's earning statement in April 2016 states that, "The economic situation on the Chinese market remains negative and consequently, in financial year 2015, the Asia Pacific area as a whole recorded a 4.4% revenue decrease at current exchange rates and a 16.1% decrease at constant exchange rates." Burberry also reported negative global revenues growth in 2016Q2-Q3.

payment statistics—augmented the method for calculating travel expenditure to include bank cards and bank transactions data, instead of relying on counterparty data and estimation of cash expenses as it did before.[12]

Yet an inadvertent outcome of this change in methodology is that it enabled the travel imports data to capture transactions other than genuine travel consumption spending. Anecdotes offer some support for this. For instance, it was widely reported in news media outlets that Mainland Chinese visitors to Hong Kong were snapping up investment-type insurance products on their trips, paid for with their UnionPay bank cards. UnionPay is China's state-owned and sole clearing house for bank card transactions, and their brand of bank cards allow Chinese nationals to debit directly from their renminbi accounts at home while making purchases abroad.[13] Reportedly, the insurance products Chinese visitors purchased are denominated in US dollars or Hong Kong dollars, providing a hedge against RMB depreciation, and often carry an attractive yield. Hard data provided by the Hong Kong Office of Commissioner of Insurance confirms that both the number and value of insurance policies purchases by Mainland Chinese tourists in Hong Kong have increased rapidly in recent years (Figure 6). Since 2014, growth in the value of the insurance policies has outstripped the growth in the number of policies—implying a sharp rise in the average value per policy sold to Mainland Chinese residents—a pattern that mirrors China's travel imports data. Under SAFE's new travel expenditure methodology, purchases of these insurance policies would be recorded as travel imports in the current account, even though they should be recorded in the

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[12] SAFE acknowledged in a note discussing its transition that a disadvantage with this new system is that some overseas purchases via bank card are actually goods transactions and investment abroad, but without further information it is hard to apportion the amount allocated to goods item versus financial account. "China's Implementation of BPM6," SAFE (October, 2015)

[13] Bloomberg, "China may be losing its cat and mouse game with Hong Kong insurance buyers," December 19, 2016. According to Bloomberg, mainland buyers have bypassed restrictions by channeling money through swiping their credit or debit cards multiple times so that each transaction remained below the limit. Although there is a $5,000 limit per transaction per card, there is no restriction on how many times a bankcard can be used in a given period of time. According to the UnionPay website, UnionPay cards can be used in 150 countries.

financial account.

Aside from the well-publicized example of Hong Kong insurance products, which could only account for a small part of the outflows, there are numerous other anecdotal stories of improbable Chinese travel imports that involve a Chinese resident using tourism or education (which is also included under the "travel" line in the current account) as pretext to acquire foreign assets, including foreign currencies to deposit abroad or foreign real estate properties (see Appendix B for more detailed examples). The anecdotes illustrate the motivations and various channels available to Chinese households to circumvent capital controls and acquire financial assets abroad; they also offer a clue as to why China's foreign exchange regulator has been keen on increasing scrutiny over household demand for foreign currency at domestic banks and imposing incrementally harsher limits on transactions abroad involving UnionPay cards since late 2015.[14]

Purchases of insurance saving and annuity products, real estate properties, and cashback through a cover-up jewelry transaction all meet BPM6's definition of financial outflow rather than travel imports. Purchases of foreign investment-related life insurance and annuity products are considered a financial outflow via debt instruments by BPM6.[15] Real estate purchases should be classified as FDI outflows. And a cashback withdrawal that eventually ends up as a deposit in a bank account abroad should be recorded as an outflow in money and deposits in the financial

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[14] Since September 2015, the Chinese foreign exchange regulator has imposed a series limits on daily and annual transactions amount. According to UnionPay website: "According to the requirements of the State Administration of Foreign Exchange, a cap on annual cash withdrawal overseas (including Hong Kong, Macao and Taiwan, the same applies hereinafter) is newly imposed for UnionPay RMB cards issued in mainland China, in addition to the currently cap requirement of ten thousand RMB equivalent on cash withdrawal per card per day. From January 1st 2016 onwards, cumulative annual cash withdrawal overseas for each mainland China-issued UnionPay RMB card shall not exceed the equivalent of one hundred thousand RMB." In early 2017, Chinese authorities specifically banned UnionPay from being used for buying Hong Kong property.

[15] According to section 5.65 in BPM6 "This category consists of reserves of life insurance companies and annuity providers for prepaid premiums and accrued liabilities to life insurance policyholders and beneficiaries of annuities. Life insurance and annuity entitlements are used to provide benefits to policyholders upon the expiry of the policy, or to compensate beneficiaries upon the death of policyholders, and thus are kept separate from shareholders' funds. These entitlements are regarded as liabilities of the insurance companies and assets of the policyholders and beneficiaries. Annuities entitlements are the actuarial calculation of the present value of the obligations to pay future income until the death of the beneficiaries."

account.

All told, anecdotal stories have created two competing narratives for explaining the anomalous Chinese travel trade data: Is the rapidly growing Chinese travel deficit due to the spending prowess of the Chinese tourists, or hidden financial outflows? If the former prevails, then China has been rebalancing its external sector rapidly, in its unique way. If the latter prevails, then the appearance of a shrinking current account balance may just be a mirage of capital flight. The next section develops a methodology that examines these questions quantitatively.

3. Measuring the Misplaced Capital Outflows in the Travel Imports

The main empirical strategy of this paper is to construct alternative travel import data series for China that rely less on information from China's officially reported balance of payments statistics and more on counterparty data and economically-justifiably fundamentals. I rely on two broad methods: (1) an accounting approach, using mirror data reported by counterparties, and (2) model-based approaches, including a model of travel expenditure growth and a traditional gravity model. The constructed alternative travel imports represents "normal" travel imports. The gap between reported travel imports and "normal" imports is interpreted as capital outflows through the travel channel. Four measures of mis-recorded capital outflows through the travel channel are developed.

A. The Mirror Approach

The mirror approach is based on the assumption that expenditure by Chinese overseas travelers is mirrored in counterparty travel exports data. This approach is similar in spirit to that of studies on illicit capital flows from trade mis-invoicing (Bhagwati, 1974; Claessens and Naude, 1993; Cheung, Steinkamp, Westermann, 2015). In those papers, trade mis-invoicing is calculated as the discrepancy between the exports of the country in question and the imports of its counterparty after adjusting imports by a freight rate.

The analogue of freight rate for travel imports would be the cost of transportation to get to

the destination, i.e. international airfare, which unlike in goods imports statistics is not counted in travel imports. In the absence of errors or disguised outflows, travel imports as reported in China's current account should equal the sum of bilateral travel exports receipts from China as reported the current accounts of the destination countries. The difference between the travel imports and travel exports of China's counterparties is the first of the four measures of mis-recorded capital outflows, O_1:

$$O_{1t} = M_{Ct} - \sum_{d}^{D} E_{dCt}$$

Where M_C is official travel imports (or tourism expenditure) reported by China, E_{dC} is travel exports of destination $d = 1, ..., D$ to China (or total spending by Chinese visitors in country d).

In practice, bilateral travel receipts based on the balance of payment definition are not readily available. As a proxy for E_{dC}, I instead compute the average expenditure per capita of *all* arrivals from abroad (e_d), not just Mainland China travelers, in each destination, and multiply average expenditure per capita by the number of Mainland arrivals in the destination (A_{dC}):

$$\hat{O}_{1t} = M_{Ct} - \sum_{d}^{D} e_{dt} \times A_{dCt}$$

Where $e_d = \frac{E_d}{A_d}$.

Total travel exports, E_d, are available for most countries in their balance of payments statistics, while total inbound tourist arrival data, A_{dC}, is reported by tourism boards in many countries. China's constructed travel imports is calculated by summing over up to 20 destinations that publish all of these data, accounting for 90 percent of total Chinese outbound tourists in 2015.

A potential pitfall of this proxy is that it may underestimate China's travel spending or overstate mis-recorded outflows if Chinese travelers spend significantly more than the average tourist in these destinations. As a supplement to this measure, spending data by Mainland travelers from destination countries' tourism expenditure surveys, where available, are also used to construct the alternative

travel imports.

A. *Model-based Approaches*

<u>Gravity Equation Model</u>

A flaw about the counter-party travel survey expenditure data is that they are measured inconsistently across time and countries, and are only available for a subset of destinations for limited years.[16] The consistency problems are addressed in a World Bank database of bilateral international services trade flows, which are re-conciliated with the aggregate flows and consolidated from multiple sources of data in services from OECD, Eurostat, UN, and IMF (See Appendix C for detailed data description). The database also disaggregates the services trade data into bilateral travel imports and other sub-categories. Though bilateral travel imports data is available only up to 2011 and sparsely so for China, the overall richness in the data—with bilateral travel trade data among 199 countries going as far back as 1985 —allows one to infer the common determinants of international travel spending and what Chinese travel spending would look like conditioned on those determinants.

A model well-suited for this purpose is the gravity equation, which has been used extensively in the trade literature to explain the pattern of goods trade between countries. The determinants of goods trade in a gravity model—economic size, distances and other economic, geographic, and linguistic characteristics of the two countries—are intuitively also determinants of tourism and travel trade. The few studies that had applied the gravity model to services trade data have also found that the gravity equation fits bilateral services trade as well as goods trade (Kimura and Lee, 2004; Walsh, 2006). [17]

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[16] For example, the travel survey data for one country could include airfare, while another does not; one country includes education tuition in travel receipts, while another does not. Certain countries' expenditure survey data also contain structural breaks due to methodology changes, rendering it difficult to have a consistent time-series dataset.

[17] Culiuc (2014) uses a gravity equation framework to model bilateral tourism arrivals, and finds that the gravity equation fits the bilateral tourism arrival flows across a large sample of countries very well. He finds that elasticities of tourism departures with respect to GDPs of the origin and destination countries are large and positive, though smaller

The gravity model approach for constructing an alternative version of Chinese travel imports complements the mirror approach in important ways. First, the gravity equation yields a prediction of Chinese travel spending in each destination, and can shed light on the reasons behind the heterogeneous Chinese spending pattern across destinations indicated by the tourism expenditure surveys. Second, the gravity equation relates bilateral trade to explanatory variables which are measured consistently across time and are available for a broad set of countries. Using the model coefficients, one can make out-of-sample predictions for the destinations that do not report those data, thus extending the constructed Chinese travel imports across time and countries.

Using as dependent variable bilateral travel imports in the World Bank data, I estimate a basic gravity equation model and a version that is augmented with explanatory variables relevant to travel trade:

$$lnM_{kjt} = \beta_1 lnGDP_{kt} + \beta_2 lnGDP_{jt} + \beta_3 d_{kj} + \beta_4 Lang_{kj} + \beta_5 Contig_{kj} + \beta_6 P_{kjt} +$$

$$\beta_7 S_{jt} + \delta_t + \mu_k + Y_j + \varepsilon_{kjt} \tag{1}$$

Where M_{kjt} is travel spending (imports) of origin country k in destination country j. The GDP variable is measured on a constant PPP basis.[18] d_{kj} is the geographic distance between two countries, $Lang_{kj}$ is the dummy for shared language, and $Contig_{kj}$ the dummy for contiguous border. P_{kjt} is the prices on a PPP basis of the origin country relative to the destination country. S_{jt} is the number of universities in destination j ranked in the top 500 schools in the world at time t. δ_t is the set of time dummies. μ_k and Y_j reflect origin-specific and destination-specific dummies.

I also estimate another version of the gravity model with country-pair fixed effects, which means the time-invariant variables (distance, language, and contiguous border) will have to be

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than the near-unitary elasticity estimated for goods trade. He also finds that appreciation of the real exchange rate tends to boosts outbound tourism in the origin countries. However, his estimation is on the tourism arrival flows, rather than tourism receipts (or imports), which is ultimately the variable of interest of this paper.

[18] The model was also estimated with GDP measured in market prices and constant prices with no material impact on the results.

excluded in the regression. The various specifications are estimated on a full sample consisting trade

between 35 countries (1675 unique trading pairs), a subsample restricted to the 22 countries that are

the main service trading partners of China (368 unique pairs), and a China-data-only sample which

only includes bilateral trade pairs involving China (34 unique pairs). I then use the estimated

coefficients from the best fit model to predict Chinese travel imports from each of the travel

destination--in-sample over the period 1998-2010 and out-of-sample thereafter. Summing the

imports across the destinations and normalizing the subtotal by the share of Chinese outbound

visitors captured give the estimate for total travel imports. The estimated mis-recorded travel

imports would be the difference between the official reported and the model predicted:

$$\hat{O}_{2t} = M_{Ct} - \sum_{d}^{K} \widehat{M_{Cdt}}$$

While all models have some residuals, they should average out to be zero over the whole sample. A

persistent series of large residuals biased toward one side could be indicative of distortions in the

official reported travel imports data. The out-of-sample predictions for travel imports from the

gravity model could understate actual imports (and overstate disguised outflows in travel imports) if

omission variables that were otherwise controlled for by the time dummies in the in-sample years

were not taken into account. Supplements to this model are therefore presented next.

 Aggregate Expenditure Changes Model

Arrivals Only Model

One predictor of travel expenditure growth that is not captured in the gravity equation but has held

up very well in predicting other countries' travel expenditure is growth in outbound travelers.[19] The

baseline model then assumes that travel imports grow at the same quarterly rate as the number of

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[19] One further shortcoming of the gravity model is that the data is only available on an annual basis, though the variable
of interest is on a quarterly basis. The arrivals model addressed this issue.

Chinese outbound travelers. The underlying assumption is that the average spending per outbound

traveler remains constant. While this assumption may appear strong, it appears to be empirically

reasonable for China. A regression of Chinese travel expenditure growth on arrivals growth for an

unbalanced panel of 9 destination countries which publish bilateral travel spending data suggests that

Chinese travel expenditure grew at slightly below a 1-to-1 rate with the number of travelers (Figure

7)[20]. Splitting the sample into a 2001-2012 period and 2013-2016 period also reveals that the

coefficient on arrival growth has fallen below 1 in the latter period (Figure 8). This finding may

appear to be surprising, given that China's average income is fast growing and China's increasing

spending prowess has been touted much in the media. But it is not surprising in the context of

international norms, as shown in the examples of Korea, the United States, and the United Kingdom

earlier.

With the constant average spending assumption, travel imports are calculated as:

$$\widehat{M_{Ct}} = M_0 \prod_{i=1}^{t} (1 + \Delta \, lnN_i)$$

Where M_{Ct} is the total travel imports of China at time t, N_i is the number of outbound travelers at

time i. M_0 is the numeraire, which is chosen to be the earliest date when outbound tourism data are

available (1998Q1). The difference between the reported official travel imports and $\widehat{M_{Ct}}$ is then

interpreted as capital outflows mis-recorded as travel imports, O_3.

$$\widehat{O_{3t}} = M_{Ct} - M_0 \prod_{i=1}^{t} (1 + \Delta \, lnN_i)$$

In reality, average travel spending per capita is determined by a number of factors, some of

which offset each other, which makes it difficult to generalize the direction of change. On one hand,

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[20] The nine countries are United States, Canada, Australia, Japan, Taiwan, Thailand, Indonesia, Singapore, and United Kingdom. The time period ranges from 1991 to 2016.

an increase in the number of outbound travelers due to travel liberalization should, ceteris paribus, lower the average spending per traveler as the more well-off ones were already travelling before. On the other hand, average travel imports could rise if the new cohorts of travelers are even more well off than the incumbent travelers, or existing travelers spend more per capita because international travel is a superior good.[21] The net effect on average travel expenditure requires models that can take into account income effects and other economic characteristics of the home country. I turn to such a model next.

Travel Expenditure Growth Model

This model augments the previous model by explaining travel expenditure growth with economic fundamentals in additional to tourism arrivals. The additional explanatory variables are: changes in the real effective exchange rates, growth in real GDP per capita, and the level of GDP per capita. The following panel regression is estimated for a sample of emerging market economies and advanced countries over the period 1995-2014:

$$\Delta\, lnM_{kt} = \alpha_1\, \Delta\, lnN_{kt} + \alpha_2\, \Delta\, lnREER_{kt} + \alpha_3\, \Delta\, lnRealGDPpercapita_{kt} +$$
$$\alpha_4\, \ln(GDPpercapita_{kt}) + \mu_k + Y_t + \varepsilon_{kt} \tag{2}$$

$$\Delta\, lnAvgExpTourist_{kt} = (\alpha_1 - 1)\, \Delta\, lnN_{kt} + \alpha_2\, \Delta\, lnREER_{kt} +$$
$$\alpha_3 lnRealGDPpercapita_{kt} + \alpha_4\, \ln(GDPpercapita_{kt}) + \mu_k + Y_t + \varepsilon_{kt} \tag{3}$$

Where M_{kt} is the total travel imports of country k at time t, N_{kt} is the number of outbound travelers, *REER* is the real effective exchange rate, μ_k is the country-specific fixed effects, and Y_t is the year dummies. α_1 is interpreted as the impact on total travel expenditure of a marginal traveler. If $\alpha_1 >$ 1, the marginal outbound traveler tends to spend more abroad than the Chinese nationals already

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[21] Since the Global Financial Crisis, the number of outbound Mainland Chinese travelers has more than tripled; over the same period, disposable income per Chinese household grew by about 270 percent. Many first time international travelers, who are not as well-off as incumbent travelers, can now afford to travel internationally. Meanwhile, the sophistication level of the incumbent travelers may have increased due to further increasing wealth.

travelling, therefore raising the average spending per Chinese traveler. If $\alpha_2 > 0$, then a real appreciation of the home currency would lead to increased overall travel imports as well as growth in average spending per traveler.

Applying the model parameters from equation (2) and (3) to China's quarterly data, I obtain a prediction of the change in China's "normal" travel imports, denoted $\Delta\ lnM_{Ct}$ for quarter *t*. Choosing a numeraire and applying the predicted change iteratively, I obtain the level of travel imports $\widehat{M_{Ct}}$, as well as the average travel expenditure per traveler, denoted as $AvgExp\widehat{Tourist}_{Ct}$:

$$\widehat{M_{Ct}} = M_0 \prod_{i=1}^{t}(1 +\Delta\ lnM_{Ci})$$

The difference between the reported travel imports and the model estimation is interpreted as the "abnormal" travel imports, or the part of reported travel imports that is likely financial outflows:

$$\hat{O}_{4t} = M_{Ct} - \widehat{M_{Ct}}$$

This measure addresses the shortcomings of the arrival-based and mirror approach measures, as it does not assume that travel expenditure grows at the same rate as outbound tourism nor does it rely on potentially mis-measured counterparty data.

4. Results and Discussions

A. The Mirror Method

The constructed travel imports for China using the mirror approach tracks the official travel imports well from 2002 until around 2014Q1 (Figure 9), after which the official travel imports significantly exceed the constructed mirror imports. The constructed travel imports using this method suggests that Mainland Chinese travelers spent about $140 billion abroad in 2015, substantially less than the $292 billion reported by official sources. The portion of official travel imports that is unaccounted for by the mirror approach was about $86 billion in 2014 (0.8 percent of GDP), $150 billion in 2015 (1.4 percent of China's GDP), and rose to $190 billion in the four quarters up to 2016Q3 (1.7 percent of China's GDP).

Interpreting these gaps requires a heavy caveat. The divergence between the two series does not all reflect disguised outflows but in part reflect a methodology change in the travel statistics. As mentioned earlier, SAFE augmented the accounting of travel expenditure to include bank cards and transactions data for data starting in 2014, instead of relying just on counterparty data. [22] The more appropriate interpretation of Figure 8 is that it demonstrates that the mirror method closely mimics SAFE's pre-2014 method of calculating travel imports; had SAFE not augmented its accounting method, travel imports would have been substantially lower than currently reported.

But the timing of the methodology change also coincides with the emergence of China's domestic bank cards—issued by the state-owned company China UnionPay—as a globally accepted means of payments, as part of the effort by the Chinese government to promote RMB internationalization. Though China UnionPay was created in 2002, its brand of bank cards was not widely accepted abroad as a means of payment in most of the 2000s. In 2012, the company established UnionPay International, a subsidiary mandated to expand the global network of UnionPay cards. The number of foreign countries that recognize UnionPay cards grew rapidly since, reaching 162 countries today; the number of ATM machines that take UnionPay cards also proliferated abroad. As UnionPay bank cards earned increasing global recognition, Chinese nationals are presented with a new channel to withdraw a large sum of foreign exchange—a sum that could even be larger than the annual individual foreign currency quota of $50,000, as the limit was not enforced until capital outflows through that channel started making news headlines in recent years. Whereas it was difficult before, acquisition of foreign financial assets through bank cards became accessible to many Chinese households. As such, the augmented methodology inadvertently captured financial transactions that were not captured by the prior methodology, in additional to bona fide travel consumption.

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[22] "China's Implementation of BPM6," SAFE (October, 2015)

The most plausible inference from the large gap between the travel imports calculated by the mirror method and officially reported is this: the official travel imports were overstated after 2013 due to hidden capital outflows via the bank card and remittances channels, but they were also understated before due to an older methodology that tended to under-record transactions. Figure 10, which compares the assumed average Chinese expenditure per destination underlying the mirror method (which mimics SAFE's pre-2014 method) to the average spending of Mainland visitors reported by travel surveys, suggests that average spending per Mainland visitor is significantly higher in the United States, Australia, the United Kingdom, and Canada; it is somewhat higher in Korea, Japan, marginally higher in Taiwan, and lower in Thailand and Indonesia.[23] The much higher average spending by Chinese visitors in the first four countries was primarily due to the large number of Chinese students studying there, rather than shopping.[24] Because of the atypically high average spending of Mainland visitors, the mirror Chinese travel imports calculated from the average international tourist spending in each destination likely understate actual spending.

Using the information provided by travel surveys in available destinations of Chinese-specific spending, I re-calculate Mainland travel imports for the period 2013-2015. The calculations suggest that China's travel imports were *understated* by about $40 billion in 2013 (0.4 percent of

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[23] The available countries for this comparison cover 77 percent of Chinese outbound departures in 2015. Most of the tourism surveys are based on a small sample of all international visitors.

[24] These four countries alone account for more than 70 percent of all Chinese students studying abroad. The United States is by a wide margin the most popular education destination for Chinese students, with three times as many international Chinese students than the next most popular country, Australia. A closer look at these data reveals that the higher spending per Chinese visitor was not mainly due to the often hyped reason that Chinese visitors spend more on shopping. Consider the example of the United States: on average, Chinese international students spend about $35,000 per student on education-related expenses, compared to an average of $7,200 for a traditional Chinese tourist who engages in shopping and sight-seeing. Once adjusted for the education spending, Chinese visitors to the United States for traditional tourism only spend slightly higher than Australian visitors, who have travelled a similar distance as Chinese visitors. Controlled for distance, Chinese tourists actually spend less than a Brazilian tourist on a per capita basis. Given detailed bilateral travel data also published by UK and Australia, one can also decompose the average spending of Chinese visitors to these countries into the contribution by each of the following activities: shopping, education, and other. In Australia, Chinese visitors traveling for education purposes account for only 13 percent of total arrivals, while accounting for 44 percent of spending in 2016. Once adjusted for education-related travel, average spending by Chinese visitors in Australia was $2200, below the $2500-$2700 average spending by Korean or Taiwanese tourists, who traveled a comparable distance to reach Australia.

GDP), *overstated* by $40 billion in 2014 (0.4 percent of GDP), and *overstated* by $100 billion 2015 (1 percent of GDP). The recent overstatements in travel imports– or hidden financial outflows—are lower than the estimates produced by using average spending across all international visitors in each destination, but they are still meaningfully large. I turn to the results of the gravity model next, which provide a longer and methodologically consistent estimate of China's travel imports over time.

B. Model-based Measures

Gravity Model

Table 1 shows the gravity equation panel estimates. The sign and size of the coefficients for the variables included in the benchmark travel trade model, which includes only the usual gravity regressors, are similar to that in an application of the gravity model to goods trade. Two countries of larger GDP size tend to spend more travelling in each other's country, with the coefficients around 1, just as in goods trade. Two countries closer in geographic distance tend to spend more traveling in each other's country. A percentage increase in distance decreases travel trade by 0.6-1.6 percentage points, which is in line with the estimates in goods trade literature.[25] Countries that share a border or language tend to engage more in travel trade. Travel spending abroad tends to rise with higher exchange-rate adjusted prices in the domestic market. The education quality variable, proxied by the number of universities in a top 500 university global ranking, is also mostly positively significant to travel spending in the specification without fixed effects.

The results for the China sub-sample contain a few notable distinctions from the full-sample and restricted sample results. The coefficient on GDP for Chinese travel spending is significantly larger than 1. The above unitary income elasticity suggests that international travel is a superior

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[25] Overman, Redding, and Venables (2003) states that the coefficient on distance in gravity equations is usually estimated to be in the interval -0.9 to -1.5 Disdier and Head (2008) surveyed 103 papers that involve estimation of the gravity equation and found the mean to be -0.9, with 90 percent of the estimates lying between -0.28 to -1.55.

good for Chinese travelers and rises non-linearly with income. Furthermore, Mainland Chinese

travel appears to be much more sensitive to common language than the typical international traveler.

Chinese travel spending increases in the quality of education institutions in the destination country.

The sign on the PPP factor is different from expected, and it shows that Chinese spending rises when

domestic prices fall relative to destination prices. A likely explanation for this aberration is that the

PPP relative factor price is too broad to capture the segment of goods that draw Chinese shoppers

abroad. For example, luxury goods are relatively cheaper abroad than in China due to tax reasons.

Overall, the gravity model fit travel trade well, with comparable adjusted R-squared as those

found in the literature.[26] The restricted sample with country-pair fixed effects (column 6) has the

highest adjusted R-square of 0.9 among the variations of gravity models estimated, even though

variables other than the GDP variables are dropped due to their insignificance once country-pair

fixed effects are included. For this reason, I will focus on the results from this specification

(henceforth referred to "panel gravity model"). (See Appendix D for more details about the fit of the

panel gravity model and China-data only model[27])

The total travel imports estimated from the panel gravity model indicates that Chinese

officially reported travel imports had been below model estimates throughout the 1999-2013 period,

but were significantly above model prediction in 2014 and 2015 (Figure 11). The understatement of

official travel imports during the period 1999-2013 was largest in 2010 and 2011 -- $30 billion (0.5

percent of GDP). The understatement decreased gradually from then on, to $8 billion (0.1 percent of

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[26] The adjusted R-squared for the full and restricted sample model with fixed effects is 0.82 (column 3) and 0.78 (column 5), respectively, which is within the range of that in the literature on goods trade gravity equation estimations. Culiuc (2014) reported a R-squared of 0.73 for his full sample gravity equation panel estimation for goods trade, and 0.91 for only the intra-OECD sample. His analogue results for tourism arrivals is 0.85. Egger and Pfaffermayr (2003) reported an adjusted R-squared of 0.92 for the gravity equation model with fixed effects and usual gravity regressors in an unbalanced panel. The fit for the sample involving only China as the origin country is 0.72, lower than for the full sample but still quite tight.
[27] The panel gravity model estimated from the restricted sample in fact fits the bilateral trade involving China better than a gravity model that is estimated on China trade data.

GDP) by 2013. Overstatement of Chinese travel imports began after 2013 and was $80 billion (0.8 percent of GDP) in 2014 and $114 billion (1.0 percent of GDP) in 2015. Extrapolating the model predicted travel imports for 2016, the overstatement would be $143 billion in 2016 (1.3 percent of GDP). These figures are higher than the mirror estimates using the travel surveys, but the broad contour are similar—that disguised outflows in travel imports started in 2014, coinciding with a period of heightened concerns about growth as China internally rebalanced away from investment-driven growth.

Aggregate Expenditure Growth Model Measures

Arrivals Only

Similar to the gravity model results, the arrivals model suggests that travel imports were understated in the years before 2013 and overstated since (Figure 12). The likely capital outflows misclassified as travel imports since 2013 are: $50 billion (0.5 percent of GDP) of the travels import in 2014, $100 billion in 2015 (1 percent of GDP), and $123 billion in the four quarters up to 2016Q3 (1.3 percent of GDP).

Travel Expenditure Growth Model

The travel expenditure growth regressions from equation (1) overall exhibit a good fit with travel expenditure growth (Table 2). Growth in real GDP per capita, real exchange rate appreciation, and outbound tourism growth are all positively and significantly associated with growth in travel expenditure. The coefficient on outbound tourism growth is positive and significant, and ranges from 0.4 to 0.6 for advanced countries and from 0.3 to 0.4 for emerging market economies. These numbers are substantially below 1, which suggests that the marginal outbound traveler tends to spend less than existing residents already travelling overseas, thus outbound tourism growth should on the margin reduce average spending per traveler.

This result is intuitive, as one would think that the more well-off travelers (and likely higher

spenders) would already be traveling, thus the marginal outbound traveler would be less well-off and spend less.[28] This result also confirms that it is indeed an anomaly that Chinese travel expenditure growth outstripped Chinese outbound tourism growth by such an extent. The subsequent discussion will focus on the results based on applying the parameters from the emerging market model because China's institutional characteristics better fit the sample in the emerging markets than in the advanced countries.[29]

Figure 13 shows a comparison of China's and other emerging market economies' travel expenditure growth to the model predictions. China's travel expenditure growth in 2012, 2014, and 2015 stand out as clearly higher than other countries and higher than that of expected by the emerging market economies model. Among the emerging market sample, the only other country that has travel expenditure growth that deviates from the model-fitted expenditure growth is India, which, like China, has capital controls limiting the amount of money that residents can take out of the country.[30] Using the model parameters from the emerging market model (See Figure 14), "abnormal" traveling spending – or disguised capital outflows recorded in travel imports – was $100 billion (1 percent of GDP) in 2014 and $140 billion in 2015 (1.3 percent of GDP).

C. Comparison of the Travel Outflows Measures to Other Known Sources of Capital Outflows

I compare the four measures of the disguised outflows to three other known sources of private

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[28] This effect has an analogue in the adjustment of the intensive margin (average sales per firm) in goods trade in response to a reduction in variable trade costs (Eaton, Kortum, and Kramarz, 2004; Bernard, Jensen, Redding, and Schott, 2007; Chaney, 2008; Melitz, 2003). The decrease in variable trade costs allows more firms to export, but because of the selection of less productive exporters into the exports market the average sales per firm might decrease, depending on the elasticity of substitution of the industry. A number of studies in the goods literature find negligible and sometimes negative impact on the intensive margin. They also find that the impact of extensive margin dominates in response to a reduction in variable trade costs (Lawless, 2010; Coughlin, 2012).

[29] Since some of the emerging market economies in the sample have or had capital controls (which are not controlled for), the predicted travel expenditure based on this model would be higher than they would be without capital controls (if travel is used as a channel for capital flight to evade capital controls in other emerging countries as well). The estimate for capital flows mis-recorded as travel imports would therefore likely be a lower bound.

[30] India's travel expenditure growth was especially higher than the model prediction in 2014, which happens to be the year following India's reduction of allowable personal remittances from $200,000 per year to $75,000 per year to stem capital outflows ("Fight the Flight," The Economist, Aug 16th 2013).

financial outflows: (1) Net private financial outflows as recorded in the financial account. These outflows include FDI, portfolio investments flows, and other investments which are mainly deposits and loans. (2) Net errors and omissions, which is often considered a proxy for unrecorded capital flows[31] (3) Import mis-invoicing vis-à-vis the United States.[32]

On average, outflows through the travel channel in 2014 and 2015 were a quarter of the size of total net private financial outflows in the financial account (Figure 15). They are much larger than imports over-invoicing vis-à-vis the United States (Figure 16), and on par with errors and omissions in 2014 and 2015 (Figure 17).

Recorded private financial flows registered net inflows in most of the 2000s, then saw net outflows briefly in 2012 and again in the last half of 2014 that continued to the latest quarter in 2016. The imports over-invoicing measure indicated net inflows for most of the 2000s and net outflows starting around 2013. The errors and omissions, on the other hand, indicated missing net inflows in most of the 2000s until 2009, thereafter they became missing net outflows. Though there are differences with regard to the precise timing of when the flows turned from inflows to outflows, all four measures indicate accelerated outflows in 2014 and 2015—and 2016, for the measures that have data—similar to the timing of the estimated outflows mis-recorded as travel imports.

D. Behavior of Abnormal Travel Imports

It is well understood in the trade literature that imports in goods and services tend to increase with domestic growth and exchange rate appreciations. Capital outflows, on the other hand, tend to rise in times of falling growth prospects and expectations of exchange rate depreciation. Because imports and capital flows behave in such different ways to economic forces, an examination of the

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[31] Prasad and Wei, 2005.

[32] Import over-invoicing is a well-known channel for capital flight. Bilateral trade flows between China and United States, which are among the largest in the world, are a channel for moving money out of China to the United States. The measure here is calculated according to Schindler (2005), which is the difference between China's reported imports from the United States adjusted for freight costs and U.S. reported imports from China, adjusted for the value-added in Hong Kong.

economic and financial drivers of the estimated unexplained travel imports could inform on whether they behave more like financial outflows or genuine imports.

In a similar spirit to Clark, Converse, Coulibaly, and Kamin (2016), I estimate a regression relating each of the estimated mis-recorded travel measures and other recorded financial flows to a range of macroeconomic fundamentals and risk factors—both China-specific and global. In addition to the variables included in Clark et al., the travel capital outflows regressions are augmented with two variables that capture RMB/USD exchange rate expectations, which have been shown in some studies (e.g. Cheung, Steinkamp, Westermann, 2015), to be an important determinant of capital flows. The two variables are quarterly change in the two-year non-deliverable forwards (NDF) of the RMB/USD exchange rate, and an interaction term of the change in NDF and the spreads of the two-year forwards rate over spot rate.[33] The regression is estimated on quarterly data from 1998Q1 to 2016Q2 according to the following specification:

$$\frac{Flow_t}{GDP_t} = \beta_1 Growth_t + \beta_2 \Delta 2yrNDF_t + \beta_3 \Delta 2yrNDF_t * \left(\frac{2yrNDF_t - Spot_t}{GDP_t} \right) + \beta_3 (i - i*)_t$$

$$+ \beta_4 EMBIG_t + \beta_5 EMBIG_t^2 + \beta_6 VIX + constant + \mu_t$$

Table 3 reports the results for seven types of capital flows. The dependent variable for the columns in the table are in the following order: (1) private financial flows as recorded in the financial account, (2) errors and omissions in the financial account, (3) import mis-invoicing vis-à-vis the United States (following the method of Schindler, 2005), (4) abnormal travel flows estimated by the arrival measure, (5) abnormal travel flows estimated by the mirror method, (6) abnormal travel flows

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[33] Cheung, Steinkamp, and Westermann (2015) found that deviation from covered interest rate parity (CIP) is an important determinant of capital flows. In a regression that separates the deviation from CIP into interest rate differentials and the 1-year forward-spot spreads, they found that it was the latter that drove the significance on the CIP variable. In this regression, I opt to separate the interest rate differential and the exchange rate expectation variables for this very reason. Interestingly, the forward/spot spreads is highly positively correlated with the growth variable used in this regression, and thus I interact the spreads with NDF changes rather than including it as a stand-alone variable in order to avoid collinearity problems.

estimated by the travel expenditure model, and (7) abnormal travel flows estimated by the panel gravity model.

The most notable result is that declining growth drives all types of capital outflows. The coefficient on growth is significant across all seven types of flows. A 1 percent decrease in growth is associated with 0.12-0.13 percent of GDP increase in capital outflows through the travel channel, and 0.17 percent of GDP through errors and omissions. The effect of growth on imports mis-invoicing is smaller, increasing outflows by 0.02 percent of GDP; this is likely because the trade mis-invoicing measure used in this exercise only captures imports mis-invoicing with the United States. The impact on recorded private flows is larger, with 1 percent decrease in growth being associated with 0.4 percent of GDP increase in recorded private financial outflows.

Exchange rate expectations also play an important role in explaining capital flows. A 1 percent acceleration in expected depreciation of the RMB vis-à-vis the dollar is associated with roughly 0.1 percent of GDP increase in capital outflows through the travel channel. The effect is magnified if acceleration in depreciation expectations occurs in combination with a large expected future depreciation (the forward-spot spreads).

Using the model results, one can assess the contribution of each of these factors to the substantial Chinese capital outflows during the period 2014-2015 (Table 4).[34] One finding is consistent across each type of capital flows: slowing growth was the dominant driver of outflows during this period. Accelerating exchange rate depreciation expectations against the dollar also played a role in the accelerating outflows during this period.

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[34] The coefficients on the interest rate differentials and risks factors are not as clear cut as the growth and exchange rate variables. The interest rate differential is mostly insignificant, similar to the results reported in Cheung, Steinkamp, and Westermann (2015). The EMBIG spreads variables, which proxy for country financial risk, generally have the right signs and significant for explaining recorded private flows and the arrival-based travel flows measure: higher financial risks are associated with higher outflows. The VIX is an insignificant explanatory variable for recorded private flows, consistent with findings in Clark, Converse, Coulibaly, and Kamin (2016), although it is significant for trade mis-invoicing and the travel measures, albeit with wrong sign.

The bottom-line is the estimated abnormal travel outflows behave more like financial flows than like normal goods and services imports. They respond to the same factors that drive recorded private financial outflows and goods trade mis-invoicing—increasing during times of slowing growth and heightened expectations of exchange rate depreciation.

E. China's Current Account and External Rebalancing

This analysis suggests that a noteworthy portion of what was recorded as travel imports in China's current account in 2014-2016 was likely disguised capital outflows by Chinese households, and thus travel imports in that period were overstated; they should have been recorded instead as a debit on the financial account (or errors and omissions). Reported Chinese travel imports were also most likely understated prior to 2014 due to a methodology that under-recorded travel transactions.

Corrected *only* for the distortions in travel imports, China's current account surplus could on average be overstated by 0.4 percent of GDP annually over the 2002-2013 period. Subsequently, the average of the various estimated disguised outflows in travel imports suggests that the current account surplus could be understated by 0.7 percent of GDP in 2014 (with a range of 0.4-1.0 percent of GDP), 1.1 percent of GDP in 2015 (with a range of 1.0-1.4 percent of GDP), and 1.4 percent of GDP in 2016 (with a range of 1.3-1.7 percent of GDP). Table 5 provides a summary table of the estimates. Also considering the potential overstatement in the travel exports due to methodology issues, the *net* overstatement in China's current account for the 2002-2013 period would average to 0.2 percent of GDP; the understatement since would average to around 0.3 percent of GDP in 2014 (range of 0.1-0.6 percent of GDP), 0.7 percent of GDP in 2015 (range of 0.5-1.0 percent of GDP), and 1.0 percent of GDP in 2016 (range of 0.9-1.3 percent of GDP).[35] All in all, the broad range of estimates would suggest that the understatement in the current account balance in 2015 and 2016

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[35] See Appendix E for details about the travel exports adjustments. Using the revised travel imports and exports data from March 2017, the panel gravity model would suggest 0.9 percent of GDP understatement of China's current account balance for every year in the period 2014-2016. Appendix details these results.

was clustered around 1 percent of China's GDP.

Adjusted for the distortions in the travel imports, the current account balance would indicate a sharper upswing than the official statistics, to about 4 percent of China's GDP in 2015 (Figure 18).[36] And though the official current account balance has fallen in 2016, the adjusted version suggests that it likely has not decreased by as much. From these perspectives, external rebalancing appears to have reversed more sharply than reported in 2014 and 2015, and slowed in 2016.

One may ask: if the Chinese official sector is no longer accumulating foreign exchange reserves, should an increase in China's current account surplus warrant as much concern? For a large economy like China's, a small current account as a share of its own GDP could represent substantial outflows relative to size of the rest of the world. Indeed, as a share of world's GDP, China's adjusted current account balance would have returned to its levels before the global financial crisis in 2015 (Figure 19).

This is not to deny that there had been real progress in the rebalancing of China's external sector. Chinese consumption as share of GDP has steadily increased since 2010. Indeed, even excluding the disguised financial outflows, genuine Chinese travel imports had by 2015 grown to be almost twice as large as the second largest travel importer in the world, the United States (Figure 20), and accounted for about 20 percent of global tourism spending. From the savings and investment perspective, the increase in China's current account in 2014 and 2015 was due to a faster deceleration in the investment share of GDP than the increase in consumption share, whereas in the 2011-2013 period consumption was growing fast enough to compensate for slowing investment. In the earlier period, the combination of increasing wealth of Chinese households, acceleration of RMB

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[36] This trajectory holds true even when one uses the cyclically-adjusted current account balance as the starting point. China's cyclically-adjusted current account was 2.5 percent in 2014 (higher than official) and 3 percent in 2015 (same as official), according to IMF calculations (IMF external sector report, 2014 and 2015). Thus, the cyclically-adjusted current account corrected for disguised household outflows would be larger than the non-cyclically-adjusted current account in 2014 and at least as large in 2015.

internationalization, and gradual easing of Chinese travel spending limits led to rapid increase of Chinese consumption abroad, which helped facilitate the decline in the current account surplus—call this external rebalancing with Chinese characteristics.[37] However, as economic growth began to slow markedly in 2014 and 2015, wealthy Chinese households exploited the travel channel to acquire foreign financial assets; these outflows are domestic household savings that were not absorbed by domestic investment—thus, they added to the current account surplus.

F. Where Are the Outflows Going?

Capital outflows of the magnitude estimated in the previous sections must leave a footprint somewhere. Unfortunately, private cross-border transactions are generally more opaque than official transactions. Exacerbating the measurement difficulty in China's case is that some private outflows are occurring through informal channels meant to conceal the country of origin and to evade capital controls. Even so, some have shown up in statistics of global real estate purchases by Chinese nationals, as well as in the U.S. balance of payment statistics.

Real estate purchases by Chinese nationals abroad experienced a sharp jump in 2014 (Figure 21), coinciding with the timing of the increase in the estimated mis-recorded travel imports.[38] Reported real estate purchases by Chinese nationals are disproportionately concentrated in United States, Australia, and Canada, the three most popular destinations for Chinese studying abroad, accounting for about 80 percent of reported total Chinese foreign real estate purchases.[39] The

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[37] Indeed, average Chinese spending abroad rose especially following the global financial crisis. Model-based approaches predicted average spending per capita of Chinese tourists to be higher than the average implied by official statistics in 2002-2013, but the gap was especially pronounced around 2009-2010; the direction of the gap reversed in 2014, and by 2015, official average spending per Chinese tourist greatly exceeded the model predictions. See Appendix F for a comparison of average spending per Chinese tourist across the methods.

[38] Sales to Chinese nationals in the United States and Australia rose 80 percent in 2014 and further increased 30 percent in 2015. Canada also experienced a similar increase, to such an extent that the Canadian government levied a 15 percent tax on foreigner purchases of real estate in 2016. The source for US is National Association of Realtors, for Australia it is the Foreign Investment Review Board. A caveat about these data is that they are likely to be a lower bound on the actual sales to Chinese investors due to the several ways in which these purchases could go undetected or bypassed taxes through intermediaries.

[39] The sources behind this figure are National Association of Realtors, Australian Foreign Investment Review Board, Savills, and National Bank of Canada, and Colliers International.

connection between real estate purchases and education abroad is not a simple coincidence—in a survey of the potential Chinese real estate buyers, 83 percent of the respondents cited education as chief motivation for purchasing real estate abroad, followed by investment objectives.[40]

In 2015, the average purchase price of a house in the United States by Chinese buyers is $831,761 and a median of $486,111 in 2015, according to a survey published by the U.S. National Association of Realtors. The prevalence of Chinese purchases of highly priced residential real estate abroad suggests that capital controls have not been strictly enforced, and even if enforced, have serious leakages.[41] To the extent that Chinese buyers obtained from domestic banks the foreign exchange intended for real estate purchases by citing education or tourism as reasons, or if they use their credit or debit card to pay for any of the related expenses, the transaction will be recorded as travel imports in the balance of payment instead of financial account outflows, as they should be.[42]

Another place where the Chinese capital outflows appears to have left a trace is in an obscure line in the U.S. balance of payments– in the errors and omissions. In 2015, the errors and omissions in the U.S. balance of payments suddenly surged to an inflow of 1.5 percent of U.S's GDP ($270 billion), a rare phenomenon that previously only occurred during periods of global financial turmoil (Flatness, Whitaker, and Yuskavage 2009). The last time that the inflows in the U.S. balance of payments errors and omissions exceeded the current size was in 1998, around the time of the Asian Financial Crisis, the Russian financial crisis, and the collapse of Long-Term Capital Management.

This unusual rise in inflows of the U.S. errors and omissions in 2015 coincides with rising outflows in the errors and omissions in China's balance of payments and mis-recorded travel

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[40] These survey results are published on Juwai.com, with the original sources attributed to: Hurun Report "Chinese Global Citizen 1.0: Immigration and the Chinese HNWI 2015" , "Hurun Report 2015 Annual Chinese HNWIs Asset Allocation White Paper 2015", and "2015 China Luxury Report".

[41] In January 2017, the Chinese government increased scrutiny on household foreign exchange requests and explicitly warned in the bank application for foreign exchange that the foreign currencies must not be used to purchase overseas property.

[42] According to National Association of Realtors, 50 percent of reported transactions involving total foreign purchases of U.S. real estate are all-cash deals.

expenditure. A two-year rolling correlation between China's errors and omissions and the U.S. errors and omissions saw a rise in correlation from essentially zero at the beginning of 2014, to 0.6 at the end of 2014, and to 0.9 in 2015 (Figure 22). Adding the disguised travel capital outflows to China's errors and omission outflows would increase the correlation to 0.8 in 2014 and slightly more than 0.9 in 2015. Though some of the U.S. errors and omissions inflows represent U.S. residents' purchases of collateralized loan obligations issued by offshore special purpose vehicles, residential real estate purchases by foreigners in the United States are also recorded as errors and omissions in the U.S. balance of payment statistics. Correlation does not establish causation, but the coincidental timing of the increase in U.S. errors and omissions inflows with Chinese purchases of foreign real estate and other hidden travel outflows does offer some circumstantial evidence that not an insignificant amount of Chinese household capital outflows may have been destined for the United States.

6. Conclusion

This paper identifies the anomalies in the services trade portion of China's current account and quantifies the amount of disguised capital outflows through services trade. The analysis in this paper provides broad evidence that the travel channel has become an important route for Chinese household capital flight in recent years, even as genuine travel consumption has also increased rapidly. The disguised household outflows were large, accounting for almost a quarter of recorded net private outflows in 2015. The same channels that were meant to facilitate RMB internationalization and encourage outflows during the years when China experienced large net inflows had opened up opportunities for capital flight that were not available before to the common Chinese household. And when growth began to falter and exchange rate expectations reversed in late 2014, wealthy Chinese households started to take advantage of those outlets for capital flight.

Given the outflows pressure and tightened capital controls in the financial account in recent

years, it is conceivable that China's outflows would tend to leak through the current account, to the extent that current account restrictions are less stringent and more transitory than financial account restrictions.[43] This paper argued that China's travel services trade—which is only one of the components of the current account through which capital outflows can leak—likely suffers from significant measurement errors due to disguised capital outflows. This could mean that China's current account balance was around 1 percent of GDP higher than reported in official statistics in 2015 and 2016. [44]

There is an important distinction between the context of the China's current account surplus before the global financial crisis and in 2014-2016: China's current account surplus during the former was financed by official outflows through the purchases of foreign exchange reserves, whereas during the more recent period it has been financed by private outflows (Figure 23). Private cross-border transactions are generally difficult to track; in particular, Chinese household acquisition of foreign assets often occurred through informal channels to circumvent capital controls, which amplify the challenge of tracking these flows. A natural follow-up is to examine the impact of foreign private purchases of domestic private assets and the implications for global asset markets. Unfortunately, such analysis is inhibited by the lack of data. Many national statistical agencies, for example, are currently ill equipped to track foreign purchases of domestic real estate. Improvement in the collection of such data would be useful in enhancing understanding in this area.

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[43] Under Article VIII of IMF's Articles of Agreement with its members (of which China is one), "No member shall, without the approval of the Fund, impose restrictions on the making of payments and transfers for current international transactions."

[44] The current account is used for policy assessment purposes in several ways. For instance, the IMF and U.S. Treasury use the current account as one of the metrics for assessing exchange rate valuation. IMF also uses the reported current account balance as part of the reserve adequacy metric.

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Appendix A: Revisions in China's Balance of Payment Travel Statistics

China's travel trade statistics in the balance payments experienced two major revisions between late 2015 to March 2017. The section explores the implications of the March 2017 revisions and discusses how they impact the conclusions of this paper.

What Changed and Why?
In the first revision, which was implemented in late 2015 and applied toward data starting in 2014, SAFE augmented the calculation of travel expenditure by including data reported by the international transaction reporting system (which include remittances), credit cards, debit cards, and estimates of cash expenditure, as part of its transition to adopt the codes of the new Balance of Payments Manual Version 6. This version of the data was also published by the latest UN World Tourism Organization (2017), and formed the basis of the analysis in this paper. Apart from the upward revisions to travel imports that were discussed extensively in the main text, travel exports were also revised up for data starting in 2014, presumably for the same reasons as the travel imports.[45] In a methodological note, SAFE acknowledged the difficulty of parsing goods transactions and investment transactions from the travel expenditure data.

The second revision occurred at the end of March 2017. In the latest version, SAFE revised down travel imports by $7 billion for 2014, $42 billion for 2015, and $80 billion for 2016. But travel exports were *also* revised down by $61 billion for 2014, $69 billion for 2015, and $74 billion for 2016. Indeed, travel exports are now lower than they were before the 2015 revisions when travel trade was calculated using a more narrow definition. Although the precise nature of the revisions is unclear, SAFE noted in a press release that they have adjusted for the parts in travel that are financial account transactions and have turned over the information to the financial account department.[46] Because the accounting method was unchanged, one is left to interpret the revisions as due to the exclusion of the financial transactions from travel.

How do the revisions affect the conclusions of this paper?
The large downward revisions of travel exports are surprising for a few reasons:

1. Given the expanded definition of "travel" under BPM6 to include education and health care expenses, could the travel exports in 2016 have fallen below the level in the BPM5 (pre-2015 revision) version in 2013?
2. For an economy that has experienced an increased varieties of consumption goods and services, could travel exports in China have fallen over the years as the number of visitors remained stable?
3. As implied by the latest revised travel exports data, the average foreign visitor spending in China in 2015 was $336 USD, which is low compared to other countries at similar development level, as well as compared to the $853 implied by the previous version.
4. Exports over-invoicing tends to occur during periods of strong exchange rate appreciation expectations and capital inflows—could travel exports be over-invoiced to such a degree during a period of persistent outflows?

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[45] The note detailed SAFE's transition from reporting according to the IMF Balance of Payment Manual Version 5 (BPM5) definitions to version 6 (BPM6). (See "China's Implementation of BPM6")
[46] SAFE press release on balance of payment states for the fourth quarter (3/30/2017).

To investigate these questions, I collected data on international arrivals in China and estimated travel exports using the same panel gravity model used in estimating the travel imports in this paper.[47] The results indicate that the model-predicted travel exports are higher than the latest version of official travel exports in the period 2013-2016, though lower than the official estimates from the 2015 revisions. The revised travel imports continue to be higher than what the panel gravity model would suggest in the period 2014-2016 despite the downward revisions. The overall travel deficit is 0.9 percent of GDP smaller in every year in the period 2014-2016—still consistent with the conclusion in the main text that the current account balance is around 1 percent of GDP larger than reported.

Overall, the latest revisions alleviated the problem of disguised capital outflows that led to inflated travel imports, but apparently introduced a new puzzle of missing travel exports. Whereas the version of the travel imports data from the 2015 revisions revealed the full extent of household financial outflows via the bank cards and remittances channels, the latest revisions had rendered it more difficult to quantify those outflows because the reassignment of the hidden outflows were not visible in the financial account. As one of the goals of this paper is to estimate the size of the household capital outflows through the novel channel of travel, I judged that the pre-March 2017 version provides valuable and more complete information about that type of flows; hence the analysis of this paper is conducted on the version of data before the March 2017 revisions.

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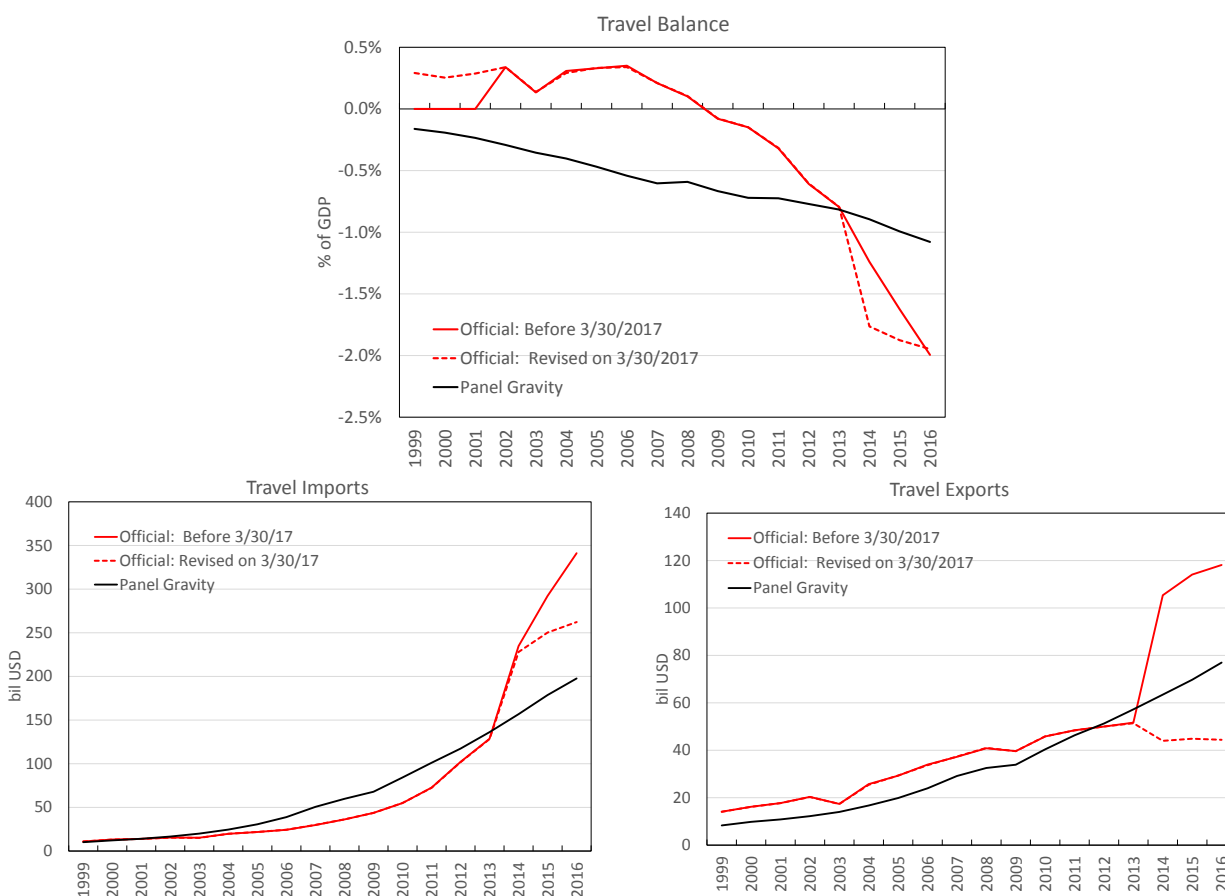
[47] China's arrival statistics show that nine countries account for 69 percent of all foreign arrivals in 2015.

Appendix B: Examples of Hidden Capital Outflows Through the Travel Channel

Example 1: An entrepreneur transferred his RMB savings into the bank accounts of each of his thirty employees, and then asked his employees to each submit a request to their banks for their full quota of U.S. dollars citing education abroad as the reason. He then transferred the foreign currency, totaling $1.4 million USD, to his foreign bank account. (SAFE Report on Foreign Exchange Violations by Corporates and Individuals, March 30, 2017)

Example 2: A Mainland Chinese tourist in Macau withdrew a large amount of money through an UnionPay ATM card in a jewelry pawn shop in Macau to supposedly purchase jewelries in Macau, but instead just received cash in exchange with a transaction receipt as a sale of jewelry. She then deposited the cash abroad. (Pomfret, James, "How China's official bank card is being used to smuggle billions of dollars into Macau," [48] Reuters, March 12, 2014)

Example 3: A Mainland Chinese individual signed up for an "investment tour" organized by a Chinese real estate developer to see a Malaysian residential real estate project. She traveled to Malaysia and used her UnionPay card to make a down payment for a unit, lured by the possibility of obtaining the 10-year visa upon owning a home in Malaysia and the education opportunities for her children. (South China Morning Post, March 20, 2017)

Example 4: The parents of a Chinese student studying in Vancouver purchase an apartment or house in Vancouver by pooling the ATM cards of all of their family and extended family members. (Jing Daily, July 8, 2013)

Example 5: In 2016, Country Garden, a Chinese real estate developer, asked that its Mainland buyers to make payments in Hong Kong or Singapore to bypass Beijing's capital controls. A Country Garden salesperson instructed buyers whose payments exceed the annual foreign currency quota to bring several bank cards to complete the payments. In the past, they had accepted various kinds of domestic payments, including Hong Kong insurance policies. (Caixin, March 13, 2017; South China Morning Post, April 5, 2017)

Example 6: A top New Zealand residential real estate company noted on their website that they have an arrangement with UnionPay to facilitate payments on real estate purchases for Chinese nationals: "Harcourts gold markets all residential estate listings exclusively on Juwai.com, the No. 1 Chinese international property portal. All listings are marketed in Chinese. Additionally we now have an association with UnionPay, China's largest Credit Card Company, we are proud to offer this service." (Website of Harcourts gold real estate, "International Buyer Strategy" page)

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[48] According to the same article, sources in the credit-card industry say that the cashback practice has also spread beyond Macau to other Chinese tourist destinations such as Taiwan, Japan, and South Korea.

Appendix C: Data

Mirror Approach

Total travel exports: balance of payment travel exports statistics, available in each country's balance of payment statistics, measured on the basis of BPM6.

Total foreign arrivals: various national tourism boards.

Average expenditure per Chinese visitor (balance of payment): Total travel exports divided by total foreign arrivals.

Average expenditure per Chinese visitor (travel surveys): U.S. International Trade Administration (USA), Tourism Research Australia (Australia), Tourism Authority of Thailand (Thailand), Tourism Bureau (Taiwan), Japan Tourism Agency (Japan), Ministry of Tourism and Creative Economy (Indonesia), Singapore Tourism Board (Singapore), Banque de France (France), Statistics Canada (Canada)

Chinese Visitor Arrivals: The total number of outbound Chinese travelers is collected from the Chinese visitor arrival statistics reported by individual destination countries. The coverage of China's outbound travelers ranges between 80-90 percent of the sample period, with the coverage in 2015 being 90 percent, compared to 86 percent in 2014. The outbound departures numbers average 86 percent since 2012. According to these data, total outbound Chinese travelers grew robustly in 2014 by 19 percent, though the growth has decelerated to only 2 percent in 2015. The most popular destination for Chinese travelers is Hong Kong, receiving 40 percent of all outbound Chinese tourists, followed by Macao at 20 percent. However, both of these two special autonomous regions of China saw a contraction in the number of Mainland Chinese arrivals in 2015, as Chinese travelers opted rather to go to Thailand, Japan, and Italy. The United States also saw a steady yearly increase in Chinese visitors, though from a low base. Despite the rapid growth of Chinese travelers to these locations, Chinese outbound travelers still overwhelmingly travel to Hong Kong and Macao, which are both next door to China.

Gravity Model

Bilateral travel imports: Consolidated data on international trade in services v8.9 published by World Bank. The database contains bilateral travel trade for 199 countries for years spanning 1985 to 2011, with reconciliation of aggregate with underlying flows. The data use mirror techniques to consolidate multiple sources of bilateral trade data in services, including from OECD, Eurostat, UN, and IMF, and are adjusted extensively to assure consistency. In terms of coverage, all OECD flows are accounted for, but only 40 to 60 percent of bilateral flows for low and middle-income countries are unreported. According to World Bank, the Trade in Services Database is still far away from being comparable to trade data for merchandise goods, as such the database should be seen as the best currently available approximation to a comprehensive picture of global trade flows in services.

GDP PPP constant 2011 prices: Penn World Table version 9.0.

PPP relative prices: This is the PPP price level of the origin/importer country relative to exporter country adjusted market exchange rate. Available in Penn World Table.

Distance, Common Language, Common Border: These gravity variables are available at CEPII distance database, which are also used in Head, Keith, and Thierry Mayer, and John Ries (2010). The geographic distance variable is the "distwces", and it measures the distance between two countries based on bilateral distances between the biggest cities of those two countries, with the inter-city distances being weighted by the share of the city in the overall country's population.

Number of universities in global top 500: This variable indicates how many of the universities in the country are listed as top 500 by the Academic Ranking of World Universities, which is published by Shanghai Ranking Consultancy. The independent organization has ranked the top 500 universities among 1200 universities globally since 2003. Universities are ranked by several indicators of academic or research performance, including alumni and staff winning Nobel Prizes and Fields Medals, highly cited researchers, papers published in Nature and Science, papers indexed in major citation indices, and the per capita academic performance of an institution.

Number of World Heritage Sites: This variable counts the number of sites in the destination country on the official UNESCO world heritage list.

Aggregate Travel Expenditure Growth Model

Aggregate travel expenditure data: The panel data for fitting the model specified in equation (1) is drawn from the annual departure statistics of the UN World Tourism Organization (UNWTO) for 1995-2014 available. The UNWTO database also provides data on the total outbound tourism expenditure of the countries denominated in U.S. dollars. The sample of countries for the panel regression includes the 21 countries in the G20 excluding China.

Real effective exchange rate: International Financial Statistics published by the IMF.

Real GDP per capita: World Bank

Appendix D: Model Fit of Gravity Equation Model

Figure A compares the average Chinese expenditure in each of the destination implied by the bilateral travel flows predicted by the panel gravity model against the reported average expenditure from tourism board surveys. Just as the tourism surveys, the gravity model predicts the United Kingdom, Australia, and the United States—the three most popular destination for Chinese students studying abroad—to be the top places in terms of per capita spending by a Chinese visitor. The model predicts that a Chinese visitor spent much more in the United Kingdom than suggested by the tourism surveys. Singapore is another country where spending per Chinese visitor predicted by the model is much higher than indicated in surveys.

A. Per Capita Spending By Chinese Travelers While Abroad, By Destination (2015)
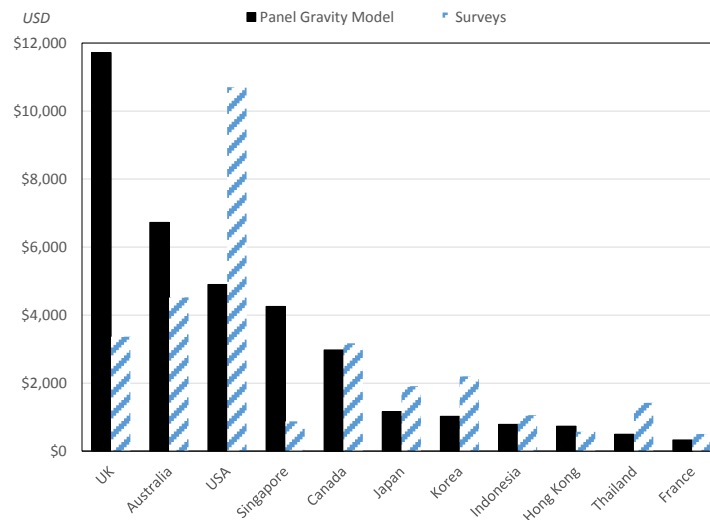
Figure B and C below compare the predicted in-sample bilateral trade flows involving China against actual as reported in the World Bank database for bilateral services trade flows. The panel gravity model, which is estimated on bilateral travel trade flows between 22 countries (368 unique country pairs) fits the bilateral travel trade flows data involving China better than a model estimated only on China data.

B. Panel Gravity Model
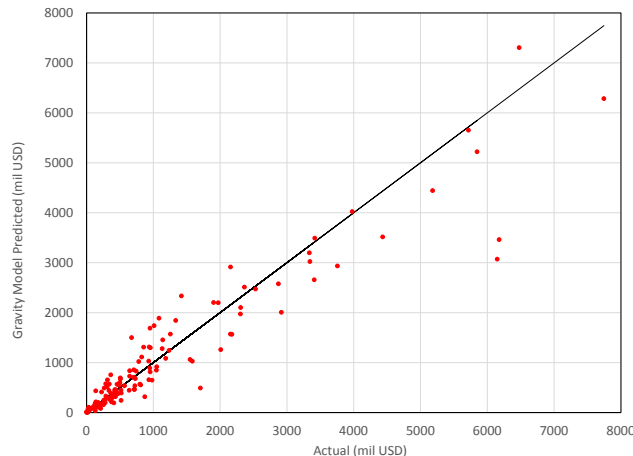
C. China-Data Only Model

41
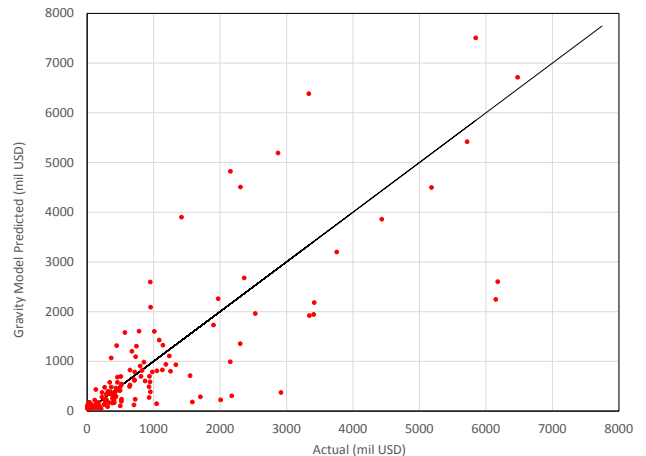
Appendix E: Adjustments in China's Travel Exports

As did travel imports, China's reported travel exports were also revised upwards in the 2015 revisions that augmented the methodology for calculating travel expenditure. The SAFE's explanatory note on the revisions focused on Chinese expenditure abroad and contained no discussion on the travel exports revisions. Based on the limited information, one can then only deduce that the upward revisions were made for the same reasons as imports—that the new methodology adds payment data to the calculations and broadens the categories counted as travel to the BPM6 definitions. For travel exports, this would mean that the new methodology captures purchases made by foreign visitors using their foreign bank cards, as well as foreign visitors spending in education and health care in China.

In that context, travel exports were revised upwards to $105 billion for 2014—a $50 billion increase from the BPM5 version—travel exports edged up slightly from that level in subsequent years. The latest March 2017 revisions, which Appendix A discussed, entirely erased the previous upward revisions for the period 2014-2016 and lowered the travel exports by such that spending by foreigners in China in 2016 has fallen below the 2013 level, when exports were calculated based on the more narrow BPM5 definitions.

These large and fluctuating revisions naturally lead to a question: which version of the data is closer to the truth? To answer this question, I apply the analogous methods described in the main text of this paper to construct travel exports that are not dependent on Chinese balance of payment statistics. I apply the mirror method (using counterparty travel imports data for up to 93 percent of foreign visitors to China), the arrivals model, and the panel gravity model (estimating travel imports of China's travel trading partners using the coefficients from the gravity model).

China's Travel Exports

The resultant travel exports calculations show considerable variation across methods (see above chart). Despite the variance, the various constructed travel exports since 2013 are all larger than the March 2017 version of travel exports but lower than the version from the 2015 revisions.

Unlike travel imports, there are no obvious economic incentives for over-invoicing of tourism receipts during a period of persistent capital outflows. By a process of elimination then, the remaining explanation for these deviations is methodological errors. The amount of adjustment to the current account for these errors is listed in the adjacent table.

Adjustments for Travel Exports (% of GDP)

	Mirror (BOP)	Mirror (Surveys)	Gravity	Arrivals	Agg Expenditure Gr
2014	0.3	0.3	0.4	0.4	0.4
2015	0.4	0.4	0.4	0.5	0.4
2016	0.4	-	0.4	0.4	-

	Range	Mid-point	Average
2014	[0.3, 0.4]	0.4	0.4
2015	[0.4, 0.5]	0.5	0.4
2016	[0.4, 0.4]	0.4	0.4

* Positive = overstatement.

Appendix F: Comparisons of Official vs. Models Average Spending Per Chinese Tourists

Figure A below compares the average spending per Chinese visitor implied by official reported travel imports against the implied average calculated from the other methods of estimating travel imports (mirror, panel gravity, China-only gravity, and arrivals). The per capita spending by a Chinese visitor as estimated by all the measures of travel imports ranges from $1200 USD per traveler to slightly above $1500 in 2016—that is, about half of the $2600 implied by the reported travel imports data.

Figure A: Travel Spending Per Outbound Mainland Chinese Resident
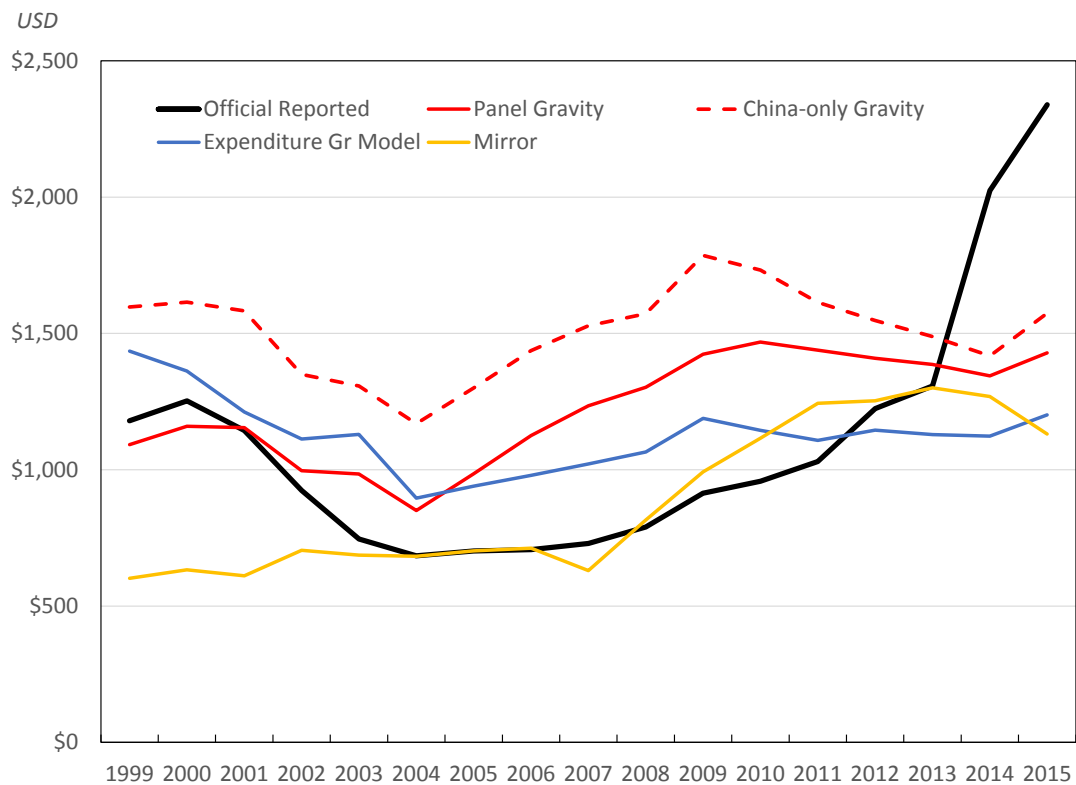
Table 1: Gravity Equation for Travel

VARIABLES	(1) Full Sample	(2) Full Sample	(3) Full Sample	(4) Restricted Sample	(5) Restricted Sample	(6) Restricted Sample	(7) China Data	(8) China Data
Log Origin GDP, PPP constant prices	0.810***	0.817***	0.912***	0.625***	1.515***	1.596***	1.568***	1.691***
	(0.01)	(0.01)	(0.12)	(0.02)	(0.16)	(0.09)	(0.23)	(0.24)
Log Destination GDP, PPP constant prices	0.715***	0.607***	0.679***	0.223***	1.026***	0.960***	1.244***	1.263***
	(0.01)	(0.01)	(0.11)	(0.02)	(0.16)	(0.09)	(0.08)	(0.08)
Log Distance	-0.898***	-0.881***	-1.335***	-0.757***	-1.099***		-1.141***	-1.210***
	(0.01)	(0.01)	-0.02	(0.02)	(0.02)		(0.17)	(0.17)
Common Border	0.440***	0.5413***	0.596***	0.134	-0.069		-0.490	-0.405
	(0.04)	(0.04)	(0.04)	(0.07)	(0.09)		(0.51)	(0.51)
Common official language	1.766***	1.758***	0.384***	1.282***	0.633***		4.068***	3.819***
	(0.04)	(0.04)	(0.03)	(0.04)	(0.05)		(0.77)	(0.79)
Number of top universities		0.013***	-0.007*	0.016***	-0.014***		0.007*	0.005
		(0.00)	(0.00)	(0.00)	(0.00)		(0.00)	(0.00)
Relative PPP factor		0.154***	0.210***	0.079***	0.093*			-0.493*
		(0.01)	(0.03)	(0.02)	(0.05)			(0.28)
Intra EU Dummy		0.126***	0.401***	1.144***	0.106			
		(0.03)	(0.04)	(0.08)	(0.08)			
Constant	-9.375***	-8.790***	-2.556	-0.923**	-17.461***	-30.109***	-27.564***	-28.862***
	(0.12)	(0.18)	(2.28)	(0.45)	-3.36	(1.05)	(4.30)	(4.35)
Observations	17,818	16,482	16,482	4,182	4,182	4,182	301	301
Adjusted R-squared	0.616	0.634	0.823	0.527	0.776	0.903	0.716	0.718
Unique country pairs	1675	1516	1516	368	368	368	34	34
Country-pair FE	No	No	No	No	No	Yes	No	No
Destination FE	No	No	Yes	No	Yes	No	No	No
Origin FE	No	No	Yes	No	Yes	No	No	No
Year FE	No	No	Yes	No	Yes	No	No	No

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Note: The dependent variable in these regressions is the bilateral travel imports of the origin country from the destination country.

Table 2: Travel Imports Regressions

A. UNWTO Panel Regression

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Advanced Countries					Emerging Market Economies				
Ln(departures) change	0.585***	0.447***	0.400***	0.401***	0.439***	0.308***	0.333***	0.333***	0.331***	0.407**
	(0.13)	(0.12)	(0.11)	(0.12)	(0.09)	(0.07)	(0.04)	(0.04)	(0.05)	(0.18)
Ln(REER) change		0.844***	0.802***	0.820***	0.963***		0.461***	0.468***	0.471**	0.429***
		(0.09)	(0.07)	(0.08)	(0.13)		(0.10)	(0.12)	(0.13)	(0.16)
Real GDP per capita growth chg			0.975**	1.043**	1.263***			-0.071	-0.065	0.864***
			(0.41)	(0.39)	(0.32)			(0.34)	(0.31)	(0.32)
Ln(GDP per capita)				-0.224*	0.050*				-0.032	0.011
				(0.13)	(0.03)				(0.19)	(0.02)
Constant	0.029	0.017	0.001	2.349*	-0.515*	0.161***	0.116	0.119	0.396	-0.069
	(0.02)	(0.02)	(0.02)	(1.31)	(0.29)	(0.05)	(0.07)	(0.08)	(1.66)	(0.14)
Observations	183	180	162	162	162	684	116	116	116	116
Number of country_id	16	15	14	14		60	7	7	7	
Adjusted R-squared	0.631	0.759	0.768	0.771	0.549	0.144	0.561	0.557	0.552	0.498
Country FE	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	No
Year FE	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	No

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Note: The dependent variable in these regressions is annual change in expenditure growth. Column (1)-(5) are results for a sample restricted to advanced countries, and column (6)-(10) for a sample restricted to emerging market economies.

Table 3: Drivers of Abnormal Travel Imports

VARIABLES	(1) Recorded private financial outflows	(2) Errors & Omissions	(3) Imports Over-invoicing	(4) Travel (arrivals)	(5) Travel (mirror)	(6) Travel (expenditure gr model)	(7) Travel (panel gravity)
Growth	-0.366**	-0.166*	-0.020***	-0.134***	-0.130***	-0.118***	-0.112***
	(0.17)	(0.09)	(0.00)	(0.02)	(0.02)	(0.02)	(0.02)
2-yr USD/RMB NDF Chg	-0.758***	0.037	-0.021***	-0.050	-0.081**	-0.067**	-0.086**
	(0.16)	(0.07)	(0.00)	(0.03)	(0.03)	(0.03)	(0.03)
NDF chg X (fwds-spot/spot)	0.053*	-0.020*	0.002***	0.004	0.008**	0.008***	0.007***
	(0.03)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
i-i*	-0.650	0.140	0.063***	0.093	-0.038	0.072	0.12***
	(0.39)	(0.20)	(0.01)	(0.07)	(0.06)	(0.06)	(0.04)
EMBIG spreads	0.068*	0.002	-0.002**	0.014**	0.010	0.009	0.001
	(0.04)	(0.02)	(0.00)	(0.01)	(0.01)	(0.01)	(0.00)
EMBIG spreads^2	-0.000	-0.000	0.000*	-0.000**	-0.000**	-0.000*	0.000
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
ln_vix	-1.367	0.507	-0.127***	-0.421*	-0.569**	-0.753***	-0.756***
	(1.15)	(0.62)	(0.03)	(0.23)	(0.22)	(0.19)	(0.13)
Constant	35.085*	14.835	2.327***	12.745***	14.582***	13.037***	12.731***
	(17.79)	(8.88)	(0.46)	(2.23)	(2.52)	(2.30)	(2.44)
Observations	50	50	49	51	51	51	48
R-squared	0.631	0.235	0.624	0.763	0.667	0.742	0.740
Adjusted R-squared	0.569	0.107	0.560	0.725	0.612	0.700	0.694

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 4: Contribution of Economic Factors to Average Quarterly Changes in China's Capital Flows in 2014Q4-2015Q4 (% of GDP)

	Travel (mirror)	Travel (panel gravity)	Travel (arrival)	Travel (agg chg model)	Over-import Invoice	Recorded Private Financial + E&O	Total*
Actual Change in Flows/GDP	*-0.4*	*-0.3*	*-0.5*	*-0.3*	*0.0*	*-4.7*	***-5.1***
Predicted	*-0.4*	*-0.1*	*-0.3*	*-0.2*	*0.0*	*-3.4*	***-3.6***
Growth	-0.4	-0.3	-0.4	-0.3	-0.1	-1.5	***-1.9***
Exchange Rate Expectations	-0.1	-0.1	-0.1	-0.1	0.0	-0.7	***-0.8***
EMBIG+VIX	0.1	0.2	0.0	0.1	0.0	-0.5	***-0.4***
i-i*	0.0	0.1	0.1	0.1	0.1	-0.7	***-0.5***

Note: The "Travel" variables here denote the disguised outflows estimated from each of the respective methods. Also, negative sign = deterioration in outflows

*Total = average of the disguised outflows in travel + over-imports invoicing + recorded private financial + E&O

Table 5: Summary of Potential Understatement of China's Current Account Balance* (Percent of GDP), 2014-2016

	Adjustment for Disguised Outflows in Travel Imports							
	Mirror (BOP)	Mirror (Surveys)	Gravity	Arrivals	Agg Expenditure Gr	Range	Midpoint	Average
2014	0.8	0.4	0.8	0.5	1	[0.4, 1]	0.7	0.7
2015	1.4	1	1	1	1.3	[1, 1.4]	1.2	1.1
2016	1.7	-	1.3	1.3	-	[1.3, 1.7]	1.5	1.4

	Adjustment for Both Travel Imports and Exports							
	Mirror (BOP)	Mirror (Surveys)	Gravity	Arrivals	Agg Expenditure Gr	Range	Mid-point	Average
2014	0.5	0.1	0.4	0.1	0.6	[0.1, 0.6]	0.4	0.3
2015	1	0.6	0.6	0.5	0.9	[0.5, 1]	0.8	0.7
2016	1.3	-	0.9	0.9	-	[0.9, 1.3]	1.1	1.0

* Positive = understatement.

Figure 1: China's Current Account Balance (4 quarter sum)

Bil USD, 4q sum
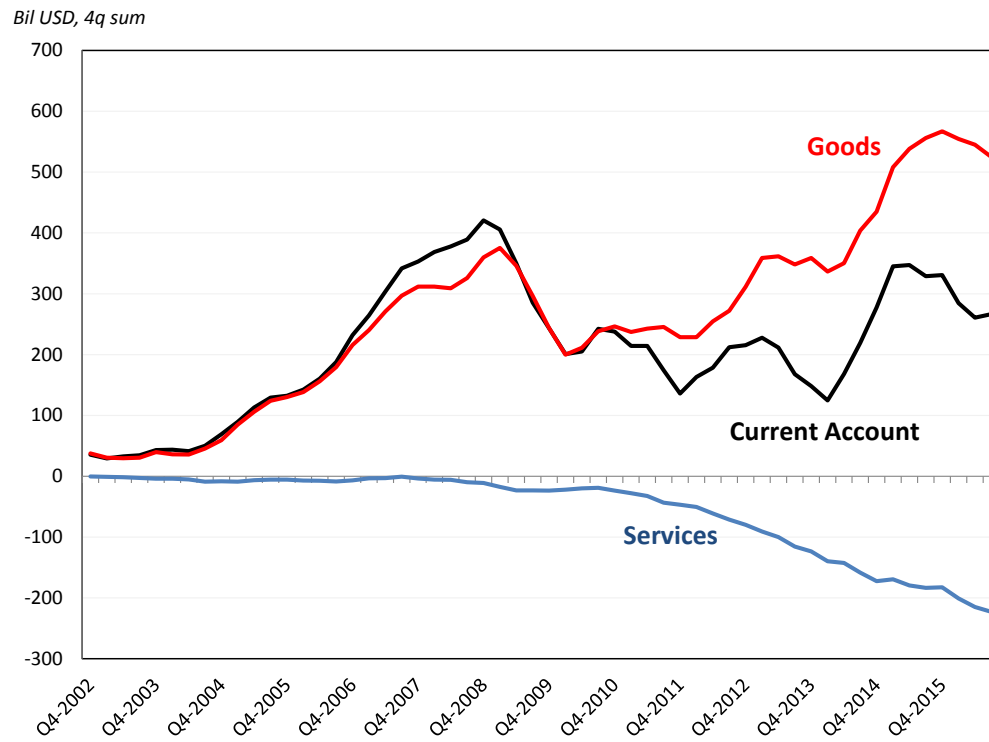
Figure 2: Components of Service Trade Balance (4 quarter sum)

Bil USD, 4q sum
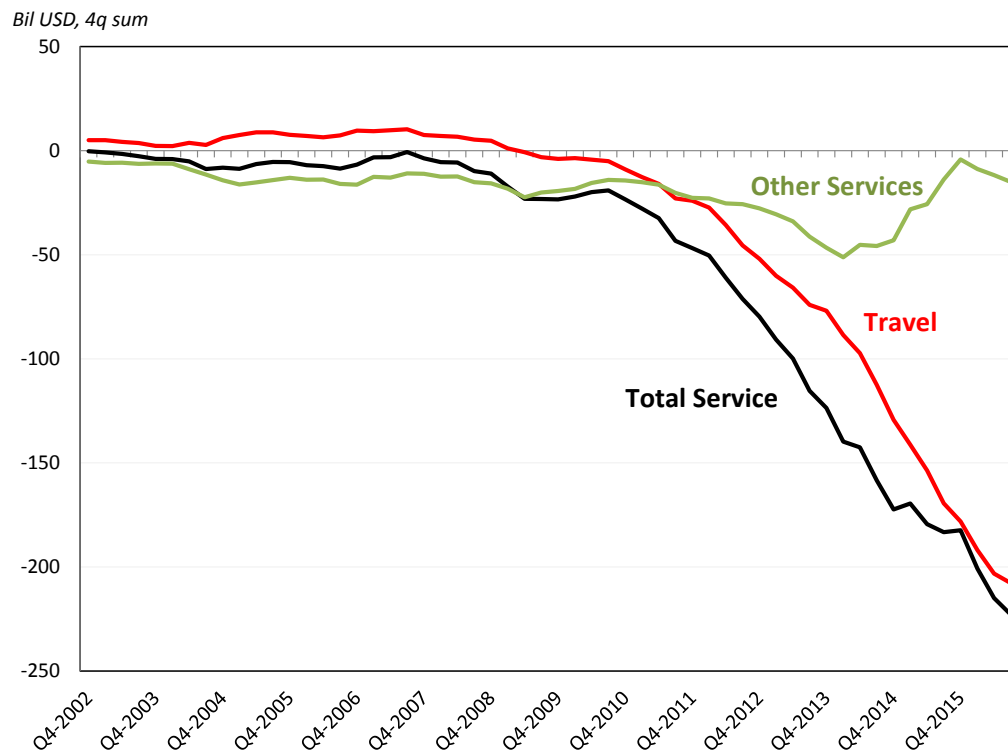
Figure 3a: Travel Imports (Percent of GDP) vs. GDP per capita, 2010
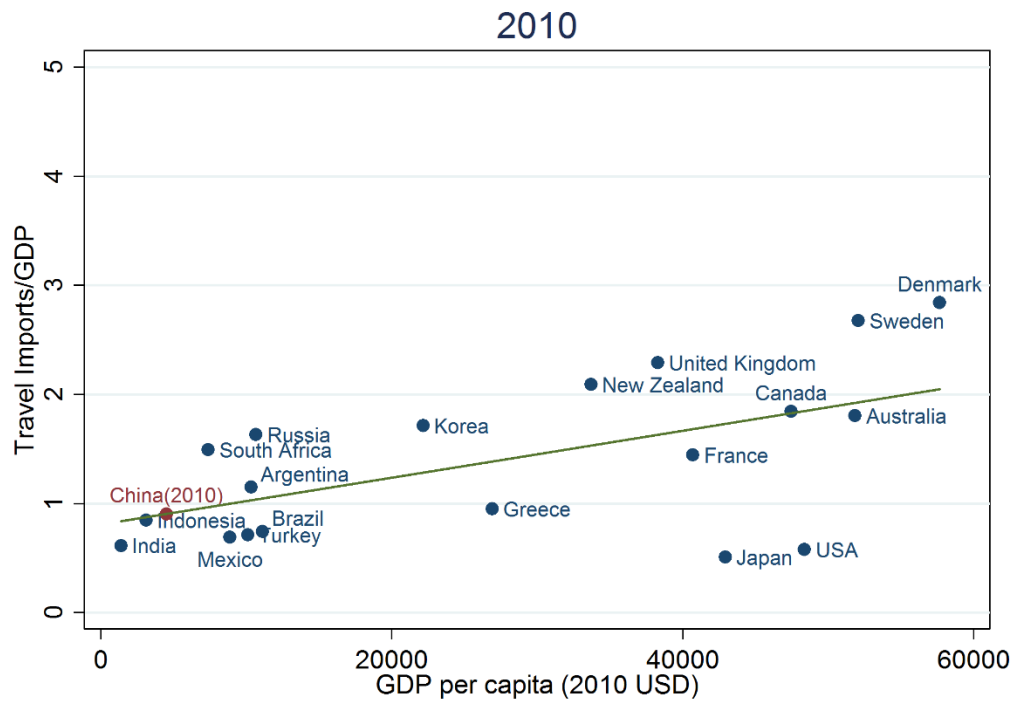
Figure 3b: Travel Imports (Percent of GDP) vs. GDP per capita, 2014
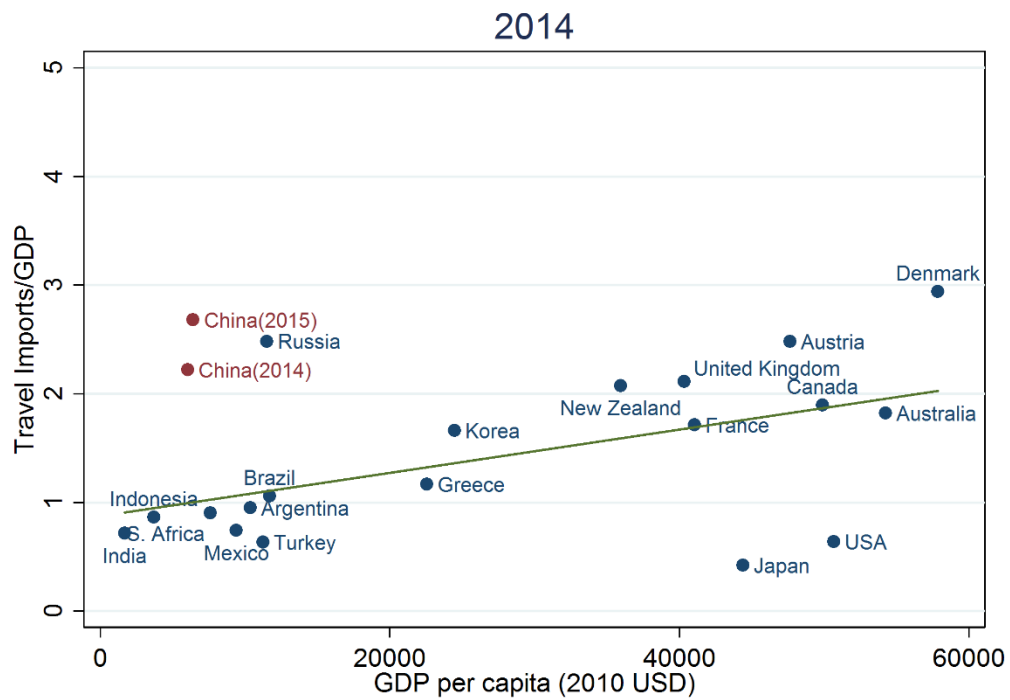
Source: United National World Tourism Organization and World Bank. Datapoint for 2015 for China was plotted with data for 2014 because cross country travel imports data was not available from source as of this writing.

Figure 4: China's Balance of Payment Travel Imports versus Number of Departures, yoy%
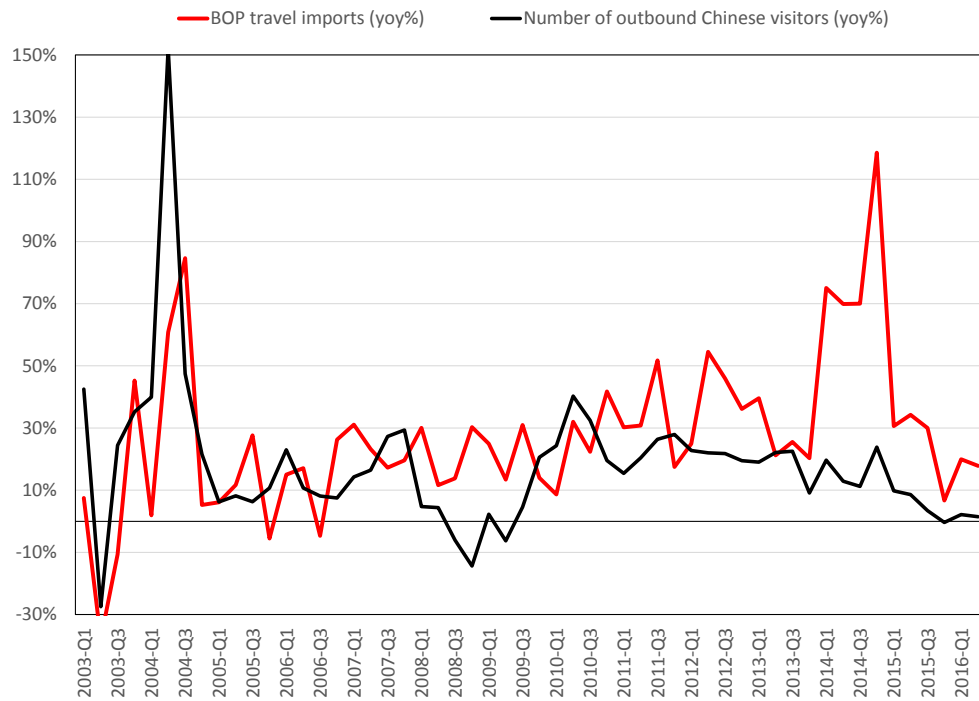
Source: SAFE; individual country tourism boards.

Figure 5: Growth in Outbound Korean Travelers vs. Korean Travel Imports
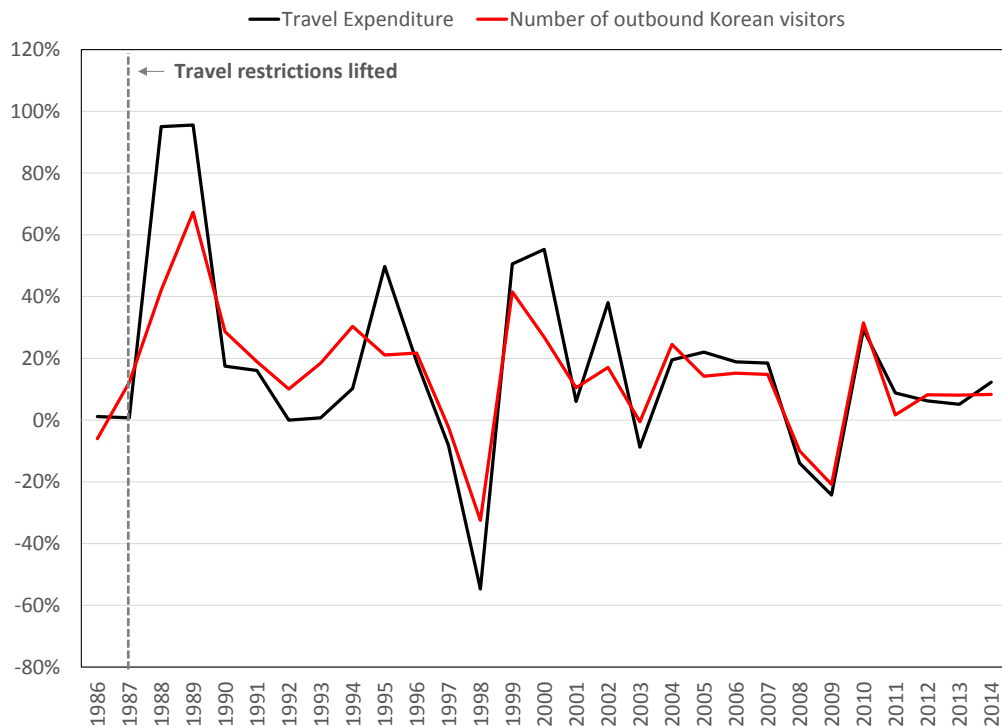
Source: Korea Tourism Organization

Figure 6: Purchases of Insurance Products by Mainland Chinese in Hong Kong
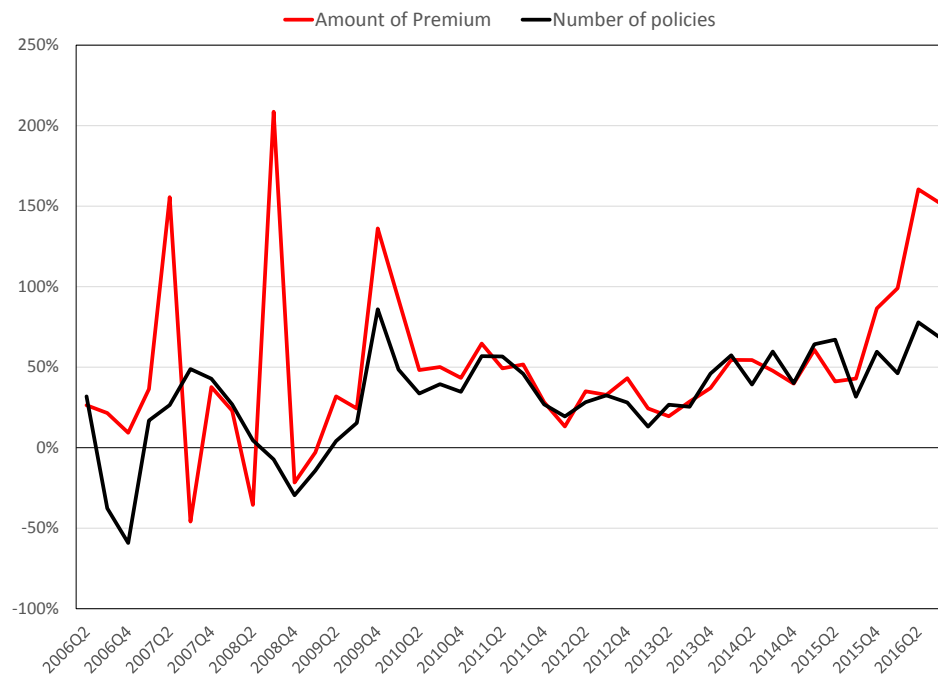
Source: Hong Kong Office of Commissioner of Insurance

Figure 7: Chinese Travel Expenditure Growth vs. Chinese Arrivals Growth
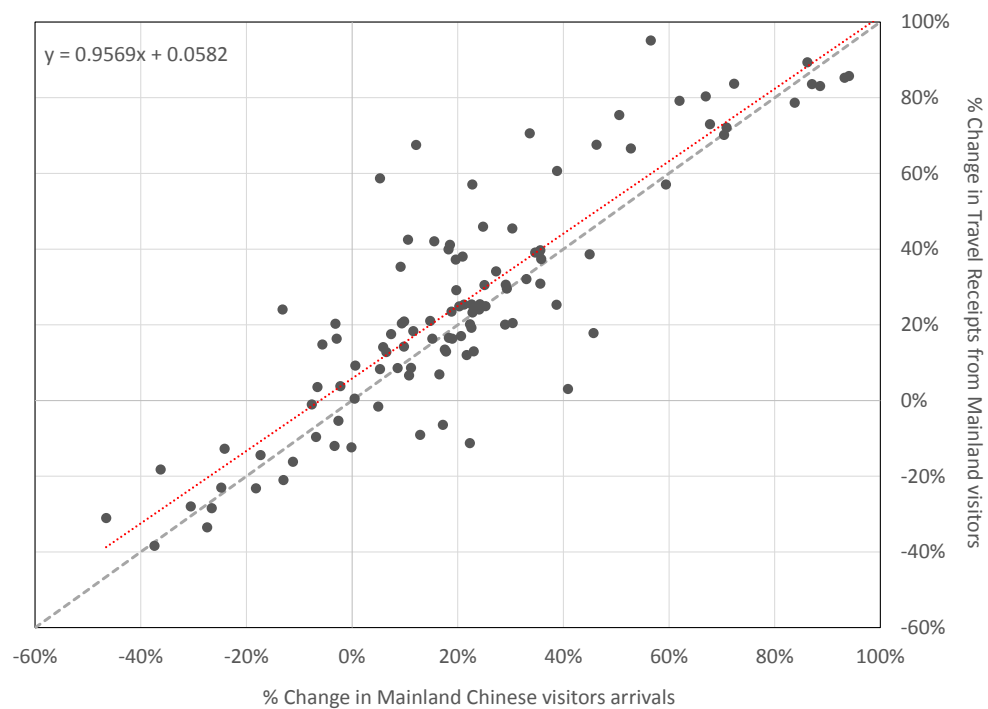
Note: This chart is based on Chinese arrivals and spending data from nine countries that publish those data: USA, UK, Thailand, Indonesia, Singapore, Australia, Canada, Taiwan, and Japan. The time period of this unbalanced panel dataset ranges from as early as 1991 to as recent as 2016. The red dotted line represents a 1 to 1 mapping of arrival and expenditure growth.
Source: Various national tourism boards.

Figure 8: Chinese Travel Expenditure Growth vs. Arrivals Growth, by Time Period

A. 2001-2012

B. 2013-2016
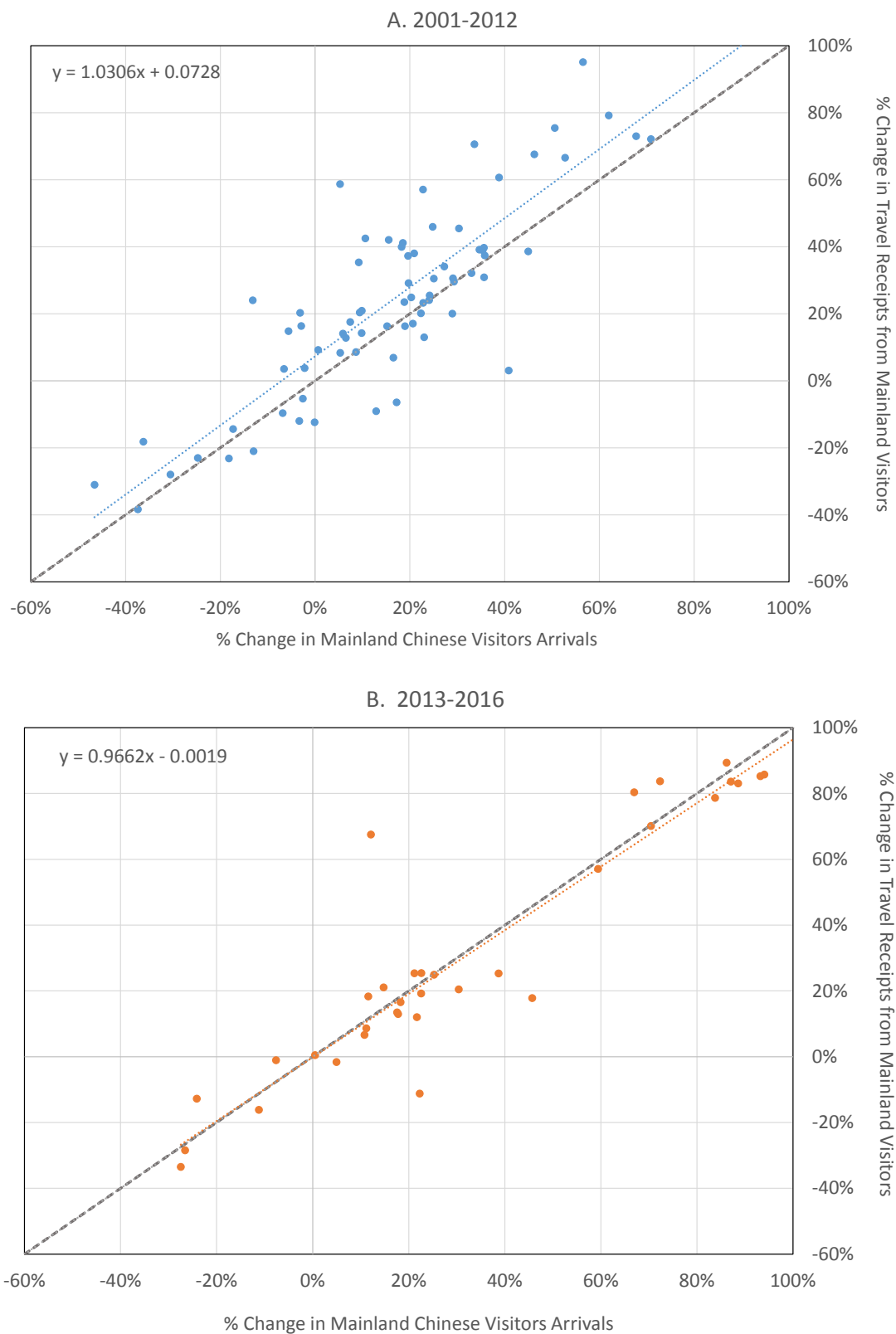
Figure 9: China's Travel Imports: Official versus Mirror Method
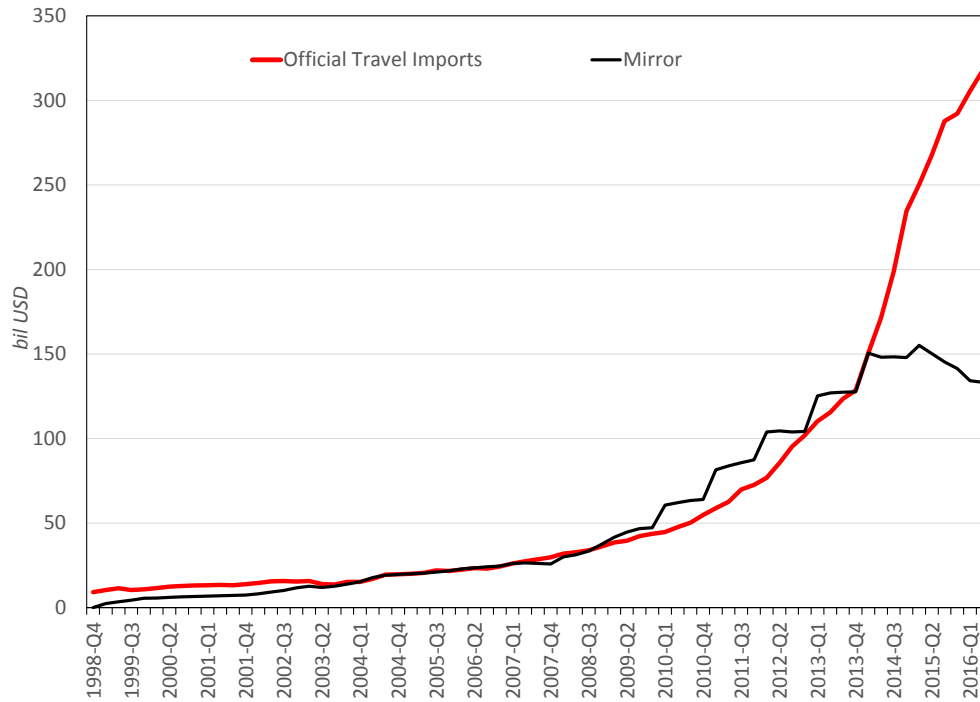
Figure 10: Average Spending Per Mainland Chinese Visitor, USD (2015)
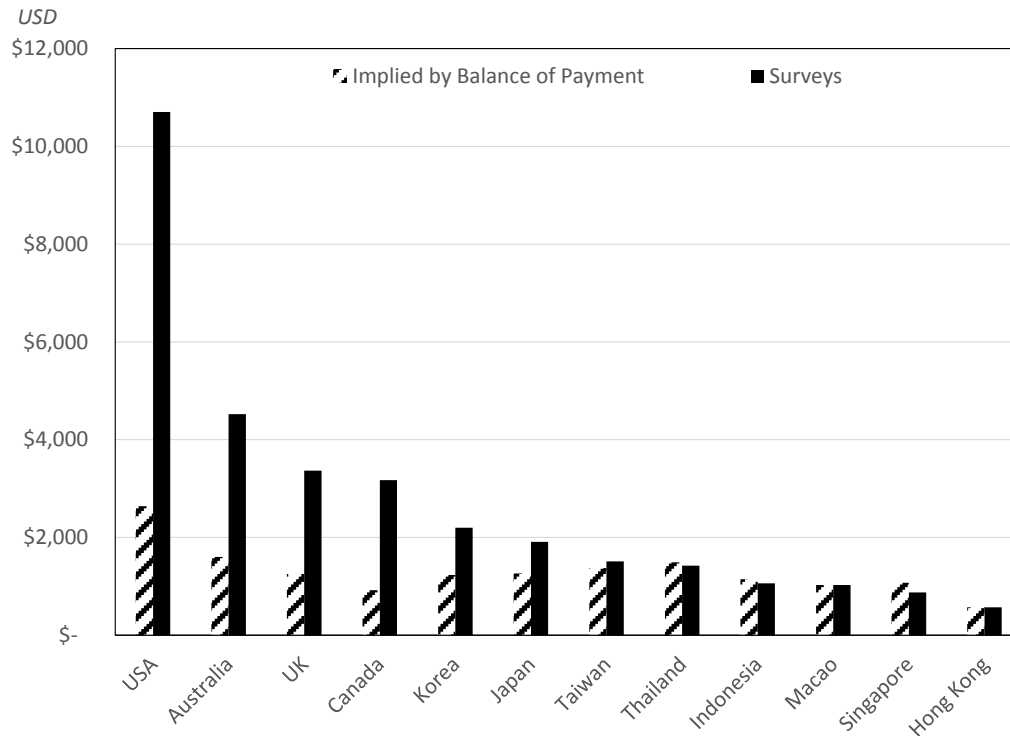
Source: Average spending implied by balance of payment is calculated by dividing total travel exports by total international arrivals at the country. Balance of payment data is reported by national statistics agencies, and arrivals and average spending per Mainland Chinese visitor are reported by national tourism boards.

Figure 11: China's Travel Imports: Official versus Gravity Model Predicted Travel Imports
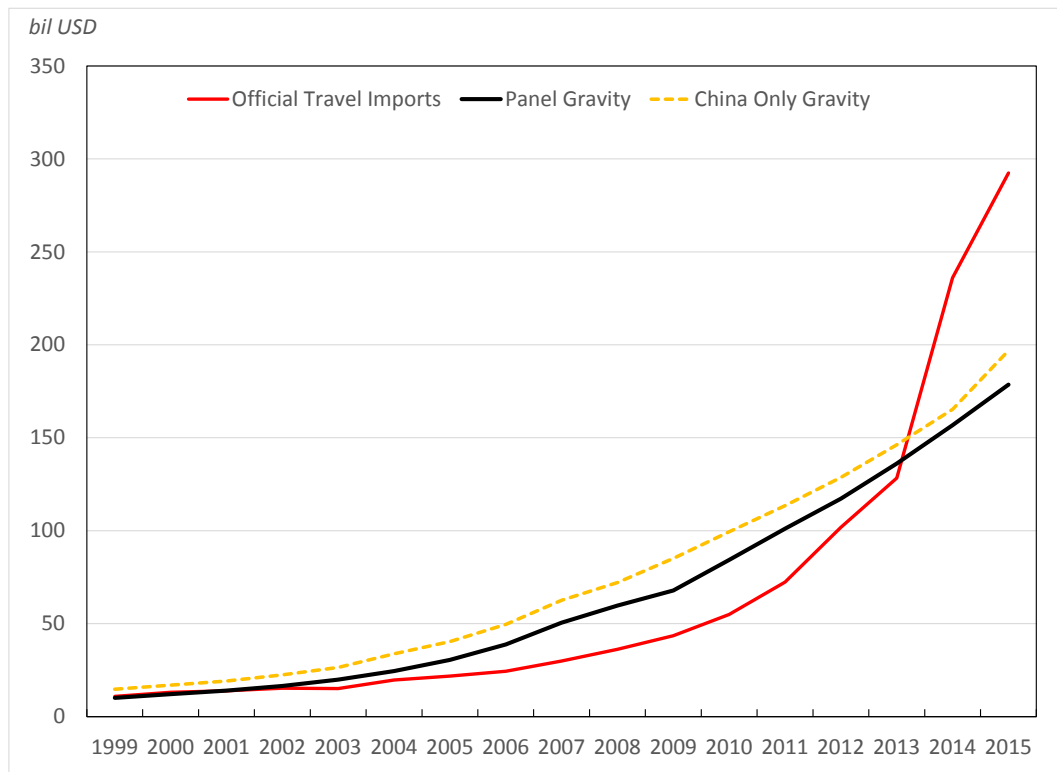
Figure 12: China's Travel Imports: Official versus Arrival-based Travel Imports
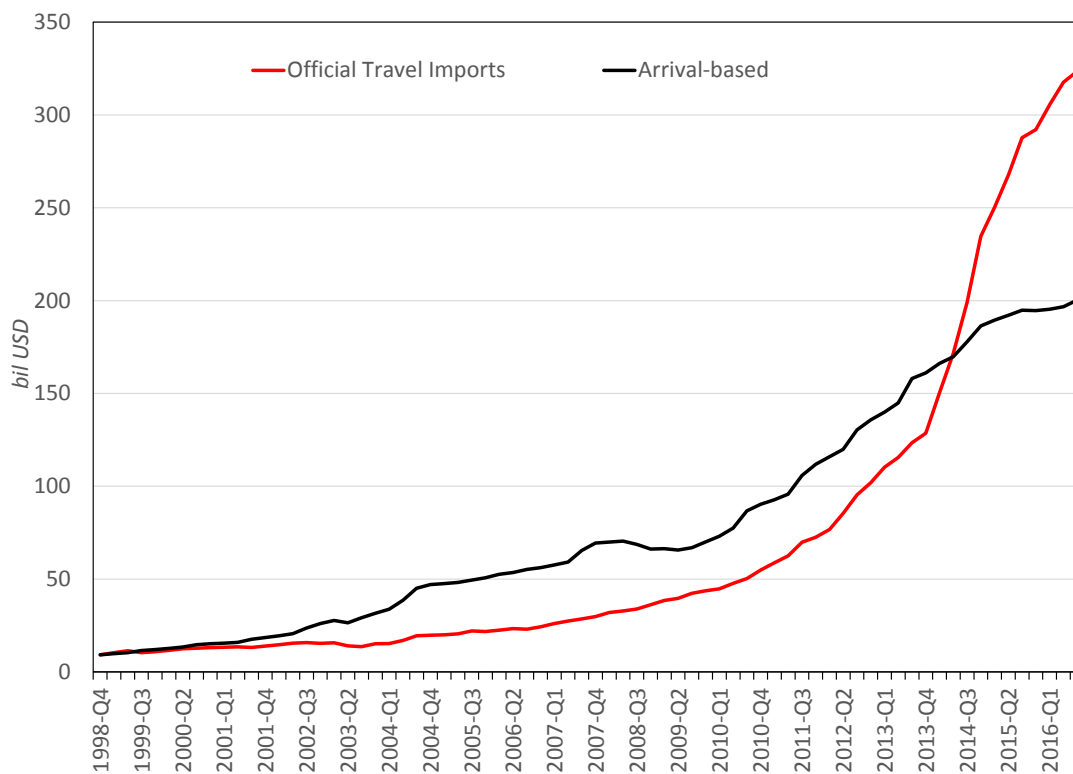
Figure 13: Actual Travel Expenditure Growth vs. Model Predicted Expenditure Growth
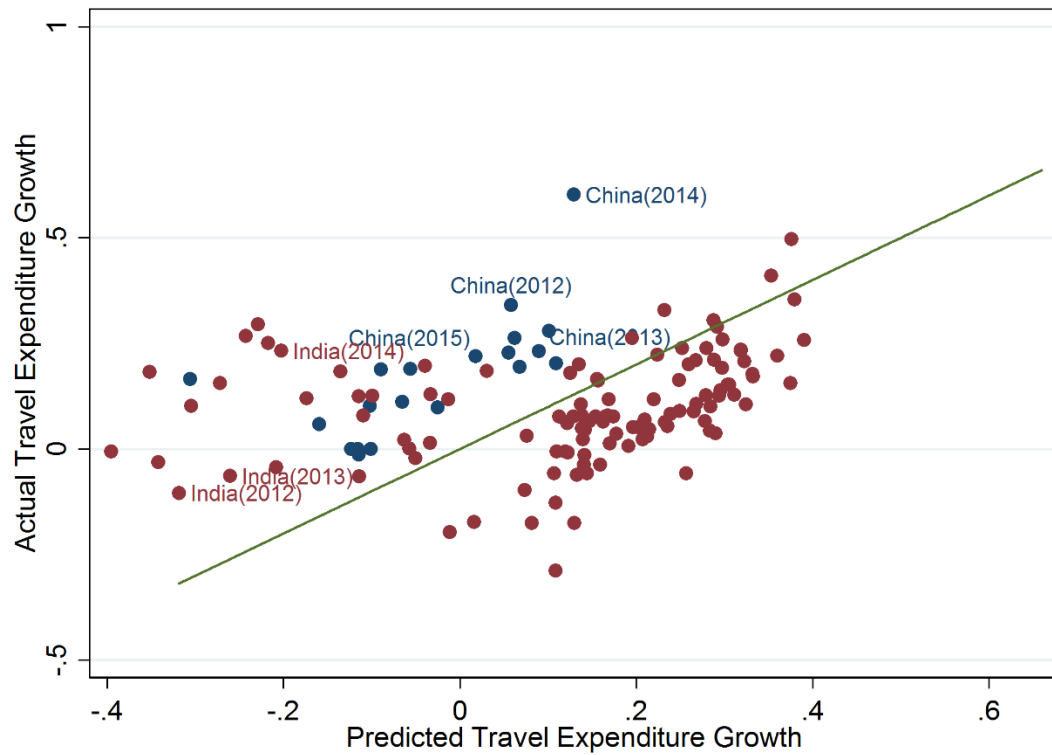
Figure 14: China's Travel Imports: Official versus Expenditure Growth Model Travel Imports
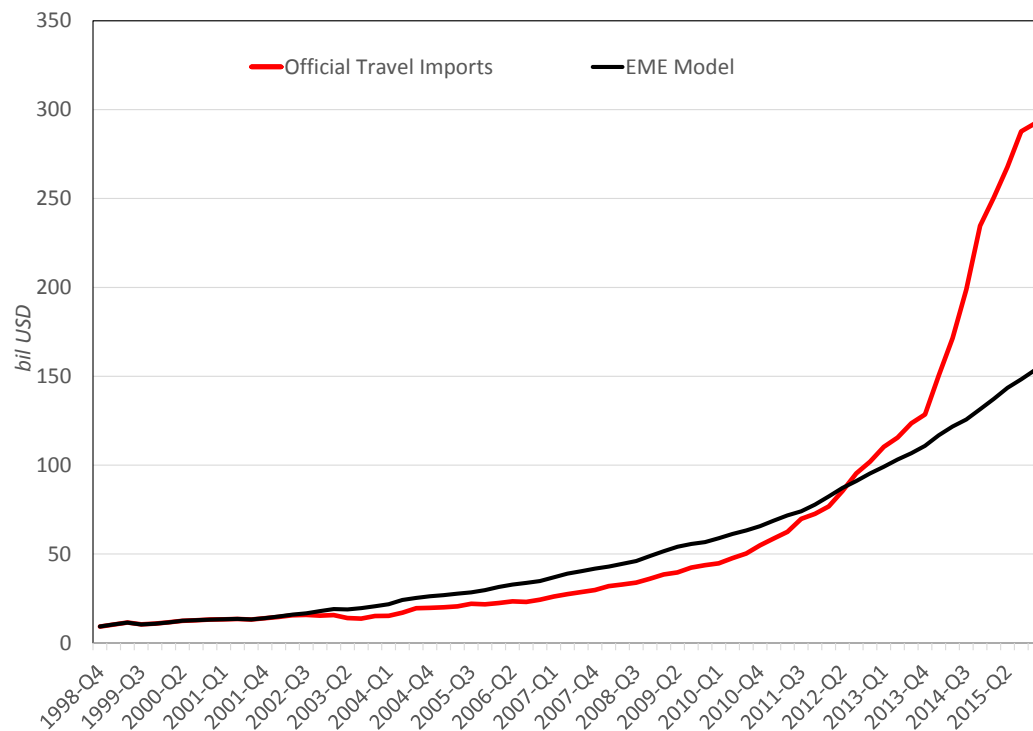
Figure 15: Comparison with Recorded Net Private Capital Outflows
(Note: The scaling of the axes are such that the right axis is four times the left axis)
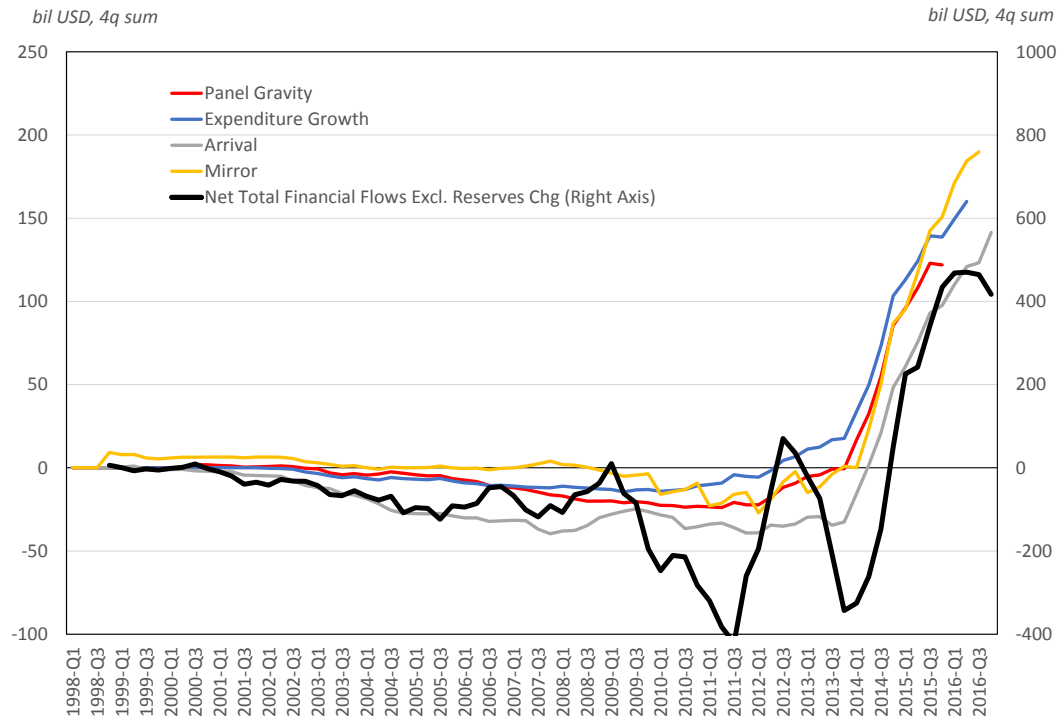
Figure 16: Comparison with Imports over-invoicing vis-à-vis United States
(Note: The scaling of the axes are such that the left axis is five times the right axis)
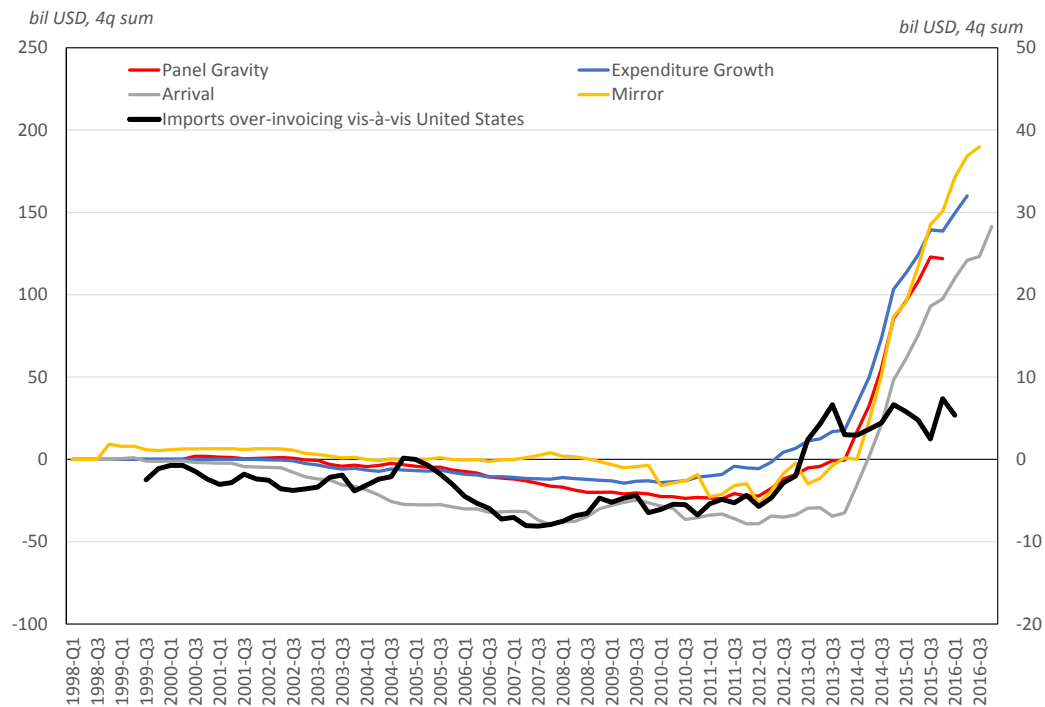
Figure 17: Comparison with Errors and Omissions
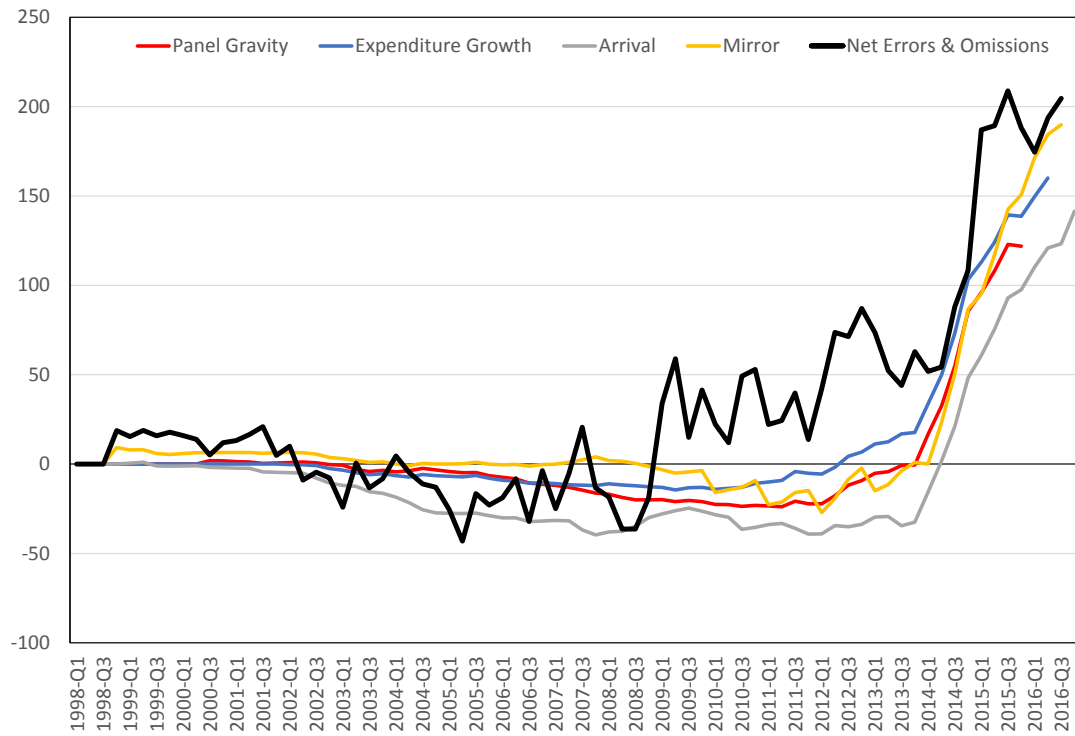
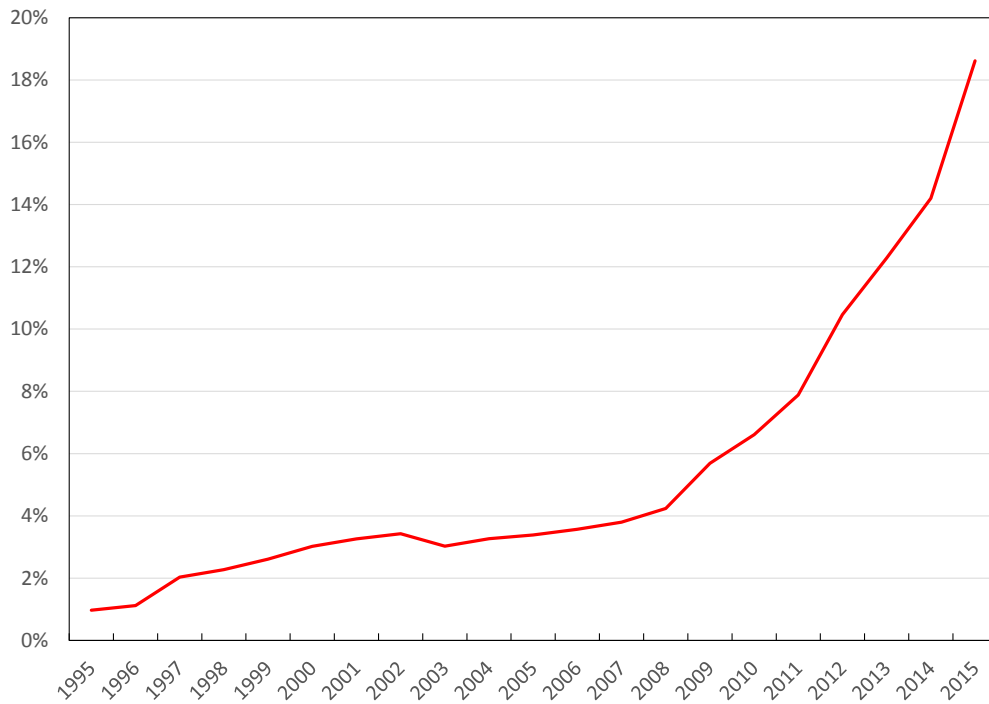Figure 18: Current Account Balance (% of GDP, 4 quarter average)
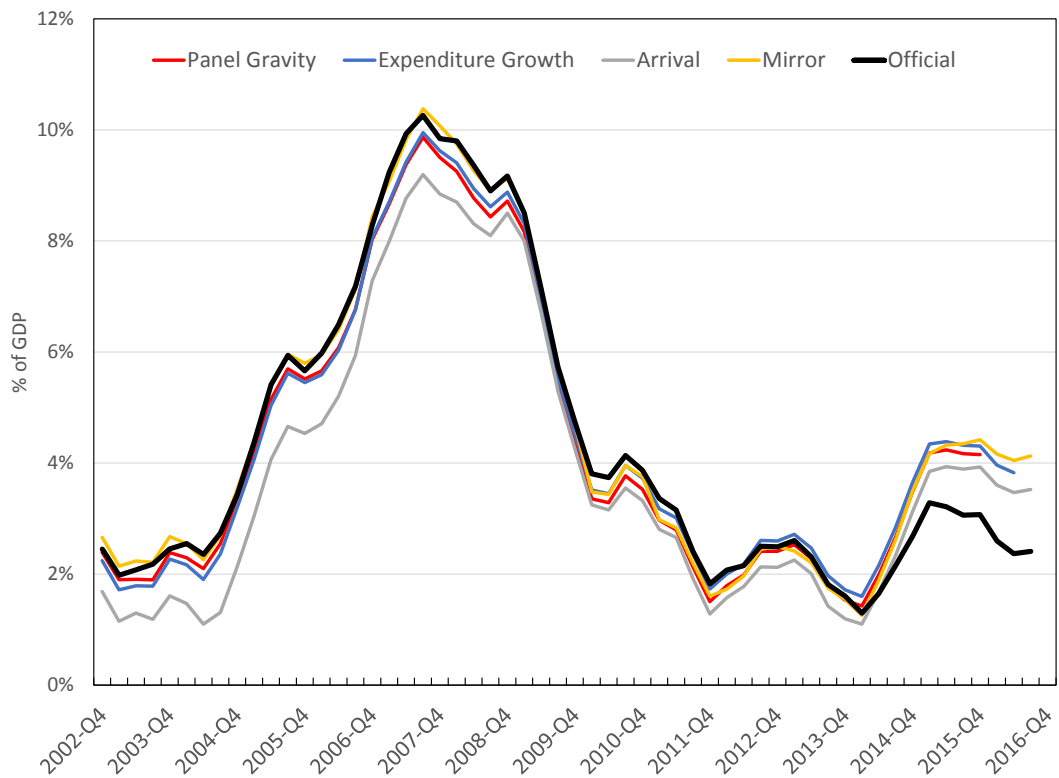
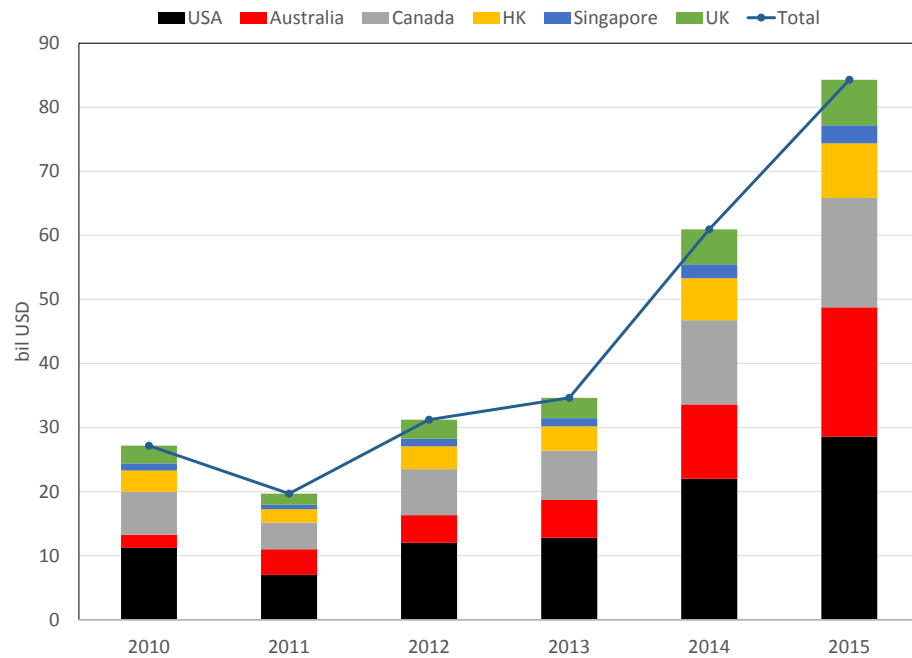Figure 19: China's Current Account Balance (% of World GDP)*
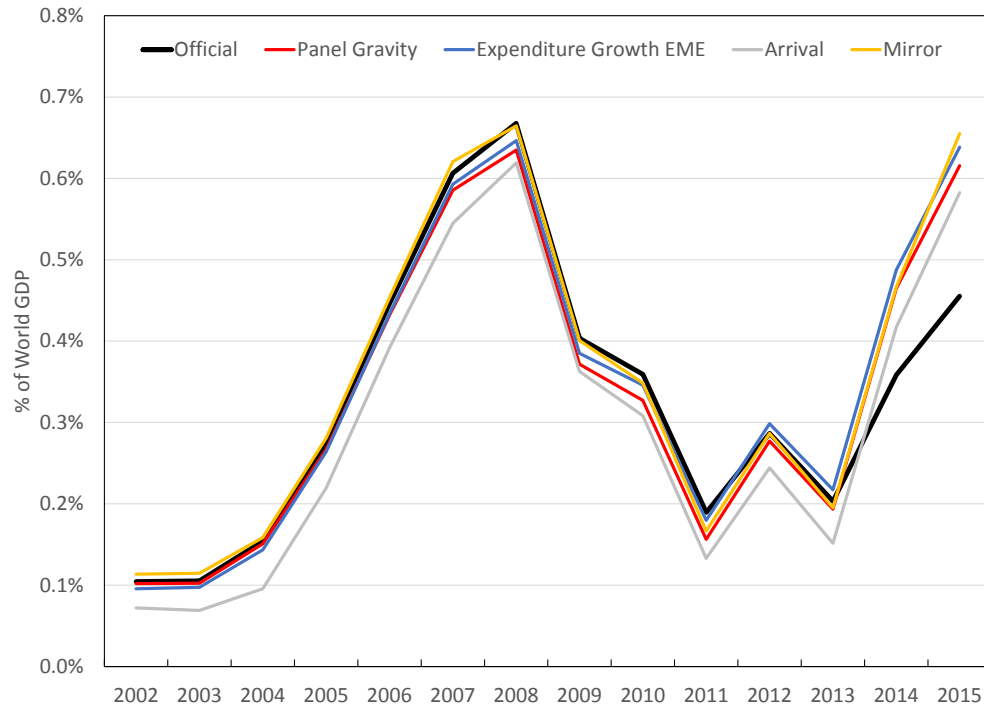
Source: World Bank.   Note: Data for World GDP for 2016 is not available as of the writing of this paper.

Figure 20: China's Adjusted Travel Imports (Percent of Global Tourism Spending)


Source: UN World Tourism Organization and author's calculations.

Figure 21:   Chinese Real Estate Purchases Abroad

Source: National Association of Realtors (US) and Foreign Investment Review Board (Australia) and surveys of affluent Chinese nationals surveys of affluent Chinese nationals.

Figure 22: Correlation between U.S. Inflows and China Outflows in Errors and Omissions

*8-quarters rolling correlations
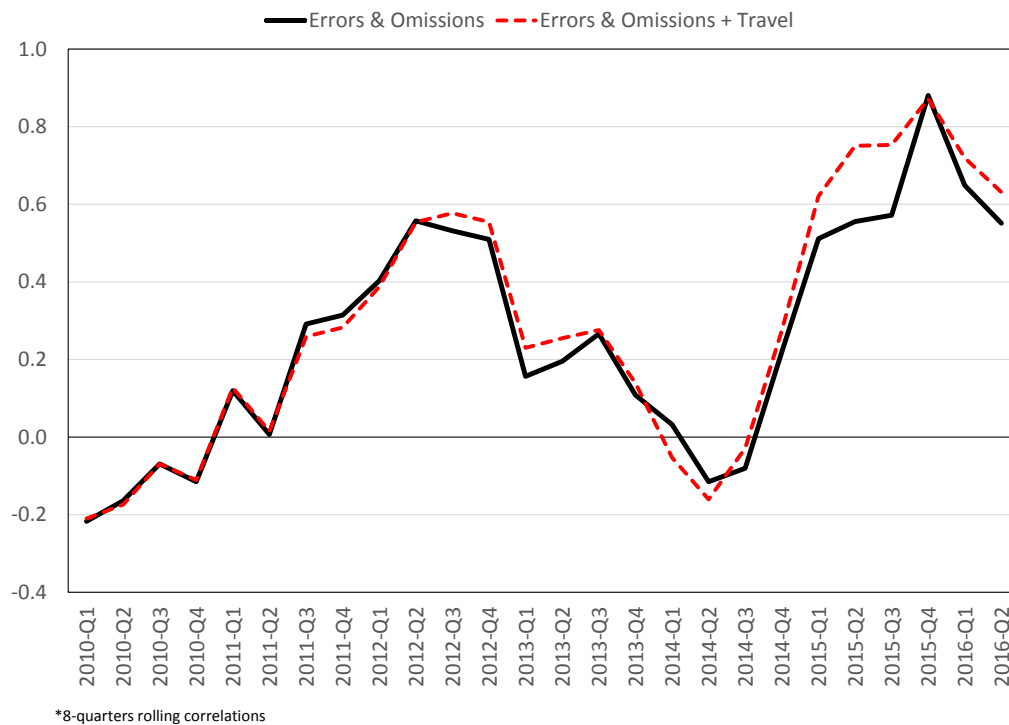
Source: Bureau of Economic Analysis, SAFE, and author's calculations.

Figure 23: Financing of China's Current Account Balance
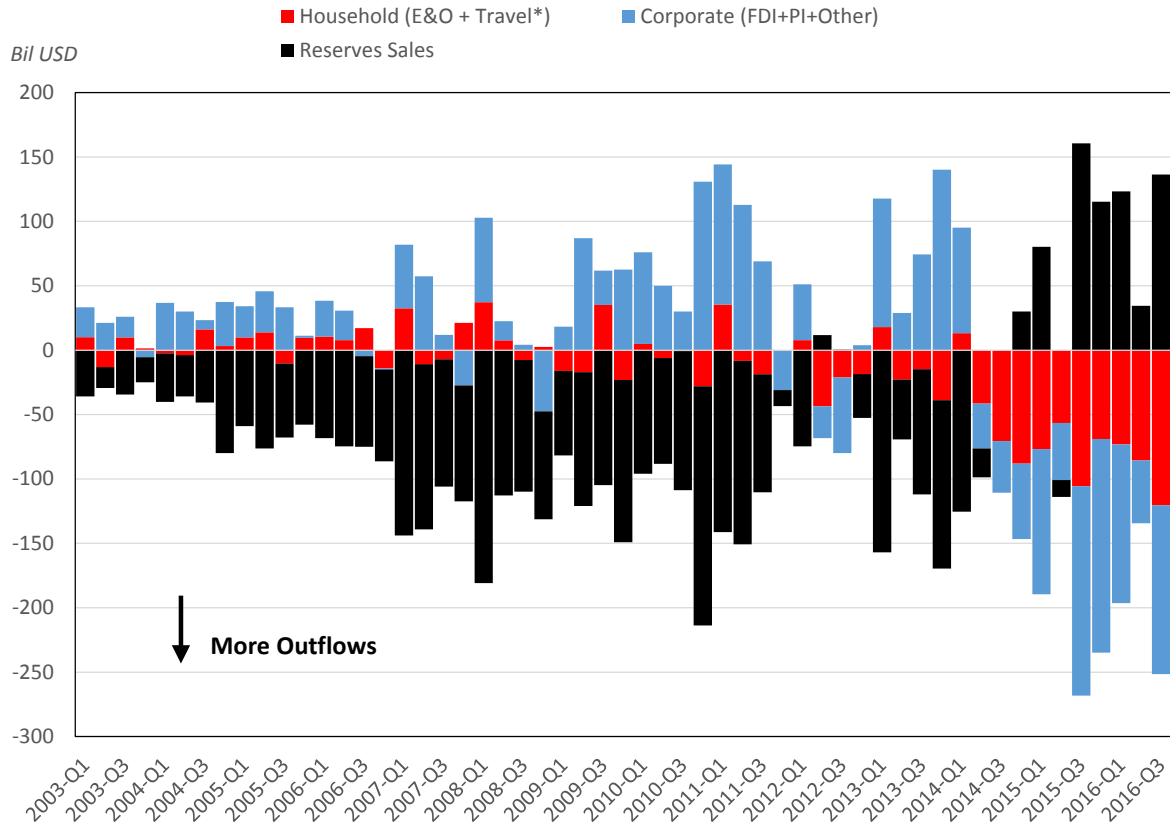
Note: Household flows are calculated as the sum of disguised capital flows through the travel channel and errors and omissions. Disguised capital flows through travel is calculated as the average of the estimate from the gravity model, arrivals, and expenditure growth model.
Source: SAFE and author's own calculations.