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China's Perspective and Future Strategies**

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Ute Zischka

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## Editor's Letter

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Life is full of inflection points: those moments in time that capture the shift in policy, tradition, wars, peace, financial systems. When we initiated our call for paper submissions, we did not limit potential authors to prescribed themes. And yet, many of the selected papers touch upon impending inflection points within our increasingly globalized and connected world. Be it ceasefire negotiations in Colombia, Chinese participation in the TPP, impending transitions out of the digital poverty trap, or policies to manage literal (riparian) inflection points, the papers in this edition demonstrate that people and places throughout the Pacific (and beyond) are on the brink.

That's not to say that unpredictable and rapid events exclusively dictate global changes. Rather, trends and patterns, when appropriately analyzed, provide a road map to create and implement effective policies that safeguard and promote security, development and cooperation. The papers and authors presented in this issue provide just that. They examine current policies, markets, and societies to offer apt analysis and prescriptions. While the bridge between academia and politics has been scrutinized recently, these authors illustrate the value of a specialized foreign policy education.

Moving beyond the global scale (as an undergrad Geography major, I was taught to examine everything in scales), changes at

the School of International Relations and Pacific Studies are in the works. As we rebrand to find our own GPS coordinates within the international relations graduate consortium, the school is at its own inflection point.

Here at the Journal of International Policy Solutions, we have scaled things back to offer a simpler, more focused product. We hope that by harkening back to a more traditional layout, the words and ideas may stand out on their own. As my predecessor eloquently discussed on this page one year ago, the policy world must not allow fleeting headlines to dictate our global perceptions. Similarly, we hope that a minimalist redesign will refocus attention on the analysis and policies discussed in each paper.

Finally, my fellow graduating classmates and I are at our own inflection points. We now have a packed toolbox filled with critical and quantitative analysis skills (both of which are intertwined within the following papers) that will allow us to tackle future challenges and opportunities that await the Pacific. Much like the policies discussed in this issue, our futures are uncertain, but we remain confident that our personal decisions will garner success.

So, without further ado, please enjoy our issue! It goes without saying that none of this would be possible without the hard work and dedication from the Editorial Board, draft editors and, of course, our talented authors. We encourage you to keep the conversation going at the dynamic blog recently launched by the 2014-15 board: [internationalpolicysolutions.blogspot.com](http://internationalpolicysolutions.blogspot.com).

See you on the other side!

Best,  
*Maeve Whelan-Wuest*  
Editor in Chief





# The Trans-Pacific Partnership: China's Perspective and Future Strategies

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Edited by Michael DeZubiria

The Trans-Pacific Partnership (TPP) is a multilateral trade agreement encompassing Asia-Pacific economies attempting to liberalize trade and further economic integration. Originally, the agreement between New Zealand, Chile, Brunei and Singapore did not cause strong concern for the rising power in the region: China. It was not until 2008, when the United States joined the agreement and started to aggressively push forward the negotiations that analysts started to become concerned about its impact on China, which is currently excluded from the U.S.-led negotiation.

Countries of the Asia-Pacific have joined various bilateral and multilateral Free Trade Agreements (FTA). The growing complexity – and accompanying inefficiency – from these FTAs has been dubbed the “Noodle Bowl Effect”, a problem that the TPP aims to solve. Besides the TPP, Asian countries have also attempted to integrate trade agreements through mechanisms led

by the Associations of South East Asian Nations (ASEAN). The Regional Comprehensive Economic Partnership (RCEP) is discussed within an ASEAN+6 model, where China, Japan, South Korea, India, Australia and New Zealand are included. The RCEP, however, excludes the United States at the current stage, and incorporates lower trade standards than the TPP.

What does the TPP mean to China politically and economically? What are the aspects of the TPP that might hurt China? And perhaps most importantly, what can China do to protect its national interests?

To answer these questions, our report first analyzes the international political implications of the TPP for China. We suggest that the TPP fits into the larger strategic picture of the U.S. pivot to Asia, is being used as a method to rebalance China's growing regional influence, and attempts to set rules to constrain its future development. The second part studies economic effects of the TPP on China. We suggest the TPP effect on non-tariff barriers would cause trade diversion from China, and would push China to make domestic reforms. The third part examines three areas of China's economy that will need to be reformed to minimize trade diversion and changes in foreign direct investment (FDI) that could occur as a result of the TPP, and which will help China's economy continue to grow and remain competitive in the future. Based on those findings, the final part of our report makes the following suggestions for China's countermeasures to the TPP: (1) construct and develop the RCEP based on ASEAN+6 model; (2) push forward domestic reforms liberalizing the economy; and (3) engage the United States in the future in order to facilitate regional integration.

## **Political Implications of the TPP**

The political implications of the TPP are large and contentious

for each Asia-Pacific country, given that it could offer a framework to solve the current “noodle bowl” of agreements. Alternatively, it could simply intensify the complicated trade networks. The United States, under George W. Bush, paid little attention to regional institutions in Asia such as ASEAN or the Asian-Pacific Economic Cooperation (APEC), instead emphasizing security and counter-terrorism strategies in other parts of the world. However, under the Obama administration, the U.S. has been rebalancing both politically and economically towards the Asia-Pacific, and in doing so, may also be exerting itself as a regional power to counterbalance China’s rise. Since the Washington has since taken the lead in advocating for the TPP, it has continued to call for standards that Beijing cannot realistically meet in the near future, which may be a way to keep China out of the regional framework. These deliberate actions pose core questions about the TPP and the American agenda in Asia: 1) is the TPP part of a larger strategy for the U.S. to either contain or rebalance the region? 2) are Southeast Asian economies going to pivot towards the U.S. because of a perceived threat with China’s rise? A “mutual pivot?”

Currently, China is an emerging political and economic world power advocating for further regional economic integration in East and Southeast Asia to promote reciprocal development and stability. This not only economically benefits China’s neighbors, but will also drive China from a position as a strong Asia Pacific player to a regional hegemon. As some scholars argue, the TPP will threaten China’s geopolitical status and goals. Shen Mingui, a researcher at the Chinese Academy of Social Sciences (CASS), claims that East Asian alliances will be forged by U.S. accommodations that would threaten China’s relationships with their fellow East Asian comrades.<sup>1</sup> Others argue China should pay little attention to the TPP because the trade loss would be minimal and instead focus on promoting other forms of economic

cooperation.<sup>2</sup> Furthermore, some experts have pointed out that China should not be concerned with the TPP since the likelihood of such a high-level trade agreement getting through Congress is slim.<sup>3</sup> While President Obama no longer has the fast track authority that was available under the previous administration, it seems reasonable to expect the current administration to have their ears to the ground on what can and can't be negotiated on.<sup>4</sup>

Moving forward, is the TPP just part and parcel of the new American "pivot" to Asia or a soft but coercive method to contain China? The Americans claim that it is more of an energetic rebalancing response to previous administrations missteps. The two wars that the United States had been engaged in the Middle East and the financial crisis in 2008 have decreased U.S. influence, politically and economically, in the Asia-Pacific. The U.S. has since been scrambling to restore its place as the stable economic power, which informs current efforts to rebalance toward Asia. While on the economic side, the TPP also falls in line with Obama's recent domestic promises. The administration has been increasingly using trade as a method to boost economic recovery since the 2008 recession. Under Obama, the U.S. has ratified free trade agreements that had stalled under President Bush and now are on pace to fulfill Obama's goal to double its exports within 5 years (2010-15).<sup>5</sup> (Recent research shows Obama will not meet his goal- do we add that?) The Americans continue to reiterate their claim that the TPP will open up Asia Pacific markets more fully to American businesses, emphasizing their past role in the region. Moreover, for American policymakers and business, China's economic pace provides ample opportunities to cash in, grab a bigger piece of China's economic pie, and use China as a political punching bag that plays well to their constituents.

On the other hand, the TPP may very well be a strategic move by the U.S. to contain China's economic prowess in the region, through the imposition of U.S.-made rules and standards as a re-

gional norm. The TPP engulfs developing and developed countries into one mix. The developing countries, particularly Malaysia and Vietnam, have similar export products to those of China<sup>6</sup>. Trade diversion (discussed next section) is of particular concern because the TPP could provide major obstacles to China's future economy and growing geopolitical influence (although we question how large this diversion will actually be). The East and Southeast Asian regions are part of China's geopolitical framework, and have been for generations. America's latest move directly challenges China's regional influence. A multilateral trade agreement across East Asia will appeal to many ASEAN countries to establish policies conducive to the U.S. instead of China, possibly alienating China from its neighbors. Moreover, Japan entering the TPP, despite Obama's recent concession exclude Japan's agriculture sector, will provide an even larger obstacle for China to establish itself as the driving economic power in the region.<sup>7</sup>

These developments present another important question: are Southeast Asian economies implementing a "mutual pivot"? Putting aside domestic demands, the TPP fits the United States economic and political aspirations into a fused agreement. Furthermore, Southeast Asian countries are able to tie their own economic aspirations with a strategic alliance in trade that will also bring political alliances. Foreign ministers and quasi-authorities have targeted China's recent foreign policy as being too coercive or aggressive, particularly with recent actions in the South and East China Seas. This may help to explain a possible "mutual pivot" policy carried out by the Americans and other members of the TPP. As discussed by Jeffrey Schott, "no one else in Asia wants to contain China."<sup>8</sup> Ultimately, the various East Asian economies, especially through trade and investment with China, have seen large benefits from regional integration.

Additionally, while some see the TPP as a potential threat,

Indonesia and China are both missing from the agreement. From China's perspective, Indonesia is superior to the rest of the South-east Asian TPP members in terms of growth and potential influence in the global economy. Without Indonesia and China, the TPP will fail to include the two fastest growing economies and future political powerhouses in Asia, and therefore lack strong political and economic clout. Meanwhile, as long as China remains under one-party, Communist rule with growing military capabilities, the United States will seek to have a stronger role as a security warden, and the so called "hub and spoke" U.S.-Asia alliance structure will remain intact.<sup>9</sup>

The U.S. power is waning, but with the *mutual pivot*, and China's (perceived) controversial foreign policy, America may be using the TPP as a mechanism to further integrate with China's neighbors in hopes of cementing its place in the region. While this seems potentially dangerous to China geopolitically, it seems unlikely the TPP will have the desired effect that American policymakers seek. It seems that the American strategy has been to integrate into China's economy, set standards Beijing can't yet meet, and attempt to divert export-based trade to regional partners. Beginning to reform the Chinese economic structure, develop China-led trade agreements, and deepen regional ties and integration all present viable means to counter the American rebalance.

## Economic Implications of the TPP

Assuming the TPP is implemented, there will be real economic effects on China and other TPP non-members. Guyou Song and Wen Jin Yuan (2012) argue that "most Chinese scholars claim [TPP's] successful implementation will have a negative impact on China."<sup>10</sup> They both explain that this negative effect will stem primarily from trade diversion away from China and toward

those within the TPP agreement. In fact, some analysts claim the TPP as “a tool to economically contain China’s rise.”<sup>11</sup> What they fail to explain, however, is what would actually cause that trade diversion. In this section, we examine China’s trade relationship with TPP member-countries, economic implications of TPP on China – assuming it goes through – as well as what trade diversion might imply. We will also look at how other existing or planned competing regional agreements may also affect China.

Leading scholarly opinions in China also assume that the United States, through the TPP, is attempting to “interfere with East Asia’s regional economic integration, gaining the upper hand over China and [become] the dominant economic power of the region.”<sup>12</sup> It is no secret that China is a rapidly growing economy. In 2012, China had the 3<sup>rd</sup> highest GDP (purchasing power parity) in the world, after the European Union and the United States, and largest in the Asian region.<sup>13</sup> In the same year, China had a real growth rate of 7.8%, which although slower than its peaks above 10% in recent years prior, and places China as the sixteenth fastest growing economy in the world.<sup>14</sup> China’s exports account for 10.4% of the world’s total exports, with the top five export destinations as follows: the EU, the U.S., Hong Kong, Japan and South Korea.<sup>15</sup> China imports the most from – in order – the EU, Japan, South Korea, Taiwan and the U.S.

Certain TPP member economies, including Australia, Brunei Darussalam, Chile, New Zealand, Malaysia, Peru, Singapore, the United States and Vietnam rely heavily on China as both a market for exports and a source of imported goods. China has become each country’s top five sources of imports and destination of exports due to its complementary economic structure and large potential market. See *Figure 1* for a breakdown of China’s trade partnerships with TPP member countries. Among the 12 TPP participants, China already has active trade agreements with Chile, New Zealand, Peru and Singapore, and also has on-

going negotiations with Australia.<sup>16</sup>

As of 2011, 25% of Chinese exports are sent to TPP countries, with the U.S. accounting for 18% of that total. China imports 19% of total imports from TPP countries, and similar to export breakdowns, the U.S. comprises 7% of that total.<sup>17</sup> *Figure 2* illustrates this breakdown and shows Chinese trade within the potential ASEAN+6 agreement in conjunction. Within TPP-member countries, China is currently both a lead exporter and importer, exerting itself as a dominant trade partner.

ASEAN+6, or Regional Comprehensive Economic Partnership (RCEP), is a potential regional competing strategy of economic integration. For clarity, *Figure 4* lists all countries in TPP and ASEAN+6, including overlapping countries, to give an idea of China's trade partnership with these countries, as well as the diversity that exists. ASEAN+6 includes a slightly larger share of total trade breakdowns for China. In addition, the trend of Chinese exports and imports from 2003 to 2011 is shown in *Figure 3*. Despite the dip in overall exports and imports in 2009 due to the 2008 Financial Crisis, trade between China and both TPP and ASEAN+6 countries has been steadily increasing.

Looking at these current statistics, an agreement like ASEAN+6 would comprise a much larger portion of Chinese trade. The most pressing concern, however, is that an agreement like the TPP would cause developing countries in the Asia Pacific region to more competitively export to the United States, causing trade diversion away from Chinese, and therefore shifting trade preferences of TPP member states away from China. For example, currently 93 percent of China's total exports are manufacturing goods – with a large portion going to the United States. If TPP succeeds, would the United States start to import manufacturing goods from Vietnam or Malaysia, which are not as economically efficient as China, would become more attractive because of the trade agreement? Since the United States is such a huge market



for Chinese goods, this would stoke China's concerns about market access.

Before we look at the breakdown of diversion, we first look at future projections. A recent study by the Peterson Institute for International Economics projected that future "trade diversion effects of the TPP fall mainly on China – its exports would be 1.2 percent lower than on the baseline."<sup>18</sup> However, in this study, the authors define within their metrics in determining the larger effects of these trade agreements, that tariff preferences or barriers are not in fact large drivers or diverters of trade flows.<sup>19</sup> Instead, the authors focus on non-tariff barrier effects, in addition to degrees of rule of origin and investment barriers when estimating their projected impacts. The ideology behind deemphasizing tariff barriers as a mode of explaining trade diversion is also supported by Baldwin (2011), who argues that regional trade agreements with a basis in tariff cutting do not necessarily create trade within the region.<sup>20</sup> We posit that tariff barriers, or a change in trade preference, will not be the force factor behind any trade diversion felt by China, but in fact, non-tariff barriers (NTB) – which create a more compliant business environment for members of an agreement like TPP – will create trade diversion. The economic effects of NTBs are felt through costs associated with limiting trade at the border, "supply shifting" due to internal regulations (i.e not allowing the sale of products that do not meet a human rights standard) and "demand shifting" through information dissemination.<sup>21</sup>

The Peterson's Institute study also looks at the long-run impacts of TPP both alongside an Asian track agreement, like an APEC+6 agreement, and without a competing agreement in effect.<sup>22</sup> With a single TPP track, China is projected to have a \$47 billion dollar income loss (in 2007 USD), as opposed to a \$233 billion dollar income and \$189.3 billion dollar gains only an Asian trade track agreement and with both agreements, respectively.

As for the export market, China is projected to lose \$57.4 billion with just the TPP agreement, gain \$516.3 billion with an Asian agreement or gain \$456.8 billion with both. If both an Asian trade agreement and TPP are active in 2025, the study found that both would possibly “provide complementary benefits” with gains reaching \$766 billion, potentially offsetting any losses to China with a TPP-only future.<sup>23</sup> If TPP were to go through, trade diversion by means of non-tariff barriers is certainly a valid concern. If an Asian FTA agreement were to go through, however, China is projected to experience a 9.9% increase.

These long-term projections help encourage China to start making smart reforms now to prepare for potential diversions later. In the short-run, however, because of the large trade preference China holds with its current trading partners and countries within the TPP, impacts will be minimal. Wen Jinyuan (2012) makes the point that most TPP-member countries are at a different development stage than China, leading to “marginal impacts” from TPP.<sup>24</sup> For example, Singapore, Australia and New Zealand are more focused on trading high-tech products, leading to little competition between TPP countries and China.<sup>25</sup> Vietnam and Malaysia are the only two countries who specialize on more low-end manufactured goods that might threaten China’s market access, however both Vietnam and Malaysia “have an exceptionally small overall volume of trade compared to that of China, and therefore will only have a marginal negative impact on China if they become more competitive in trading with the U.S. after joining the TPP.”<sup>26</sup> If China does plan on becoming more competitive in the high-tech and service industries in the future – a likely goal given current domestic policy – then reform would be beneficial for China to become more competitive on those levels in the future.

## **A Brief Summary of Necessary Reforms**

As mentioned in the previous section, in order for China's economy to remain competitive going forward, both regionally and globally, it will need to take action towards reducing non-tariff barriers to trade. Should China neglect these reforms, they may suffer in a variety of ways. Exports may find access to overseas markets restricted if they fail to be produced within strict environmental, labor or safety standards.<sup>27</sup> Equally important, foreign companies may be less likely to invest in the Chinese economy if they are apprehensive about risks involved with poor protections for intellectual property rights, or if they believe that they will face an uneven playing field because of competition or innovative policies that favor domestic companies. Given that the TPP addresses all of these areas and is intended to be a high standard agreement, it is likely that TPP signatory countries will become a more and more attractive place for foreign firms looking to do business. In order to remain competitive, China will need to improve in these areas as well.

While China will need to improve in a variety of areas, including environmental regulations, labor standards and rules for government procurement, three sectors will be particularly important to reform if China hopes to begin a transition away from its current status as the factory of the world and towards an economy that is more competitive in the knowledge-generation and services industries. These areas are intellectual property rights protection, innovation policy, and the financial services sector.

### *Intellectual Property Rights*

China has been frequently criticized for failure to secure the protection of intellectual property rights (IPR),<sup>28</sup> and while there

has been some progress in improving IPR protections in recent years, a variety of problems remain. One notable improvement has been action by the central government to remove domestic IP requirements from government procurement contracts.<sup>29</sup> Additionally, there have been recent instances of Chinese courts referencing U.S. patent trial principles, including Supreme People's Court judicial interpretations that relied on techniques used in U.S. federal courts to determine patent infringement.<sup>30</sup> Yet, despite these positive developments, there are a multitude of issues that China faces with regards to IP. One key issue is the large number of "junk" patents that continue to be issued in China.<sup>31</sup> Many of these patents are utility model patents, which have relatively low inventiveness requirements and are easier to obtain than standard patents.<sup>32</sup> In addition, this means that they are also more difficult to invalidate than standard patents, making them a useful tool to use in litigation.<sup>33</sup> Additionally, incentives paid by local governments for "self-developed" patent registration by domestic firms encourage abusive patent filings.<sup>34</sup> These patents negatively impact foreign and domestic businesses in China, discourage high value research, and raise the cost of patent protection.<sup>35</sup> Beyond these issues, there is widespread use of counterfeit software by Chinese government agencies, abusive trademark filings, and inadequate protections of trade secrets in China, to say nothing of the recent reports of government-sponsored hacking of businesses and institutions in the United States with the apparent purpose of obtaining trade secrets.<sup>36</sup> The TPP will offer greater protection on all of these issues than is currently available in China. If these problems are not addressed, it is likely that more and more businesses will find incentive to relocate to TPP member countries because of the increased IP protections that will be available.

### *Innovation Policy*

In an effort to transition from China's current status as the "factory of the world" to an economy driven by innovation, China has taken certain steps that it hopes will foster domestic innovation.<sup>37</sup> These include an increased focus on the development of Strategic Emerging Industries (SEIs), including the IT industry, high-end equipment manufacturing, advanced materials, alternative fuel cars, environmental protection and biotechnology.<sup>38</sup> Measures to promote these industries include increased bank lending to high-tech sectors, tax incentives for R&D, and the creation of technical standards, among others.<sup>39</sup> However, although the Ministry of Commerce has issued guidance to encourage foreign investment in these strategic industries, these benefits have been largely directed at domestic firms, which have not partnered with foreign investors.<sup>40</sup> Moreover, the Chinese government is actively encouraging attempts by Chinese companies to create domestic alternatives to extant technology that has proven to be commercially viable.<sup>41</sup> State-owned enterprises (SOE) have been advised to purchase these domestic alternatives in order to inflate domestic demand and to help recover investments made into R&D<sup>42</sup>, even when these alternative technologies are commercially unsuccessful.<sup>43</sup> These problems help to create the impression that foreign companies looking to do business in China face an uneven playing field, and may have difficulty competing with local businesses because of preferential treatment by the government. This may further incentivize businesses to relocate to TPP member countries if they offer guarantees of an even playing field under the TPP.

### *Financial Services*

Along with the numerous other reforms that began in the late

1970s, China has been steadily worked to create a market-driven financial services sector to replace the pre-1978 state-planned sector.<sup>44</sup> There has been significant progress, and the Chinese financial services market is currently the fastest growing market in the world.<sup>45</sup> In 2010, total Chinese banking assets exceeded \$15 trillion USD, up 20 percent from 2009, and produced 5.6 billion dollars in investment banking revenue.<sup>46</sup> Foreign direct investment in financial services increased more than 120 percent from 2007 to 2010. And yet, foreign firms looking to invest in the Chinese market still face a variety of challenges and have been unable to fully penetrate the market with foreign banks holding only 2 percent of China's total financial assets in 2011.<sup>47</sup> This is because there are a number of barriers that continue to impede the ability of foreign firms to more completely enter the market. Capital requirements for foreign banks operating in China present an example of an inhibiting barrier. These requirements exceed international norms, and apply even to banks focused on providing wholesale commercial banking services with no strategic interest in incorporating locally.<sup>48</sup> Currently, foreign banks are required to hold 200 million RMB (approximately \$32 million USD) to open a first branch to conduct foreign exchange transactions, and an additional 200 million RMB to conduct local currency operations.<sup>49</sup> This effectively prevents all but the largest banks from being able to enter the Chinese market and keeps the total foreign market share of banking assets in China at very low levels.<sup>50</sup> Another significant barrier is the requirement for foreign firms to have a local partner, without which they can only offer advice on local securities or Initial Public Offerings (IPOs), but cannot invest.<sup>51</sup> Additionally, all foreign exchange transactions must channel through China's State Administration of Foreign Exchange to be converted into RMB, which prevents a more organic integration of global and Chinese trade.<sup>52</sup> There is great opportunity for continued growth in the financial services sector,

as this sector could play a critical role in moving China more towards a knowledge-based economy. Reforms for the sector, therefore, remain necessary to ensure that foreign financial firms, with their significant amounts of capital and specialized knowledge, can more freely enter the Chinese market and contribute to its continued growth and development.

## **Policy Recommendations**

The previous sections have discussed the internal and external influence of the TPP agreement and garnered the following conclusions: (1) The current U.S. push in the TPP agreement fits into its political and economic balancing strategy aimed towards China, and is intended to strengthen U.S. leadership by establishing norms and standards in the region; (2) As a trade agreement, the TPP focuses on non-tariff barriers, which would cause China to suffer from trade diversion; (3) Given China's economic scale and trade links with the region, it is not likely that the TPP can isolate from the Asia-Pacific; and, (4) TPP requirements do not fit the current domestic situation in China, but in the long run, reforms that include TPP standards are essential for China's future economic development. Given these conclusions, it is unrealistic to suggest that China should try and join the current TPP negotiation. Although, China should recognize that discussing the TPP with the United States would be beneficial. Overall, China should gradually prepare itself to engage in similar economic agreements in the region.

Based on these judgments, we suggest that China take three steps to address short run and long run interests of China: (1) in the short run, China should push forward the RCEP as the regional trade vehicle; (2) in the intermediary period, China should reform domestic policies and encourage gradual liberalization within the RCEP framework; and, (3) in the long run,

China should bargain with the United States to integrate into high-level liberalization and cooperation.

### *Contribute to the Establishment of the RCEP*

The RCEP negotiation is supposed to forge an economic zone that covers half of world population, 30 percent of world GDP and 30 percent of world trade.<sup>53</sup> The RCEP aims to “harmonize the ‘noodle bowl’ of differences between the various ASEAN FTAs.”<sup>54</sup> Besides the difference in membership, RCEP differs from TPP in other significant ways: First, RCEP has fewer requirements on economic liberalization. Participants are not forced to adopt legislative changes in intellectual property, labor rights or environmental protection. Secondly, RCEP embraces the ASEAN norm of consensus, and therefore calls for low levels of obligation and provides differential treatment to developing countries. Thirdly, RCEP claims an open access to outside trade partners.<sup>55</sup>

Pushing the RCEP agreement benefits China in through the following incentives: (1) it prevents China from being excluded from regional cooperation frameworks, and thus allows China to spread its regional influence; (2) if RCEP succeeds in integrating bilateral trade agreements in the region, China would be able to further strengthen its economic link with the region; and, (3) the RCEP provides China access to markets it seeks FTAs with, like India, Japan and Australia, and thus grants new opportunities for cooperation.<sup>56</sup>

The current RCEP, however, is not able to totally offset the trade diversion caused by the TPP. As discussed before, the effect of the TPP is concentrated on economic liberalization and non-tariff barriers. It is not likely that further reducing tariffs can allow China to avoid this diversion. Furthermore, the U.S., one of China’s major trade partners, is currently not included in the RCEP.



Another major benefit of the RCEP for China is that it provides an alternative vehicle of regionalization. The RCEP norm of non-interference is more suitable for socialist China still in its developing process. Without mandatory requirements of domestic reform, RCEP imposes less pressure on developing countries. By supporting RCEP, China aligns itself with other regional developing countries that do not necessarily oppose liberalization, but do want to introduce reform at its own pace. This would better position China in future bargaining with the U.S. China should help establish the framework with an objective of helping to facilitate the future regional development.

### *Domestic Reform and RCEP Development*

China's medium-term task is to prepare for negotiation with the U.S. and other TPP countries. Domestically, policy and legislative reforms should be pushed forward. Internationally, China should encourage voluntary and gradual liberalization within RCEP negotiations.

As discussed before, further liberalization could benefit China's future development. However, the reform process has largely slowed down in the recent years. Researchers suggest that the TPP can serve as an alarm to motivate China to continue to liberalize its economy.<sup>57</sup>

On the other hand, while the RCEP provides a potential vehicle for regionalization, its currently stated goal cannot yet compete with the TPP. The current RCEP negotiation is still concentrated on traditional RTA goals of tariff-relief. If developing countries in the RCEP later negotiate with the U.S. individually to get into TPP in the future, then the group is not serving as a viable alternative vehicle.

Consequently, China should encourage further development of the RCEP to selectively adopt a progressive liberalization

agenda that fits the interests of developing countries. This makes the RCEP an effective alternative to the TPP vehicle that reflects tough requirements and U.S. values and standards. If the RCEP could be promoted as a group that reflects a different process of liberalization and regionalization, China will have more advantage in future negotiation with U.S.

### *Engage the US*

With its growing economic capacity, China does not need to worry about being isolation from the regional economic institutions.<sup>58</sup> China and the United States are major trade partners and both have strong economic interests in the Asia Pacific region. In the long run, it is unrealistic to imagine a regional economic order that excludes China or the U.S. The lingering question is: in which order would China and U.S. engage to integrate the region?

If the RCEP model fails in further integrating the region, China may have to consider joining the TPP. This option could prove more difficult than China's entrance into the WTO, as China's membership in the TPP would also have to be ratified by the U.S. congress.<sup>59</sup> Since China is in a weak position to negotiate its membership, the U.S. can take the chance to impose its rules and values on China's development.<sup>60</sup> The agreement would result in two aspects: economically, the TPP agreement may benefit China as it provides a strong push for domestic reform. Politically, however, it would mean that China must comply further with a U.S.-dominated order, and accept American rules and values.

If the RCEP model becomes successful, China could be put in a more ambitious position for the negotiation. The TPP may not be the only choice for further regionalization as open access of the RCEP may attract the U.S. and other TPP economies. A moderate approach may be adopted to cover the whole Asia-Pacific

region. China would be able to negotiate an agreement that better balance its political and economic interests.

## **Conclusion**

Nevertheless, the ongoing TPP negotiation still has many uncertainties: Can the diversified partners successfully reach an agreement within the deadline? What agreement would be finalized on each theme? Our final recommendation is that China should keep an eye on further developments of the TPP negotiations and update the strategy that best fits its interests. At the same time, further reforms of the domestic economy and integration within the region present major tasks for the current Chinese leadership.

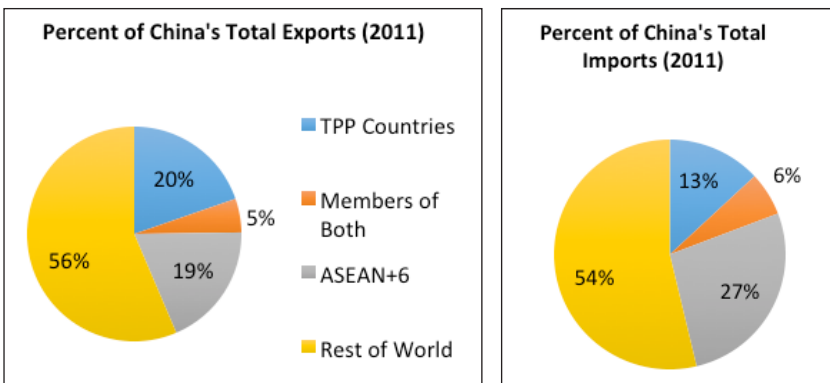
## Appendix I.

*Figure 1: TPP Countries Trade with China*

Country	Percent of Exports to China	Country's Internal Rank	Percent of Imports from China	Country's Internal Rank
Australia	27.5%	1	18.5%	1
Brunei	-	-	-	-
Chile	22.8%	1	16.9%	2
Malaysia	13.0%	1	13.2%	1
New Zealand	12.4%	2	16.0%	1
Peru	15.3%	2	16.7%	2
Singapore	10.4%	4	10.4%	2
United States	7.0%	4	18.4%	1
Vietnam	10.7%	3	13.8%	1

\*Source: World Trade Organization

*Figure 2: China's Total Trade Breakdown*



\*Source: IMF (DoTS)

Figure 3: China's Trade Over Time

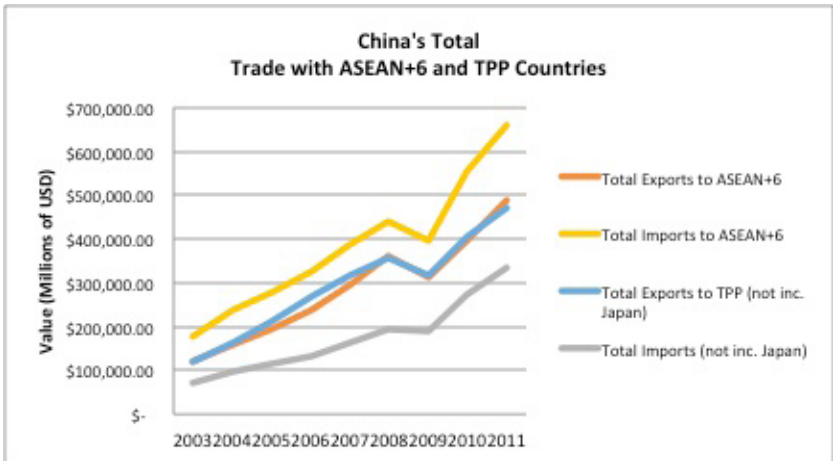
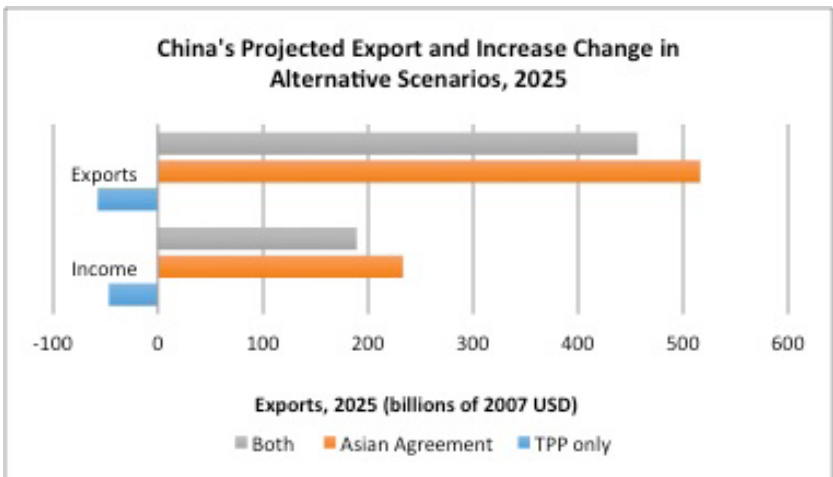


Figure 4: China's Projected Export and Increase Change in Alternative Scenarios



\*Source: Petri, Peter, et. al. "Economic Implications of TPP and Asian Tracks"

Figure 5:

Countries	TPP	ASEAN +6	GDP (In Billions of U.S. Dollars)**	Population (in Millions)**	GDP/ Capita (in U.S. dollars)**	% of China's Total Exports*	% of China's Total Imports*
World	X					100%	100%
China			7,298.15	1,347.35	5,416.67	-	-
Australia	X	X	1,486.91	22.403	66,371.22	1.78%	4.65%
Brunei Darussalam	X	X	16.362	0.425	38,534.13	0.04%	0.03%
Chile	X		248.431	17.248	14,403.11	0.57%	1.18%
Japan		X	5,866.54	127.896	45,869.72	7.75%	11.16%
Malaysia	X	X	287.943	28.553	10,084.61	1.47%	3.56%
N.Z.	X	X	158.869	4.416	35,973.02	0.20%	0.29%
Peru	X		177.19	30.009	5,904.49	0.24%	0.45%
Singapore	X	X	259.849	5.274	49,270.87	1.86%	1.59%
U.S.	X		15,075.68	311.946	48,327.86	17.08%	6.84%
Vietnam	X	X	122.722	89.316	1,374.01	1.53%	0.64%
Cambodia		X	12.89	15.103	853.495	0.1%	0.0%
India		X	1,826.81	1,206.92	1,513.62	2.7%	1.3%
Indonesia		X	846.45	241.03	3,511.80	1.5%	1.8%
Korea, Republic of		X	1,116.25	49.779	22,424.06	4.4%	9.3%
Laos		X	8.302	6.288	1,320.26	0.0%	0.0%
Myanmar		X	51.444	62.417	824.192	0.3%	0.1%
Philippines		X	224.771	95.856	2,344.89	0.7%	1.0%
Thailand		X	345.672	64.076	5,394.71	1.4%	2.2%
TPP Total			17,833.96	509.59	34,996.68	25%	19%
TPP Total + Japan			23,700.50	637.49	37,178.07	33%	30%
RCEP (w/o China)			12,631.78	2,019.75	6,254.07	-	-
RCEP (ASEAN+6)			19,929.93	3,367.10	5,919.02	26%	38%

\*Source: IMF (DoTS)

\*\*Source: IMF Data (WEO data)

\*\*\* World Trade Organization

<http://stat.wto.org/CountryProfile/WSDBCountryPFView.aspx?Language=E&Country=AU,BN,CL,CN,MY,NZ,PE,SG,US,VN>

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# Market Liberalization and Trade Openness in Fragile States: Policy Lessons from Sub-Saharan Africa and Latin America

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## **Fragile States: Problems, Policy, and Prudence**

**T**he president of the World Bank (WB) has emphatically observed that “fragile states are the toughest development challenge of our era.”<sup>1</sup> Moreover, state fragility, conflict, and violence were principal themes of the 2011 WB World Development Report. Along with multilateral institutions and international policymakers, academics are also keenly aware of these issues. Robert Rotberg (2003) specified that “the urgent policy questions of the twenty-first century” are “how to best understand failed states, to strengthen those poised on the abyss of failure, and to restore the functionality of failed states.”<sup>2</sup> With these sentiments in mind, it is remarkable to note that Latin American (LA) and Sub-Saharan African (SSA) countries, sharing many

common characteristics, were once in relatively similar positions in regards to economic, political, and social stability. Yet in the past three decades countries in SSA have remained stagnant, increased their fragility rankings, or failed, whereas countries in LA have remained stable or improved their rankings in the majority of cases. This paper argues that sound macroeconomic policy reforms, including liberalization of financial markets and openness to trade, are the key policy decisions which served to halt the slide of LA countries towards failure.

### **Fragility and Failure: The Triad of Statehood & its Economic Features**

“Fragile” and “failed” states have become a pervasive concept in the international affairs discourse. While there are several competing methodological frameworks that conceptualize state fragility, this paper will work from the *Country Indicators for Foreign Policy* (CIFP) framework, which defines fragility as continuum whereby states are indexed by their strength or weakness in three major areas: *authority*, *legitimacy* and *capacity* (ALC).<sup>3</sup> *Authority* represents “the extent to which a state possesses the ability to enact binding legislation over a population, to exercise coercive force over its sovereign territory, and to provide a stable and secure environment to its citizens and communities.”<sup>4</sup> *Capacity* refers to “the potential for a state to mobilize and employ resources towards productive ends,” and finally *legitimacy* denotes, “the extent to which a state commands public loyalty to the governing regime.”<sup>5</sup> All states are fragile to some degree; it is merely a matter of extent.

More than twenty economic indicators are used to calculate the ALC scores.<sup>6</sup> CIFP research has demonstrated that economic indicators fit best into the authority and capacity dimensions of the model. This categorization has been further vindicated as changes in economic conditions have been shown

to have the most significant effect on state fragility rankings.<sup>7</sup>

At the far end of the fragility spectrum is state failure. Failed states are often characterized by widespread violence and are described as “tense, deeply conflicted, dangerous, and bitterly contested by warring factions.”<sup>8</sup> It is widely recognized that fragile and failing states pose a grave threat not only to the livelihood of the millions of people living in them, but also to broader international security and stability.<sup>9</sup> Studies have revealed that substantial negative economic shocks in fragile states can lead to conflict and state failure.<sup>10</sup> Grasping the underlying policy decisions that lead states to higher or lower fragility is thus imperative.

## **Two Schools of Thought: Micro-Level vs. Macro-Level Interventions**

There are two primary schools of thought when it comes to developing policy for engagement in fragile states: 1) advocates for micro-level interventions and 2) advocates for macro-level interventions. The first school asserts that the basic needs of the state must be met before implementing any higher level reforms. Such interventions will focus on meeting needs in only the immediate priority areas such as food security, shelter, healthcare, and sanitation. Proponents of this approach claim that focusing energy, time and resources on macro-level policies is misguided as they will lead to weak institutional capacity. Moreover, they argue that if the state devolves into a conflict situation, that those well-intentioned efforts will have been wasted.

In contrast, analysts who advocate for macro-level interventions argue that trade openness, financial market liberalization, promotion of industrial capacity and institution building are the more effective long term solutions to state fragility. They argue that micro-level policies will only serve to treat the symptoms of the problem, rather than address the problem itself. The 2005

*OECD Principles for Good International Engagement in Fragile States and Situations* supports this view in their recommendation to focus on state building. In particular the landmark report advocates the “mobilization of revenue” and promotes “strong economic performance and employment generation” in fragile states.<sup>11</sup>

## **Mechanisms:**

### **How Open Policies Catalyze Economic Growth**

Macro-level policy recommendations, including economic liberalization and trade openness, have a domino effect. “Openness” or “liberalization” refer to “the easing of restrictions on the capital account and the financial transactions of individuals and businesses in the effort to make financial transactions more efficient and thereby promote a more productive allocation of resources.”<sup>12</sup> In more general terms, it is the policy process through which financial outcomes are determined by market forces as opposed to the government.<sup>13</sup>

There is significant empirical evidence that open economic policies contribute to economic growth and positive social outcomes.<sup>14</sup> Well renowned studies have found that “equity market liberalizations increase subsequent average annual real economic growth by about 1% per annum” (Bekaert et al. 2005). Lifting controls that prevent firms from tapping international capital markets and allowing foreign players to invest in the financial system can both reduce the cost of funds and increase the size and efficiency of markets.<sup>15</sup> Galindo et al. (2002) also demonstrate that “financial liberalization can improve corporate governance, because foreign competition pressures local firms to adopt international accounting and regulatory standards.”<sup>16</sup> In both the banking sector and the securities market, these improvements serve to reduce agency costs that can often make it expensive and difficult to raise necessary capital.

Improvement in productivity is another gain achieved by greater openness. Factor productivity growth due to the impact of liberalization has been shown to be more important than the impact of capital growth.<sup>17</sup> Hence, the effects of liberalization tend to be permanent as opposed to temporary – this longevity has been attributed to “the role [of] financial openness in stock market and banking sector development, and to changes in the quality of institutions.”<sup>18</sup> In addition, it has been demonstrated that there is higher investment efficiency after liberalization, even in developing economies. On the whole, it is evident that macroeconomic policy shifts can initiate a cascade of positive outcomes for all levels of society, even when a nation is fragile.

### **Hypothesis: Macro-Level Interventions Spur Growth and Reduce Fragility**

The hypothesis of this paper is that outward oriented, free market economies grow more rapidly and in turn reduce state fragility. This growth is achieved through improvements in efficiency, productivity and competitiveness. These qualities are diffused and absorbed as the fragile economy matures into a stable and prosperous one. Over time these policies will result in improved institutional infrastructure and capacity. To test this hypothesis, this paper approaches the case study as a controlled experiment. Firstly, two structurally similar sets of countries at comparable fragility levels are chosen, in this case SSA and LA.<sup>19</sup> If it can be demonstrated that these two sets of countries pursued two very different economic policy paths and dichotomous outcomes were seen, then *ceteris paribus* there is a reasonably strong argument that the international economic policies were the independent variable driving the outcome. If the case study holds, its findings will be consistent with those of Carment, Samy, and Prest (2008) who found that a lower per-capita income level was associated

with higher fragility, while all other potential determinants lost significance once reverse causality was controlled for.<sup>20</sup>

## **Macroeconomic Policies in Sub-Saharan Africa: A Tumultuous History**

It is well documented that SSA's economic policies remain relatively protectionist, much to the detriment of those living on the continent. High levels of trade restrictions, on both imports and exports, have acted as substantial obstacles to growth. Yeats (1997) notes that "if Africa is to reverse its unfavourable export trends, it must quickly adopt trade and structural adjustment policies that enhance its international competitiveness and allow African exporters to capitalize on opportunities in foreign markets."<sup>21</sup> Other prominent development economists such as Collier (1995) have linked the declining importance of SSA in world trade to the fact that "its economies have become more inward-looking while all other economies have become more integrated into the world economy." These appraisals are not anecdotal – the inward-looking nature of SSA economies has been quantified extensively.<sup>22</sup>

It is notable that these observations were made in the 1990s, after many countries in the region imposed capital controls and trade restrictions as part of import-substitution industrialization policies. These policies were aimed at conserving foreign exchange reserves and protecting domestic industries. Now, however, scholars are pointing out the "substantial evidence that this inward-looking development strategy discouraged trade as well as foreign direct investment (FDI) and had deleterious effects on economic growth and living conditions in the region."<sup>23</sup> These protectionist policies have resulted in the low integration of SSA into the global economy, and along with other barriers to trade and foreign investment, have acted as a major constraint



to boosting FDI influx to the region (as seen in *Figure 1*). The fact that there is a positive relationship between openness and FDI flows to SSA has been quantified.<sup>24</sup> Therefore *Figure 1* illustrates not only the low FDI flows into SSA, but also the protectionist economic policies that have been at least partially responsible for the unfortunate circumstances in SSA today.

## **Macroeconomic Policies in Latin America: Stumbling Towards Success**

In contrast to SSA, most LA countries engaged in rapid liberalization strategies in the 1970s as a response to the adverse effects of financial restrictions. According to Galindo *et al.* (2002), “[t]his push was mainly driven by the Southern Cone countries, which pursued laissez-faire financial policies mainly supporting unrestricted private participation in financial markets without direct government regulation.”<sup>25</sup> However as a reaction to the 1980s debt crisis, the financial openness of states in the region subsequently declined as policymakers adopted more risk-averse positions. This decline in openness put the majority of countries in LA at approximately the same level of financial market openness as their SSA counterparts.

Despite this reactionary shift, at the beginning of the 1990s LA countries rapidly adopted the liberalization policies prescribed by the Washington Consensus. This shift was associated with the general belief that the scarcity of saving in LA would be alleviated by external financing, thereby increasing both growth and investment rates. In particular, the Washington Consensus “privileged stabilization and liberalization” by focusing on macroeconomic tools.<sup>26</sup> These policies resulted in high interest rates, which attracted FDI and capital inflows. Moreover, sweeping trade reforms were enacted at this time in LA and elsewhere, leaving SSA “as the only region in the world where substantial

tariff and non-tariff barriers to trade [were] the norm rather than the exception."<sup>27</sup>

In the last decade, LA has adopted what has been termed by some as the "Open Economy Redistribution with Growth" model, where left-leaning policymakers have kept free trade measures in place while removing remaining anti-export bias from the past. Moreover, there have been explicit attempts to intensify trade relations within LA and beyond. The openness of capital accounts was also sustained, while at the same time countries reduced their external indebtedness and built up currency reserves.<sup>28</sup> This model has been hailed as one of the most successful development strategies in recent history, with a 91% positive result on measured outcomes.<sup>29</sup>

## **Measures of Fragility, Openness, and Economic Well-Being**

There are two primary sets of indicators used in this analysis: 1) the broader fragility index and 2) the individual economic indicators, which make up the economic cluster. The fragility index serves to give an overall picture of where selected countries stand relative to one another; these comparisons can be made temporally to observe noticeable trends. The corresponding changes in the economic cluster demonstrate not only the effect of macroeconomic policies on growth and openness, but also the wider relative impact that economic factors have on the fragility scores. Additionally, one of the main indices used to measure financial openness in this analysis is the KAOPEN index, which is a widely used index calculated by measuring the degree of capital account openness relative to other countries using freely available IMF data.<sup>30</sup> The index has a mean of zero and ranges in value from -2.66 (full capital controls) to 2.66 (complete liberalization).

## Contrasting Latin America and Sub-Saharan Africa: Before and After Liberalization

Table 1 provides a quantitative representation of the policy changes seen over the past three decades in SSA and LA. In the first section, *average import tariff* levels are surveyed. The regions in question are highlighted in gray. In the 1980s, LA had higher import tariffs than SSA. From the early to late 1990s, this trend reversed, with South America and Central America & Mexico reducing their tariff levels by more than 50%, while tariff levels in SSA stagnated. The late 1990s and early 2000s saw this trend continue, however SSA countries succeeded in lowering their tariff levels by more than 10 points. From 2002 through 2010, LA countries continued to reduce average tariff levels, eventually reaching less than one quarter of what they were in the 1980s. Unfortunately the trend in reduction for SSA came to an end, with average levels only dropping by approximately one point over the decade. Turning now to the second section of table 1, the KAOPEN index of financial openness is shown.

Here the differences are even more striking. While in the 1980s SSA and LA have very similar levels of economic openness, from the 1990s onward LA countries continually improved their openness measures, with South America moving up the scale almost two full points (on an approximately 5 point scale); Central America and Mexico exceed this, improving their score 2.51 points – more than any other region in the world. On the other hand, SSA countries hardly improved, increasing by only 0.35 on the KAOPEN index.

The “World Map of Financial Openness” (2008) based on the KAOPEN index provides a clear visual representation of the disparity between LA and SSA countries in terms of economic freedom. In this figure, the darker shaded regions represent the most financially liberalized, while the lighter shaded regions represent

the least. The majority of countries in SSA are in the <25 percentile category, whereas the majority of countries in LA have a KAOPEN index score in the >25 percentile categories, up to several countries who are in the >75 percentile category. Further evidence of the dichotomy between SSA and LA countries can be seen in *Figure 3*, which shows the Financial Risk Index map.

The financial risk map in *Figure 3* is based on a composite value of economic indicators, some of which correspond to those used in CIFP's fragility rankings.<sup>31</sup> On the whole, the ratings serve as a proxy for overall economic health of a country; the index measures a country's ability to finance its official, commercial, and trade debt obligations. Here we see data for 1986 and 2007 presented. The most striking feature of the graphic, when comparing SSA and LA, is the relative similarity between the two continents in 1986, followed by the wide divergence in 2007. While SSA countries did improve with time, their position is not enviable in relation to the vast improvements made by LA countries. This evidence serves as further vindication that the open economic policies in LA countries worked to reduce economic volatility.

*Figure 4* represents gross domestic product at purchasing power parity (PPP) per capita for SSA and LA from 1980 to 2010.<sup>32</sup> When comparing overall differences in living standards, using a PPP basis is more useful since PPP takes into account the inflation rates and the relative cost of living, as opposed to merely using exchange rates, which can misrepresent the actual dissimilarities in income. Starting in 1980, GDP was reasonably similar across these two continents, yet over the past three decades there has been a strong steady incline in LA economic prosperity, while SSA GDP growth practically stood still, hardly keeping up with inflation. On the whole, *Figure 4* reveals the steady divergence in economic well-being of SSA and LA.

Finally, *Figure 5* provides a visual representation of state fra-

gility by country. Focusing on LA and SSA in 1980, it can be seen that the majority of countries on both continents have medium or medium-low fragility, with only a few in the medium-high range. This fragility data roughly corresponds to the financial risk map in *Figure 3*. Even so, fragility rankings capture a much more holistic picture of the overall social, economic, and political conditions in a given state. Turning now to the map for 2010, again the fragility scores roughly correspond to the financial risk map, in that many of the SSA states exhibit higher (i.e. worse) fragility scores, in contrast, LA states have kept the same or improved their fragility scores. The fact that the improvements in fragility correspond well to the world map of financial openness seen in *Figure 1* is no coincidence; the evidence presented throughout this analysis supports this point.

### **Addressing the Skeptics: Counter Arguments and Other Explanations**<sup>33</sup>

It is inarguable that rule of law, property rights and democratic governments play a role in economic prosperity; nonetheless, quality institutions rely on fiscal resources to build their infrastructure, thus without capital flowing into the country, institutions cannot fully develop (Sachs 2003). Moreover, institutions take a *very* long time to develop capacity and generate change through policy implementation. Studies have shown this relationship, finding that “human capital is a more basic source of growth than are institutions”, “poor countries get out of poverty through good policies,” and “*subsequently* improve their institutions.”<sup>34</sup>

Other explanations for the economic tragedy of SSA include low levels of education, poor health, and adverse geography. Nevertheless, LA states likewise faced all of these issues when they initiated their economic rise. Even now, the World Bank’s

*Country Policy and Institutional Assessment* data, which measures institutional capacity, social welfare and equality, and more<sup>35</sup>, on a 1 (low) to 6 (high) scale, show an average value of 3.14 for SSA and 3.6 for LA between 2005 and 2010. These values are strikingly similar relative to other regions.<sup>36</sup> This alludes to the fact that both regions have similar social, institutional and political conditions. It is beyond the scope of this analysis to go into detail on each indicator,<sup>37</sup> yet the fragility rankings demonstrate the basic point, that LA countries had little to no advantage starting out.

Another core argument against liberalization is that it exposes vulnerable economies to the vagaries of the global economic system. One must only survey the economic literature to see that it has been largely proven that the benefits of liberalization outweigh the potential losses due to regional and global banking crises.<sup>38</sup> Another facet of this argument as pointed out by Obstfeld, “financial development is a concomitant of economic growth, and a growing financial sector in an economy open to trade cannot long be insulated from cross-border financial flows.” In other words, one must take the good with the bad – the risks of an open economic system are a part of doing business in the 21<sup>st</sup> century; countries are responsible for mitigating risk as best they can through both domestic policy and multilateral arrangements.

## **Conclusion: Failed Precedent, Future Prosperity?**

Fragility is the opposite of development – when a state is fragile, it is unable to provide the two basic pillars of a society: security and prosperity. These goals are inextricably linked; a more secure society will be more prosperous, and a more prosperous society will be more secure. The evidence presented in this paper unmistakably demonstrates that open economic policies are key to improving state welfare – by adopting robust trade and market liberalization policies, countries can grow faster and advance

economic performance. This progression causes a chain reaction and leads to greater efficiency, productivity and competitiveness. In turn, such a society will expand its human capital and develop its institutions. The stark contrast between LA and SSA countries exemplifies the implications of making the right (or wrong) policy choices. Policymakers must take a long and hard look at these facts and ensure that future decisions are well informed in order to meet the development challenges of the 21<sup>st</sup> century.

Appendix:

Figure 1. FDI Flows by region (billions USD)<sup>39</sup>

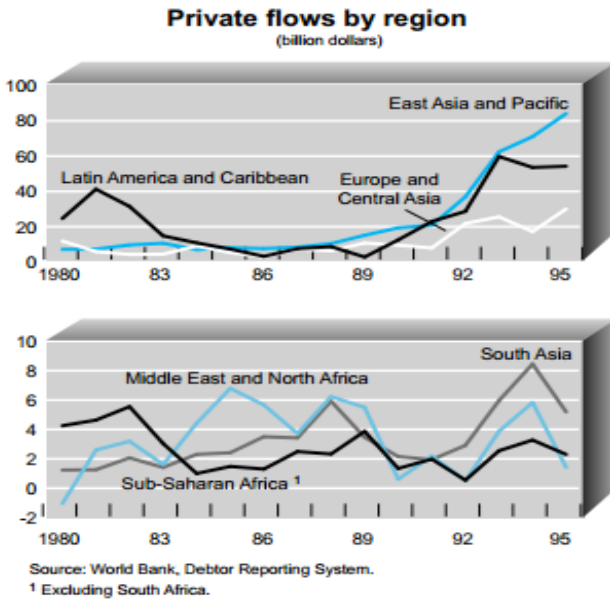




Table 1. Changes in policy stance in the field of domestic and external liberalization<sup>40</sup>

Regions	1982-90	1991-1997	1998-2002	2002-2010
A. Average Import Tariff*				
South America	40	19	12.2	10.6
Central America and Mexico	46.6	18.1	8.8	7.2
Sub-Saharan Africa	26.7	24.9	14.5	13.2
MENA	29.7	21.9	17.3	16.2
South Asia	62.9	52.9	20.8	14.9
East and South East Asia	20.3	16.7	7.6	6.9
Asian economies in transition <sup>b</sup>	44.5	38.9	15.5	12.5
EE-FSU <sup>b</sup>	.....	11	9	6
Advanced economies	8.5	7.1	3.3	4.2
B. Kaopen Index of Capital Account Openness**				
South America	-0.78	-0.17	0.76	1
Central America and Mexico	-0.84	0.29	1.18	1.67
Sub-Saharan Africa	-0.91	-0.82	-0.59	-0.56
MENA	-0.64	-0.35	0.02	0.36
South Asia	-1.29	-0.74	-0.93	-0.9
East and South East Asia	0.85	0.96	0.5	0.57
Asian economies in transition <sup>b</sup>	-1.75	-1.31	-1.05	-0.58
EE-FSU <sup>b</sup>	-1.84	-0.53	0.01	0.65
Advanced economies	0.83	1.89	2.28	2.32

Source: Cornia (2011) on the basis of \*Economic Freedom Dataset (2011), World Development Indicators (2011), \*\*Chinn and Ito (2011). The Kaopen index is a positive function of openness.

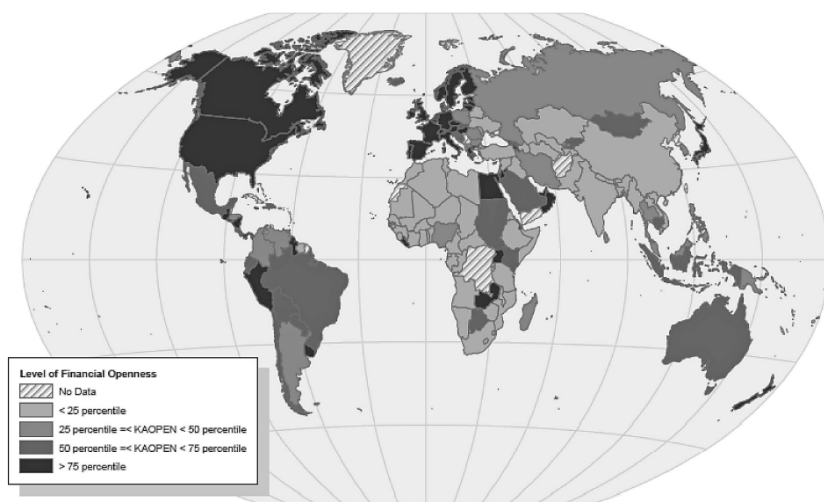
Figure 2. The World Map of Financial Openness<sup>41</sup>

Figure 3. Financial Risk Index Map (1986 vs. 2007)<sup>42</sup>

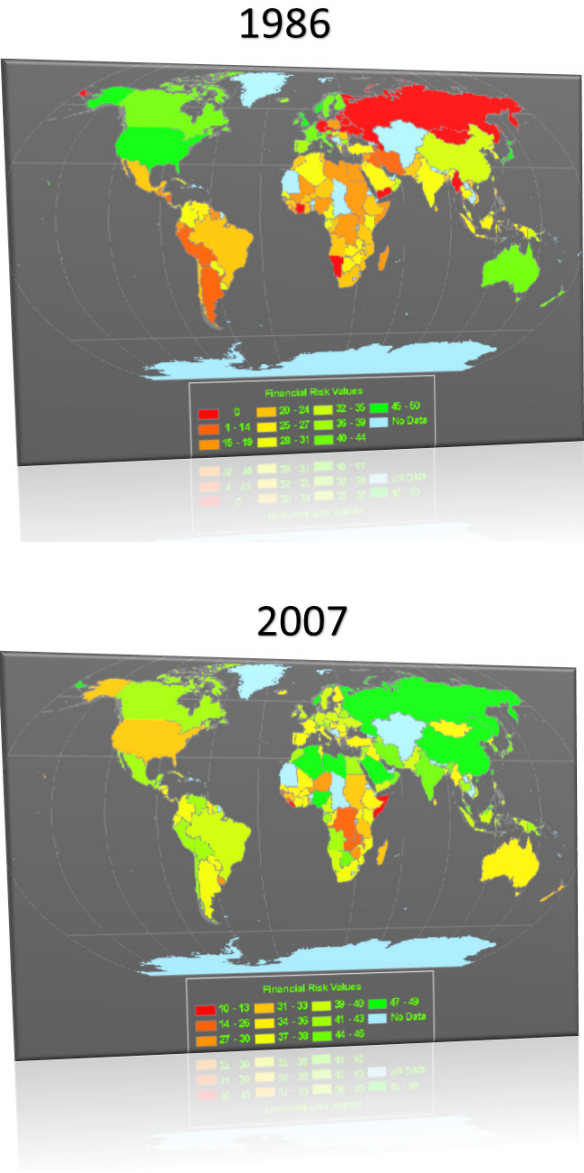


Figure 4. Sub-Saharan Africa vs. Latin America and Caribbean GDP, PPP (current international \$)<sup>43</sup>

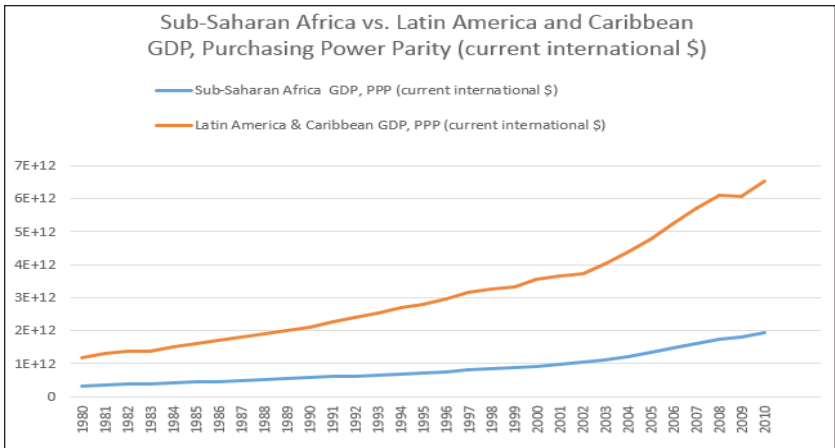
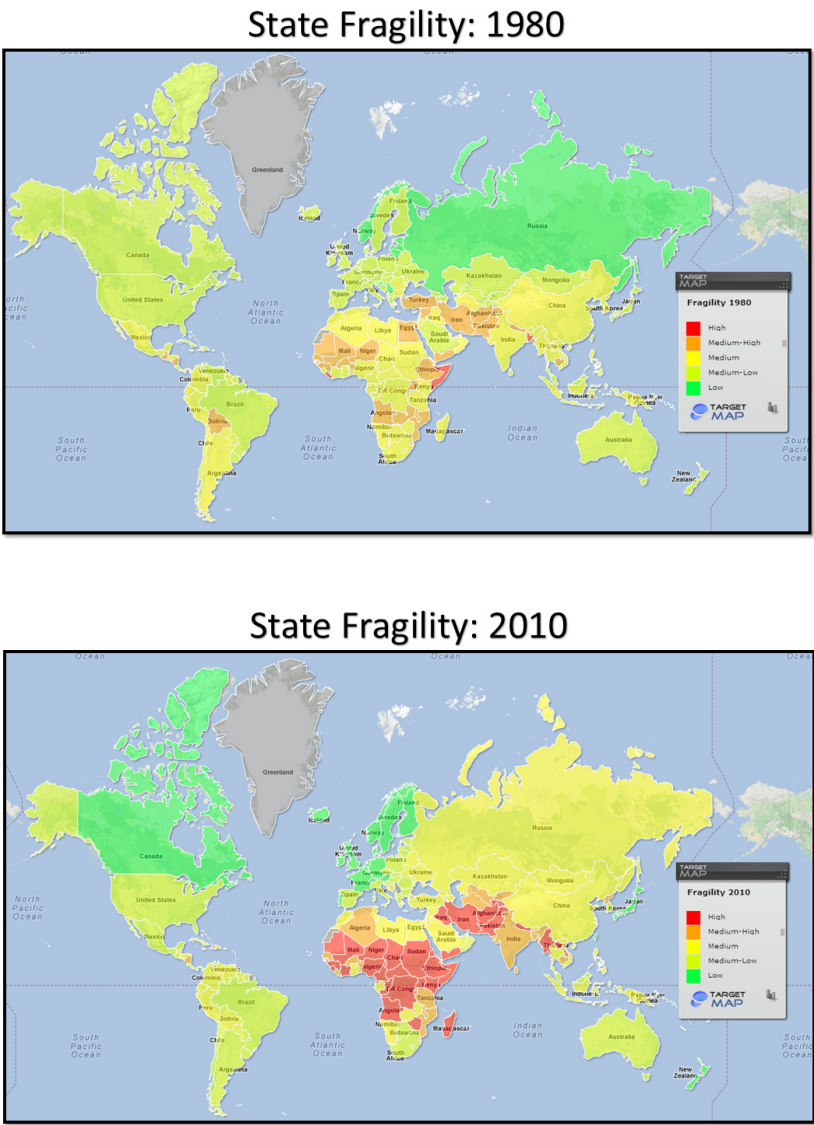


Figure 5. CIFP State Fragility Compared by Region (1980 vs. 2010)



## Notes

<sup>1</sup> Robert B. Zoellick, "Fragile States: Securing Development," *Survival*, vol. 50, no. 6 (2008), pp.67–84.

<sup>2</sup> Robert I. Rotberg, "The Failure and Collapse of Nation-States: Breakdown, Prevention and Repair," in *When States Fail: Causes and Consequences*, ed. Robert I. Rotberg (Princeton, N.J.: Princeton University Press, 2003)

<sup>3</sup> David Carment, "Assessing State failure: Implications for theory and policy," *Third World Quarterly*, vol. 24, no.3 (2003)

<sup>4</sup> *ibid*

<sup>5</sup> *ibid*

<sup>6</sup> List of economic indicators used in CIPF fragility ranking: Annual GDP Growth %; GDP per capita (constant 2000 US \$); GDP (constant 2000 US \$); Present value of external debt (% of GNI); Foreign direct investment, net inflows (% of GDP); Net ODA received (% of central government expenses); Net ODA received per capita (current US\$); Inflation, consumer prices (annual %); Index of Economic Freedom; PPP/GDP (current international dollars/current USD); Electric power transmission and distribution losses, % of output; Telephone lines (per 100 people); Internet users (per 100 people); Paying taxes rank; Regulatory quality; Workers' remittances and compensation of employees, received (% of GDP); Total reserves (includes gold, current US\$); Current Account Balance (as % of GDP); Trade (% of GDP); Unemployment, total (% of total labor force); Labor force, female (% of total labor force).

<sup>7</sup> David Carment, Stewart Prest and Yiagadeesen Samy, *Security, Development, and the Fragile State*. (New York: Routledge, 2010)

<sup>8</sup> Jack A. Goldstone, et al."State Failure Task Force Report: Phase III Findings" (2000) Available at <http://www.cidcm.umd.edu/publications/papers/SFTF%20Phase%20III%20Report%20Final.pdf>; Rotberg "The Failure and Collapse of Nation-States: Breakdown, Prevention and Repair."

<sup>9</sup> Zaryab Iqbal and Harvey Starr, "Bad Neighbors: Failed States and Their Consequences," *Conflict Management and Peace Science*, vol. 25 no. 4 (2008): pp.315–331.

<sup>10</sup> Edward Miguel, Shanker Satyanath and Ernest Sergenti, "Economic Shocks

and Civil Conflict: An Instrumental Variables Approach," *Journal of Political Economy*, vol. 112, no. 4 (August 2004); Antonio Ciccone, "Transitory Economic Shocks and Civil Conflict (December 2010); Joseph Landry, "Understanding State Failure: A Two-Stage Empirical Analysis of the Influence of Shock Events in Fragile States," Global Dimensions of Policy Annual Conference, McMaster University, (Jan. 28-29, 2013)

<sup>11</sup> OECD, "Principles for good international engagement in fragile states & situations," (2007): Available at: <http://www.oecd.org/dac/incf/38368714.pdf>

<sup>12</sup> Myriam Quispe-agnoli, and Elizabeth Mcquerry, "Measuring Financial Liberalization in Latin America: An Index of Banking Activity," *Federal Reserve Bank of Atlanta*, Domestic Finance and Global Capital in Latin America Conference (2001): pp.1-39.

<sup>13</sup> This includes both domestic and international policy.

<sup>14</sup> The body of literature illustrating the positive effects of liberalization policies is too dense to adequately summarize in this paper, but awareness of it is critical. For excellent reviews of the literature and further evidence see Francis Ng and Alexander Yeats, "Open Economies Work Better! Did Africa's Protectionist Policies Cause its Marginalization in World Trade?" *World Development*, Vol. 25, No. 6, (1997), pp.889-904; Jeffrey D. Sachs, "Institutions Don't Rule: Direct Effects of Geography on Per Capita Income," *The National Bureau of Economic Research*, Working Paper No. 9490 (February 2003); Romain Wacziarg and Karen Horn Welch, "Trade Liberalization and Growth: New Evidence," *National Bureau of Economic Research*, Working Paper No. 10152 (December 2003); Francisco Alcala and Antonio Ciccone, "Trade and Productivity," Working Papers 12, Barcelona Graduate School of Economics (2003); David Dollar and Aart Kraay, "Trade, Growth, and Poverty," *The Economic Journal*, vol. 114, no.493 (2004): pp.F22-F49; Ashok Parikh, "Relationship Between Trade Liberalization, Growth, and Balance of Payments in Developing Countries: An Econometric Study," *The International Trade Journal*, vol. 20, no.4 (2006): pp.429-67; Roberto Chang, Linda Kaltani and Norman V. Loayza, "Openness can be good for growth: The role of policy complementarities," *Journal of Development Economics*, vol. 90, no.1 (2009) pp.33-49; and, Patrick Clairzier, "Paths to Development through Trade: EU-Led Trade Liberalization vs South-South Cooperation," So-

*cialism and Democracy*, vol. 25, no. 2 (2011) pp.64–80.

<sup>15</sup> Arturo Galindo, Alejandro Micco and Guillermo Ordóñez, “Financial Liberalization: Does It Pay to Join the Party?” *Economía*, vol. 3, no.1 (2002): pp.231–261.

<sup>16</sup> *ibid*

<sup>17</sup> Geert Bekaert, Campbell R. Harvey and Christian Lundblad, “Financial Openness and Productivity,” *World Development*, vol. 39, no. 1 (2011): pp.1–19.

<sup>18</sup> *ibid*

<sup>19</sup> Clearly SSA and LA are not homogenous regions, there will always be state level exceptions to the generalities made in this paper. With that said, in the case of this paper, a regional level analysis is more prudent for understanding trends in the global political economy than a state level analysis.

<sup>20</sup> Carment, Samy, and Prest, *Security, Development, and the Fragile State*.

<sup>21</sup> Ng and Yeats, “Open Economies Work Better! Did Africa’s Protectionist Policies Cause its Marginalization in World Trade?”

<sup>22</sup> Amar Bhattacharya, Peter J. Montiel and Snil Sharma, “How Can Sub-Saharan Africa Attract More Private Capital Inflows?” *Finance and Development*, vol. 34, no. 2 (June 1997): pp.3–6; Lisa Chauvet, Paul Collier and Anke Hoeffler, “The Cost of Failing States and the Limits to Sovereignty,” United Nations University, World Institute for Development Economics Research, Research Paper No. 30 (May 2007); Graziella Bertocchi and Andrea Guerzoni, “Growth, History, or Institutions? What Explains State Fragility in Sub-Saharan Africa,” IZA DP No. 4817 (2010)

<sup>23</sup> Chantal Dupassquier and Patrick N. Osakwe, “Foreign Direct Investment in Africa: Performance, Challenges and Responsibilities,” *African Trade Policy Centre*, Economic Commission for Africa Work in Progress, No. 21 (September 2005):

<sup>24</sup> Bhattacharya, Montiel and Sharma, “How Can Sub-Saharan Africa Attract More Private Capital Inflows?”

<sup>25</sup> Galindo, Micco, and Ordóñez, “Financial Liberalization: Does It Pay to Join the Party?”

<sup>26</sup> Giovanni A. Cornia and Milica Uvalic, “Learning from the past: Which of the past current development strategies are best suited to deal with the ‘quadruple crisis’?” DESA Working Paper, No. 116 (2012)

<sup>27</sup> Dani Rodrik, "Trade Policy and Economic Performance in Sub-Saharan Africa," Prepared for the Swedish Ministry of Foreign Affairs, (November 1997), Available at: <http://www.sss.ias.edu/files/pdfs/Rodrik/Research/trade-policy-economic-performance-africa.PDF>

<sup>28</sup> Cornia and Uvalic, "Learning from the past: Which of the past current development strategies are best suited to deal with the 'quadruple crisis'?"

<sup>29</sup> Positive outcomes include: fast GDP growth, falling inequality, rapid accumulation of human capital, current account equilibrium, resilience to external shocks, low fiscal deficits and public indebtedness, limited carbon emissions per million US dollars and an improvement in food security; Cornia and Uvalic, "Learning from the past: Which of the past current development strategies are best suited to deal with the 'quadruple crisis'?"

<sup>30</sup> The KAOPEN index is based on the binary dummy variables that codify the tabulation of restrictions on cross-border financial transactions reported in the IMF's Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER). For more detail see Menzie D. Chinn and Hiro Ito "A New Measure of Financial Openness," *Journal of Comparative Policy Analysis*, Volume 10, Issue 3, p. 309 – 322 (September 2008).

<sup>31</sup> These indicators include: Foreign Debt as a Percentage of GDP, Foreign Debt Service as a Percentage of Exports of Goods and Services, Current Account as a Percentage of Exports of Goods and Services, Net International Liquidity as Months of Import Cover, and Exchange Rate Stability.

<sup>32</sup> The value of all final goods and services produced within a country in a given year divided by the average population for the same year.

<sup>33</sup> There are many different ways to analyze the phenomena described in this paper, however in the interest of space we will address only the most potent criticisms of this theory. This paper concedes that macro-economic policies are not the *only* factor in development. Governments that invest in human resources, physical infrastructure, and the rule of law will be rewarded with increased rates of economic growth.

<sup>34</sup> Fragility rankings take institutional quality into account – if LA had started off with significantly better institutions, it would have been reflected in 1980. There are numerous studies which have shown that there is a robust relation-



ship between international trade, productivity and growth, even when controlling for institutional quality; Alcalá and Ciccone, "Trade and Productivity"; David Dollar and Art Kraay "Institutions, trade, and growth," *Journal of Monetary Economics*, vol. 50, pp. 133–62 (2002); Edward L. Glaeser, Rafael La Porta, Florencio Lopez de Silanes and Andrei Schleifer, "Do Institutions Cause Growth?" (June 2004): Available at: [http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=556370](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=556370)

<sup>35</sup> These include: building human resources rating, business regulatory environment rating, debt policy rating economic management cluster average, efficiency of revenue mobilization rating, equity of public resource use rating, financial sector rating, fiscal policy rating, gender equality rating, macroeconomic management rating, policies for social inclusion/equity cluster average, policy and institutions for environmental sustainability rating, property rights and rule-based governance rating, public sector management and institutions cluster average, quality of budgetary and financial management rating, quality of public administration rating, social protection rating, structural policies cluster average, trade rating, transparency, accountability, and corruption in the public sector rating.

<sup>36</sup> One can surmise that, if the data were available further back in time, LA would be worse and SSA similar based on the fragility rankings and economic data that has been presented thus far.

<sup>37</sup> See [www.carleton.ca/cifp](http://www.carleton.ca/cifp) for a thorough comparison by country and region through time.

<sup>38</sup> Bekaert, Harvey and Lundblad, "Financial Openness and Productivity"

<sup>39</sup> World Bank Data. <http://databank.worldbank.org/>

<sup>40</sup> Cornia and Uvalic, "Learning from the past: Which of the past current development strategies are best suited to deal with the 'quadruple crisis'?"

<sup>41</sup> Chinn and Ito, "A New Measure of Financial Openness"

<sup>42</sup> "International Country Risk Guide" *The PRS Group*, (Syracuse, NY: 2013) <http://www.prsgroup.com/icrg.aspx>

<sup>43</sup> World Bank Data. <http://databank.worldbank.org/>



# Peace Talks and Credibility: The 2012 Colombia-FARC Negotiation Attempt

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**E**mpirical analysis shows that a considerable number of conflicts resume violence soon after peace was declared, occurring when either side (or both) calculates that the expected payoffs of restarting the conflict (and winning it) exceed the short-run benefits of maintaining peace.<sup>1</sup> In this paper, I analyze the 2012 peace negotiations between the Colombian government and the FARC, emphasizing the importance of the implementation phase over the negotiation process.<sup>2</sup> I argue that the conflict in Colombia will resume once the involved parties reach implementation phase of the agreement, because the FARC will still have incentives to cheat on it, regardless of the degree of success within the negotiations.

## **Resuming negotiations**

In contrast to previous attempts to negotiate with the FARC, the Colombian government sits on the high ground for many reasons.

President Santos won the second round of the 2010 elections with a safe margin and the 'Santos Coalition' now controls both houses of the legislature. Santos increased the gap between himself and opposition candidate Antanas Mockus (Green Party) from 25% to over 40% from the first to the second round of elections, and secured the presidency with nearly 70% of the votes. The post-electoral coalition—named 'coalition of national unity' led by Santos's party, *Partido de la U*, and the Conservatives party—currently controls over 90% of both the Senate and the House of Representatives. This overwhelming majority was reached when the Green party decided to join the coalition in July 2012.<sup>3</sup> This allowed Santos to pass the Legal Framework for Peace Bill in June 2012, which established the transitional justice framework for peace with the FARC and a costly pro-negotiation signal.<sup>4</sup>

It is worth mentioning that Santos also faces a degree of incredulity from within his coalition through his attempts to negotiate peace, notably from the supporters of former president Uribe. While approving the Peace Bill brought up mixed reactions from politicians and the electorate, Santos' popularity reached 83% in November 2011 after an air strike killed FARC leader Alfonso Cano. It has become clear to Santos that his popularity as a president – and therefore his likelihood of reelection – is directly related to how well he manages the resolution of the FARC conflict in Colombia.

Moreover, the Colombian government has greatly increased its military capability since the 2000s under the Uribe administration. These developments have allowed for increasingly more success in fighting back against the FARC – particularly the dismantling of the structure of the organization by killing many FARC rebels and leaders within the last decade. The FARC, in turn, are weakened by the military campaign and are structurally unstable, with many of its members and veteran leaders now dead.

Finally, another reason for resuming negotiations is the en-

hanced credibility caused by the participation of third parties that have ideological affinities with the FARC, i.e. Venezuela and Cuba—the latter being the location of the peace talks.<sup>5</sup> But the involvement of both countries is controversial. On one hand, since the Chavez administration, Venezuela has provided a safe haven for the FARC. Venezuelan opposition leaders, such as National Assembly Member Maria Corina Machado, argue that despite their support for the Colombian government, a peace agreement “will not be sustainable for the long term” until Venezuela becomes a true democracy.<sup>6</sup> On the other hand, Cuba has had an ambiguous relationship with the FARC. While the island does not export revolution, nor it supports terrorism as a means to power, nor it is able to offer full support to the FARC, it also does not explicitly deny material and training support for a left-wing revolutionary group.<sup>7</sup> Nonetheless, Havana wants better relations with Bogota, which is why it is making extensive efforts as a third party.

### **Will a comprehensive deal lead to peace?**

There are two main reasons to believe the negotiations between Colombia and FARC could reach a common agreement. As a result of effective military operations, the changes in the FARC leadership have led the group to become less militaristic and more political in essence. Under these conditions, the new leadership could calculate that striking a deal when the FARC still holds bargaining power is more beneficial than prolonging a conflict that they are unlikely to win.<sup>8</sup> Current peace negotiations rely on the bargaining over a five-point agenda, with rural development and political participation as its main topics.

Rural development is both a cause and a consequence of the conflict in Colombia. Underdevelopment of the rural areas in Colombia has been claimed as a main motivation for the existence of the FARC.<sup>9</sup> Yet, the duration of the conflict, the expropriation of land

by the FARC, and concession of territories by the government have greatly worsened rural conditions. As a result, both sides need to settle on redistributing land among rural workers. This is particularly important because, in the past, incomplete land reform has worsened the conflict.<sup>10</sup>

The second focal point is the participation of the FARC within the Colombian political process, with legitimate representation of their political views as a reward for FARC military demobilization. In April 2012, Colombian general Sergio Mantilla sent a negative signal when he publicly accused the *Marcha Patriótica* movement—which culminated at the creation of the opposition party *Consejo Patriótico Nacional*—of being inspired and infiltrated by the FARC. Because of the negative signals sent by the Colombian military, FARC negotiator Andres Paris accused the Colombian Defense Minister Pinzon of sabotaging the entire peace process.<sup>11</sup> A previous attempt of creating a political party to represent the interests of the FARC was dismantled in the 1980's due to the assassination of its leaders. The 1986 elections granted the newborn party, the *Unión Patriótica*, extensive political representation throughout all levels in Colombia. Those elected politicians, however, were soon killed by Colombian security forces as well as paramilitary groups, including the *narcotraficantes* within the FARC.<sup>12</sup> For negotiations to work, therefore, both sides have to agree on a form of ample and legitimate representation for the FARC. After all, factions that fear permanent exclusion from the political system and/or possible imprisonment will not be convinced simply by the opportunity to compete in fair elections. In this case, they would need a guarantee of the opportunity to control key governmental positions in order to assure their independent position in power.<sup>13</sup>

The three remaining points in the agenda are the rights of the victims, the end of fighting and of drug trafficking. This is a comprehensive agenda that understands the high costs of sustaining the fifty-year war and tries to balance the preferences of both sides.

Notwithstanding the relative loss of power of the FARC, which led it to declare a unilateral ceasefire, the Colombian government has shown mixed signals on its intention of compromising. In fact, Colombian Defense Minister Juan Carlos Pinzon has responded to the ceasefire declared by the rebel negotiator Ivan Marquez, saying the military has the duty of pursuing the criminals labeled as terrorists. On the same day, the government's head negotiator, Humberto de la Calle, announced that there would be no military concessions for the ceasefire because past failed attempts gave the rebels a strategic advantage. At the same time, if the government did not want negotiate, it would not have approved a legal framework bill and could have refused negotiations with the FARC, as more radical supporters of Uribe wanted.<sup>14</sup>

Nevertheless, successful negotiations do not mean that peace will prevail, as peace relies essentially on the success of the implementation phase. In the current scenario, the likelihood of resuming the conflict is much higher in spite of reaching an agreement. This is so for four main reasons. First, the internal cleavages within the FARC between the militants and the *narcotraficantes* could either form a subgroup that would remain active even after negotiation, or lead the FARC to simply reject demobilization and an end to drug trafficking.<sup>15</sup> All points in the agenda are vital for the success of the agreement, but stopping drug trafficking in Colombia is particularly important for Santos in his efforts to maintain the support of the United States. President Obama also has incentives to support Santos' efforts, such as combating the illicit drug trade in Latin America, and improving America's relations with Colombia and other Latin American countries. Second, the FARC has no way of guaranteeing that the territories that it will give up, or the \$2 million (USD) of daily profit coming from drug trade, will be replaced by any comparable source of revenue in the short run. Even though part of this money is directed to security-related expenses, it is enough to sustain the group's activities and secure

a substantial offshore reserve.<sup>16</sup> Compromising, therefore, would likely leave the FARC in worse circumstances, and so a crucial credible commitment problem arises: the FARC (or at least part of it) has incentives to renege on a future agreement not only if it fails to provide generous political representation to the group, but also if they are not able to replace such a significant source of income. Third, in addition to the commitment problem is the significant history of noncompliance by the FARC, during which the FARC abused peace periods as an opportunity to gather more power. Fourth, from the rebels' perspective, turning in their weapons is an alternative only in face of amnesty or a negotiated disciplinary measure, options that would have high political costs for Santos and his coalition.<sup>17</sup>

## **Moving forward**

While an agreement between Colombia's government and the FARC may be possible, due to unique political and military conditions, peace is unlikely to prevail in the near future. Ultimately, resolving the issues that caused this long-lasting conflict is not sufficient condition to generate peace. The agenda, regardless of being comprehensive and having flexibility for agreement between the parts, cannot be implemented, because the government cannot diminish the incentives the FARC has to revert back to the status quo. In fact, the FARC announced in mid-January 2013 that it would end the two-month unilateral ceasefire after the Colombian government refused to extend the truce. Two police officers and three civilian engineers were kidnapped following this announcement, even though the FARC still stated they did not withdraw their intention of negotiating peace.

Nonetheless, given that the rebels and the government have reasons to cheat on the agreement—as has happened in the past—declarations simply reaffirming the status of the peace talks be-



come even less credible.

As negotiated solutions seem increasingly less likely in the near future, even the third parties' role of facilitating the peace talks cannot yet feasibly be extended to the implementation of a possible settlement. Currently, Venezuela and Cuba are neither capable nor credible enough to guarantee protection during demobilization and the implementation of power-sharing structures.

The solution to signing a credible and effective deal is guaranteeing the implementation of key focal points of the negotiating agenda, especially land reform. Market-oriented reforms supervised by the government and backed by a development bank worked well to reduce violence in Guatemala and El Salvador.<sup>18</sup> This type of solution succeeded because it reduced land disputes and improved development in the region. Additionally, such a solution could be used as a way to compensate victims and their families. Over time, effective land reform could potentially lead to the reduction or the end of conflict. Government monitoring of the implementation will be critical to ensure the reforms are carried out as planned.

Third party monitoring can be also be used to convince the FARC that the reform can be implemented – and Venezuela and Cuba should not be the only viable options. In addition to Norway, many other countries, including the U.S., Brazil, Argentina and Spain, and organizations such as the UN, the EU and the OAS, have offered their support for the negotiations. It is but a matter of deciding which role they can have in the implementation phase that increases its credibility.

## **Conclusion**

The year 2012 witnessed significant progress in the negotiations between the Colombian government and the FARC. However, if Santos do not manage to have the same success in the implementa-

tion phase, chances are peace is not going to last.

To make implementation possible, Santos will have to rearrange incentives for the FARC to credibly commit to the accords. Besides conducting a complete land reform to end with the very roots of the conflict, his administration will also need to develop reintegration mechanisms to discourage engagement in the conflict as well as drug trafficking. In order to do so, such mechanisms will have to be able to offset the gains they had from that. Also, he will should to be willing to make political concessions to guarantee the FARC political representation to offset the demilitarization of the group. Finally, engagement of the international community can be important to ensure an enduring peace. The Colombian government will need foreign resources to conduct a complete land reform and promote rural development, and to give it credibility to enforce the agreement.

## Notes

<sup>1</sup> See Mason, T. David and Patrick J. Fett, "How Civil Wars End: A Rational Choice Approach," *Journal of Conflict Resolution*, vol. 40, no. 4 (December 1996) and Jason, T. Quinn, David Mason and Mehmet Gurses, "Sustaining the Peace: Determinants of Civil War Recurrence," *International Interactions*, Vol. 33 Issue 2 (2007), 167-193

<sup>2</sup> Barbara F. Walter, *Committing to Peace: The Successful Settlement of Civil Wars* (Princeton, N.J.: Princeton University Press, 2001) pp. 19-43.

<sup>3</sup> Adriaan Alsema, "Green Party joins Santos' congress coalition," *Colombia Reports*, July 21, 2011, <http://colombiareports.com/colombia-news/news/17778-green-party-joins-santos-congress-coalition.html>

<sup>4</sup> Adriaan Alsema, "Colombia coalition divided about possible peace talks with FARC," *Colombia Reports*, August 22, 2012, <http://colombiareports.com/colombia-news/peace-talks/25657-colombia-coalition-divided-about-possible-peace-talks-with-farc.html>

ble-peace-talks-with-farc.html

<sup>5</sup> See Walter, *Committing to Peace: The Successful Settlement of Civil Wars*.

<sup>6</sup> Anne Phillips, "Peace signs in Colombia: Can Bogota and the FARC finally overcome their differences?" *Foreign Affairs*, August 4, 2013, <http://www.foreignaffairs.com/articles/139620/anne-phillips/peace-signs-in-colombia>>.

<sup>7</sup> *ibid*

<sup>8</sup> On this regard, the literature on civil wars argues that conflicts ended in negotiated settlements are less likely to sustain peace as opposed to conflicts that end up with a decisive victory by either side, because the 'organizational capacity' for both parts is maintained in the first case. Read more in Wagner (1993) *apud* Quinn, Mason & Gurses (2005).

<sup>9</sup> As a matter of fact, the Communist guerrillas initiated in the 1960's were supported by the poor farmers living in underdeveloped rural areas.

<sup>10</sup> Oliver Kaplan and Michael Albertus, "Land for Peace in Colombia: the key to ending Bogota's war with the FARC," *Foreign Affairs*, April 15, 2013, <http://www.foreignaffairs.com/articles/139166/oliver-kaplan-and-michael-albertus/land-for-peace-in-colombia>

<sup>11</sup> Adriaan Alsema, "FARC says Colombia defense minister is sabotaging peace process," *Colombia Reports*, November 24, 2012, <http://colombiareports.com/colombia-news/news/27149-farc-say-colombia-defense-minister-is-sabotaging-peace-process.html>

<sup>12</sup> Read more in El País (2012). Available in: <<http://www.elpais.com.co/el-pais/colombia/noticias/ivan-cepeda-celebro-creacion-del-consejo-patriotico-nacional>>.

<sup>13</sup> Walter, *Committing to Peace: The Successful Settlement of Civil Wars*.

<sup>14</sup> "Colombia minister rejects FARC ceasefire," *Al Jazeera*, November 20, 2012, [http://www.washingtonpost.com/world/the\\_americas/colombias-defense-minister-rejects-farc-cease-fire/2012/11/19/d372c130-3298-11e2-92f0-496af-208bf23\\_story.html](http://www.washingtonpost.com/world/the_americas/colombias-defense-minister-rejects-farc-cease-fire/2012/11/19/d372c130-3298-11e2-92f0-496af-208bf23_story.html) and Neuman, William, "Rebel Group in Colombia Announces Cease-Fire," *The New York Times*, November 19, 2012, <http://www.nytimes.com/2012/11/20/world/americas/colombia-rebels-announce-cease-fire.html>

<sup>15</sup> As Sampaio points out, the Colombian military offensive already caused lo-

gistical and hierarchical fragmentation of the FARC, leading to the development of local autonomy. Read more in Antonio Sampaio, "FARC peace talks: why now?" *IISS Voices*, International Institute for Strategic Studies, August 10, 2012, <http://iissvoicesblog.wordpress.com/2012/10/08/farc-peace-talks-why-now/>

<sup>16</sup> According to the Colombian Attorney General's Office and InsightCrime, 70% of FARC's assets are based in other Latin American countries like Venezuela, Ecuador, Costa Rica, Panama, and Mexico. While the Colombian government estimates in 2012 the annual income from the drug trade to be about US\$1.1 billion, Bert Ruiz shows a more conservative number of US\$2 million a day. Read more on: Bert Ruiz, *The Colombian Civil War* (Jefferson, N.C.: McFarland & Company Inc, 2001); and Elyssa Pachico, "70% of FARC Assets Held Outside Colombia," *InSight Crime*, September 18, 2012, <http://www.insightcrime.org/news-analysis/70-of-farc-assets-held-outside-colombia>

<sup>17</sup> An appropriate socio-anthropological question is if the Colombian society is ready and willing to reintegrate the rebels, and vice-versa.

<sup>18</sup> Kaplan and Albertus, "Land for Peace in Colombia: the key to ending Bogotá's war with the FARC"

# Cyber Threats to U.S. Critical Infrastructure and the Legislative Response: A Political and Policy Analysis

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As previous scholars have noted, the term “cyberspace” possesses origins in science fiction. The word is attributed to William Gibson, who introduced and popularized it in his 1984 novel *Neuromancer*, using it to describe a digital world—a “dataspace”—in which individuals could plug in and traverse free of the constraints of the physical world.<sup>1</sup> In 2011, the White House released the “International Strategy for Cyberspace,” a policy blueprint designed to explain the official U.S. position on prosperity, security, and privacy in cyberspace.<sup>2</sup> The document, written for both domestic and international audiences, was the first of its kind from the Office of the President, and was, in effect, an attempt to carve out the president’s “vision for the future of the Internet,” as then-Cybersecurity Coordinator Howard Schmidt stated on the White House blog.<sup>3</sup> In the foreword, President Barack Obama began the document with the fol-

lowing statement: “Cyberspace, and the technologies that enable it, allow people of every nationality, race, faith, and point of view to communicate, cooperate, and prosper like never before.”<sup>4</sup> While the world’s citizens are not yet able to plug their minds into a matrix as Gibson envisioned, the pervasiveness of the Internet in the bedrock of modern life—global finance, security, the delivery of basic needs—means that individuals and groups are connected and interdependent on an unprecedented scale. Unfortunately, increased connectivity often equates to heightened vulnerability and exposure to malicious actors. Throughout the aforementioned strategy document, a vision for cyberspace is presented as one that should be open and free, but also secure.

The array of topics surrounding the security of cyberspace, cybersecurity, is quite diverse. It includes cyber war, digital piracy, and network defense to name a few. Former Secretary of Homeland Security Janet Napolitano, in a February 2012 testimony before the Senate Homeland Security and Governmental Affairs Committee, described our digital infrastructure as a “vast array of interdependent IT networks, systems, services, and resources are critical to communication, travel, powering our homes, running our economy, and obtaining government services.”<sup>5</sup> Despite this criticality, an estimated 85 to 90 percent of the nation’s critical infrastructure rests in the hands of private entities, the majority of which do not enjoy some of the advanced digital security measures of the federal government.<sup>6</sup> This paper discusses the protection of U.S. computer networks as critical infrastructure in the 21<sup>st</sup> century, with an emphasis on the contemporary debate on the extent to which the federal government should impose regulations. Given the degree of individual connectivity as never seen before, vulnerability to malicious attack, and the high level of private sector involvement in the maintenance and operation of critical infrastructure, some key questions arise for policy makers: To what extent has the digital age

changed the nature of infrastructure defense? What should the policy responses to potential threats look like? Finally, does the particular composition of U.S. political institutions provide some clues as to the constraints of certain policy responses?

Using two opposing cybersecurity bills proposed in the Senate in 2012, S.2105 (the Cybersecurity Act of 2012) and S.2151 (the SECURE IT Act), this paper will answer the questions posed above. The first section will describe the nature to which cyberspace has heightened the vulnerabilities of the nation's critical infrastructure, namely by creating a threat environment that is both constantly changing and characterized by information deficiencies. The second section uses S.2015 and S.2151 to highlight the type of policy response needed to counteract this threat. The third section, using the theories of authority delegation and principal-agent dilemmas, describes the political limitations to the policy response proposed, many of which are a direct consequence of the type of policy response needed to counteract cyber threats. Finally, the last section concludes by recommending a number of key policy solutions to work around these constraints.

Although this paper makes specific reference to bills S.2015 and S.2151, the goal of the paper is to analyze the general feasibility of implementing cybersecurity policy in the U.S. There are a number of specific political considerations associated with these two bills, some of which are referenced in the document, but they are largely ignored in favor of broader issues of the nature of the cyber threat and political viability. The Cybersecurity Act (CSA) was introduced in the Senate Committee on Homeland Security and Governmental Affairs by Chairman Senator Joseph Lieberman and ranking Republican Susan Collins in early 2012. The SECURE IT Act, which stands for Strengthening and Enhancing Cybersecurity by Using Research, Education, Information, and Technology Act of 2012, was introduced by Senator John McCain in opposition to CSA and was presented in the Senate Committee

on Commerce Technology and Transportation shortly thereafter.

## 1. Critical Infrastructure and Cybersecurity

According to the Department of Homeland Security (DHS), the general definition of critical infrastructure in the U.S. includes the following:

*“systems and assets, whether physical or virtual, so vital to the United States that the incapacity or destruction of such systems and assets would have a debilitating impact on security, national economic security, national public health or safety, or any combination of those matters.”<sup>7</sup>*

One key element of this definition is that “physical” and “virtual” assets are aggregated under the umbrella of critical infrastructure. In support of this notion, Robert Litan and Peter Orszag group the two risks together when considering the private sector response to national security attacks. Litan and Orszag (2002) argue that the private sector will generally undersupply security at critical sites because they do not bear the entire cost of an attack, nor do they receive all of the benefits.<sup>8</sup> Most of the benefits, such as a functioning cellular communications network or access to treated water, are enjoyed by society as a whole. In effect, Litan and Orszag make the case that a breach of security is a negative externality for society, and they do not distinguish between a physical or cyberattack.

The decision to upgrade a perimeter security system or hire more security guards to protect a physical plant has its analogies in cyber defense. Take, for example, a water treatment operator’s decision to implement an “air gap” — a complete segregation of the control network from an external network like the Internet.<sup>9</sup> An air gap, theoretically speaking, is designed to pro-



vide the ultimate level of security since exchange of data requires the physical transfer via media device by a human operator. Although there have been recent innovations in the automation of this process, an air gap can incur significant labor costs and slow down operations due to the inability to quickly transmit real-time data. Furthermore, an air gap is only as secure as its human handlers, so investment in training would be required to ensure that technicians do not make the kind of careless mistake that led to the Stuxnet contamination of the Natanz control network in Iran, which was protected by an air gap.<sup>10</sup>

If the operator must provide all of the costs of these security measures while only receiving a portion of the benefit, the operator will likely not implement the highest level of protection. This is the case when discussing the problem of negative externalities, regardless of whether the landscape is physical or digital. However, there are a number of crucial characteristics of the cyber threat that differ from the physical threat: First, physical plants are designed to exist behind walls and fences. They are often located in remote areas and closed off to the general populace. This is not the case with cyberspace. As former U.S. Deputy Secretary of Defense William J. Lynn III states, "The Internet was designed to be collaborative and expandable and to have low barriers of technological innovation; security and identity management were low priorities."<sup>11</sup> And while industrial control systems, the most powerful of which are called supervisory control and data acquisition (SCADA) systems, are safe behind security fences, they are exposed via their connection to "human-machine interface" terminals—desktop computers—and, by extension, the Internet as a whole.<sup>12</sup> This vulnerability was made frighteningly apparent with the advent of the search engine Shodan. Described as a "search engine for hackers," Shodan searches for, and identifies, Internet protocol (IP) addresses for computers and other devices connected to networks. If it can successfully make a connection,

it will record software, geographic data, and other unique identifiers displayed on the Internet. One Shodan user was able to find a nuclear particle accelerator at the Lawrence Livermore Laboratory open to the Internet with minimal security; another found thousands of open-access Cisco routers. By June 2012, Shodan had gathered data on close to 100 million devices.<sup>13</sup>

Shodan was developed by John Matherly as a personal project and was not originally designed to locate specific critical networks. Thus, Shodan also illustrates the rapid pace of innovation and development within the cyber world, as thousands of “tinkerers” and aspiring programmers create new tools that, unwittingly or not, alter the landscape of cybersecurity. Nevertheless, this episode is just one of many that highlight the difficulties of security keeping pace with innovation. Contrast this to SCADA systems, many of which were implemented prior to the widespread use of the Internet and protected by default passwords easily obtained from user manuals.<sup>14</sup>

Finally, unlike a physical attack, many cyberattacks or breaches are unreported or, even worse, undetected. A physical attack, such as an explosion, is difficult to cover up. However, a breach of security in the cyber realm may go unreported due to operator concerns about liability, reputation, or simply because there are no established mandates. According to former Secretary Napolitano, in 2012, the DHS Computer Emergency Readiness Team (US-CERT) received thousands of incident reports, but neither the true number of incidents, nor their level of severity, are known because private companies not contracted with the government do not have to report intrusions to authorities.<sup>15</sup> This lack of information makes it difficult to plan and coordinate a response to such threats. Similarly, industries that use the same SCADA systems do not have a framework for which they can safely share information about breaches, vulnerabilities, and other threats. For example, if a water treatment plant uses the

Siemens S7 (a popular line of controllers used in the automation of industry) and suffers an attack, there is currently only a loose mechanism for safely sharing information with other operations of the Siemens S7.

## **2. Policy Solutions to the Cyber Threat**

Given that the cyber threat to critical infrastructure is characterized by negative externalities in the form of undersupplied security, difficulties keeping up with a rapidly changing landscape, and information/collaboration gaps, the appropriate policy solution would need the following characteristics: regulation or incentives to better supply the required level of security, a mechanism for information sharing and public-private collaboration, and the flexibility to adapt to a changing environment. Scott Charney, Corporate Vice President of Microsoft Trustworthy Computing, stated that the best policy outcome in response to cyberattacks will include “flexible and agile risk management,” “innovative information sharing,” and “meaningful and attainable international norms for the security of cyberspace.”<sup>16</sup> This section will compare and contrast the different approaches of the proposed CSA (S.2105) and SECURE IT (S.2151) acts in the context of these three prioritized outcomes.

### *2.1 Government Intervention*

One way to align private sector incentives with the public good is the implementation of a regulatory regime for securing critical networks.<sup>17</sup> In this area, CSA is the only bill of the two that includes meaningful regulation of the private sector. *Sections 101-111* outline the regulatory footprint of CSA.<sup>18</sup> In brief, the bill delegates authority of critical infrastructure as it relates to cyber defense to DHS. The process for defining the scope of critical

infrastructure to be covered under DHS authority rests largely in the hands of DHS—albeit in partnership with an advisory council, sector-specific agencies, and other stakeholders. The process is as follows:

1. Sector-by-sector risk assessment to prioritize and categorize threats to operators and control systems.
2. Designation of “covered” critical infrastructure (infrastructure subject to regulation).
3. Development of performance requirements.
4. Assessment of compliance with performance requirements.

The bill does include some limits on the scope of DHS authority. Appendix 1 at the end of this document includes a high-level flowchart outlining the limitations of DHS jurisdiction. Additionally, it is very important to note that *Section 101* of the bill stipulates that the owner of the network or control system is the responsible party for compliance with these regulations. *Section 103* prohibits DHS from designating a commercial IT solution itself as critical infrastructure and *Section 104* prohibits the regulation of the design, development, or manufacture of IT solutions and products.

The exclusion of commercial producers of software and hardware is a controversial element of the bill. James A. Lewis, a cybersecurity specialist for the Center for Strategic and International Studies argues that *Section 104*—the “blanket restriction” as he phrases it—seriously weakens the regulatory power of the bill.<sup>19</sup> Lewis draws a comparison to smart grid design and the encryption of sensitive information. The proper security solution

is the use of a random number generator to scramble the data. However, this technology can be expensive and difficult to implement, so designers instead used a fixed set of numbers from which the meter could randomly draw—a far weaker security solution.<sup>20</sup> Lewis argues that under *Section 104*, DHS would have no power to enforce the better solution. This is a valid point, but regulating solutions would violate the “flexibility” requirement, which will be explored further in this paper.

## *2.2 Information Sharing*

Information sharing provides the greatest opportunity to compare and contrast different approaches since it is a key element in both Senate bills. There is no doubt that the need to deal with the threat of cyberattack is an urgent matter; the difference between CSA and SECURE IT is the treatment of that urgency.

Much like its proposed regulatory regime, CSA places many stipulations on the sharing of information, both amongst private entities and between the private sector and government agencies. For example, *Sections 703 and 704* remove the legal barriers to a private sector entity disclosing lawfully obtained threat information to a cybersecurity exchange, but only if that information is used to protect from a cyber threat. It further stipulates that entities may not use the threat information to gain an unfair advantage at the expense of the entity sharing said information. *Section 704* also requires DHS to consult with privacy and civil liberties experts to develop policies governing the “receipt, retention, use and disclosure of cybersecurity threat information by a Federal entity” to minimize the exposure the risk associated with sharing personally identifiable information through cybersecurity exchanges. In fact, *Section 704* states that DHS should only mandate a cybersecurity center if the non-Federal entity has the capacity to “protect personally identifiable information from

unauthorized disclosure and use.”<sup>21</sup>

To contrast, SECURE IT had very few restrictions on information sharing with the intention of removing regulatory barriers to information gathering. *Section 102* of SECURE IT, like CSA, allows the creation and distribution of cyber threat information through voluntary cybersecurity exchanges. However, the bill places very few restrictions on the private entity in using this information. In fact, many of the proposed regulations contained within the bill are designed to protect private entities from government control.

Both bills broaden the scope beyond solely using shared information to better defend against a cyberattack, perhaps using the opportunity to provide law enforcement greater tools for the prosecution towards crimes of all variations. *Section 102* of SECURE IT stipulates that if the private entity voluntarily submits information to an enforcement agency, it can use this information to protect an information system as well as “preventing, investigating, or prosecuting a criminal act,” which can potentially be subject to a very broad interpretation.<sup>22</sup> Similarly, CSA *Section 704* stipulates that a cybersecurity exchange operated by the Federal government may disclose the threat to law enforcement if the information appears related to a crime which has been, is being, or is about to be committed.”<sup>23</sup> Once again, the language is very broad in scope and subject to a great variation in interpretation.

### *2.3 Flexibility*

This leads to the final area of discussion: the potential for either bill to adapt to a rapidly changing environment. In terms of regulation, the language in CSA is very broad. The bill authorizes DHS to designate a site “critical” if a cyberattack could reasonably result in interruption of life-sustaining services sufficient to cause mass casualties or evacuations, catastrophic damage to the

U.S., or severe degradation of national security—all without specific quantifications of the terms “mass”, “catastrophic”, or “severe.” Furthermore, the four-step regulation process highlighted above uses very general language as to the method for developing and achieving performance requirements. Senator McCain questioned the motivation for “providing regulatory carve-outs for the IT hardware and software manufacturers,” implying that the motivation was designed to garner political support from technology firms.<sup>24</sup>

However, this broad language likely has an additional purpose: to make the regulatory footprint as light as possible so as not to disrupt the commercial development of solutions not yet conceived by both regulators and industry. The problem with Lewis’s argument about the random number generator is that it assumes there will not be a better solution in the future. Similarly, the language surrounding information sharing lacks specificity of scope because, as the Shodan search engine exposed, the rapidly changing information environment is not as static as a legislative bill. Any cybersecurity bill must allow for innovation, adaptability, and change. Of course, lack of specificity is not the same as accountability, and in terms of information sharing, SECURE IT is too lax in stipulating the use of information.

### **3. Interest Group Response and the Problems of Delegation**

As with any policy solution, Senate cybersecurity bills have stakeholders—those who feel as though they have something to gain or lose through policy implementation. The two most vocal voices of opposition to one or both bills can be generalized into two categories: privacy advocates and the industry lobby. For example, the Center for Democracy & Technology (CDT) has openly opposed both bills due to privacy concerns regarding the

sharing of information. It wrote to an open letter to the Senate signaling that there would be repercussions if either the bills (especially SECURE IT) were passed without revision. Powerful interest groups like the American Civil Liberties Union and FreedomWorks also signed the letter.

With regards to the regulatory framework proposed in CSA, the U.S. Chamber of Commerce, the country's largest business-lobby group, urged the Senate in February 2012 to delay the consideration of the bill due to concerns about added expense to industries that fall under the jurisdiction of "covered" critical infrastructure—in other words, industries that would be subject to regulation by DHS.<sup>25</sup>

In order to understand the extent to which these type of responses will have on the viability of passing meaningful cybersecurity legislation, it will be necessary to utilize the theory of policy-making delegation in the U.S., more specifically the principal-agent relationship between groups, elected officials, and bureaucracy. In very general terms, groups delegate the decision-making process to politicians, who, in turn, delegate authority to bureaucratic agencies to carry out their directives. Politicians do this for a number of reasons: the policy-making task in question is too laborious, controversial, or simply beyond the scope of his or her ability.<sup>26</sup> Kiewiet and McCubbins (1991) argue that all parties gain if the task delegated most efficiently uses the comparative advantage of the agent.<sup>27</sup> Politicians most efficient at seeking a political platform that represents the groups most likely to get him or her elected, have a comparative advantage in introducing policy that represents the interests of groups. Agencies, many of which are comprised of specialists, have a comparative advantage in implementing policy due to superior information. The principal-agent problem arises when agents begin to work outside of the delegated scope of the principal. The way in which this is dealt with in the U.S. is very closely tied



to the structure of its political system.

The U.S. political system is characterized by a separation of powers—a structure of delegation in which arise three dilemmas.<sup>28</sup> The first is political uncertainty, which arises from the fact that today's political winners can structure bureaucratic agencies as they like when they are in power, but there is no guarantee agencies will continue to work in their interests once they are out of office. Therefore, the best way to control agencies is through structural controls to curtail their autonomy in the event of a power change.<sup>29</sup> The second dilemma is the compromise inherent in a system of checks and balances, through which the winners generally have to allow the losers a say in crafting policy. In this case, the losers will seek structures that will undermine the performance of the policy or delegation. Finally, and perhaps most crucial to this discussion, is the concept of the interest group “fear of the state.”<sup>30</sup> Groups, removed from public authority, cannot directly control politicians once they are in power, and have even less authority over bureaucracies. Therefore, they will seek to bind the hands of agencies to reduce the likelihood that they will work against the interests of the group.

This dynamic is evident within the debate over the two Senate cybersecurity bills. From the statement of the CDT and similar privacy groups, there is clearly a fear that the delegated agencies (DHS in the case of CSA and DOD/NSA/DHS in the case of SECURE IT) have been granted too much freedom to collect information on citizens, and with few stipulations on how it can be used by the government.<sup>31</sup> For example, CDT takes issue with the broad-based language of the bill. Singling out SECURE IT for especially egregious imprecision, CDT notes that under the bill, companies can share information to “foster situational awareness,” a generality that “permits companies to share the virtually limitless category of private information” that meets this criteria.<sup>32</sup> CDT has proposed a more narrow definition of what the

government can do with the information businesses voluntarily share: cybersecurity as defined by the protection of control networks from attack, theft and other direct threats, investigation and prosecution of cybercrimes or acts that could cause bodily harm or death, and protection of minors from child pornography.<sup>33</sup>

Although there is no clear consensus from industry and business groups with regards to cybersecurity legislation, there is certainly resistance to the regulatory approach outlined in CSA. Former Secretary of Homeland Security, Tom Delay, who now represents business interests, captures the same fear of the state exhibited by privacy advocates. Ridge, arguing against regulation, said CSA gives DHS too much leeway to write strict regulations despite the intentions of the politicians introducing the bill. Ridge commented that a “light touch can become very prescriptive,” and could impose large costs on impacted industries with very little security again.<sup>34</sup> This concern very clearly captures the principal-agent problem feared by groups: in addition to having virtually no control over bureaucracies, they know that there is agency loss from delegating authority from politicians to bureaucracies. Therefore, the best outcome would be to structurally control the agency—via competing or limited mandates, congressional hearings, etc.—so that it cannot work outside of the interests of politicians and, by extension, the groups they represent.

From the theoretical framework of delegation outlined previously, politicians interested in reelection will be very sensitive to the concerns of their constituency. This dynamic is also evident in the public cybersecurity debate. Senator Ron Wyden, a Democrat from Oregon representing libertarian interests in the east and progressives in the west, echoed the privacy concerns of interests groups like CDT: “These bills [CSA and SECURE IT] allow law enforcement agencies to mine Internet users personal

data for evidence of acts entirely unrelated to cyber-security.”<sup>35</sup> Similarly, Senator McCain introduced SECURE IT in response to business concerns not just over government regulation, but the way it was crafted: “[U]nelected bureaucrats at the DHS could promulgate prescriptive regulations on American businesses... a super-regulator, like the DHS under this bill, would impact market forces which currently allow our brightest minds to develop the most effective network security solutions.”<sup>36</sup>

Thus, the very qualities necessary for an effective policy response to the cybersecurity threat—regulation and information sharing in forms that allow the greatest flexibility—are exactly the type of outcomes that groups fear most. Politicians, as Moe and Caldwell (1994) argue, have a strong incentive to listen to these demands.<sup>37</sup>

## **4. Predictions and Policy Recommendations**

As such, the likelihood that either CSA or SECURE IT bills will survive in their current forms is very slim. Business groups and privacy advocates alike have valid concerns about the bills, and they should be addressed. However, the lack of a cybersecurity protection regime—targeted at critical infrastructure owned by private sector entities in the U.S.—is an unacceptable outcome in the face of increasing threats and vulnerabilities. The more we learn about the nature of our interconnectivity, the more we discover how vulnerable we really are.

Any future iteration of either of these cybersecurity bills must include incentives to ensure the private sector supplies the correct level of security and information sharing to better understand and defend against vulnerabilities, complete with the flexibility to adapt to changing circumstances. The following recommendations seek to address the shortcomings of CSA and SECURE IT as they relate to policy and political feasibility.

#### *4.1 Narrower Focus on Cyber Crime*

The CDT, and groups like it, has concern about the scope of information sharing and the lack of direction agencies have in using this information. As such, a future bill should drastically limit the scope of crime to include only those that relate to defending critical infrastructure and its related control networks. There is no reason why cybersecurity legislation should be used to gain information about a completely unrelated crime simply because the government had the authority to do so. However, in order to maintain flexibility, the language still must remain open enough to allow agencies and private entities to adapt to mutating threats. Inclusion of definitions like “hacking” may be beneficial now, but there is no guarantee it can encapsulate the rapidly changing nature of network-based interactions.

#### *4.2 Enhanced Accountability*

In exchange for this flexibility, groups must be offered protections in the form of increased agency accountability in the event that delegated authority is used in a way that is harmful to civil liberties. The CSA has some relatively weak provisions—such as the requirement that DHS notify the Attorney General of violations of privacy and civil liberties—these must be increased in order to effectively “bind the hands” of the agency to the extent that groups feel protected. For example, agencies should have to report frequently to congressional committees, agencies (such as the Attorney General), and privacy groups on the types of information they are collecting, how it is being used, and the extent to which they are taking steps to remove personally identifiable information. Inclusion of stakeholders in the procedural process is what McCubbins, Noll, and Weingast call “fire alarms”: constituents or monitoring agencies will sound the alarm whenever

they perceive harm from the agency.<sup>38</sup> These structural limitations will certainly have the effect of slowing down the ability of the agency to respond to the threat, but it is a superior outcome to having a very narrowly prescribed bill that is obsolete before it is implemented.

### *4.3 Coercion, With Benefits*

Regulation is tricky business for government. Any time incentives are centralized through a single portal there is risk of inefficiency and stifled innovation. Therefore, regulation should take the form of two-layer model: a regulatory framework to standardize controls to ensure that the market is effectively supplying the level of security needed—free of specifics to allow the market to innovate—coupled with tax and other financial incentives to ease the burden of costs associated with this adjustment. As in CSA, the language of standards should remain effectively broad in order to allow the agency, and business, to adapt to new threats and new standards.

### *4.4 Shifting Costs*

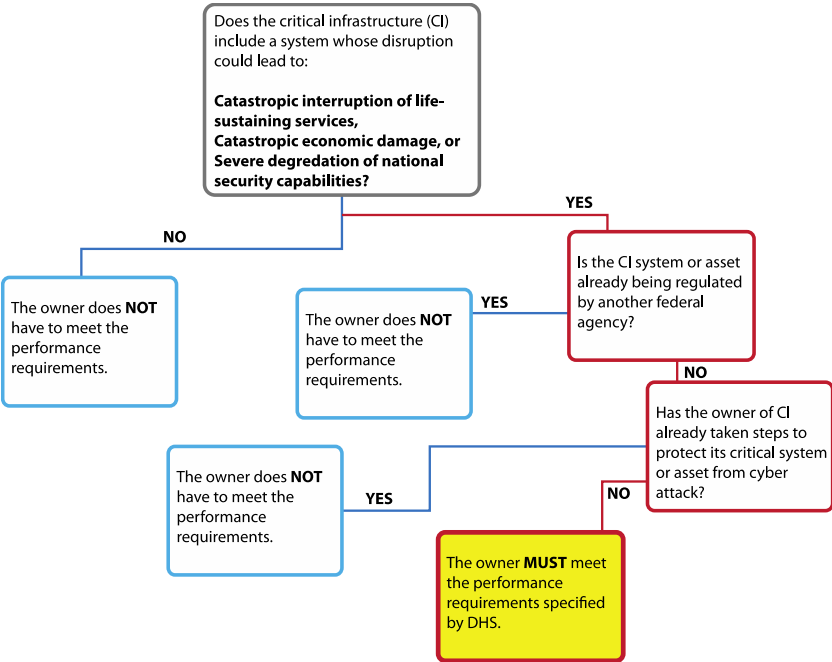
Finally, in order to pay for government subsidizing the cost of enhanced security in the private sector, a future bill should shift the cost from the industries directly to those who enjoy the benefits of increased security: private citizens. In 2001, the Aviation and Transportation Security Act, in response to the September 11 terrorist attacks, levied a fee of \$2.50-\$5.00 per airline ticket to cover the costs associated with the establishment of the Transportation Security Administration (TSA).<sup>39</sup> A similar fee should be levied on those industries—such as energy, telecom, and water—should they be deemed “covered critical infrastructure” under a future bill. The costs would be the same as if industry paid

the fees themselves and passed them on to consumers. There would be less political resistance simply because consumers have poorer organizational power than businesses and industry. Further studies will need to quantify the amount of the levied fee per industry.

## **Concluding Remarks**

Increased interconnectivity through the Internet has drastically increased the imperative to effectively safeguard U.S. critical infrastructure and the networks that support them. The nature of the threat requires government intervention, information sharing, and flexibility. However, these very characteristics make political feasibility that much less certain due to interest groups' fear of the state and agency loss due to delegation of authority. Therefore, these concerns must be mitigated with a policy solution that is effective both in terms of outcome and political feasibility. An agency with more structural controls and less authority is much better than one with no power due to political gridlock.

Appendix 1:  
Regulatory Reach of DHS under the Cybersecurity Act



## Notes

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# Riparian Relations with Rambo: A Case Study on China's Transboundary Water Agreements

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## *Executive Summary*

Even though scores of transboundary water agreements exist regarding many of the world's 263 international rivers, these treaties may not be facilitating interstate cooperation. On the contrary, they may be prolonging an "uneasy peace" among signatories that masks deeper conflict and security risks. Through the study of riparian relations, or the intercourse between sovereign states as it relates to internationally shared waterways, international law scholars have identified key dynamics that affect the formation and nature of transboundary water agreements. Specifically, game theory scholars classify riparian relations as asymmetrical "upstream, downstream" games, also known as "Rambo situations," because states with more bargaining power due to de facto property rights will always "win

the fight". This paper seeks to use this game theory framework to address the question "Why are some weaker riparian states obtaining a preferred outcome in transboundary water-sharing agreements, and others are not?"

The paper is laid out in five sections. The first section states the problem, while the second section explains the game theory specific to riparian relations. The third section identifies hypotheses for a case study on China and the Mekong River Basin, namely that China is more likely to be a compliant signatory of a low obligation transboundary water sharing agreement than a high obligation agreement. The fourth section introduces the data used to perform the case study; the fifth section outlines the analysis used to derive the case outcome. Last, the paper offers five policy recommendations for Mekong River states and other downstream riparians in order to achieve a more "fair" and preferred outcome when transacting with riparian "Rambo's".

By analyzing China's transboundary water agreements, we find that some of China's downstream riparian partners are able to obtain their preferred outcome only because the agreements they sign are of relatively low obligation and do not require China to fundamentally change its behavior. For other downstream states to reach their preferred outcome, it would require a high-obligation level agreement, which is much more difficult to achieve because of the asymmetrical power between China, the upstream riparian, and downstream riparians, in addition to the paramount strategic importance of water resources to China with its population of 1.36 billion people. The China-Mekong River Basin case study demonstrates the difficulty of creating a high-obligation agreement with preferred outcomes for lower riparians, but it presents a solution in the "self-enforcing agreement." This type of agreement, if designed creatively and strategically, will improve national welfare for all involved states through introduction of relevant incentives and issue-linked punishments.

In the past century, states have reached hundreds of agreements over international rivers to co-manage and regulate water usage.<sup>1</sup> The 1997 UN Convention on Non-Navigational Uses of International Watercourses and the International Law Association (ILA) 2004 Berlin Rules on Transboundary Waters<sup>2</sup> serve as guidelines for a legal regime on managing transboundary waters, both of which call for “reasonable and equitable use and development.”<sup>3</sup> But few states actually officially prescribe to these documents—the UN Convention has yet to be ratified, and the ILA is an international organization with no actual legal power. So, what constitutes “reasonable and equitable use and development?” Furthermore, if states aren’t governed by these legal regimes in their transboundary water agreements, what rules do they follow? And how do they enter into agreements?

### *The Puzzle*

Many of these questions can be explained by game theory, which tells us that riparian relations, or the interactions between sovereign states as it relates to internationally shared waterways, are almost always asymmetrical “upstream, downstream” games. These games are also known as “Rambo situations” because states with more bargaining power due to de facto property rights will always “win the fight,” much like Rambo in the self-titled film series.<sup>4</sup> Game theory also tells us that side payments can change the incentives of a deal so that an upstream riparian will enter into a contract.<sup>5</sup> What is puzzling, however, is that the majority of the agreements for the world’s 263 international rivers are bilateral agreements that cover multilateral basins, which only comprise 33 percent of international basins; the other 67 percent are bilateral basins, over which comparatively few agreements have been formed.<sup>6</sup> Combining basic game theory knowledge with these multilateral and bilateral basin treaties, it

is clear that many states are not offering the right incentives and therefore are not obtaining their preferred outcome.

Thus, even though scores of transboundary water agreements exist, they may not be facilitating interstate cooperation and conflict resolution as much as would be expected, and perhaps the most risky of situations are the conflicts that persist without any international contract. Knowing this, the bigger question to ask is: Why are some weaker riparian states obtaining a preferred outcome in transboundary water-sharing agreements, and others are not?

By looking closely at one of the world's most prominent riparian "Rambos," the People's Republic of China, we can more accurately pinpoint the causal mechanisms for variance between different cases of asymmetrical water agreements. China shares 19 international river basins with 14 countries at almost every land border.<sup>7</sup> The international flows that enter China but do not originate there are a fraction of the major international flows that exit China.<sup>8</sup> As a result, China's riparian relations largely fall into the category of Rambo situations.<sup>9</sup> This does not mean that China will not sign agreements with riparian partners, rather it means that China will not sign agreements where it must compromise its *de facto* water rights—it is common practice for "Riparian Rambos" to sign agreements that are never enforceable by them.

To narrow the focus even further, then, I seek to answer the question: "Why are some of China's riparian neighbors and their aligned stakeholders obtaining a preferred outcome in transboundary water-sharing agreements with China, while others are not?" In the following sections I will outline 1) the problem posed by international water agreements and its significance, 2) the theory behind transboundary water sharing and international law, 3) my theory and testable hypotheses and 4) a case study analysis to test the theory and 5) recommendations for China's riparian partners, other stakeholders in the Mekong River Basin,

and weak riparian states globally.

## I. Problem

### *International Water Agreements: What are they, what do they do?*

International water treaties cover a range of issues, and as they are agreements sovereign states enter willingly, the composition of member states (e.g. bilateral versus multilateral) and the roles states can play vary (e.g. participating versus observing). The substance of these treaties ranges from relatively low-obligation treaties, which include provisions on navigation, information sharing, and joint development, to relatively high-obligation treaties, which include provisions on the regulation of water quality and quantity, monitoring and enforcement, and dispute mechanisms.

### *China's Stance on Transboundary Water Agreements*

Historically, China has never signed any high obligation treaties on international waters. China has strategically kept silent on its policy on international river basins, with no clear statements on the issue from top leadership. China voted against the UN Convention, citing the "'indisputable sovereignty over a watercourse which flows through a state's territory'" and "the asymmetry of 'rights and obligations of upstream and downstream states'" as critical points of contention.<sup>10</sup> China was not alone in its criticism, and the convention was never ratified because only 16 countries ended up signing it, many believing that the convention does not incentivize states to change behavior. China could have abstained from voting, but its negative vote sent a strong signal of the importance of sovereignty over resources within its borders.<sup>11</sup>

*Regional Ramifications of China's Lack of Cooperation*

With respect to China and its neighbors, water scarcity and the effects of climate change on water supply have already had a visible effect. In China, water scarcity has been a consummate problem for the north, where agricultural, human, and industrial demand for water far exceeds supply, causing China to take an aggressive stance on domestic water resources management policy. China's neighbors face similar problems: economic and agricultural development in northern Thailand, Laos, and Cambodia puts increasing demands on water use, while Bangladesh and India face issues of high absolute poverty amidst flooding from unruly monsoons in the Ganges-Brahmaputra-Meghna Basin.<sup>12</sup> Pakistan depends on the Indus River flows for agricultural irrigation, its main production sector. With the demand for agricultural and nonagricultural water use on the rise in India, Nepal, Pakistan, and Afghanistan due to population growth and development, total withdrawals from the Hindu Kush Himalayan-originating rivers equal or surpass long-term flow balances.<sup>13</sup> It is clearly not in China's long-term economic and political interest for its downstream neighbors to run out of water—and yet, a lack of cooperation could lead to contingencies with irreversible damage.

Even so, China continues along its path of securing energy and water security for its own citizens before considering the security needs of other states. China's new State Council recently approved \$635 billion of water infrastructure projects to increase hydropower and improve water resource management in areas prone to scarce drinking water, droughts, and flooding. Already the home of half of the world's 50,000 large dams, China is following the only path it knows in order to continue domestic economic development, all the while eschewing the type of multilateral cooperation its basin neighbors seek.<sup>14</sup>



## II. Theory

Environmental economists view the fundamental problem of shared international rivers as one of negative externalities due to market failure.<sup>15</sup> When downstream water becomes scarce, polluted, or diverted due to upstream behavior, this is a negative externality of the upstream user's management—a cost that they do not have to consider when maximizing their utility.<sup>16</sup> Thus, in transboundary water sharing, there is a clear market failure. Yet, in light of the fact that “countries are autonomous sovereign entities dedicated to their own self-preservation,” international regimes will only form if it is in the interest of all parties to do so.<sup>17</sup> When a state has more geopolitical power than another state, or if it is a riparian “Rambo,” it can act unilaterally with little regard for what other states may prefer because the aggrieved states have no way to enforce their preferred outcome.

However, game theory and international law tells us that states enter into meaningful agreements in two situations: a dilemma of common interest and a dilemma of common aversion. A dilemma of common interest is when actors have common interests in ensuring a particular outcome but they also need an enforcement mechanism to ensure that no actor will defect and “free-rides,” such as the case of water pollution in transboundary waters.<sup>18</sup> A dilemma of common aversion is when actors have a common interest in avoiding a particular outcome but they are indifferent as to what that outcome is. For example, international river navigation agreements are generally arbitrary convention that “allows actors’ expectations to converge on one of the equilibrium outcomes.”<sup>19</sup> Precise coordination is necessary in a dilemma of common aversion because defection always leads to negative payouts, never positive payouts.

Transboundary water dilemmas and resulting agreements can fall into any of the aforementioned categories. The most

common agreement we see is that of navigation, which merely requires coordination.<sup>20</sup> Pareto-improving transboundary water sharing agreements born out of dilemmas of common interest exist, but are more likely when states have symmetrical power. When states have asymmetrical power, the only way to bring about Pareto-improving or “fair” agreements is for aggrieved states to “increase institutional scope through linkage.”<sup>21</sup> This means that weaker states must make side payments and punishments with credible enforcements related to issues of supreme interest to the “Rambo.”<sup>22</sup> These theories explain China’s membership in and compliance with transboundary water agreements, and inform my hypotheses for why some of China’s neighbors obtain Pareto-preferred or “fair” agreements and why some do not.

### III. Hypotheses

I argue that China will choose to engage in and comply with transboundary water sharing agreements that give other signatories their preferred outcomes in two situations:

1. The agreement is of low obligation, and by signing on to the agreement China is not required to change its behavior.
2. The agreement is of high obligation, and by signing on to the agreement China is assured a sufficient side payment for compliance and is threatened with a sufficient punishment for non-compliance, both of which are linked to issues related to China’s core interest.

In the low obligation agreement, either there are common interests or no real conflict for China’s dominant strategy, or it is

a dilemma of common aversion. In the first case, interests are aligned when China and other signatories would pursue unilateral interests anyway, but recognize that there are even greater benefits to cooperation, such as economies of scale and spillover effects. These agreements do not change China's behavior or its interests, but a formal agreement is still required because cooperation necessitates a high level of precision to signal credible commitment and ensure payouts for all parties. These types of agreements are not necessarily long-term, and are often one-off joint development projects (e.g. a hydroproject). In the second case, the dilemma of common aversion, China and other signatories are required to change their behavior, but in an arbitrary way that incurs less costs than if the agreement did not exist.

The high obligation agreement is much more rare, and perhaps non-existent. This is a dilemma of common interests but, because it involves asymmetric players, the gains to other parties are much greater than gains to China. It is even possible that China's payout before side payments may be net negative, but by linking side payments and punishments to China's core interests, such as trade, it changes China's incentive structure.<sup>23</sup> Given these factors, my hypotheses for why some of China's neighbors obtain a preferred outcome in transboundary water-sharing agreements with China while others do not are:

H1. China is more likely to be a compliant signatory of a low obligation transboundary water sharing agreement than a high obligation agreement.

H2. China is more likely to be a compliant signatory of a high-obligation transboundary water sharing agreement when it assures a sufficient side payment and provides a credible threat for non-compliance based on issue-linkage.

The complexity of international agreements warrants the inclusion of other hypotheses that also determine whether states obtain their preferred outcome, because they affect the enforceability and legitimacy of an agreement. This can in turn impact whether low obligation or high obligation agreements are formed. One such hypothesis supported by pertinent literature is that third party guarantors are needed to provide credible enforcement mechanisms for issue linkages.<sup>24</sup> This is because international organizations (IOs) such as the World Bank and the United Nations Development Program (UNDP) wield enough power to enforce side payments and sanctions. In addition, the third party guarantor must be viewed as credible by all members for compliance to occur. This often involves an image of legitimacy and the ability to access state leaders.<sup>25</sup> International relations theorists also emphasize the power of numbers in negotiations, especially when weaker states try to change incentives for a stronger hegemonic state.<sup>26</sup> Empirical evidence shows that bilateral negotiations are proven to favor the stronger state.

H3. Credible third party guarantors in international water agreements will lead to more Pareto-improving and “fair” agreements.

H4. Coordination by weaker riparian states in a multilateral basin with a hegemonic state will lead to more Pareto-improving and “fair” agreements.

## **IV. Data**

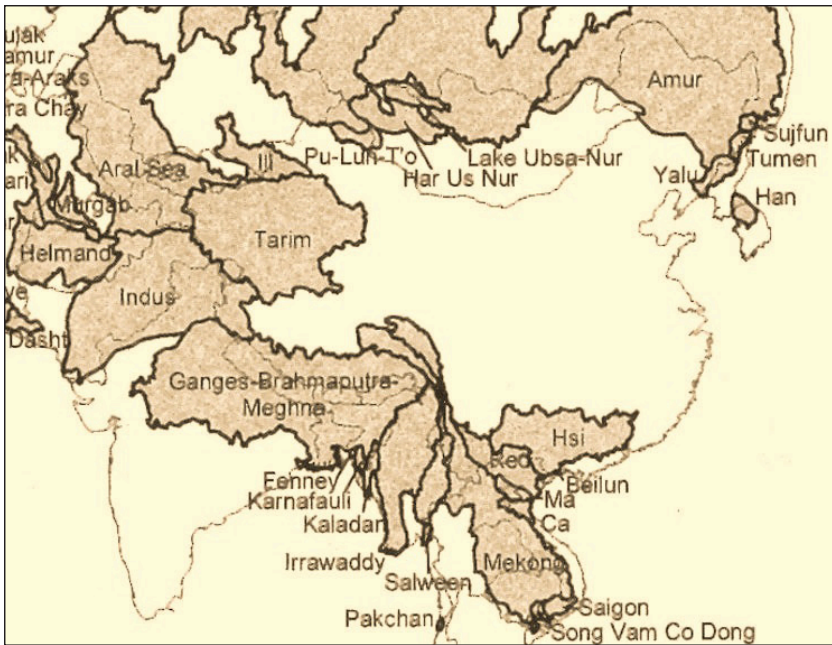
I choose to test the theory through case study analysis of China’s current agreements with its riparian neighbors of its large shared water basins. While the Chinese Ministry of Water Resources (MWR) acknowledges that it has cooperative relationships with over 60 countries and water cooperation agreements and Mem-

orandums of Understandings (MOUs) with over 40 countries, scholarly research in the field imply that these agreements are not substantive due to the small size of the shared basin or the lack of a shared basin at all.<sup>27</sup> Including them in a universe of qualitative data has diminishing returns for a focused research question such as presented in this paper. While longer time-series data would also provide more robust results, it would also introduce more time-variant trends that might bias the data. Since China has only attained the political and military might to become a “Riparian Rambo” in the past 20 years, this is an ideal timeframe to examine.

### *Universe of Cases*

There are only seven large water basins that China shares with other states.<sup>28</sup> These are: the Heilong/Amur River Basin, the Tumen and Yalu River Basins, the Ili and Irtysh River Basins, the Yaluzangbu/Brahmaputra, and the southeast basins: the Lancang/Mekong and the Nujiang/Salween. Initial research on outcomes shows the rationale for each agreement’s placement in the cross-tabulation of the independent and dependent variables.

Figure 1. China's Shared International River Basins<sup>29</sup>



### *Measuring the Dependent Variable*

DV1. China Signs and Complies with Agreement (1=signs): This information has been gathered from third party researchers and has been verified by a source from the non-China signatories – to whom it should matter the most.

### *Measuring the Independent Variables*

IV1. Obligation level of agreements (1=high obligation): I measure obligation level by classifying different types of provisions as low or high obligation. Based on a close reading of international and environmental law, I conclude that if an agreement contains provisions on navigation, information sharing, and

joint economic development of resources (with little or no mind to sustainability), and no other types of provisions, it qualifies as low obligation level. If an agreement includes provisions on the regulation of water quality and quantity, monitoring and enforcement, and dispute mechanisms, it qualifies as a high obligation level (it may also contain low-level provisions).

IV2. Interaction of side payment and punishment with issue linkage (1=side payment and punishment): A side payment would be discernible if an agreement provision included a technology transfer or allocation of funding to China in an area related to its core interest on the basis that it fulfilled certain measureable goals. A punishment would be similarly related to its core interest, and would be enforced if China did not fulfill certain measureable goals.

### *Outcomes*

#### Heilong/Amur River Basin

China, Russia, and Mongolia all share the Amur Basin. China only has bilateral agreements on this multilateral basin. Very little conflict has occurred between China and Russia, due to the low population density and abundant water in the shared stretch of the basin.<sup>30</sup> We do not see Russian governmental or non-governmental organizations pressuring China to engage in greater collaboration or dispute resolution, showing that this is an agreement that they consider "fair".

The Amur water resources that China and Mongolia share, on the other hand, are much more scarce and vulnerable. In 1994, the two nations signed the Mongolia-China Agreement on protection and shared utilization of transboundary waters. Protocol for agreed volumes of water withdrawal and excessive fishing on Buir Lake are mentioned, but there is no mechanism for

enforcement of the provisions outlined or dispute resolution.<sup>31</sup> The website confirms this glaring omission, noting: "While the Agreement helps to sustain dialogue and information exchange, it has not yet led to resolution of existing controversies."<sup>32</sup> This indicates that the agreement is not considered "fair" by Mongolia, and that it would enter into a higher obligation agreement if possible.

### The Yalu and Tumen River Basins

China and North Korea alone share the Yalu, while China, Russia and the DPRK share the Tumen. China and North Korea jointly own four hydropower stations by way of the joint China-Korea Hydropower Corporation, established in 1955. Power is shared equally, but operations are managed by the North Korean side.<sup>33</sup> Knowing the DPRK's need for technology transfers and lack of interest in environmental conservation, we conclude that this was their preferred deal.

The Tumen Basin is shared by China, North Korea, and Russia, and leads from China to the Sea of Japan. UNDP began working in the area in the 1990s with hopes of "protecting the transboundary biodiversity and international waters and to attract green investment."<sup>34</sup> Biodiversity in the area is still an aspirational goal for the UNDP, an obligation that has not been realized.

### Ili and Irtysh River Basins

China shares the Ili and Irtysh predominantly with Kazakhstan. China's development of both rivers is viewed by Kazakhstan as a major threat to the country's agricultural and economic development. Yet even as a member of the Shanghai Cooperation Organization and with support from the European Commission, Kazakhstan is unhappy with a low obligation treaty. Even after signing a 2002 agreement of joint use of 23 rivers, which included



provisions to share information and establish a joint committee, little to no progress has been made to alleviate Kazakhstan's concerns.<sup>35</sup> Kazakhstan has yet to see any lasting commitments from China that aligns with its main preferences.

#### Yaluzangbu/Brahmaputra River Basin

In 2002, India and China entered into an MOU with provisions for information sharing, which was renewed in 2008. An Expert-Level Mechanism (ELM) was established in 2006 to discuss cooperation on more substantive trans-border issues, such as emergency management.<sup>36</sup> Considering China has minimal plans for development on the Brahmaputra it seems the agreement is sufficient for India. There has been little information from reputable sources that suggest India is not content with a low obligation agreement here.

#### Lancang/Mekong River Basin

China contributes 16 percent of the flow of the Mekong River, and shares the basin with Burma, Laos, Thailand, Vietnam, and Cambodia. In 2002, China signed an agreement to provide hydrological data about the Lancang/Mekong, to which it has complied; in 2008 it was renewed.<sup>37</sup> There is extensive literature citing the many provisions that Mekong river basin countries and international stakeholders would like to see China agree to.<sup>38</sup> The Mekong River Commission is the prime example of aggrieved states that would like a high obligation agreement but have failed to obtain one.

## V. Analysis

### *Results*

Figure 1. Cross-tab for the IV *Obligation Level of Agreements*

IV DV	Low obligation agreements	High obligation agreements
China does not sign		
China signs	China – MRC, GMR China – Mongolia China – Kazakhstan China – North Korea China – Russia China – India China – UNDP	

Figure 2. Cross-tab for the IV Interaction of side payment and punishment with issue linkage on a high-obligation agreement

IV DV	No side payment, no punishment, or neither	Side payment and punishment
China does not sign	China – MRC China – Mongolia China – Kazakhstan	
China signs		

Based on these results, we find that the first hypothesis from the theory holds. For every major shared basin, China has signed low obligation level agreements, and yet only in some of the cases did cosignatories also achieve their preferred outcomes. Countries that can fulfill their water-sharing needs by reaching agreements with low obligations from China get their preferred and “fair” agreements—precisely because China does not have to change its behavior drastically. Countries that cannot fulfill their water-sharing needs by reaching low-obligation agree-

ments with China are still getting low obligation agreements, not the high-obligation agreement they would prefer.<sup>39</sup>

However, it is puzzling that we find no cases where China has signed a high-obligation agreement for transboundary water rights, when theory tells us that there should be a deal that can sufficiently reward and coerce China into this type of agreement. Do we not see China signing high obligation deals because no parties have offered the sufficient amount of issue-linked side payments and punishments, and if so, why not? Perhaps China is not signing high obligation deals because there is no sufficient amount of issue-linkage and side payments for China due to the importance of a sustainable water supply to maintaining social stability and the Communist Party's legitimacy. Perhaps the necessary third party guarantors have not been in place nor credible. To investigate the reasons why China has not signed a high-obligation deal, I choose a case study that is the most likely candidate for an agreement of this nature: the Mekong River Commission.

### *Case Study Methods*

As the majority of China's riparian neighbors are weaker states, it is helpful to more deeply analyze a case where a weaker state joined with more powerful stakeholder to bring China to the table. In performing qualitative case study analysis, I have two goals in mind. The first is to tease out the reasons why the high-obligation agreement did not include a sufficient side payment or a credible punishment. The second is to critically assess other potential factors in the Mekong agreement that perhaps have more explanatory power than the hypotheses put forth.

### *Mekong River Basin Case Study*

The Mekong River Commission (MRC), established in 1957 as

the first UN spin-off for international river basin planning, is a multilateral regional organization dedicated to the sustainable management of water and related resources in the Mekong River Basin.<sup>40</sup> It has taken many policy directions since 1957; an important change was the addition of China and Burma in the 1990s as "Dialogue Partners". Its current mission is centered on implementing Integrated Water Resources Management (IWRM), a concept based on principles of economic wellbeing, social equity, and environmental sustainability."<sup>41</sup> The MRC, though guided by the environment and water ministers of member countries, is 90 percent funded by Japanese and various Western European governments.<sup>42</sup> The goals of the MRC, however, are not always the same as the goals of member countries, nor do they smoothly coincide with that of other multilaterals involved in Mekong issues. These other organizations include: The Greater Mekong Subregion Programme (GMS), ASEAN, the World Bank, and the Asian Development Bank (ADB).

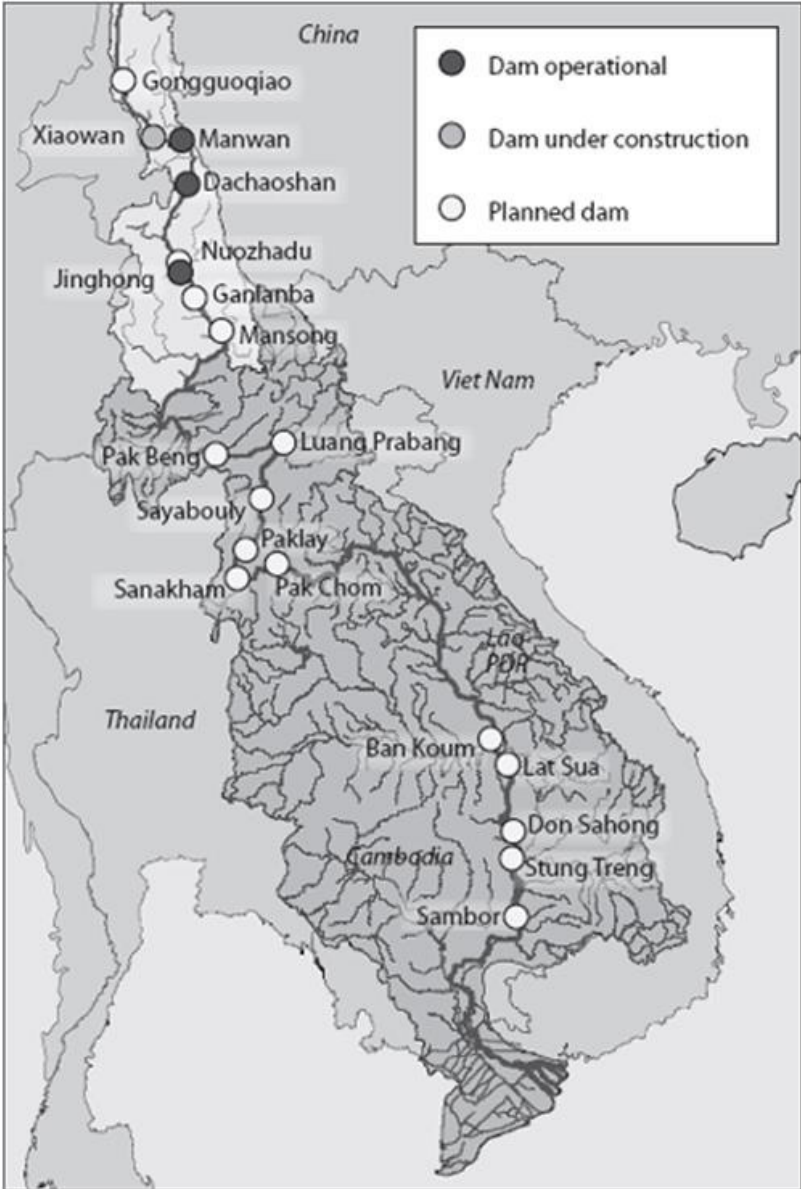
The GMS was established in 1992 by the ADB and the UN Economic and Social Commission for Asia and the Pacific (ESCAP) to promote sustainable economic growth. It is the most successful organization in terms of membership, with all six Mekong riparian states as members, but some countries have expressed concern over the lack of social and environmental impact assessments by GMS infrastructure projects.<sup>43</sup> The World Bank devised a Mekong Water Resources Assistance Strategy (MWRAS) to help Mekong countries make sustainable investments.<sup>44</sup> The ASEAN Working Group focuses on networking and exchange of information. Not only is organizational redundancy an issue, but stated goals of sustainability, water sharing, and development have yet to be met.

### Country Goals

Thailand is interested in irrigation and cheap hydropower and is

not concerned about strict rules over dam construction. In fact, Thailand is in favor of China's upstream dam construction so that it can divert water for irrigation purposes as it modernizes its agricultural sector. Laos would like to develop its hydropower resources and seeks investment from China and regional partners. Vietnam is also developing hydropower, but due to the robust aquaculture in the Mekong Delta—it produces 50 percent of Vietnam's annual rice crop—it has to balance this development with sustainable management of water resources (See Figures 3 and 4). Vietnam blames Chinese dams and the lack of impact assessments for the delta's increasing salinization problem. Cambodia, as the most downstream riparian state, has the most to gain from a conservation regime as well as the most to lose from an abundance of dams along the Mekong. Its economic livelihood is dependent upon its fisheries and the sustainability of the Tonle Sap Lake, which in turn rely on seasonal river flows and fish catch.<sup>45</sup> Ultimately, the entire region has much reason to be concerned, as over 21 percent of the basin is eroding, only 31 percent of its original forests are intact, and in some areas fish catch has decreased by 50 percent.<sup>46</sup> With population in the region rising, people who rely on the Mekong for their livelihood will face challenges as over one million people in Cambodia depend on fishing for their livelihoods, and 70 percent of rural households in Laos earn income from fishing.<sup>47</sup>

Figure 3. Mekong River Basin Mainstream Dams and Proposed Dams, 2013<sup>48</sup>



### Transacting with China

Clearly, the lack of collective action and diversity of interests representing downstream states considerably weakens their bargaining power and ability to extract demands from China. China has declined the numerous urgings from UNDP and lower co-basin countries to join the MRC as a full member, which has allowed Beijing to evade compliance with member country statutes.<sup>49</sup> With the ADB's establishment of the GMW in the 1990s, there was no need for China to be incorporated into the MRC negotiations of diverse national interests mediated by the UNDP. Because China's national interest is in domestic water security and poverty reduction through trade in its Yunnan and Guangxi provinces, it "views mainland Southeast Asia chiefly as an export market for products from its southwest provinces," and the GMS allows it to do this on its own terms.<sup>50</sup> For example, China was accused of releasing water from the dams when Chinese ships were scheduled to travel downstream, but closing dams and causing extremely low flows when Thai ships were scheduled to travel upstream.<sup>51</sup> China's aid to Cambodia and Laos, however, assuages its circumvention of more meaningful MRC participation. The GMS has followed the ASEAN model of "soft regionalism" that invests in win-win economic development plans devoid of monitoring and compliance mechanisms, with the "Cross-border Transport Agreement" as perhaps the largest achievement.<sup>52</sup>

### The Puzzle of No High-Obligation Agreement

The case study shows us that the MRC and other Mekong river riparian states would like China to enter into a high-obligation treaty but have not been successful in such pursuits. Three main reasons emerge as to why this is the case. First, there is no magic formula of side-payments and issue-linkages that can ameliorate the barriers presented by monopolistic power, a costly court

system, and costly negotiations for a Pareto-improving outcome to be reached. Every case is different, and sometimes the costs may prove insurmountable. Secondary hypotheses help explain the other reasons. Quite frankly, the MRC and its member states are doing a dismal coordination job. Not only are member states actively pursuing divergent interests from the goals of the MRC, there are far too many organizations involved in its basin policy.<sup>53</sup> This regime complexity makes it more difficult to enforce any agreement with China because China is free to “forum-shop” to find the party whose interests best align with China’s—hence the GMR and China’s bilateral agreements with Thailand.<sup>54</sup> Last, there is no credible third party guarantor. If a credible and committed third party is involved, it is likely to advocate for an agreement that is more “fair” because it has interests in maintaining regional and global stability. Thus it will invest in ensuring a “self-enforcing” deal.

## VI. Recommendations

In light of these reasons for why their preferred outcome of a high-obligation treaty has not been achieved, Mekong river states, the MRC, and other stakeholders should consider the following recommendations:

**1. Unify national goals to increase bargaining power and levy sanctions.** Specifically, downstream stakeholders must coordinate amongst themselves before addressing China. If a united Thailand, Laos, Vietnam, and Cambodia withheld cooperation in developing regional economic links until China cooperated on ecological protection programs, combined with side payments to offset the costs to China, a higher obligation treaty may be possible. However, in order to negotiate with China at this level Mekong river states need support from international stakehold-



ers. In addition to contributions to side payments, western European, Japanese, and American stakeholders must engage more strategically in the Mekong basin's economic development so that these states are not reliant upon deals with China for trade, water resources, and energy management.<sup>55</sup>

**2. Address regime complexity to reduce coordination costs and not allow China to "forum-shop".** A new multilateral organization may be better than trying to revive the current ones. The MRC has two principals with divergent interests—the donor countries with interests in IWRM and the basin countries with economic development taking precedence—which makes it difficult for the organization to send a clear message to China.<sup>56</sup> Moreover, the MRC is a dated institution tainted with anti-Communism and western interventionist historical legacies. The ASEAN model of multilateral engagement also brings baggage with a history of low-obligation, imprecise agreements without enforceability. The GMS appears to have the most credibility among all disputant states as a neutral and "fair" regime.

**3. Create credible issue-linkages with China and gradually increase commitment levels over time.** Current agreements focus too much on principles and norms and too little on mechanisms of self-enforcement. A self-enforcing Mekong River agreement must restructure incentives, ensure full participation and compliance, and prioritize issue linkage and side payments. This type of agreement is rarely the most Pareto-efficient outcome, but it fulfills a more important metric for international agreements—that it is "individually and collectively rational."<sup>57</sup> A clear example would be for Mekong Basin states to grant China's request to jointly widen shipping channels or construct power-transmission cables in exchange for information about China's upstream water development plans on the Lancang, China's compliance

with social and environmental impact assessments, and compliance with monitoring and data-sharing.

**4. Identify an engaged and invested third party guarantor to enforce issue-linked side payments and punishments.** Donor countries and IOs pour millions of dollars into the region each year to solve Mekong-related issues, but these contributions do little to change the behavior of the offending upstream party. Instead donor and Mekong Basin states must work with a third party guarantor to offer China the right combination of compliance-based incentives and sanctions. The World Bank is currently the best stakeholder to fill this role.

**5. Re-envision the role of IOs and donor countries of the MRC. If the MRC is to continue to exist, government members must play a larger role in decision-making than the coalition's donors and IOs.** IOs and donors should be aware of when they can benefit environmental sustainability and human equity—and when they cannot—and invest their effort and monies accordingly. Food aid, trade agreements, and energy subsidies go a long way in influencing the lower riparian members to recalculate how many dams, irrigation projects, or hydropower stations they need to build to feed and secure their countries. When MRC states are given these types of subsidies, they too can be incentivized to change their behavior and engage in less bilateral agreements with China, having certain guarantees on food, economic, and energy security.<sup>58</sup>

## Conclusion

By analyzing the cases of China's agreements regarding its major shared international river basins, we find that some of China's downstream riparian partners are able to obtain their preferred

outcome because the agreements they sign are of relatively low obligation and do not require China to fundamentally change its behavior. Other downstream states sharing basins with China are not so fortunate. For these states to reach their preferred outcome, it would require a high-obligation level agreement, which, while possible, is difficult to achieve when China's interest in securing its domestic water resources is so great.

The case of the Mekong River Basin international river agreement is instructive for all weaker riparian states in that there are complex reasons why, in the context of transboundary river disputes, preferred and "fair" outcomes do not always happen, even if states are exploring all options of side payments and punishments with issue-linkages. Still, there is hope for the Mekong riparians and others to achieve Pareto-improving and "fair" outcomes in transboundary water conflicts with China or other "Riparian Rambos". Self-enforcing agreements, if designed creatively and strategically, will improve national welfare for all states involved through introduction of new incentives to cooperate where there were none before.

## Notes

<sup>1</sup> Unsurprisingly, the majority of these agreements have taken the form of navigational treaties; Neda A. Zawahri and Sara McLaughlin Mitchell. "Fragmented Governance of International Rivers: Negotiating Bilateral Versus Multilateral Treaties." *International Studies Quarterly* 55, no. 3 (2011): 835.

<sup>2</sup> The Berlin Rules were updated in 2004, and were formerly the Helsinki Rules updated in 1966, formerly the Dubrovnik rules established in 1956.

<sup>3</sup> Asit K. Biswas, "Management of Transboundary Waters: An Overview," in *Management of Transboundary Rivers and Lakes*, eds. Olli Varis, Cecilia Tortajada, and Asit K. Biswas (Berlin: Springer, 2008) 1-20. <http://public.eblib.com/>

EBLPublic/PublicView.do?ptiID=372220

<sup>4</sup> Helga Haftendorn, "Water and International Conflict," *Third World Quarterly* (2000): 52.

<sup>5</sup> Scott Barrett, *Environment and Statecraft: the Strategy of Environmental Treaty-making* (Oxford: Oxford University Press, 2003) 235.

<sup>6</sup> Ibid.

<sup>7</sup> These international rivers are the Heilong (Amur), Yalu, Suifun, Tumen, the Aral Sea, Har Us Nur, Irtysh (Ob), Pu Lun To, Tarim, Beilun, Ganges-Brahmaputra-Megna, Indua, Irrawady, Lancang (Mekong), Nu (Salween), Pearl (Xi and Bei), and Yuan (Red); James E. Nickum, "The Upstream Superpower: China's International Rivers," in *Management of Transboundary Rivers and Lakes*, ed. Olli Varis, Cecilia Tortajada, and Asit K. Biswas. (Berlin: Springer, 2008): 227.

<sup>8</sup> Ibid., 229.

<sup>9</sup> Timo Menniken, "China's Performance in International Resource Politics: Lessons from the Mekong," *Contemporary Southeast Asia*, vol. 29, no. 1 (2007): 101.

<sup>10</sup> Nickum, "The Upstream Superpower," 231.

<sup>11</sup> China's behavior here is not new; in fact it follows seamlessly from China's general foreign policy of the "five principles of peaceful coexistence" adopted by the Bandung movement in 1955.

<sup>12</sup> Jayanta Bandyopadhyay and Nilanjan Ghosh, "Holistic Engineering and Hydro-Diplomacy in the Ganges-Brahmaputra-Meghna Basin," *Economic and Political Weekly*, vol. 44, no. 45 (2009): 53.

<sup>13</sup> David Michel, "Under Pressure: International Water Management Challenges in the Himalayan Region," in *Himalayan Glaciers: Climate Change, Water Resources, and Water Security*, ed. Committee on Himalayan Glaciers, Hydrology, Climate Change, and Implications for Water Security (Washington, D.C: National Academies Press, 2012), 122.

<sup>14</sup> Brahma Chellaney, "China's Hydro-Hegemony," *New York Times*, February 7, 2013, [http://www.nytimes.com/2013/02/08/opinion/global/chinas-hydro-hegemony.html?hpw&\\_r=0](http://www.nytimes.com/2013/02/08/opinion/global/chinas-hydro-hegemony.html?hpw&_r=0).

<sup>15</sup> If externalities are not taken into account an outcome is not Pareto-efficient based on the First Welfare Theorem, which states that no redistribution of resources can be undertaken without making someone worse off; Charles E. Kol-

stad, *Environmental Economics* (New York: Oxford University Press, 2000), 74.

<sup>16</sup> In reality this is a very difficult calculation to make, because costs and benefits of social welfare must take into account the net present value of all of the future costs and benefits, which not only is a difficult undertaking when there is uncertainty about future costs and benefits and their respective spillover effects, but it is difficult when due to misallocation of property rights the discount rate for these costs and benefits is too high.

<sup>17</sup> Arthur A. Stein, "Coordination and Collaboration: Regimes in an Anarchic World," *International Organization*, vol. 36, no. 2 (1982), 309.

<sup>18</sup> Stein (1982) defines Pareto-deficient as all actors preferring another given outcome to the equilibrium.

<sup>19</sup> Stein, "Coordination and Collaboration," 312.

<sup>20</sup> Ibid.

<sup>21</sup> A "fair" agreement is a normative assumption of distribution that most economists ignore in determining efficient outcomes, but it is important for international water agreements due to the high consideration of equity in the international legal regime created by the ILA and the UN Convention born out of the "reasonable and equitable use and development" provision. From Scott Barrett, "Conflict and Cooperation in Managing International Water Resources," *Policy Research Working Paper 1303*, *The World Bank*, May 1994.

<sup>22</sup> Stein, "Coordination and Collaboration," 916.

<sup>23</sup> Barrett, *Environment and Statecraft*, xiii.

<sup>24</sup> Katri Mehtonen, Marco Keskinen, and Olli Varis, "The Mekong: IWRM and Institutions," in *Management of Transboundary Rivers and Lakes*, ed. Olli Varis, Cecilia Tortajada, and Asit K. Biswas (Berlin: Springer, 2008), 221.

<sup>25</sup> Asit K. Biswas, "Management of Transboundary Waters: An Overview," in *Management of Transboundary Rivers and Lakes*, ed. Olli Varis, Cecilia Tortajada, and Asit K. Biswas (Berlin: Springer, 2008), 10.

<sup>26</sup> Oliver Hensengerth, "Transboundary River Cooperation and the Regional Public Good: The Case of the Mekong River," *Contemporary Southeast Asia*, vol. 31, no. 2 (2009): 342.

<sup>27</sup> Nor does the MWR include a list or links to these agreements and MOUs for further study; "International Cooperation," Ministry of Water Resources, The

People's Republic of China, <http://www.mwr.gov.cn/english/gjil.html>.

<sup>28</sup> Hensengerth, "Transboundary River Cooperation and the Regional Public Good," 327.

<sup>29</sup> Nickum, "The Upstream Superpower," 227.

<sup>30</sup> Ibid., 236.

<sup>31</sup> China-Mongolia Environmental Agreements," *Amur-Heilong River Basin*, [http://amur-heilong.net/http/09\\_int\\_agreements/0902chinamongolianagreements.html](http://amur-heilong.net/http/09_int_agreements/0902chinamongolianagreements.html).

<sup>32</sup> Ibid.

<sup>33</sup> Nickum, "The Upstream Superpower," 237. Aside from this joint venture, there are no other agreements regarding the Yalu.

<sup>34</sup> Ibid., 238.

<sup>35</sup> "China may turn Kazakhstan into desert," *The Uyghur-American Association*, January 25, 2013, <http://uyghuramerican.org/article/china-may-turn-kazakhstan-desert.html>.

<sup>36</sup> "India-China Cooperation," Ministry of Water Resources, Government of India, <http://wrmin.nic.in/index3.asp?subsublinkid=290&langid=1&sslid=372>.

<sup>37</sup> "Upstream Partners," Mekong River Commission, <http://www.mrcmekong.org/about-the-mrc/upstream-partners-2>; "Agreement on provision of hydrological information renewed by China and MRC," Mekong River Commission, <http://www.mrcmekong.org/news-and-events/news/agreement-on-provision-of-hydrological-information-renewed-by-china-and-mrc>; For a 2006 update of the 2002 MOU, refer to <http://www.mrcmekong.org/news-and-events/news/mrc-china-and-myanmar-cooperate-on-shared-mekong-resources>

<sup>38</sup> Onishi Kayo, "Water Governance of the Mekong River Basin and Chinese National Problems," in *International Water Security: Domestic Threats and Opportunities*, ed. Nevelina I. Pachova and Libor Jansky (Tokyo: United Nations University Press, 2008); Marko Keskinen, Katri Mehtonen, and Olli Varis. "Transboundary Cooperation Versus Internal Ambitions: The Role of China and Cambodia in the Mekong Region," in *International Water Security: Domestic Threats and Opportunities*, Edited by Pachova, Nevelina I. and Libor Jansky. Tokyo: United Nations University Press, 2008.

<sup>39</sup> Scott Barrett reminds us that all states would “prefer” an agreement where they were given all the rights, but that when we use the language of “prefer”, this refers to the “fair” outcome that states expect given the geopolitical reality.

<sup>40</sup> “Vision and Mission,” Mekong River Commission, <http://www.mrcmekong.org/about-the-mrc/vision-and-mission>

<sup>41</sup> Mehtonen, Keskinen and Varis, “The Mekong: IWRM and Institutions,” 208.

<sup>42</sup> Ibid., 219.

<sup>43</sup> Ibid., 216.

<sup>44</sup> Ibid., 213.

<sup>45</sup> Leadership Group on Water Security in Asia, “Asia’s Next Challenge: Securing the Region’s Water Future,” *Asia Society* (2009) <http://asiasociety.org/files/pdf/WaterSecurityReport.pdf>.

<sup>46</sup> Evelyn Goh, *Developing the Mekong: Regionalism and Regional Security in China-Southeast Asian Relations* (London: International Institute for Strategic Studies, 2007), 49.

<sup>47</sup> Ibid.

<sup>48</sup> “Sustainable Hydropower,” Mekong River Commission, <http://www.mrcmekong.org/topics/sustainable-hydropower>

<sup>49</sup> Biswas, “Management of Transboundary Waters,” 11.

<sup>50</sup> Goh, *Developing the Mekong*, 47.

<sup>51</sup> Goh, *Developing the Mekong*, 45.

<sup>52</sup> Hensengerth, “Transboundary River Cooperation and the Regional Public Good,” 340. For more on the compliance mechanisms of the agreement, see <http://www.adbi.org/files/2005.06.15.cpp.customs.simplification.inspection.pdf>.

<sup>53</sup> Karen J. Alter and Sophie Meunier, “The Politics of International Regime Complexity,” *Perspectives on Politics*, vol. 7, no. 1 (2009): 15.

<sup>54</sup> Goh, *Developing the Mekong*, 57.

<sup>55</sup> Another way of saying this is that the Coasian assumption of price-takers does not hold, so the original assignment of property rights could prevent a Coasian deal from forming.

<sup>56</sup> Hensengerth, “Transboundary River Cooperation and the Regional Public Good,” 341.

<sup>57</sup> Scott Barrett, *Environment and Statecraft*.

<sup>58</sup> Mikiyasu Nakayama, "The Implications of Domestic Security Policy for International Water Issues in the Context of "Virtual" and "Real" Water: The Aral Sea and Mekong River Basins," in *International Water Security: Domestic Threats and Opportunities*, ed. Nevelina I. Pachova and Libor Jansky (Tokyo: United Nations University Press, 2008).



# The Digital Poverty Trap: Exploring the Economic Impact of a Restricted Internet

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## Executive Summary

Nationwide restriction to Internet access severely impedes the growth capacity of businesses and individuals within that country. Restriction comes in two forms: 1) limited access as a result of infrastructure; and 2) limited access through filtering. These methods adversely affect Internet use within businesses, the ease of doing business in a country, and the Gross Domestic Product (GDP) per capita of that nation. This report utilizes a statistical modeling approach to provide further understanding of the nature of this relationship. The core data for this project was collected through the World Bank<sup>1</sup> and the OpenNet Initiative.<sup>2</sup>

First, the relationship between available Internet and growth is examined. Countries are divided into four labeled groups for analysis: “High Flyers,” “Resource Dependent,” “Rising Stars” and “Laggers.” These categories were chosen organically—as

seen later in Graph 2, the groups are distinctive and the countries within each category generally have similar characteristics. Through these categories, the relationship between GDP per capita and Internet use in businesses is examined – with the outliers being natural resource dependent countries. Using the same methodology, the correlation between the number of Internet users in a country and the level of business Internet use is examined, followed by the link between ease of doing business and the number of Internet users in a country. This latter relationship is especially stark; for every additional twenty Internet users (per 100) there is a 15.5% improvement in the facilitation of business. The importance of building easily accessible Internet infrastructure in a country is highlighted through these first three relationships. It is equally important, however, to note that the correlation goes both ways; countries with stagnated economies are less likely to take the necessary steps in investing in technological infrastructure.

For the last two models, the adverse affects of government-mandated Internet restrictions are analyzed, highlighting the economic importance of a free Internet. Through these studies, two important facts emerge. First, when a country moves from a free to restricted Internet, businesses within that country will use the Internet 17.26% less. These businesses are not able to take advantage of worldwide markets as much, which leads to a competitive disadvantage. Secondly, if a country moves from a completely free Internet to partially free Internet there is a 34% drop in GDP per capita. When moving from a completely free Internet to a restricted Internet, the drop increases to 70%.<sup>3</sup> However, there is an inability to directly prove causation, instead this study can simply indicate a strong correlation between underdevelopment and lack of Internet use. Further research is needed in this area to directly support causation, due to the intrinsic flaw of data from underdeveloped countries being less available and

less reliable.

According to a recent study by the McKinsey Global Institute, there are approximately two billion Internet users worldwide and Internet-related fields account for 3.4% of a country's GDP.<sup>4</sup> In this globalized world, developing countries can't afford to disallow businesses and people to have full, easy access to the Internet. Without the political and technological infrastructure of the 21<sup>st</sup> Century, countries are destined to fall into a digital poverty trap leaving their growth stunted.

## **Introduction**

The Internet has been lauded as the 21<sup>st</sup> century version of electricity, heralding in a new era of growth and prosperity.<sup>5</sup> But how exactly does the Internet affect the growth of a country's GDP? How is a country impacted if they don't use the Internet in businesses? More importantly, what is the correlation between a restricted Internet and growth? These questions and others will be explored in this paper. In part one, a general framework will be constructed, setting out the relationship between Internet use, businesses Internet use, the ease of doing businesses, and GDP per capita growth within a country. The aim of this section is to highlight the economic necessity for governments to provide the infrastructure necessary to supply the Internet to its citizens and businesses. In part two, statistical regressions are performed to demonstrate the dire economic consequences of Internet filtering of politically sensitive websites. According to a recent study by the Boston Consulting Group, businesses that widely use the Internet grow at astounding rates compared to those that do not.<sup>6</sup> Not only is there a direct correlation between business Internet use and GDP per capita, but also investors find it easier to do business with countries in which the Internet is prevalent. Particularly in developing countries, policy shifts must be imple-

mented to free the Internet from restrictions so that businesses and individuals have full ability to participate when global market competitiveness is at an all-time high.

### *Description of key aspects of the data*

The basic measure of prosperity or growth used in this study, GDP per capita, has a mean of \$8,868 USD and a wide standard deviation of \$11,502 USD. This outlines the disparity between rich and poor countries in the world. The distribution of income for the countries used in this study is indicative of wider trends seen throughout the world. There are three distinct categories of countries: low income, with a GDP per capita of less than \$10,000 USD per year; middle income, between \$15,000 USD and \$27,000, and high income, over \$30,000 USD per year. The fact that the mean GDP per capita is contained in the “low income” group highlights just how skewed income distribution is throughout the world.

Business Internet use, the indicator that measures the level of Internet usage by businesses in a country, also has an uneven distribution. The mean of this indicator is 4.03 and the standard deviation is 0.96. As can be seen by the histogram in Figure 1, while this distribution is more normally dispersed than GDP per capita, there is a large divide between two types of countries—those that use the Internet in businesses to a low to moderate degree, and those that use the Internet in businesses extensively. The reason for this rift between the two country types will be discussed in detail below.

## **SECTION 1 – Internet Availability**

*There is a positive relationship between GDP per capita and business Internet use*

The positive correlation between Internet use among businesses and GDP per capita has been used in the past to demonstrate the Internet's positive affect on commerce. For this report, a Business Internet Use Score was determined from data taken from the World Bank, scoring countries from zero to seven, with seven indicating the highest level of Internet use among businesses. The high correlation between business Internet use and GDP growth does exist, and using a sample data set, four groups emerge: "High Flyers," "Resource-Dependent," "Rising Stars" and "Laggers." (see Graph 2)

"High Flyers" consist of countries that have both a high GDP per capita as well as pervasive Internet use among businesses. All of the countries in this category are fully developed, such as Singapore, France, Finland and the United Kingdom. A very low level of Internet filtering, with no filtering of political websites, and very few filtering socially sensitive websites marks this group. The average number of Internet users is very high (81 per 100 people) as well as the GDP per capita (\$28,552 USD).

Finland, for example, has a small population and remote location, and relies on improving infrastructure and human capital to achieve high levels of prosperity. It has spent over 6.5% of its GDP on information and communication technology and has a business Internet use score that is among the highest in the world. Despite the fact that only 65% of its roads are paved, the number of broadband subscribers in Finland is among the world's highest. In part through high investment in technology, as well as policies that allow for unrestricted access to the Internet, Finland has experienced stable growth.<sup>7</sup>

The second category of countries, the "Rising Stars," have a low GDP per capita but have invested in the Internet with many of the countries quickly developing. This category consists of larger countries that are fighting to bring millions out of poverty, such as India, and countries with a record for success-

fully utilizing the Internet, such as Malaysia and Thailand. The “Rising Star” countries have a higher level of Internet filtering compared to the “High Flyers”, but not by much since extensive filtering was not measured in any of these countries. The number of Internet users is much lower than the “High Flyers” (31 per 100 people) and the GDP per capita is also relatively low (\$2,720 USD).

Malaysia is probably the best-known member of the “Rising Stars” category, due to its past decade of rapid growth. Spending a staggering 9.7% of its GDP on information and communication technology expenditure, it has been able to open up its markets to worldwide e-commerce communities. While Malaysia’s GDP per capita growth is not at the level of the “High Flyers”, it has seen movement in recent years, as the country has brought millions of people out of poverty, due, in part, to the market expansion caused by access to Internet.<sup>8</sup>

The third category is the “Resource-Dependent” countries, which have been able to attain a high GDP per capita despite relatively low levels of Internet use among businesses. These countries, including Qatar and Bahrain, rely on revenues from natural resources to boost their GDP. Pervasive Internet filtering is present in all of these countries, particularly related to politically and socially sensitive websites. While the number of Internet users is relatively high (61 per 100 people), the Internet is used in businesses less than in the “Rising Stars” category, while GDP is only slightly below that of the “High Flyers”.

Bahrain, an example of a resource-dependent country, has failed to take the necessary steps to open itself to the global e-commerce community. While its GDP per capita of \$21,240 USD falls near the level of the “High Flyers”, the number of Internet users is comparably much lower. Bahrain has had a history of censorship and arbitrarily arresting online activists.<sup>9</sup>

Lastly, the “Laggers” category contains countries that have

been stuck in one form of extreme poverty or another, and have been unable to generate substantial GDP growth or invest much in technological infrastructure. The countries lagging behind in business Internet use will have a difficult time attaining high levels of GDP growth per capita, unless they have natural resources. This group uses a moderate level of Internet filtering, and while the number of Internet users is only just below “Rising Stars” (27 per 100 people), it has much lower GDP per capita (\$1,799 USD). This group contains countries such as Algeria, Nigeria, Morocco, and Venezuela.

Also included in the category is land-locked Moldova, a low-income country that has failed to put in place policies that create incentives for businesses to use the Internet. While there has been a certain level of investment in technological infrastructure, not enough has been done for future sector growth.<sup>10</sup>

### *The link between Internet availability and use in businesses*

Another piece of this puzzle is the relationship between the level of Internet users in a country and the level of business Internet use (see Graph 3).

While this relationship is evident by the graph, the placement of the countries has changed, reflecting the discourse between having available Internet and utilizing it in businesses. “High Flyer” countries and most “Rising Star” countries outperform expected levels of business Internet use. The low levels of Internet filtering in these two categories have led to an increase of businesses freely using the Internet to maximize potential. Even “Rising Star” countries with a low level of Internet users boast exceptionally high levels of Internet business use, outperforming the “Resource-Dependent” countries.

All of the “Resource-Dependent” countries and most of the “Lagger” countries, both of which have moderate to high levels

of Internet filtering, underperform in the level of business Internet use relative to the level of Internet users. While the “Resource-Dependent” countries are able to provide a high quality of life for many of its citizens despite Internet filtering, the “Laggers” pay the highest price for restricting the Internet. Model 1 demonstrates this positive correlation, with Internet users (I\_users) as the dependent variable and business Internet use (Bsn\_Iuse) as the independent variable, with an adjusted R-squared figure of .52 and is statistically relevant at a 95% confidence interval.<sup>11</sup>

*It is easier to do business in countries that use the Internet widely*

While a higher level of Internet use among businesses is most definitely a positive result of a free Internet, this variable says little about the business environment of the country created from high levels of Internet use. Introduction of the “Ease of Doing Business” measure is necessary to better understand the role of the Internet in businesses development. Model 2 places “Ease of Doing Businesses” (Ease\_bsn) as the dependent variable, and the number of Internet users (I\_users) as the independent, achieving an adjusted R-squared figure of .62 at a 95% confidence level.

This correlation signifies that *for every additional twenty Internet users (per 100) there is a 15.5% improvement in the ease of doing business*. Internet restrictions aside, this illustrates the integral importance of a widely available Internet, especially in developing countries. The ramifications of this are significant in many areas. For example, Foreign Direct Investment (FDI) increases drastically after it is proven that a country is easy to deal with economically. However, even countries that have a moderate level of Internet penetration must continue to build infrastructure for small businesses as they are a primary driving force of growth. Much initial FDI in the information technology sector focuses on large telecommunications companies, leaving small businesses



without access to the technology needed to spur growth.<sup>12</sup> Countries that are able to provide Internet infrastructure for small and medium-sized enterprises (SMEs) are able to best capture the additional added benefit of the Internet; SMEs that use the Internet extensively export and grow twice as much as others.<sup>13</sup>

All countries in the “High Flyers” category have both a high level of Internet users as well as good businesses environments. Additionally, it is not just “High Flyers” that benefit from a high number of Internet users; in fact, *doing business is simpler in all countries with high Internet use*. If a country has more than sixty Internet users (per 100), then the country as a whole falls in the top quartile on the “Ease of Doing Business” scale. While a fair amount of noise does exist, the correlation holds up across all country categories. For many businesses, access to the Internet is a driving force for innovation, e-commerce, and logistics. In developed and many developing countries, having a company website has become an integral part of business models; 69% of all OECD countries now have a website, and 35% use these websites for purchasing purposes.<sup>14</sup> These e-commerce trends will continue to propel countries to further growth, as inclusion into a web-integrated society is becoming more and more of a necessity for high-level development.

While this is a relationship that might be qualitatively understood, further data collection and analysis is required to understand the true extent of why boosting a country’s Internet infrastructure is so important to future growth. Much more research is needed in this field to assist developing countries in technology infrastructure policy. For example, the use of the Internet in SMEs needs to be examined. If there were a strong correlation between small business Internet use and growth of these businesses, governments would be more willing to propose policies that would make the Internet more readily available. In the 21<sup>st</sup> Century, the facility of doing business with a country depends strictly on how

well that company is connected in the globalized world. Countries with advanced e-commerce, telecommunication capabilities and smart logistics are where business is done easily. Conversely, if a country is lagging behind in Internet availability, they will be left behind as businesses gravitate towards countries that are more conducive to business and Internet ease.

## **SECTION 2 – Internet Freedom**

*In countries where Internet freedom is restricted, business Internet use is less prevalent*

In order to fully understand the impact of Internet restriction policies, Internet Freedom indicators are introduced. The original data set by the OpenNet Initiative consisted of four different measures of restriction: Political, Social, Conflict, and Internet Tools (see Appendix 1 for more details on each measure). Of these, the only one that yielded statistical significance was the first indicator—political restrictions. There is no correlation between per capita GDP, business Internet use, ease of doing business or number of Internet users with the other three variables. Understanding the exact reasoning behind this requires further examination. For example, how can the filtering of Internet tools, such as email accounts, not directly correlate with a country's GDP? These questions require the collection of a much larger data set, including how individual websites or services are filtered. For now, the best that can be done is use what is available, the "Internet Freedom – Political" variable. For the rest of this report, this variable will be used to demonstrate the effect of a restricted Internet on a country's economy.

Model 3 is the first regression using the Internet Freedom – Political variable, which demonstrates the effect of a restricted Internet on the level of Internet use amongst businesses. This

regression produced an adjusted R-squared figure of .14, and a very low P value<sup>15</sup> at a 95% significance level. This regression shows the strong correlation between Internet filtering and how pervasive it is used in businesses – *business Internet use decreases 17.2% when restrictions are placed on the Internet*. As seen in Graph 2, the level of business Internet use has a direct relation to per capita GDP—thus demonstrating the profound impact a free Internet has on developing nations around the world.

*A country's GDP per capita is highly correlated with Internet filtering of political content*

Lastly, Model 4 demonstrates the relationship between a restricted Internet and GDP per capita. This relationship outlines the deep problem seen in many developing countries—there is a steep price to pay for restricting political content on the Internet. The point of concern for these countries should be focused on the adverse trends seen among countries that censor the Internet

Model 4, regressing Internet Freedom on GDP per capita, yields an adjusted R-squared figure of .041 and a low P value, significant at the 95% confidence level.<sup>16</sup> While much more needs to be done with this regression, it is statistically significant, and can be summarized in two ways. *Moving from no Internet filtering to "selective" Internet filtering, per capita GDP drops by almost \$3,800 USD, or over 34%. In addition, moving from no Internet filtering to "pervasive" filtering, GDP per capita drops by over \$7,500 USD or 70%.* This precipitous drop does, of course, relate to a host of other measures outside of Internet filtering, but the trend does exist and highlights the perverse effects of Internet filtering.

## Limitations of the Data

While all of the above results are statistically significant, there are

certain limitations of this data set that must be addressed. Firstly, the issue of linking GDP to any one variable does not provide the complete picture—GDP is of course affected by thousands of different components with Internet use and the level of Internet restriction representing just two of these components. To fully understand the extend of the relationship between GDP, Internet freedom and availability, an array of variables must be accounted for, such as technological infrastructure, human capital and access to ports.

In addition, to provide a more robust analysis, a larger and deeper data set must be collected. Although the 72 countries of this data set provide enough to prove the relationship, data from all countries would help the argument. Additionally, yearly statistics would be beneficial and would allow tracking of GDP growth, Internet use growth and changes in Internet freedom. The data collection mechanisms currently in place do not provide reliable information on such a large data set, meaning that more work must be done to buttress the evidence that an open, free and available Internet is one of the chief driving forces of economic growth.

## **Conclusion**

Despite the outlined qualifications, the relationship is clear: a free, open and available Internet leads to economic growth. The policy implications of this are apparent: governments must invest more in technological infrastructure in order to get countries out of the digital poverty trap. The Internet age is the first time when even poor, land-locked countries can easily trade with countries around the world. Further, already developed and developing countries are utilizing the Internet to promote growth in sectors where it was once thought impossible. If countries decide not to invest in infrastructure they are creating a measurable impedi-

ment to domestic as well as international economic prospects.

In addition to the concerns about infrastructure, this report outlined the serious economic effects of restricting politically sensitive websites; first by identifying how restricting the Internet freedom correlates with Internet use in businesses, followed by its relation to GDP per capita. Both of these measures are related to Internet freedom, with the impact on GDP being especially critical – countries with free Internet should expect to have a GDP per capita that is 70% higher than in those countries in which the Internet is highly restricted. For many countries around the world, such damage to its GDP is the difference between a robust and lagging economy. Governments must decide if restricting the Internet is worth the large cost in economic growth and commerce.

## **APPENDIX 1. An explanation of the data used**

Most of the data used for this paper comes from the World Bank Database ([data.worldbank.org](http://data.worldbank.org)), which provides current, open-source data from around the world. Most of this data was collected in the years 2010 and 2011. The Internet Freedom indicators are collected by the Open Net Initiative ([www.opennet.net](http://www.opennet.net)) and are available under a creative commons license. This data was collected over the period of 2007 to 2011, consisting of data on 72 countries, with rankings from zero (no filtering) to four (pervasive filtering) in four different areas of Internet Freedom:

- Political – Examines how restricted websites are on issues such as human rights, religious freedom, minority rights, and freedom of expression
- Social – Covers issues such as gambling, sexuality and illicit items
- Conflict/Security – Looks at issues such as armed conflict and border disputes
- Internet Tools – Investigates the restrictions on websites that provide email services, search capabilities, and Internet hosting

One of the central variables in this report is Internet Freedom - Political. It must be mentioned the problems with using this variable. Firstly, tests show that the residuals are not normally distributed and there are many outliers. However, the “outliers” are in fact simply those countries that have an Internet freedom score above zero, so they may not be omitted. In addition, while the mean of “Internet Freedom - Politics” is 1.15, there are no

variables that fall under this score – all are either at the “No evidence of filtering” level or somewhere in the area of where filtering has taken place.

Graph 1 uses a condensed data set, representing 27 countries from around the world that provide a visual snapshot of the effects of Internet use. For the regressions and all subsequent graphs, the full data set of 72 countries is used, representing countries from every continent and economic portion of the world. For more information on the variables used, see Appendix 2. For all statistical regressions performed in this study, the econometric software program STATA has been utilized.

## **APPENDIX 2. Explanation of Variables**

- Number of Variables – This data set is not a complete set of countries in the world, due to limitations of the “Internet Freedom” variable, central to the analysis.
- GDP - Per capita (GDP\_cap): 2010 USD. 2011 data, mostly taken from the World Bank website as well as a few IMF estimates - Bahrain, Iran, Libya, and Syria
- Internet Users (I\_users): The number of internet users in a country, per 100 people (World Bank, 2010)
- Internet Freedom Index (IF\_pol): from the OpenNet Initiative (opennet.net), data gathered from 2007 to 2011. Each country is scored from zero to four:

0 = No Evidence of filtering

1= Suspected Filtering

2=Selective Filtering

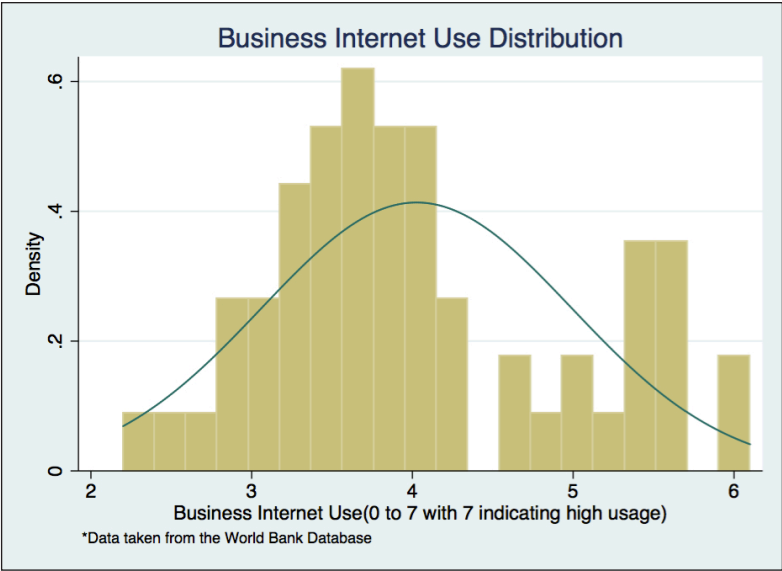
3=Substantial Filtering

4=Pervasive Filtering

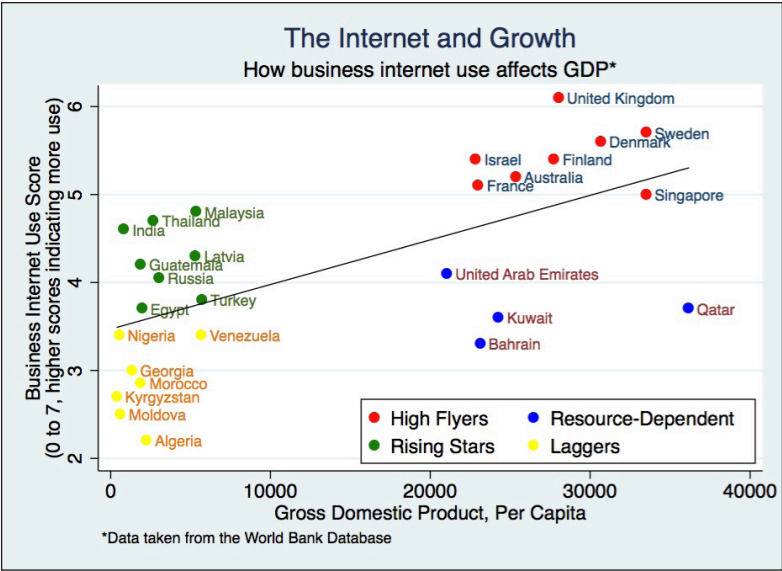
- Ease of Doing Business Index (Ease bsn): Ranking of 200 countries and territories, based on the number of business-friendly regulations – a lower score indicates a more business-friendly environment. (World Bank, 2011)
  
- Extent of Business Internet Use (Bsn Iuse): Governments were asked, “In your country, companies use the Internet extensively for buying/selling goods and services and for interacting with customers.” 1 = strongly disagree, 7 = strongly agree (World Bank, 2012)



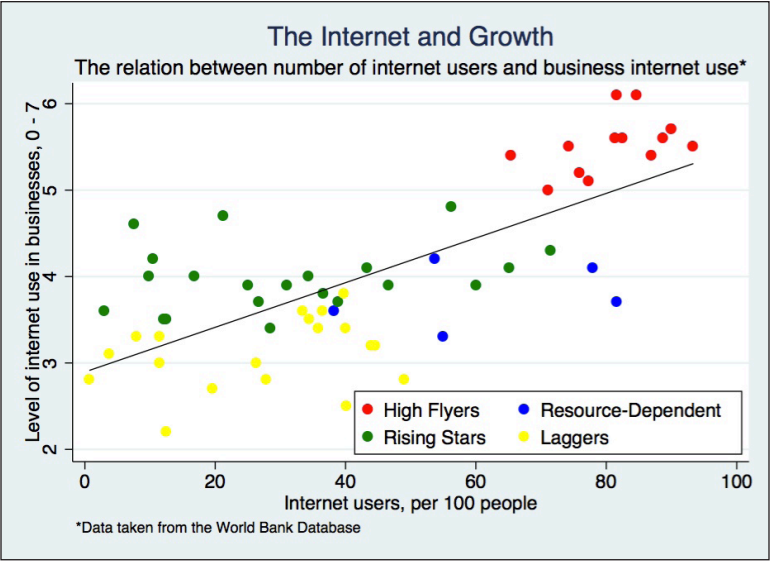
Graph 1



Graph 2



Graph 3



Graph 4

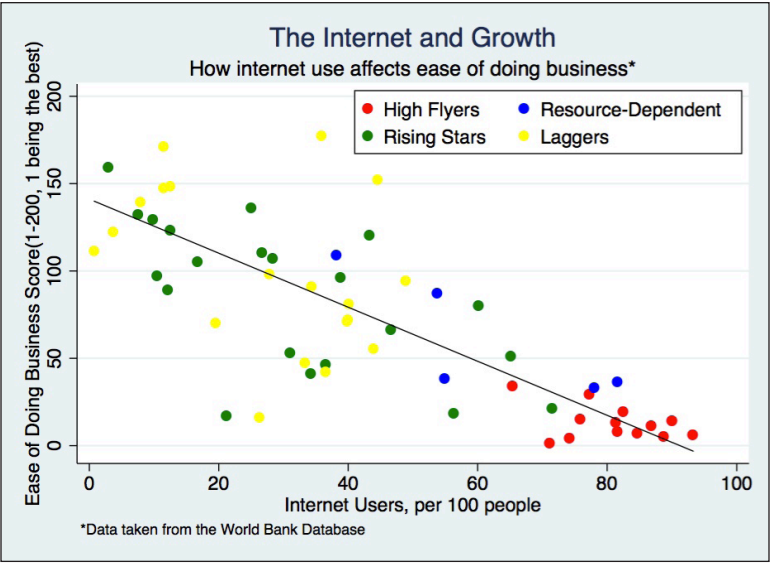


Table 1

Coefficient Table for Internet Freedom Models				
Dependent Variable	Model 1 I_users	Model 2 Ease_bsn	Model 3 Bsn_luse	Model 4 GDP_cap
Bsn_luse	20.599***			
Standard Error	(2.58)			
I_users		-1.547***		
Standard Error		(0.15)		
IF_pol			-0.299***	-1,900.243**
Standard Error			(0.09)	(947.60)
Constant	-39.192*** (10.68)	141.105*** (7.11)	4.299*** (0.15)	11,058.940*** (1,719.23)
Observations	58	69	58	72
R-squared	0.532	0.624	0.153	0.054
rmse	18.8	32.78	0.896	11265
Standard errors in parentheses				
*** p<0.01, ** p<0.05, * p<0.1				

## Notes

<sup>1</sup> The World Bank Open Data, *The World Bank*, [data.worldbank.org](http://data.worldbank.org)

<sup>2</sup> Open Net Initiative, [www.opennet.net](http://www.opennet.net)

<sup>3</sup> As defined through the Opennet Initiative, a “completely free” Internet indicates little to no evidence of filtering; a “partially free” Internet indicates selective filtering, and a “restricted” Internet indicates pervasive filtering. For more information on the methodology used to categorize Internet filtering, please visit [www.opennet.net](http://www.opennet.net).

<sup>4</sup> Matthieu Pélissier du Rausas, James Manyika, Eric Hazan, Jacques Bughin, Michael Chui, Rémi Said, “Internet matters: The Net’s sweeping impact on growth, jobs, and prosperity,” McKinsey Global Institute (May 2011)

<sup>5</sup> Robert D. Atkinson, Stephen J. Ezell, Scott M. Andes, Daniel D. Castro and Richard Bennett, “The Internet Economy 25 Years After .Com: Transforming Commerce & Life,” The Information Technology & Innovation Foundation (March 2010)

<sup>6</sup> David Dean, Sebastian DiGrande, Dominic Field and Paul Zwillenberg. “The Connected World: The Digital Manifesto: How Companies and Countries Can Win in the Digital Economy,” The Boston Consulting Group (January 2012)

<sup>7</sup> The World Bank’s World Development Indicators – Finland, <http://data.worldbank.org/country/finland>

<sup>8</sup> The World Bank’s World Development Indicators – Malaysia, <http://data.worldbank.org/country/malaysia>

<sup>9</sup> The World Bank’s World Development Indicators – Bahrain, <http://data.worldbank.org/country/bahrain>

<sup>10</sup> The World Bank’s World Development Indicators – Moldova, <http://data.worldbank.org/country/moldova>

<sup>11</sup> The nearer the R-squared is to 1.0, the better the model is at predicting one term with another. However, this number should not be used independently, as it does not indicate whether there is omitted variable bias, multicollinearity, or if the correct regression was used. For more information on the statistical analysis used for this report, please contact the author for access to the Stata programming file.

<sup>12</sup> Olivia Nottebohm, James Manyika, Jacques Bughin, Michael Chui and Abdur-Rahim Syed, "Online and upcoming: The Internet's impact on aspiring countries" McKinsey & Company (January 2012).

<sup>13</sup> Pélissié du Rausas, et al, "Internet matters: The Net's sweeping impact on growth, jobs, and prosperity"

<sup>14</sup> "The Future of the Internet Economy" OECD (June 2011). <http://www.oecd.org/dataoecd/24/5/48255770.pdf>

<sup>15</sup> The p-value is a probability estimation, represented as a number between zero and one, which indicates the likelihood of the means of two sets of data being different due simply to chance. Values that are closer to zero indicate a lower likelihood.

<sup>16</sup> While this R-squared figure is low, it does not discount the correlation between GDP per capita and Internet filtering. Understanding the complete picture of a variable such as GDP would require hundreds, if not thousands of variables.



# Barriers to High Income Status: The Case of China's Short-Lived Climate Pollutants

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## 1. Introduction

Over the past 30 years, China has experienced unprecedented economic growth. The country's economic expansion has corresponded with a spike in energy consumption, making China the largest emitter of greenhouse gases worldwide. While carbon dioxide emissions are responsible for 55% to 60% of anthropogenic global warming, increasing attention has been focused on a group of pollutants that compromise the remaining radiative forcing.<sup>1</sup>

Short-lived climate pollutants are a group of greenhouse gases, with relatively short atmospheric lifetimes ranging from a few days to decades. They include black carbon, methane, tropospheric ozone and hydrofluorocarbons (HFCs), which account for approximately 40% of current global warming, and have been

recognized as dangerous climate pollutants that negatively affect human health, agricultural production and the environment. For the most part, emissions result from primitive energy technologies including cook stoves, diesel engines or poorly regulated power plants. Yet cost effective technologies exist to reduce short-lived climate pollutants, and international collaboration to tackle the issue has gained momentum. However, reducing China's non-CO<sub>2</sub> emissions will be critical to mitigate the greenhouse gases. Additionally, non-CO<sub>2</sub> reductions could cut global warming in half by 2050, an objective initiated by the Intergovernmental Panel on Climate Change (IPCC).

This paper will first address the sources of short-lived climate pollutants in China, and then examine their impacts on agricultural production and workforce productivity. Then, abatement opportunities will be explored to assess both technological and economical feasibility in China followed by an assessment of political commitments to reduce pollutants under existing environmental policy. Reduction of short-lived climate pollutants, in particular black carbon, provides potential to improve China's air pollution. The conclusion will discuss whether these reductions will be sufficient to balance economic losses that result from environmental degradation and climate change impacts.

## **2. Analysis: Short-lived climate pollutants in China**

### *2.1 Sources of short-lived climate pollutants*

#### Black Carbon

Black carbon is a part of particulate matter that is released as a result of incomplete fossil fuel, biofuel and biomass combustion. The pollutant, commonly referred to as soot, absorbs solar radiation before returning it as heat, and thus, contributes directly to the earth's warming.<sup>2</sup> Black carbon further affects the formation



of atmospheric brown clouds, which change rainfall patterns and negatively impact agricultural yields.<sup>3</sup> Finally, as a key driver of air pollution, black carbon affects human health and is expected to contribute to 3.1 million worldwide deaths per year.

As industrialized countries continue to reduce black carbon emissions due to technology improvements, China has moved in the opposite direction. China's emissions have steadily increased, while its world share of emissions has grown drastically in recent decades. In 2009, China was the world's largest black carbon emitter, and accounted for 30% of the global inventory and more than 60% of Asia's emissions.<sup>4</sup> Although emissions from residential coal and firewood burning have declined from 85% in 1980 to 55% in 2009, they are still the key source of China's black carbon. Largely driven by low-technology coal use in rural China, industrial black carbon emissions have increased five-fold over the last 30 years, representing 32% of emissions today.<sup>5</sup> The transportation sector is the third largest source (11%) and is expected to increase due to growing use of heavy diesel vehicles.

### Methane & Tropospheric Ozone

Methane emissions occur as a result of natural processes as well as man-made sources, such as coal mining, oil and gas production, municipal waste and landfills, wastewater treatment and agricultural production (rice and livestock). The potent pollutant has a warming potential that is 25 times higher than CO<sub>2</sub><sup>6</sup>, with an atmospheric lifetime of 10 years, and thus, contributes to one third of current warming.<sup>7</sup> Further, methane has significant indirect effects as a precursor of tropospheric ozone with negative impacts on both human health and the environment.

Global methane emissions have remained relatively constant over the last 20 years at just below 3,000 MMT of CO<sub>2</sub> equivalents. China is the world's largest emitter with 20% of global emissions. While most methane sources have remained steady

over recent years, emissions from oil and gas mining have more than doubled between 2000 and 2005, and are expected to grow another 25% by 2020.<sup>8</sup> Tropospheric ozone is a greenhouse gas in the earth's lower atmosphere and is produced from emissions of precursors, including carbon monoxide, nitrogen oxides and volatile organic compounds such as methane. Methane is responsible for about two thirds of the increase in tropospheric ozone, which has a warming potential that is 1,000 times higher than CO<sub>2</sub> and can harm both human health and crop production.<sup>9</sup>

### Hydrofluorocarbons

HFCs are factory-made chemicals greenhouse gases replacing chlorofluorocarbons (CFCs) and hydrochlorofluorocarbons (HCFCs), which are predominantly used in refrigeration, air conditioning and insulating foams. While HFCs levels are still low in comparison to other greenhouse gases (<1%), they have more than doubled throughout the last decade and – if left unchecked – could increase to comprise 19% of global greenhouse gas emissions by 2050.<sup>10</sup> This is problematic as the warming potential of HFCs is 1,000 to 10,000 times higher than CO<sub>2</sub> with an atmospheric lifetime of less than 15 years.<sup>11</sup> The spike in HFC consumption will likely be driven by increased demand for refrigeration and air conditioning units from developing countries including China and India, which are expected to overtake developed countries by 2020 and exceed them by 800% in 2050.<sup>12</sup>

## *2.2 The impacts of short-lived climate pollutants*

### Impacts on health and work productivity

Short-lived climate pollutants negatively affect human health, both directly as contributors to air pollution and indirectly through their effects on temperature and climate change. It is estimated that 80% of Asia's population is exposed to PM<sub>2.5</sub>

concentrations that are two to five times higher than WHO annual mean guidelines of  $10\mu\text{g}/\text{m}^3$ .<sup>13</sup> As human capital is key to economic output, the increase of black carbon and ozone emissions comes at a heavy cost and consequently reduces China's economic growth.

Despite improvements in recent years, air pollution still poses significant challenges to public health in China. Poor air quality is associated with various forms of cancers as well as respiratory diseases and heart diseases, which together accounted for more than 80% of deaths in 2009.<sup>14</sup> In examining the effects of short-lived climate pollutants, particulate matter (as a result of black carbon emissions) causes acute symptoms and chronic disease of the cardiovascular and pulmonary system, and doubles the childhood risk of pneumonia. As such, the WHO attributed 380,000 premature deaths to indoor pollution and 275,000 premature deaths to urban air pollution, which is still largely caused by household fuel combustion and poor indoor ventilation.<sup>15</sup> A disproportionate share of the disease burden is still carried by China's urban population as well as women, girls and young children who spend most time indoors. While ozone similarly affects lung function and respiratory disease, the effect of particulate matter outweighs that of ozone significantly.<sup>16</sup>

Approaches to quantify the economic consequences of ozone and PM emissions vary. In a 2007 study, World Bank researchers applied the 'value per statistical life' (VSL) method that measures the maximum willingness to pay for a life, and thus the trade-off between money and health risks. It indicates that in 2003, the total health costs related to outdoor air pollution in China was valued with 157 billion yuan,<sup>17</sup> approximately 3.8% of 2003 GDP.<sup>18</sup> A more holistic approach calculates adjusted net savings as an estimate for China's overall sustainability,<sup>19</sup> and estimated China's losses due to pollution and environmental degradation as 10.51% of China's 2008 gross national income (GNI).<sup>20</sup> Fur-

ther, examining how pollution impacts productivity, Graff-Zivin and Neidell (2012) found that a 10 parts per billion reduction in ozone exposure is associated with a 5.5% increase in productivity of a worker in the agricultural sector in California. Similar preliminary results exist for particulate matter, which show a decline in worker productivity between 1.3% and 3.3% depending on pollutant.<sup>21</sup> While this approach does not allow for holistic cost estimates, it allows the estimation of financial costs of both firms and industries. Given the high levels of pollution in China, similar if not exacerbated effects can be expected.

### Impacts on Agricultural Productivity

Despite the relative decline of China's agricultural GDP over the past 20 years, China is still the world's largest agricultural producer, where commodities are important for both human consumption and to feed livestock. A decline in agricultural productivity as a result of climate can yield a substantial impact on the Chinese economy.

A broad range of research has examined and modeled the effects of short-lived climate pollutants on ecosystems, indicating high levels of ozone causing cellular damage to various staples, and in turn reduced crop yield. In examining China's most important staples, Aunan et al expect a 4% crop loss in rice production, a 5-15% crop loss of wheat, and a 7% decrease in maize production due to excess levels of ozone by 2020.<sup>22</sup> However, these figures do not account for indirect effects of short-lived climate pollutants, including reduced crop yield due to decreased solar radiation from atmospheric brown clouds, temperature shifts and changes in precipitation patterns. An economic valuation of crop losses suggests that East and Southeast Asia will face approximately \$3 billion losses in maize, whereas uncertainty about rice production is large as shortfall ranges from \$500 million to \$8 billion.<sup>23</sup>

### *2.3 Mitigation Measures & Policies*

While significant reductions in carbon dioxide emissions are needed to stabilize the global temperature rise to 2 degrees Celsius, the mitigation of short-term climate pollutants is critical to Chinese policy-makers for various reasons. It addresses air pollution and has clear health and economic benefits. Further, it can leverage existing and relatively low-cost technologies to curb emission and slow near-term global warming, which can give China bargaining power in negotiations on carbon dioxide reductions through the UN Framework Convention on Climate Change.

To further reduce air pollution from black carbon, and improve public health and crop yields, a number of mitigation measures exist. Traditional cooking and heating, which still comprise more than half of China's black carbon emissions, can be replaced with clean burning stoves and cleaner fuel, such as LPG or bio-gas – or at slightly higher costs with modern recovery ovens. Similarly, the replacement of coal with coal briquettes provides a low-cost opportunity to enhance indoor air quality. In addition, black carbon emissions from heavy Diesel vehicles have soared in recent years and will likely continue to rise. While China has implemented fuel efficiency standards for personal cars, better standards, such as diesel particle filters for light duty vehicles and changes for heavy-duty vehicles and off-road mobile machinery, have the potential to mitigate adverse effects. Yet cost estimates to increase fuel efficiency for these heavy-duty vehicles are very high at approximately \$300 to \$1,400 (USD) per ton of CO<sub>2</sub> equivalent abated.<sup>24</sup>

To curb methane emissions, the most effective mitigation measure is the recovery of fugitive emissions related to oil, gas and coal mining with approximate costs of \$70 (USD) per ton of CO<sub>2</sub> equivalent. A further low-cost option exists with the cap-

ture, separation and treatment of landfill gases from municipal waste, as well as anaerobic digestion with liquid manure management on large farms.<sup>25</sup> Under China's Clean Development Mechanism, a comprehensive program focused on capturing land fill gas and coal bed/mine methane, as of 2012 more than 300 methane reduction projects are underway in conjunction with foreign investment.

Overall, most abatement measures for short-lived climate pollutants are feasible for implementation in China. They largely build on technologies that are already in use in or outside of China, and could be made available through technology transfer or collaborative efforts. From an economic point of view, a 2012 Institute for Advanced Sustainability Studies workshop summary suggests that half of existing abatement measures could be implemented at net cost savings, comparing average costs of methane abatement with an estimated benefit of \$1,000 per metric ton of abatement.<sup>26</sup>

Domestic policies in China to mitigate short-lived climate pollutants  
Chinese domestic policy-makers should implement emission reduction policies for a number of reasons. The main drivers include negative health impacts from air pollution, energy supply-side pressure, a subsequent need to diversify the country's energy portfolio, and international pressure to reduce greenhouse gas emissions. Climate change policies have gradually developed since 1988,<sup>27</sup> and the recent Law on the Prevention and Control of Air Pollution has been in force since 2000.<sup>28</sup> The Chinese government released its first national strategy to address climate change in June 2007 through the National Development and Reform Commission. The National Climate Change Program was crafted upon existing legislation<sup>29</sup> and the 11<sup>th</sup> Five-Year Plan (2006-2010); it outlined the country's position on key climate change issues, set some quantifiable targets along with

key areas for climate change mitigation and adaptation. As such, China envisaged a 20% reduction in energy intensity over five years by 2010, measured as energy use per unit GDP, which was nearly reached with a reduction of 19.06%.<sup>30</sup>

Although technology improvements and low-carbon targets result in the reduction of black carbon and particulate matters, the mitigation of short-lived climate pollutants is not explicitly addressed in China's current climate change legislation. The most notable policies to reduce black carbon emissions were the Law on the Prevention and Control of Air Pollution, fuel economy standards, and taxes for motor vehicles in 2004. In order to capture methane emissions related to coal production, the National Climate Change Program aims to develop a Coal bed Methane Industry (CBM) by providing tax incentives, fee exemptions and preferential policies to CBM projects. However, the target of reducing 200 metric tons of CO<sub>2</sub> equivalents by 2010 was not reached. Despite heavy investments in liquefied natural gas and the construction of several pipelines, the 6% goal of primary energy to come from gas, predominantly methane, by 2016 will likely not be realized.<sup>31</sup>

Technology change to curb carbon dioxide emissions has long been the key element of China's climate change mitigation strategy. The 2005 Renewable Energy Law, for example, is aimed at expanding wind, biomass, hydro, and solar energy to 16% of all energy supplied by 2020. Similarly, a 5% target on installed nuclear power is planned by 2020, which will rise to 16% of energy generation by 2013. In addition, the central government has developed policies to improve the efficiency in power generation, appliances standards, and national building codes, and since 2010 has set up low-carbon and carbon trading pilot projects.<sup>32</sup> The 12<sup>th</sup> Five-Year Plan (2011-2015) expands market-based instruments and existing policies particularly in the area of private sector energy efficiency and calls for a reduction of en-

ergy intensity by 17% in comparison to 2010.<sup>33</sup> Furthermore, the Action Plan for Air Pollution Prevention and Control released in September 2013 sets aggressive ambient air quality improvement goals while outlining a number of concrete steps to be taken across all carbon emitting sectors.<sup>34</sup>

In summary, the progress of domestic policies to address greenhouse gas emissions and advance more sustainable development has been remarkable as measured by the number of programs in place to improve air, water and soil pollution, and energy efficiency. However, success is mixed as local government incentives focus on economic performance and lack effective enforcement mechanisms. Similarly, market instruments still fall short of optimal abatement levels, because pollution fees are lower than marginal abatement costs. As a result, the effectiveness of policies is difficult to assess. While environmental conditions continue to deteriorate, Zhang (2012) highlights that “the government stresses its efforts toward pollution abatement instead of increasing environmental quality.”<sup>35</sup> He further suggests that a stronger focus on post-pollution treatment is necessary, as economic growth will continue to put pressure on air quality and ecosystems.

#### China's involvement in international cooperation to reduce greenhouse gas emissions

In addition to challenges related to regional air and water pollution, trans-boundary problems pose unique challenges and require international cooperation. Key platforms include the United Nations Framework Convention on Climate Change (UNFCCC), the Clean Development Mechanism (CDM) and both bilateral and multilateral groups.

Due to the principle of “common but differentiated responsibility”, based upon historic cumulative emissions and the need for economic growth in developing countries, China is not sub-



ject to emission reductions under the UNFCCC's Kyoto Protocol. Nevertheless, global calls for action have become louder as China's emissions and negative environmental impacts increase. Thus, since 2007, despite initial resistance, the national government has summarized greenhouse gas inventories and mitigation measures in annual submissions to the UNFCCC. While the current reporting acknowledges the importance of non-CO<sub>2</sub> greenhouse gases briefly, focus is primarily set on the reduction of methane in the building material and chemical industry, agriculture, and waste treatment without further stipulating quantitative targets.<sup>36</sup>

Furthermore, China is a participant of the Clean Development Mechanism created under the Kyoto Protocol, which grants carbon credits to developed country investments in low-carbon technologies in developing countries. As of 2012, China has 4,034 projects underway, of which 8.5% of projects provide funds for HFC and Methane reductions, 80.3% focus on hydro and wind energy, and the remaining projects predominantly enhance energy efficiency and carbon dioxide reductions.<sup>37</sup>

Outside the UNFCCC, China participates in bilateral and multilateral platforms to reduce short-lived climate pollutants, including the Global Alliance for Clean Cookstoves, the Global Research Alliance on Agricultural Greenhouse Gas and the Global Methane Initiative. These private-public partnerships are voluntary initiatives, consisting of governmental and non-governmental stakeholders to share both knowledge and best-practices, and bear potential funds for technology change in China. Although bi-lateral partnerships exist with many member countries, China has not yet become part of the newly formed and promising Climate and Clean Air Coalition to Reduce Short-Lived Climate Pollutants (CCAC). The non-binding voluntary coalition was formed in early 2012 and has emerged as a key platform to raise awareness of SLCP impacts and mitigation op-

tions. The group also serves as a catalyst to foster national and regional action with the sole expectation that members endorse “meaningful action to address SLCPs.”<sup>38</sup>

### **3. Conclusion: Can China avoid the middle-income trap?**

China is the largest emitter of short-lived climate pollutants, which adversely affect the country’s air quality, human health and agricultural production. Mitigation measures are technologically and financially feasible and provide economic as well as health benefits to the country. While some initiatives are underway and air quality has been deemed a government priority, most of China’s environmental and climate change policies have focused on technological improvements to reduce carbon emissions, which only indirectly reduce black carbon, methane and tropospheric ozone.

Despite recent efforts, China’s focus on pro-growth policies has come at economic costs. Given that China’s environment has already affected GNI in the past, and is continuing to deteriorate, the question arises: can China continue its growth path despite economic losses related to reduced worker productivity, worse agricultural yields and other climate change effects the country may face in the future?

Much will depend on political will for a more rapid transition to a low-carbon economy through improved pollution reduction or post-pollution treatment. If policy-makers are unable to improve urban air quality, the attraction of high-skilled labor – whether from China or abroad – may prove difficult and pose a serious barrier to China’s economic upward transition.

Yet despite improving regulatory frameworks and significant investments in clean technology, negative externalities from fossil fuel use are not expected to change significantly as “China’s

past, present, and future is coal.”<sup>39</sup> Fossil fuels continue to dominate China’s energy mix, and, if unchecked, carbon dioxide emissions and associated particulate matter are expected to increase at least in the short term. In addition to indirect economic costs from air pollution, international climate change policy envisages a universally binding agreement to cap CO<sub>2</sub> emissions by 2020. Such a treaty would need to include both developed and developing countries, and will likely create costs to China that could further hinder economic development. At the same time, urgent attention to address climate change mitigation and adaptation is critical to Chinese policy-makers, as the country is dependent on water supply from surrounding glaciers as well as precipitation to meet agricultural and ultimately food security needs.

Given China’s continuing carbon emissions from coal and oil, international pressure to mitigate climate impacts, and the urgent need to reduce air pollution, the reduction of short-lived climate pollutants bear high potential in the near term for both environmental protection and economic development. As abatement opportunities are financially feasible and results are expected quickly, China could benefit economically from improved air quality, as well as demonstrate leadership in a new emerging arena - both of which are needed to attract resources that drive social and economic development and upward mobility out of the middle-income trap.

## Notes

<sup>1</sup> Radiative forcing is a measure of the influence a factor has in altering the balance of incoming and outgoing energy in the Earth-atmosphere system and is an index of the importance of the factor as a potential climate change mechanism. Lenny Bernstein, et al., “Synthesis Report: An Assessment of the Inter-

governmental Panel on Climate Change," Climate Change Synthesis Report, IPCC (2007) [http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4\\_syr.pdf](http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr.pdf)

<sup>2</sup> Black Carbon remains in the atmosphere for less than two weeks but its warming potential is 460-1500 times stronger than that of CO<sub>2</sub>.

<sup>3</sup> Veerabhadran Ramanathan and G. Carmichael, "Global and regional climate changes due to black carbon," *Natural Geoscience*, vol. 1 (2008): 221

<sup>4</sup> "Reducing Black Carbon Emissions in South Asia: Low Cost Opportunities," Office of International and Trade Affairs, U.S. Environmental Protection Agency (2012)

<http://www.unep.org/ccac/Portals/24183/docs/BlackCarbonSAsiaFinalReport5.22.12.pdf>

<sup>5</sup> Ibid.

<sup>6</sup> Over a 100 years; 72 times higher over 20 years

<sup>7</sup> "The Global Methane Initiative: Factsheet," The Global Methane Initiative (2011) <https://www.globalmethane.org>

<sup>8</sup> Ibid.

<sup>9</sup> "HFCs: A Critical Link in Protecting Climate and the Ozone Layer. United Nations Environment Programme (2011) [http://www.unep.org/dewa/Portals/67/pdf/HFC\\_report.pdf](http://www.unep.org/dewa/Portals/67/pdf/HFC_report.pdf)

"Primer on Short-Lived Climate Pollutants," Institute for Governance & Sustainable Development (November 2012) <http://igsd.org/documents/Primer-onShort-LivedClimatePollutantsFeb192013.pdf>

<sup>10</sup> Guus J. M. Velders, David W. Fahey, John S. Daniel, Mack McFarland, and Stephen O. Andersen, "The Large Contribution of Projected HFC Emissions to Future Climate Forcing," *Proceedings of the National Academy of Sciences of the United States of America*, First Edition (May 2009)

<sup>11</sup> ibid.

<sup>12</sup> ibid.

<sup>13</sup> Ramanathan and Carmichael, "Global and regional climate changes due to black carbon"

<sup>14</sup> Janet Larsen, "Cancer Now Leading Cause of Death in China," Plan B Updates, Earth Policy Institute, May 25, 2011, <http://www.earth-policy.org/>

plan\_b\_updates/2011/update96

<sup>15</sup> U.S. EPA, "Reducing Black Carbon Emissions in South Asia: Low Cost Opportunities"

<sup>16</sup> "Integrated Assessment of Black Carbon and Tropospheric Ozone: Summary for Decision Makers," United Nations Environment Programme and World Meteorological Organization (2011) [http://www.unep.org/dewa/Portals/67/pdf/Black\\_Carbon.pdf](http://www.unep.org/dewa/Portals/67/pdf/Black_Carbon.pdf)

<sup>17</sup> Authors take into account direct and indirect hospital costs (3.9b), costs related to chronic bronchitis (42.5b), and costs associated with excess death (119.9b). "Cost of Pollution in China: Economic Estimates of Physical Change" World Bank (2007) <http://documents.worldbank.org/curated/en/2007/02/7503894/cost-pollution-china-economic-estimates-physical-damages>

<sup>18</sup> Ibid.

<sup>19</sup> Calculated as: gross saving – debt and depreciation + education investment – cost of environmental pollution – cost of resource degradation.

<sup>20</sup> "Adjusted Net Saving," World Bank (2010) <http://go.worldbank.org/3AWKN2ZOY0>

<sup>21</sup> Tom Chang, Joshua Graff-Zivin, Tal Goss & Matthew Neidell, "Particulate Pollution and Productivity of Pear Pickers," *National Bureau of Economic Research Working Paper*, no. 19944 (February 2014)

<sup>22</sup> However, while trends are comparable across models, it must be noted that figures on crop loss vary substantially.; Kristin Aunan, Terje Koren Berntsen and Hans Martin Seip,

"Surface Ozone in China and Its Possible Impact on Agricultural Crop Yields," *Ambio*, vol. 29, no. 6 (September 2000) pp. 294-301

<sup>23</sup> "Integrated Assessment of Black Carbon and Tropospheric Ozone"

<sup>24</sup> Costs are global estimates; Ibid.

<sup>25</sup> Ibid.

<sup>26</sup> "Short lived Climate Forcers: Pathways to Action," Workshop Summary, Institute for Advanced Sustainability Studies (2012) [http://igsd.org/climate/documents/SLCP\\_Workshop\\_March\\_2012\\_summary.pdf](http://igsd.org/climate/documents/SLCP_Workshop_March_2012_summary.pdf)

<sup>27</sup> Iselin Stensdal, "China's Climate-Change Policy 1988-2011: From Zero to Hero?" FNI Report, Fridtjof Nansen Institute (July 2012) <http://www.fni.no/>

doc&pdf/FNI-R0912.pdf

<sup>28</sup> "Country Analysis Brief: China" U.S. Energy Information Agency (2013) <http://www.eia.gov/countries/cab.cfm?fips=ch>

<sup>29</sup> Such as the Renewable Energy Law (2005), a Medium- and Long-Term Development Plan for Renewable Energy

<sup>30</sup> Wee Kean Fong, "China's Latest Energy Consumption Data Reveals New Opportunities and Challenges," *ChinaFAQs*, World Resource Institute, November 5, 2012 <http://www.chinafaqs.org/blog-posts/chinas-latest-energy-consumption-data-reveals-new-opportunities-and-challenges-0>

<sup>31</sup> Two pipelines have been completed and two additional pipelines are close to completion as of 2012.

<sup>32</sup> These pilot projects were established in Guangdong, Hubei, Liaoning, Shaanxi and Yunnan provinces; "China's Carbon Emission Trading: an Experiment to Watch Closely," *Policy Brief*, Stockholm Environment Institute (2012) <http://www.sei-international.org/mediamanager/documents/Publications/china-cluster/SEI-PB-2012-China-carbon-markets.pdf>

<sup>33</sup> From the 1,000 Enterprise Efficiency program in 2006 to the 10,000 Energy Consuming Businesses Program in 2011.

<sup>34</sup> "The State Council Issues Action Plan on Prevention and Control of Air Pollution Introducing Ten Measures to Improve Air Quality," The Ministry of Environment Protection (September 12, 2013) [http://english.mep.gov.cn/News\\_service/infocus/201309/t20130924\\_260707.htm](http://english.mep.gov.cn/News_service/infocus/201309/t20130924_260707.htm)

<sup>35</sup> Junjie Zhang, "Delivering Environmentally Sustainable Economic Growth: The Case of China," Asia Society (September 2012) [http://asiasociety.org/files/pdf/Delivering\\_Environmentally\\_Sustainable\\_Economic\\_Growth\\_Case\\_China.pdf](http://asiasociety.org/files/pdf/Delivering_Environmentally_Sustainable_Economic_Growth_Case_China.pdf)

<sup>36</sup> "2012 Long-Term Reliability Assessment," North American Electric Reliability Corporation (November 2012) [http://www.nerc.com/files/2012\\_LTRA\\_FINAL.pdf](http://www.nerc.com/files/2012_LTRA_FINAL.pdf)

<sup>37</sup> "CDM/JI Pipeline Analysis and Database," UNEP Risoe Centre, <http://www.cdmpipeline.org>

<sup>38</sup> "Coalition Framework," The Climate and Clean Air Coalition to Reduce Short-Lived Climate Pollutants (2012) <http://www.unep.org/ccac/Port>

tals/24183/docs/CoalitionFramework.pdf

<sup>39</sup> Julio Friedman, "Fossil Energy and China's Future," Public Talk at University of California, San Diego, School of International Relations, January 29th 2013.





