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Can Russia Maintain European Demand of Natural Gas in a Changing World?

Editorials
Zombie Lending and Soft-Budget Constraints in China’s State-Owned Sector

Research
Quantifying the 2018 Trade War between the U.S. and China in Terms of Welfare and Trade Effects
Dear Readers,

Welcome to the third issue of the International Finance and Economics Review (InFER)—the student run, peer-reviewed publication of the Master of Arts in International Economics and Finance (MIEF) program. We are thrilled to have continued the InFER legacy as the second cohort to lead the publication, and we hope you enjoy the growth and development it has undergone since Issue 2.

In this third issue of InFER, we bring a new Faculty Section. Here you will find interviews with faculty on recent developments in their areas of expertise and a new research piece by one of MIEF’s professors. We have also added a survey, to gauge faculty as well as current MIEF student and alumni opinions on some of the current economics topics we hear about in the news and discuss in the hallways of Johns Hopkins School of Advanced International Studies (SAIS). We hope these additions highlight the wonderful, bright, and intelligent faculty, student, and alumni network that make our time at Johns Hopkins SAIS so impactful.

In this issue, we are excited to continue publishing the work of our colleagues at SAIS outside of the MIEF program alongside the work of MIEF students and alumni. We feel extremely lucky to have had a record-breaking number of submissions, increased engagement on social media, and participation in the InFER happy hour, which we see as our publication becoming fully integrated into the larger Johns Hopkins SAIS community. To everyone who submitted and supported us: we are incredibly thankful!

With these new additions, the MIEF 2018-2019 cohort is pleased to bring to you InFER Issue No. 3. As we accept our diplomas and hand the publication leadership off to the 2019-2020 cohort, we hope that InFER will continue to grow with MIEF. Thanks for reading!

Regards,

Sydney Levine
Editor-in-Chief

Apoorv Bhargava
Senior Editor

Alejandro Fiorito
Senior Editor
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Professor Heiwai Tang

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Yulia Vnukova

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InFER Issue No. 3

JUNE 2019 | InFER 3
Financial Inclusion amongst Indian Households: Caste and Rural-Urban Divide

Apoorv Bhargava

Envisioned in 1911, Joseph Schumpeter’s theory of “creative destruction” states innovation and entrepreneurship as driving forces of economic growth. Schumpeter viewed financial development, as an essential element of this process. Though King and Levine (1993) rejected the idea that finance follows economic growth, they argued that financial development could simply be a leading indicator of growth, rather than a cause. In the past two decades, India (along with China) has emerged as a global growth engine. Global trends have shown that in order to achieve inclusive development and growth, the expansion of financial services to all sections of society is of utmost importance.

Caste System and The Rural – Urban Divide in India

The caste system in India is the quintessential social and individual identifier. Since its inception, it divided people on the basis of their occupation like teaching and preaching (Brahmins), kingship and war (Kshatriya), business (Vaishya), labor (Shudra), and, the untouchables (Dalits), creating various barriers between different sections of the society. Additionally, the sheer status of residency in an urban or rural area affects access to these financial services. This brief provides a deeper, data-driven insight to further strengthen the scope of policies which drive financial inclusion. It examines the evolution of lending from the formal sector through caste and geolocation disparities based on two nationally representative datasets of India.

This brief uses the household level data from the Indian Human Development Survey (IHDS), as conducted by the researchers from the National Council of Applied Economic Research, New Delhi (NCAER) and the University of Maryland in 2004-05 (IHDS-I) and 2011-12 (IHDS-II). The brief examines two measures: a) access to formal sector as measured by the answer to the question “Did you borrow or take any financial loan in the last 5 years?” and b) the monthly interest rate charged on these loans.
The borrowing source of any financial loans during the last 5 years is further classified into formal or informal. Formal sector is comprised of Banks, NGO, Community/Credit Group, Government Programs, Self-help group, Kisan (Farmer) Credit Card, Provident Fund/Life Insurance Corporation or Other Credit Sources. Whereas informal sources constitute employees, money lenders, friends, relatives and suppliers/middlemen/builders. Castes have been aggregated into upper caste and lower caste. Brahmin, Forward/General are put into upper caste whereas Dalits/Scheduled Caste (SC’s), adivasis/Scheduled Tribes (ST’s) and Other Backward Classes 1 (OBC’s) form the lower castes. The survey uses the 2001 census to identify every primary sampling unit that was in an urban area.

Credibility of Survey Data

The 2001 national Census of India estimates that there are 194.0 million households in India, which is comparable to our estimate from IHDS-I of 192.1 million households. The 2011 Census data puts the estimated population to be 1,210.6, which is again close to our estimate of 1,212.3 million from the IHDS-II. To further ensure credibility at a micro level, a comparison of the distribution of population of the 2 major religions (contributing to about 95% of the population) in India by caste from the National Sample Survey Office (NSSO), with the two datasets is shown below (Table 1). Clearly, the NSSO estimates closely match with those from IHDS-I. However, the IHDS-II survey, in 2011-12 differs in the split for Muslims, which can be attributed to the evolution of population over time.

Based on the 2 datasets, 44.3% and 53.7% of the total households had borrowed in the last 5 years, in 2004-05 and 2011-12, respectively. Using this sub-sample of those who had borrowed in the last 5 years, the next section examines caste and geolocation disparities through lending sources and mean interest rate differential on these loans. Of those who had borrowed, only 34.2% and 43.2% borrowed from formal sources in 2004-05 and 2011-12 respectively.

Table 1: Distribution of Population of the 2 Major Religions in India by Caste Categories

<table>
<thead>
<tr>
<th>Source</th>
<th>Religion/Caste</th>
<th>SCs</th>
<th>STs</th>
<th>OBCs</th>
<th>Others</th>
<th>All</th>
</tr>
</thead>
<tbody>
<tr>
<td>61st NSSO Survey*</td>
<td>Hindu</td>
<td>22.2</td>
<td>9.1</td>
<td>42.8</td>
<td>25.9</td>
<td>100</td>
</tr>
<tr>
<td>2004-2005</td>
<td>Muslim</td>
<td>0.8</td>
<td>0.5</td>
<td>39.2</td>
<td>59.5</td>
<td>100</td>
</tr>
<tr>
<td>IHDS-I</td>
<td>Hindu</td>
<td>24.7</td>
<td>7.4</td>
<td>43.1</td>
<td>24.9</td>
<td>100</td>
</tr>
<tr>
<td>2004-2005</td>
<td>Muslim</td>
<td>1.5</td>
<td>0.3</td>
<td>40.7</td>
<td>57.6</td>
<td>100</td>
</tr>
<tr>
<td>IHDS-II</td>
<td>Hindu</td>
<td>25.0</td>
<td>7.7</td>
<td>43.1</td>
<td>24.2</td>
<td>100</td>
</tr>
<tr>
<td>2011-2012</td>
<td>Muslim</td>
<td>0.8</td>
<td>0.6</td>
<td>52.3</td>
<td>46.3</td>
<td>100</td>
</tr>
</tbody>
</table>

* Distribution obtained from merged sample of Schedule 1 and Schedule 10 of NSSO 61st Round Survey

1 The Indian constitution describes these as “socially and educationally backward” castes
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Lending Sources

Graph 1: Informal Sector Borrowing

a. Caste based Discrimination
The share of informal borrowing for both upper and lower caste households decreased by 5% and 10% respectively, from 2004-05 to 2011-12. Additionally, 18% more households from lower caste borrowed from informal sources in 2004-05. This gap reduces to 13% in 2011-12, suggesting an increase in formal lending. This decrement could imply more access of the lower caste to formal sources.

b. Rural-Urban Divide
The lending patterns in 2004-05 suggest no significant divide in rural-urban areas. However, this gap becomes significant in 2011-12, which can be attributed to increase in formal lending by 11% in urban areas as compared to 8% increase in rural areas. This implies a deeper penetration of formal sector lending in the urban areas relative to rural ones.

Mean Interest Rate Differentials

a. Caste based Discrimination
The monthly mean interest rates charged for the largest loan to the upper and lower caste households are statistically different in both 2004-05 and 2011-12. This differential decreases from 67 basis points in 2004-05 to 51 basis points in 2011-12. This is evident from the narrowing of the gap as exhibited in the left panel of Graph 2, attributing to the increase in formal lending to the lower castes.

b. Rural-Urban Divide
The right panel in Graph 2 suggests a steep decline in the monthly interest rate differential from 41 basis points in 2004-05 to 18 basis points in 2011-12. The interest rate differential between the rural and urban areas in 2011-12 is statistically significant at 5% level but not at the 1% level. Again, the results are driven by the steep decline in interest rate charged to the rural areas. This might suggest more marginal benefit of formal lending in rural areas.
Financial Inclusion amongst Indian Households: Caste and Rural-Urban Divide

Graph 2: Mean Interest Rates

<table>
<thead>
<tr>
<th>Caste Division</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.50%</td>
</tr>
<tr>
<td>2.00%</td>
</tr>
<tr>
<td>1.50%</td>
</tr>
<tr>
<td>1.00%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>IHDS-I</th>
<th>IHDS-II</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.72%</td>
<td>1.64%</td>
</tr>
<tr>
<td>2.39%</td>
<td>2.15%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Rural-Urban Divide</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.50%</td>
</tr>
<tr>
<td>2.00%</td>
</tr>
<tr>
<td>1.50%</td>
</tr>
<tr>
<td>1.00%</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>IHDS-I</th>
<th>IHDS-II</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.91%</td>
<td>1.91%</td>
</tr>
<tr>
<td>2.32%</td>
<td>2.09%</td>
</tr>
</tbody>
</table>

Conclusions

Lending sources suggest that lower caste households saw an increase of 10% to formal sector lending from 30% in 2004-05 to 40% in 2011-12. This is double the increment of 5% for the upper castes from 48% in 2004-05 to 43% in 2011-12. Similarly, the mean interest rate differential between upper and lower castes decreased from 67 basis points in 2004-05 to 51 basis points in 2011-12. Both these results provides credence to the view that progress has been made to improve access to formal sector lending for lower castes.

However, the rural-urban divide seems to be the more worrisome case. The lending patterns reveal an increase in formal lending by 11% in urban areas as compared to 8% increase in rural area. This implies that rural areas have been unable to tap into formal sources as fast as their urban counterparts. A much steeper decline in the monthly interest rate differential from 41 basis points in 2004-05 to 18 basis points in 2011-12 suggest otherwise. The author argues that the unchanged mean interest rate in urban areas over time despite more formal lending relative to rural areas might just imply a higher marginal effect of formal lending on mean interest rate in rural areas, which isn’t surprising.

Though, access to formal sector has improved across caste, with informal lending still greater than 50%, clearly there is a lot to be achieved. This brief recommends to lay more emphasis on rural areas to design further financial inclusion policies. Moreover, a detailed research exploring the interactions between caste and the rural and urban divide would lead us closer to a comprehensive view of this discrimination.

Limitations

The financial data, i.e. the source of the loans and the interest rates used are available only for the largest loan taken by the households in the past 5 years. This article argues that this would be a good representative of the household’s choice of loan source. Especially given the loan size, the author hypothesize that the households would tap into the best source available to them. There might be a case in which households borrow informally, even though if they have access to formal loans, but it could be argued that this would be a small fraction of the total household population. Additionally, any
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measurement error in reporting interest rates would also limit the conclusion of this brief.

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Can Russia Maintain European Demand of Natural Gas in a Changing World?

Joniel Cha

Introduction

Russia contains one of the largest, proven, natural gas reserves in the world. It is also the second largest producer of natural gas, accounting for 17.8% of the world’s production, and allowing it to dominate Europe’s demand (Analytical Center for the Government of the Russian Federation, 2016). With its unique geostrategic location, Russia exports to its neighboring countries via pipelines. Its comparative advantage in this natural resource enables Russia to maintain its position as the world’s largest exporter of natural gas, at 23.6% (International Energy Agency, 2016 and 2017a). However, the politicization of commercial gas transactions with the European Union (EU) and transit disruptions through former Soviet Union countries, such as Belarus in 2004 and 2010, and Ukraine in 2006 and 2009, complicate Russia’s natural gas market with far-reaching consequences.

Europe seeks to diversify its energy supply, to avoid the strong dependence on Russia, and ensure a stable and consistent source of natural gas. However, finding an alternative source may not be easy, as Russia remains one of the few countries capable of meeting Europe’s growing demand. Central and Eastern Europe, on the other hand, oppose Russian dominance in Europe’s gas market, due to political differences (Boussena and Locatelli, 2017). Nationalistic rhetoric, unstable natural gas supply, dependency on a single supplier, and energy insecurity fears cloud Central and Eastern Europe’s reluctant transactions with Russia. Russia, however, is keen to maintain this dominate position, and is actively working to continue to serve Europe’s growing demand (Chehade, Kozinchenko, Mordovenko and Tideman 2015).

Although Europe is looking to diversify its sources, its main goal is to find a stable supply of gas at competitive prices. Russia is one of the only countries that offers gas that is commercially viable and economically feasible (Cronshaw, Marstrand, Priovska, Simmons, and Wempe, 2008). Making Europe’s dependence ever growing.
Russia’s natural gas supply derive from two main sources; reserves and imports from neighboring countries. Graph 1 presents Russia’s dominance as a natural gas producer over the past ten years. Reserves increased from 30.9 tcm (trillions of cubic meters) in 1996 to 31.2 tcm in 2006 and to 32.3 tcm in 2016 (International Energy Agency, 2016). Gazprom, a state-owned natural gas company and the largest producer of natural gas in Russia, owns 72% of the share of Russian gas reserves (Gazprom, 2017a). The company operates and invests in regions including Yamburg, Urengoy, Medvezhye, Zapolarnoye, Bovanenkovo; and developing new ones including Chayadinskooye, Kovytka, and Sakhalin (Energy Information Administration, 2017). Kazakhstan and Uzbekistan supply Russia with natural gas; 16.1 bcm (billions of cubic meters) and 5.6 bcm respectively in 2016 (British Petroleum (BP), 2017).

**Competition**

Although the United States has exceeded Russia’s gas production starting 2009, presently the United States exports only 0.5 bcm of liquefied natural gas (LNG) to Europe (BP, 2017). LNG is natural gas that has been cooled to a liquid state for shipping and storage, easing the trade of gas beyond neighboring pipelines (U.S. Department of Energy). Russia faces growing competition of energy sources to Europe gradually encroaching its market share with greater LNG imports (Foy and Sheppard, 2017). Europe stands to gain from this increasing competition to supply its gas demand at affordable prices, since the EU received 37% of its gas imports from Russia in 2017, according to
Can Russia Maintain European Demand of Natural Gas in a Changing World?

figures from the European Commission. The danger lies in the U.S. potential to use gas exports as a political tool as Russia does, and the EU to politicize the gas market. This would harm the gas market should the two superpowers engage in energy rivalry.

**Russia’s Gas Exports**

Russia’s dominance in the Europe and Eurasia region in natural gas illustratively accentuates its Russian empire- and Soviet-era historical legacy of providing for its neighbours. Meeting the needs of the European-Eurasian continent feeds Russia’s geopolitical psyche and preserves its significance and influence in the natural gas playing field. By holding a tight rein over natural gas supply and exports, and limiting its imports to two CIS countries, Russia ensures the longevity of its ability to execute power plays (American Enterprise Institute, 2013). Despite Western sanctions on Russia, its natural gas production, domestic consumption, and exports have remained strong and even growing (Analytical Center for the Government of the Russian Federation, 2016; Gazprom, 2017b and Rosneft, 2017).

Germany, Turkey, and Italy are the leading importers of Russian natural gas (Chart 1). Due to the uncertainty and potential disruption in imports from Russia through Ukraine, Germany seeks to procure Russian natural gas through direct pipelines under the Baltic Sea (Nord Stream 1 which came online in 2012 and now Nord Stream 2 to come online by the end of 2019) (Butler, 2017). Italy planned to access Russian natural gas by building a direct pipeline (South Stream) but the project was cancelled. Finally, Turkey receives Russian natural gas via a direct pipeline (Blue Stream) and may construct a second (TurkStream). Note that although Ukraine is not included, it imports Russian natural gas secondhand from neighboring European countries (BP, 2017 and KPMG, 2017). In this manner, Russia fulfills its national goal of remaining relevant in the European natural gas market, cementing its role as a key energy player, and reaping economic and geopolitical benefits.
Case Study: TurkStream

To expand its reach, Russia set its eyes on constructing TurkStream. This new gas pipeline project stretches across the Black Sea from Russia to Turkey and is being built in two lines, each with a throughput capacity of 15.75 bcm. The first line will supply Turkey while the second will supply southern and southeastern Europe. Both lines are expected to be operational by the end of 2019. After TurkStream, Gazprom aims to supply Bulgaria, Serbia, and Hungary via a new gas link.

Case Study: LNG

The two-headed, outward-facing eagle symbolizing Russia not only turns to Europe but also to Asia as the geostrategic bridge connecting the two continents. Similarly, utilizing liquefaction technologies, Russia exports LNG primarily to Japan, South Korea, and Taiwan in the Asia Pacific region (BP, 2017). Russia already has Yamal LNG and Sakhalin LNG facilities. To remain relevant in the new competitive environment with U.S. LNG moving forward and to maintain its market share, Gazprom plans to increase capabilities and capacity to support greater LNG exports as the global LNG market grows (Bloomberg New Energy Finance, 2017).

Yet due to the costs associated with LNG, as well as efficiency factors and demand response, Russia relies substantially on its pipelines in Europe and Eurasia for its natural gas exports (Bloomberg New Energy Finance, 2017). Indeed, Gazprom engaged in negotiations with China National Petroleum Corp. for gas deliveries from its Power of Siberia pipeline to begin in late 2019. Moreover, the construction, operation, and maintenance of liquefaction plants to convert gas into liquid yield heavy costs. Hence, unless profit margins can be guaranteed to cover operation and maintenance (O&M) costs, LNG production is not an economically viable solution. Additionally, efficiency factors play a key role in determining the cost-effectiveness of developing liquefaction plants. For instance, liquefaction and shipment of LNG not only bears extra costs, but also loses gas volume through the liquefaction process. Due to heavy demand from landmass Europe connected through pipelines and transported in gaseous form rather than via ships in LNG, Russia prioritizes its exports of natural gas to Europe rather than LNG to South and East Asia, for the time being. Further, as previously discussed, Russia holds a geopolitical interest in Europe, and natural gas serves as one tool at Russia’s disposal to exert control in this arena.

Recently, though, with the promise of U.S. LNG exports shipping into Europe, Asia, and elsewhere, Russia has updated its gas exports policy. This includes lower prices and revised contracts more favorable to European consumers, see Graph 3 (Boersma and Mitrova, 2018). In tandem, Gazprom signed an agreement with Royal Dutch Shell in 2018 for the joint concept of its Baltic LNG project after the feasibility study was completed in 2017. The natural gas liquefaction plant will be constructed near the seaport of Ust-Luga with an annual capacity of 10 million tons.
Europe’s Gas Demand

Europe’s gas demand is relatively flat with a few slight declines and will most likely remain that way, see Graph 2 and Braat et al. (2017). Historically, the demand for natural gas in the EU has been strong. Though it dropped 20% from the peak level of 513 bcm in 2010 to 417 bcm in 2014, the demand has picked up again in 2015 to its current level of 433 bcm as Graph 2 reflects. This decline in 2010-2014 is attributed to diminished economic growth in Europe, tensions with Russia, and competition with substitutes such as cheap coal from the U.S. and subsidized renewable energy sources (World Energy Council, 2016). The International Energy Agency (IEA) projects flat EU demand for gas through 2022. However, the European Commission estimates 2030 EU gas demand could fall as low as 380 bcm or to rise as high as 450 bcm, largely based on the EU achieving its 2030 targets to increase the share of renewable energy sources to at least 27% and to improve energy savings by at least 27% (European Commission, 2017). Despite this push for renewables, the EU still requires additional energy sources. While coal production and consumption decline rapidly, natural gas production actually remains stable. Moreover, renewable sources alone will not be able to compensate for the loss in fossil fuels energy generation especially as Europe shuts down nuclear power plants. Therefore, natural gas will bridge the necessary gap.

Graph 2: The EU’s Gas Demand, Production, and Net Imports: Forecast to 2040

However, Europe’s domestic gas production has declined (see Graph 2 and International Energy Agency, 2017b and 2017c). This entails that Europe faces an increasing import gap. The EU relies heavily on net imports to meet its gas demand, as demonstrated in its gas dependency rate (% of net imports over domestic production) increasing from 57.1% in 2005 to 69.1% in 2015 (Eurostat, 2017a and 2017b). Russia (29.4%), Norway (25.9%), and Algeria (8.8%) constitute the top three external gas suppliers to the EU – two-thirds of the EU’s total gas imports – during the period 2005-2015. Although the EU’s gas demand is forecasted to stay constant, the EU’s gas net imports are expected to rise steadily from 329 bcm in 2016 to 378 bcm in 2040 due to plummeting indigenous gas production (International Energy Agency, 2017b and Eurostat, 2017c). Thus, the EU’s gas net import will remain strong in the future.

Europe has attempted to diversify its natural gas suppliers to meet its import gap. In 2011, for example, Europe sought to diversify its imported energy sources by supporting Algeria to build pipelines and liquefaction facilities in Spain (The Oxford Institute for Energy Studies, 2017). However, the volume of gas imports from Algeria pales in comparison to gas imports from Russia (Table 1). Gazprom increased exports to Europe by an annual 12.3% in the first six months of 2017, following a 12.5% annual increase in 2016. At present Gazprom supplies 34% of European gas (Eurostat, 2017c). Despite the EU’s variety of gas suppliers, Russia remains dominant in its market share (International Energy Agency, 2017d). With new pipeline projects under way, Russia solidifies its role as the main supplier of natural gas to Europe. As noted in Chart 1, Germany, Turkey, and Italy largely depend on Russia for natural gas. Russia’s natural gas production has risen since 2016 to meet the growth in Europe’s demand for natural gas (Gazprom, 2015 and 2016). For instance, OECD Europe’s demand for natural gas spiked by 6% in 2016 (International Energy Agency, 2017).

### Table 1: Snapshot in 2016

<table>
<thead>
<tr>
<th>Source of European Gas</th>
<th>Bcm</th>
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<tbody>
<tr>
<td>Norway</td>
<td>116.6</td>
</tr>
<tr>
<td>UK</td>
<td>41.0</td>
</tr>
<tr>
<td>Netherlands</td>
<td>40.2</td>
</tr>
<tr>
<td>Ukraine</td>
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<td>Romania</td>
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<td>Italy</td>
<td>5.3</td>
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<td>Denmark</td>
<td>4.5</td>
</tr>
<tr>
<td>Poland</td>
<td>3.9</td>
</tr>
<tr>
<td>Other EU</td>
<td>8.7</td>
</tr>
<tr>
<td>Total EU Production</td>
<td>253.8</td>
</tr>
<tr>
<td>Gazprom</td>
<td>246.8</td>
</tr>
<tr>
<td>Other non-EU pipelines</td>
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<tr>
<td>Qatar</td>
<td>23.7</td>
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<tr>
<td>Algeria</td>
<td>14.9</td>
</tr>
<tr>
<td>Other</td>
<td>12.7</td>
</tr>
<tr>
<td>United States</td>
<td>0.5</td>
</tr>
<tr>
<td>Total non-EU Imports</td>
<td>351.8</td>
</tr>
</tbody>
</table>


### Russia’s Gas Prices

Russia’s gas prices have declined rapidly since 2014, from over $350/mcm to $176/mcm (see Graph 3 and Deloitte, 2018). The main factor contributing to this sharp fall lies in a combination of the 2008-2010 financial crisis in Europe, Western sanctions on Russia, and Russian economic decline (Central Bank of Russia, 2017; Carroll, 2017 and Walker et al., 2015). The price of Russian gas is expected to continue to decrease, and thus become even more attractive to the European market.
Can Russia Maintain European Demand of Natural Gas in a Changing World?

**Graph 3: Russia’s Gas Prices (USD/mcm)**

Source: Gazprom, 2017c.

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**Gas-Related Risks**

Since 2014, the United States has applied sanctions on Russia. In 2017, the United States added more sanctions targeting Russia’s energy companies and construction of the Nord Stream 2. The implications of these sanctions and their effect may reflect a similar slight downturn in Russia’s natural gas production as depicted in Graph 1.

OPEC struck a deal with Russia, among other countries, to restrain oil production in 2016 in order to increase the price of oil. Russia extended this commitment into spring 2018. Therefore, Russia’s natural gas production is projected to continue and displace the production of oil for the time being (Coleman, 2019).

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**Conclusion**

In conclusion, Russia effectively responds to Europe’s energy-security dilemma by developing pipeline projects to major countries thereby tightening its role as a main supplier of natural gas. Meanwhile, Russia searches for additional hydrocarbon reserves in the Arctic and exports LNG to the Asia Pacific region. Amid U.S. sanctions and an ongoing oil production deal with OPEC, the future short-term and long-term implications remain uncertain. To maintain its dominance and relevance in the region, Russia responded by launching projects to develop natural gas pipelines to connect directly to Germany, Italy, Turkey, Greece, and other countries (Erlanger and MacFarquhar, 2017). These important players with commercial and financial interests are direct beneficiaries of Russian gas.
Russia has been a long-time supplier of natural gas to Europe and has extensive experience in constructing, operating, and maintaining pipelines. Holding a proven track record as a reliable gas supplier and possessing a major supply of gas reserves, Russia’s Gazprom distinguishes and differentiates itself from the rest of the natural gas suppliers. Yet politicization of gas pipelines complicates the commercial, economic, and financial issues at hand. Because Europe faces relatively stable gas demand with an increasing import gap, it seeks to expand its capacity for long-term supply. Specifically, Europe must import more gas arrangements due to falling domestic gas production. Thus, the energy security that will be gained by having a stable and undisrupted supply of natural gas remains relevant for the continent. Europe must also improve its internal energy market and receive gas at competitive prices. In Europe’s world of natural gas markets, Russia remains the geopolitical king.

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———, “Key World Energy Statistics,” 2016,
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Social Cohesion and Growth
Alejandro Fiorito

The Importance of Social Cohesion

Social cohesion is a key driver of economic growth and the rising importance of social distress in determining political and economic outcomes motivates revisiting its relation with economic growth. The surge of populism worldwide is intrinsically related to social cohesion and the loss of trust in institutions. Thus, exploring the mechanisms through which social cohesion impacts growth will deepen our understanding of how social perceptions shape the world.

Social cohesion is the level of cooperation, trust, inclusion and lack of conflict of a country. This is a broad concept that has been given several definitions in the literature. Roberto Foa states that “a socially cohesive society (is one) that foster norms of cooperation between distinct ethnic, religious, and other identity groups.” Easterly et. al. (2006) define social cohesion as “the nature and extent of social and economic divisions within society.” Ritzen (2001) argues that “social cohesion is a state of affairs in which a group of people demonstrates an aptitude for collaboration that produces a climate for change that, in the longer run, benefits all”. Hence, its absence affects negatively economic growth by: (1) hindering capital accumulation; (2) preventing innovation; (3) causing inefficient allocation of resources; (4) creating political instability and/or (5) increasing transaction costs.

Figure 1 in the next page shows the strong correlation between social cohesion and GDP per capita. For example, many of the Scandinavian countries, often taken in Europe as role models, are highly cohesive societies. These small countries, with homogeneous population, tend to lead classifications, such as the Human Development Index (United Nations, 2018).

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1 There is even the 15th century term “asabiyah”, “social solidarity with an emphasis on group consciousness, cohesiveness, and unity” (Oxford Islamic Studies), introduced by the Arab historian Ibn Khaldun.
2 In turn, in a more cohesive society, where there is trust among individuals, financial institutions would be more developed, providing necessary means for capital accumulation, efficient allocation and lower transaction costs.
3 Norway, Iceland and Sweden are in the top 10, and Denmark is 11th. Other small countries such as the Netherlands, Ireland or Hong Kong are also leading this classification.
The literature on this topic focuses on the impact of social cohesion on economic growth through its effect on institutions (see Easterly et al. 2006). Although this channel is a valid and rather obvious one, there are relevant extensions to this approach. A crucial question is whether social cohesion differentials affect patterns of government spending, investment and innovation, i.e. how a country distributes its resources. Social cohesion does have a direct effect on these allocation patterns, but the distribution of resources may also affect social cohesion, causing endogeneity.

**Endogeneity: Ethnic Fractionalization**

Endogeneity is a common issue in economic development research due to mutual causality. Social cohesion affects economic growth, but economic growth in turn can improve social cohesion. Better economic conditions can: (1) generate political stability and enable the promotion of measures that tackle social inequalities; and (2) decrease turmoil when employment and living conditions improve. Figure 2 presents the two hypotheses considered in this article: social cohesion affects economic growth through economic outcomes or through institutions.

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4 As described by Bossert et al. (2011) the “index of ethno-linguistic fractionalization (ELF), (...) is a decreasing transformation of the Herfindahl concentration index applied to population shares. The ELF index measures the probability that two randomly drawn individuals from the overall population belong to different (predefined) ethnic (linguistic or religious) groups.”
To address the problem of endogeneity, previous research has used ethnic fractionalization as an instrumental variable (see Mauro 1995; Easterly and Levine 1997; La Porta et al. 1999; Alesina et al. 2003; Alesina and La Ferrara 2005). This dataset was first introduced by Alesina et al. (2003) and includes information on ethnic, linguistic and religious fractionalization for 190 countries but only for single years ranging from 1979 to 2001. Thus, it requires relying on the assumption that the ethnic fractionalization of a country does not change abruptly over time. Also, this instrument has suffered some criticisms, for instance, Ahlerup (2009) argues that ethnic fractionalization is, itself, endogenous.

Figure 3 presents the negative relation between ethnic fractionalization and social cohesion (measured by Roberto Foa’s Index and Safety and Trust from IISS). This shows that more heterogeneous countries will tend to have more social conflicts. The first stage regressions in Table 1 test whether ethnic fractionalization is a strong instrument.

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5 Alesina et al. (2003) also provide measures for linguistic and religious fractionalization. However, their interpretation is not as straightforward as for ethnic fractionalization and their correlations with social cohesion are weaker.

6 The two key features for an instrumental variable are: (1) the strength of the instrument and (2) the exclusion restriction. These imply that (1) ethnic fractionalization has to be (strongly) associated with the endogenous variable (social cohesion measures) but (2) uncorrelated with the error term of the OLS endogenous regression. The latter condition means that ethnic fractionalization should only affect our economic or institutional outcomes through its effect on social cohesion.

7 Ahlerup claims about the endogeneity of ethnic fractionalization, in this case, seem counterintuitive. For example, one way in which ethnic fractionalization increases is through immigration, but immigration is less likely to happen in countries with low social cohesion (which are also generally countries with low economic growth), making ethnic fractionalization exogenous.

8 Note that for Foa’s index evaluates approximately 150 countries, whereas, for the measures of Social Development one can exploit having data for 5 different periods of time, therefore, having more data points. Other estimators from the Social Development Indicators such as Intergroup Cohesion and Clubs and Associations were discarded because of their low correlation with the instrumental variable (see Table 3 in the appendix for a description of the correlations across years and measures). Gender Inequality was associated with ethnic fractionalization (correlation coefficient of –0.37) but this measure is broader than other indicators of social cohesion and is likely to be capturing other effects rather than mere social fractures.
There are several direct and indirect measures of social cohesion, the dependent variable in this first stage of the two-stage least square (2SLS) regression that uses ethnic fractionalization as an instrumental variable. The most meaningful measures are indices ranking countries, such as the ones made by Foa or the International Institute of Social Studies (IISS). For a complete analysis, it is also necessary to control for other factors such as the legal origin of each country (British, French, German, Scandinavian or Soviet) introduced by LaPorta et al. (2008). This, combined with regional dummy variables, serves to model region-specific characteristics that could affect levels of social cohesion, economic outcomes and institutions.

Table 1 below reports five different specifications for Foa’s social cohesion index, using robust standard errors to correct for heteroskedasticity. Ethnic fractionalization shows a negative and strong association with Foa’s index – i.e. a more ethnically fractionalized country will have a lower social cohesion index. It is statistically significant at the 1% level for all specifications but (4), where it is at 5% level. Even when controlling for original economic conditions with GDP per capita in 1970, the results remain robust. Moreover, the F-test statistics are considerably high, above the threshold of 10 proposed by Staiger and Stock (1997), implying that ethnic fractionalization is a strong instrument.

### Table 1: First Stage for Foa’s Social Cohesion Index

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethnic Fractionalization</td>
<td>-1.875***</td>
<td>-1.293***</td>
<td>-1.362***</td>
<td>-1.066**</td>
<td>-1.807***</td>
</tr>
<tr>
<td></td>
<td>(0.365)</td>
<td>(0.392)</td>
<td>(0.429)</td>
<td>(0.427)</td>
<td>(0.603)</td>
</tr>
<tr>
<td>GDP per capita 1970</td>
<td>0.00009**</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>-0.00004</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Legal Origin</td>
<td>NO</td>
<td>YES</td>
<td>NO</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Region Fixed Effects</td>
<td>NO</td>
<td>NO</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Observations</td>
<td>154</td>
<td>152</td>
<td>154</td>
<td>152</td>
<td>95</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.148</td>
<td>0.257</td>
<td>0.384</td>
<td>0.445</td>
<td>0.420</td>
</tr>
<tr>
<td>Adjusted R2</td>
<td>0.143</td>
<td>0.231</td>
<td>0.359</td>
<td>0.406</td>
<td>0.359</td>
</tr>
<tr>
<td>F-test</td>
<td>26.39</td>
<td>21.35</td>
<td>10.95</td>
<td>10.95</td>
<td>10.95</td>
</tr>
</tbody>
</table>

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

Regions are Africa, Asia, Europe, Latin America and the Caribbean, Middle East and North America.

Legal Origin includes: English, French, German, Scandinavian and Soviet as used by Laporta et al. (2008).

When the F-test is missing it is because the regression with robust standard errors does not report them when using dummy variables, however, the F-test would always be larger in this scenario.

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9 Using these different estimates helps confirming the robustness of the results. Moreover, Foa’s index shows a static picture of different estimates for the past 20 years whereas the Social Development indicators of IISS, include data in 5-year averages for 1990, 1995, 2000, 2005 and 2010. Foa reports 155 countries in his index and the Social Development Indicators range from 52 to 169. Such large numbers of countries allow for a consistent and robust estimation, as different income levels and regions are represented in the data.

10 The results are robust to specifications including controls for the legal origin, regional fixed effects and original level of GDP per capita (measured by GDP in 1970).
Channels through which Social Cohesion affects Economic Growth

Using ethnic fractionalization as an instrument in a 2SLS regression, one can estimate the effect of social cohesion in economic outcomes, while accounting for the endogeneity of the variable of interest. This unbiased regression, from which one can infer causality, can be compared with the problematic OLS regression.\footnote{Note that the second stage specifications will include the same exogenous controls used in fifth regression (the most restrictive one) of the first stage.}

Social Cohesion, Economic Growth and Government Consumption

Social cohesion (measured by Foa’s index) is strongly and positively related to economic growth (measured by average GDP per capita PPP 1990-2017) and public expenditure (measured by government expenditure in consumption in constant 2010 US Dollars). These results (see Table 2) indicate that increasing the score in Foa’s index by one point (recall that the index is from 0 to 10) is related to an increase GDP per Capita of approximately 40%.\footnote{Note that, because the dependent variable is in log terms, the coefficient (β) can be interpreted as, approximately, ×100 (percentage) impact of a change in the independent variable.} Despite being only significant at the 10% level, government consumption increases by 60% with a 1 unit increase in Foa’s index. These are substantial impacts of social cohesion on economic growth and government expenditures, but not unreasonable considering the different spheres that social cohesion comprises\footnote{Social can be a proxy of social unrest, even wars and political turmoil, factors that have an enormous impact in the economic development of a country.} and plausible multiplier effects.

\begin{table}[h]
\centering
\begin{tabular}{lccc}
\hline
\textbf{Dependent Variable} & \textbf{GDP per Capita} & \textbf{Government Consumption} \\
\textbf{Specification} & \textbf{OLS} & \textbf{IV} & \textbf{OLS} & \textbf{IV} \\
\hline
Social Cohesion Index (Foa) & 0.489*** & 0.397* & 0.766*** & 0.662* \\
& (0.0713) & (0.215) & (0.178) & (0.402) \\
GDP per capita 1970 & -2.84e-05 & -2.37e-05 & -9.92e-05 & -8.91e-05 \\
& (4.57e-05) & (5.00e-05) & (7.03e-05) & (7.67e-05) \\
\hline
Observations & 96 & 95 & 82 & 82 \\
R-squared & 0.718 & 0.719 & 0.579 & 0.576 \\
Adjusted R2 & 0.689 & 0.689 & 0.526 & 0.524 \\
\hline
\end{tabular}
\caption{GDP per Capita and Government Consumption and Social Cohesion}
\end{table}

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1.
Including legal origin and regional fixed effects.
GDP per Capita is in log terms and Government Consumption is % of GDP. Both are the average for 1990 to 2017.
These results are robust to using other measures of social cohesion (such as civic activism, safety and trust and inclusion of minorities). The fact that the IV regressions yield lower coefficients for both variables indicates that the OLS results overestimate the effect of social cohesion on both measures. As social cohesion and GDP per capita (as well as government consumption) can cause each other, a simple linear regression overvalues the effect of social cohesion on these variables.

**Allocation of Resources: Public Spending, Education, Health and Innovation**

There is a strong link between economic prosperity, public spending and social cohesion, but it is worth assessing how social cohesion affects different economic outcomes that are also associated with growth. These factors (health, education, investment, etc.) are likely to be endogenous with respect to economic growth. Yet, finding significant results may shed some light about how social cohesion affects growth, other than through strengthening or harming institutions (Easterly’s hypothesis).

This analysis is constrained by using economic outcomes that are not qualitative indicators. Hanushek and Woessmann (2012) note that educational quality, not necessarily quantity, is key for development. However, higher expenditure is potentially associated with higher quality. Therefore, all these measures should be considered cautiously, as proxies for the effect of cohesion on latent variables (the overall quality and spread of education, health, investment and/or innovation) that impact economic growth.

Social cohesion is positively associated with expenditure in education (at the 10% level), domestic government health expenditure (at the 1%) and research and development expenditure (at the 5%), as Table 2 indicates. Other factors, such as government debt, expenditure on education as percentage of total government expenditure or expenditure in the military are not significantly associated with social cohesion, nor in OLS nor IV regressions and are not reported.

Considering the 2SLS IV regressions, more socially cohesive societies have higher government expenditure on education (1.3% more on average over the period 1990-2017), health expenditure (1.8%) and total expenditure in research and development (0.37%). These results are over the percentage of GDP, so, even if in percentage terms they do not seem very large, they are substantial in nominal terms.

Furthermore, the 2SLS estimation allows to reject some spurious associations between social cohesion and net investment and savings as percentage of GDP. Both variables, while significant for OLS, are insignificant when using IV estimation. This shows how the endogeneity bias yields misleading results (even negative for investment, which would incorrectly suggest that social cohesion hinders investment).

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14 Unless otherwise noted, the results are consistent to using alternative measures of social cohesion.
Table 3: Economic Outcomes

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>Specification</th>
<th>OLS</th>
<th>IV</th>
<th>OLS</th>
<th>IV</th>
<th>OLS</th>
<th>IV</th>
<th>OLS</th>
<th>IV</th>
<th>OLS</th>
<th>IV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social Cohesion Index (Foa)</td>
<td>0.143</td>
<td>1.302*</td>
<td>0.720***</td>
<td>1.891***</td>
<td>-0.736**</td>
<td>1.138</td>
<td>3.725**</td>
<td>-5.631</td>
<td>0.261***</td>
<td>0.366**</td>
<td></td>
</tr>
<tr>
<td>Observations</td>
<td>94</td>
<td>93</td>
<td>95</td>
<td>94</td>
<td>81</td>
<td>81</td>
<td>94</td>
<td>94</td>
<td>76</td>
<td>76</td>
<td></td>
</tr>
<tr>
<td>R-squared</td>
<td>0.193</td>
<td>0.686</td>
<td>0.356</td>
<td>0.400</td>
<td>0.038</td>
<td>0.237</td>
<td>0.616</td>
<td>0.601</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adjusted R2</td>
<td>0.107</td>
<td>0.653</td>
<td>0.287</td>
<td>0.324</td>
<td>-0.0837</td>
<td>0.156</td>
<td>0.564</td>
<td>0.547</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Robust standard errors in parentheses. **p<0.01, *p<0.05, *p<0.1.
Including legal origin, regional fixed effects and GDP per capita in 1970. The dependent variables are all % of GDP.

Conclusion and Extensions

This article presents how social cohesion goes beyond institutions in its relation with economic growth. Social cohesion has a direct impact on crucial variables such as public expenditure in education, health and research and development. These effects on economic outcomes indicate that different patterns of allocation depend on the level of cohesion of a society. Countries with higher social cohesion will be more willing to spend on education, health and research and development, whereas, countries facing social distress may be less likely to do so. In turn, public spending may increase social cohesion by rising the general wellbeing of the country.

These results suggest that there are numerous areas of research worth exploring in this topic. The original framework by Easterly et al. remains robust: social cohesion impacts growth through institutions, yet, different dimensions of this relationship are also relevant.

This work does not question this neat link, but rather provide a complementary hypothesis that addresses other channels through which social cohesion can impact economic growth. In addition, Figure 6 represents how both institutions and economic outcomes can affect each other and economic growth.

Figure 4: Intertwined Allocation of Resources and Institutions

15 Although results are not reported, running 2SLS regressions using the World Governance Indicators of the World Bank as proxies for institutional quality, corroborates the positive link between social cohesion and institutions.
Social Cohesion and Growth

Institutional quality is inevitably related to the economic outcomes, and economic outcomes may also affect institutions. Evaluating how these two variables interact to foster economic growth is key; and the finding that social cohesion affects both institutions and how a country allocates its resources makes it even more pertinent. A further understanding of how social cohesion affects health and education expenditure, investment and innovation in specific regions could provide a more nuanced perspective about this topic.

Social cohesion, as any factor affecting economic growth, should be studied through different lenses and scopes. This cross-country work presents how higher levels of social cohesion have an impact on the allocation patterns of a nation. Whereas social cohesion is not linked to a country’s savings or net investment, a more cohesive society will have a higher expenditure on education, health and research and development. This new notion, combined with the conventional perspective that social cohesion affects institution, should be taken into account by both policy makers and scholars.

References


Health-care spending growth slowed in the 1990s, but then rose sharply at the end of the decade. Spending growth has also slowed in recent years; however, productivity growth data in the sector indicate payback is less likely this time around. As opposed to the 1990s slowdown, the recent episode cannot be attributed to a narrow set of policy changes that could easily unwind.

Growth in health-care spending has slowed substantially in the last decade. Inflation-adjusted, per capita spending on health-care goods, services, and investments averaged less than 2 percent each year from 2005 through 2013 after averaging 5 percent growth each year from 1961 through 2004. Spending briefly surged with the expansion of health insurance coverage under the Affordable Care Act (ACA) but then retreated to a lower growth rate in 2017, the last year with complete spending data. Since health-care spending accounts for over one-sixth of total economic output, whether there will be payback for this period of subdued growth is a question of macroeconomic importance.

The last major spending slowdown occurred in the 1990s. Chart 1 shows spending growth slowed in the 1990s before sharply accelerating in the middle of that decade. Consistent with Chart 1, the more recent period of below-normal health-care spending growth rates began in the mid-2000s (Hughes-Cromwick et al., 2012). Comparing the factors behind the 1990s and more recent slowdowns may offer clues as to whether the current episode will likewise give way to an acceleration in health-care spending.
Analysts attribute much of the 1990s slowdown to the emergence of health maintenance organizations (HMOs) and other managed care plans that placed restrictions on patient access to providers (Pinkovskiy, 2014). In 1987, only about one-quarter of the privately insured population was enrolled in managed care plans; by the mid-1990s, this share had surged to about three-quarters (Cutler and Sheiner, 1998). Under these plans, policies often restricted patient access to providers and specialized treatments. Rather than going directly to a specialist, for example, patients often required a referral from a primary care physician (Chen and Goldman, 2015).

The attempt to control costs via HMOs also coincided with a decline in a certain measure of productivity growth in the health care sector. In particular, multifactor productivity growth captures increases in output that cannot be accounted for by more labor or capital expenditures. In the health sector, examples would include management practices and technologies that provide more health-related services with the same facilities and staff. Chart 2 shows multifactor productivity growth declined sharply in the 1990s, suggesting health-care resources were deployed less effectively during this period. The decline was likely due to HMOs limiting the use of expensive health-care resources more than they limited health-care investment and labor. For example, Baker and Wheeler find some evidence that increases in the use of managed care plans led to decreases in the average number of MRI procedures performed per MRI site, an effect that would weigh on multifactor productivity.

Because managed care plans contained cost growth in large part by limiting access to care, popular pressure built up against them. In response, employers shifted toward less restrictive plans in the late 1990s and legislators passed laws to limit the restrictions on access to health-care services imposed by managed care plans (Pinkovskiy, 2014). As a result, growth in health-care spending increased near the end of the decade, which coincided with an increase in measured productivity in the healthcare sector.

In contrast to the 1990s episode, multifactor productivity growth has remained largely steady during the recent slowdown (Chart 2). This suggests the decline in health-care spending growth has not been achieved by disproportionately curtailing the use of health-care services. Nor does this steadiness in productivity growth appear to result from a decline in the quality of care. The Agency for Healthcare Research and Quality, for example, estimates 100 of its 179 quality measures improved from 2000 through 2016, while just 18 deteriorated. With the current spending slowdown occurring in tandem with steady productivity growth and quality improvement, a different set of conditions appear to be driving the slowdown than those that led to the last backlash.

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1 While measuring multifactor productivity in the nonmanufacturing sectors is difficult, a similar pattern emerges when productivity is calculated as the change in real consumption of health-care services divided by the aggregate hours worked in health-care industries (not shown). The productivity measure shown here is an output-weighted average of NAICS industries 621 (Ambulatory Health Care Services), 622 (Hospitals), and 623 (Nursing and Residential Care Facilities).
Moreover, unlike in the 1990s, the recent slowdown cannot be attributed to a narrow set of factors that could rapidly unwind. While the lagged effects of economic weakness during the Great Recession and subsequent slow recovery have certainly helped restrain health-care spending in recent years, economic factors alone do not explain the full extent of the slowdown. Medicare spending growth, which is less sensitive to the business cycle, has also been subdued. For example, spending slowed in 16 out of 17 types of services covered by Medicare from the 2000-08 period to the 2009-12 period (Chappel et al., 2014).

Likewise, while the Affordable Care Act (ACA) induced a number of changes to the health-care industry, the cost-saving provisions of the ACA cannot be the only factors at work. The slowdown started before Congress passed the ACA, and spending has fallen by more than expected even after taking those policy changes into account. Actual spending on Medicare in 2014, for example, was 7 percent below the Congressional Budget Office’s August 2010 baseline, an estimate which incorporated the expected effects of the ACA.

More recently, the ACA has raised aggregate health-care spending by expanding insurance coverage, leading to a partial rebound in the growth rate of real health-care spending in 2014 (Charts 1 and 2). However, since three-quarters of the 27 million people the Congressional Budget Office expected to gain insurance coverage through the ACA gain that coverage in the first couple years of the ACA’s insurance expansion, the bulge in health-care spending is expected to have just a short-term influence on spending growth rates, consistent with the slower growth rate seen in 2017 (Cuckler et al., 2015).

In contrast to the narrower range of policy changes that produced the 1990s slowdown, this slowdown has been broad-based. It appears to
be a product of either multiple factors or a systemic factor with widespread effects. For example, actual spending has been lower than government forecasters predicted for private payers as well as for public payers (Holahan and McMorrow, 2015).

Annual premiums for employer-sponsored health insurance grew more than twice as fast on average from 2000 to 2005 as they have in the decade since (Kaiser Family Foundation). Moreover, the average growth rate of total health spending slowed for 11 out of the 15 major categories of ailments examined by the Bureau of Economic Analysis between 2001-2005 and 2006-2012. With a broader range of factors behind it, the current slowdown likely requires a broader range of policy changes to unwind it than was the case during the 1990s episode. A backlash, therefore, appears less likely.

In response to the subdued growth rates of aggregate health-care spending, forecasters have repeatedly lowered their projections for its trajectory. Chart 3 shows actual health-care spending for 2015 came in over 20 percent below the government’s 2005 projection, while the most recent forecast for spending in 2020 is already 13 percent below the post-ACA 2010 projection.

The steady growth in health-care productivity suggests spending is less likely to accelerate sharply as it did in the 1990s. Furthermore, a wide range of factors has contributed to the recent slowdown, indicating policy changes cannot easily unwind it.

**Chart 3: National Health Spending Projections**

Sources: Centers for Medicare & Medicaid Services, Peterson-Kaiser Health System Tracker.
An Action Without a Reaction?
The Recent Health-Care Spending Slowdown

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A Cautious Analysis of International Economic Sanctions

Naomi Garcia

Introduction

Even before the Cold War marked a shift from military threats and hard-power politics to stability and multilateral cooperation, world leaders looked to economic sanctions as civil substitutions for bloody warfare. As early as 1919, Woodrow Wilson spoke highly of economic sanctions, arguing, “apply this economic, peaceful, silent, deadly remedy and there will be no need for force. It is a terrible remedy. It does not cost a life outside the nation boycotted, but it brings a pressure upon the nation which, in my judgement, no modern nation could resist.” It is sensible to anticipate the success of economic sanctions, as any international tool used to circumvent the possibility of warfare rightfully appears a noble cause. A large portion of early economic sanctions instituted by the newly-formed United Nations (UN) were for the support of international humanitarian causes and attempts to empower physically or ideologically oppressed groups of people. However, throughout the decades of their application, not only has the effectiveness of sanctions been heavily challenged, but the inequity of the aftermath they create for innocent citizens of their target countries has been increasingly scrutinized. It is most important to underline that the initial intent of economic sanctions by the UN and independently operating states was a more peaceful, less forceful replacement of military action. This editorial argues that economic sanctions are ineffective in two main ways: in achieving their goal of political change in the target country, and in promoting peace and welfare for the citizens of the target regime. Given the general ineffectiveness of sanctions in most cases and the harm they cause to civilians, future U.S. and international policy should eliminate the use of sanctions as a tool to alter states’ behaviors.

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1 This editorial is based on a previous work from Medium: https://medium.com/@naomilucille/a-cautious-analysis-of-international-economic-sanctions-7473e746841.
Background Statistics

The most comprehensive study of the effectiveness of economic sanctions was published in 1990 by Gary Hufbauer, Jeffrey Schott, and Kimberly Ann Elliot, commonly referred to as HSE. The researchers examined 115 cases of international economic sanctions from 1914-1990, and concluded an overall 34% success rate in the effectiveness of economic sanctions in instigating desired political change to a sovereign state.\(^5\) From the perspective of a world leader, a 34% success rate is a relatively low figure upon which to base a punitive international policy, and later analyses of the HSE cite an overall 6% success rate of the cases studied.\(^6\)

Supporters of international economic sanctions may argue that the risks of failure for the imposing country are proportionate to the losses of the receiving. Imposing economic sanctions on another nation does not necessarily harm the imposing country, nor does it implicitly involve the imposing country in long-term political or ideological warfare. Economic sanctions can be seen by proponents as no-risk international politics in which the potential for failure may be high, but the potential for serious internal instability rests solely in the country upon whom the sanctions are being imposed. However, this argument changes upon a deeper reexamination of the results of the HSE in the following paragraphs.

Statistics from the HSE record a significant drop in the effectiveness of sanctions from the middle to the late 1900s, beginning at an effectiveness rate of 51% from 1945-1973 and decreasing to only a 17% success rate from 1973-1990,\(^7\) showing a significant decline in the plausibility of successful economic sanctions over time. Secondly, as Dr. Robert Pape of the University of Chicago elicits in his reanalysis of the HSE, the HSE researchers include economic sanctions as “successes” even when sanctions are used in conjunction with strategic military war efforts, as well as specific embargoes designed to weaken the target country’s military power. Pape identifies the role of militaristic power in the recorded success of economic sanctions, including 6 cases of concessions only after accepted military defeat by the target country,\(^8\) and five cases of political concessions only following an internationally sponsored military coup.\(^9\) Pape concludes that, “of HSE’s entire data of 115 cases, 30 inappropriately included 10 cases of economic disruption in war; 15 case of trade disputes or strategic embargoes; and 5 cases counted twice. This leaves a total of 85 valid cases, including 5 successes, or an overall success rate of 6 percent (...) versus the 34 percent HSE report.”\(^10\) Given a 6% success rate, it would be ill-advised for any foreign policy administrator to enact economic sanctions with any hope of tangible success. Moreover, while economic sanctions may be considered a “success” despite a culmination in military ground efforts, the risk of loss in these instances is no longer the burden of the target country, but the shared burden of all countries involved, as well as that

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\(^{9}\) Ibid., p. 101.

\(^{10}\) Ibid., p. 106.
of the soldiers whom both of these nations send to war.

Since their inception, economic sanctions have continued to become more militaristic in nature, to the extent that scholars recognize them as a signal or even a pretext for war. Professor Shi Bin refers to them as deceptive pretext for combat, arguing that “the initial use of sanctions can often be used to eradicate public opposition to the use of force, becoming a precursor to war instead of its replacement.”

The use of militaristic force in conjunction with or in response to economic sanctions is in direct contrast to the initial benefits believed to come from economic sanctions. Additionally, the need for military force despite the use of sanctions is indicative of the ineffectiveness of the sanctions as a sufficient tool for international political change.

Why Economic Sanctions Remain Unsuccessful

The fundamental flaw of sanctions is the presumption that one can wage ideological warfare from a distance. If a country is faced with imminent, physical encroachment or military threat, it will make use of its own military power, potentially in conjunction with other foreign support, knowing that there is no other option for defense. However, political ideologies espoused by opposing governments are based upon lifetimes, if not many generations, of staunch beliefs. Ideological morality will not easily be overcome by poverty, nor is it likely to be beaten into submission by export deficits. The larger the discrepancy in beliefs, and the broader the demands for change imposed by any number of nations in the international community, the less likely a country is to acquiesce to such a political transformation on the sole basis of economic stability.

Consider, for instance, that the leader of a certain foreign nation is informed by the UN that his or her style of leadership is considered to be in severe violation of human rights. The leader must choose to either rectify the form of government, or the international community will impose economic sanctions. Simplified, the leader’s choice is between immediately abandoning a political ideology in response to international demands or accepting the economic sanctions and hoping that the economy can withstand them. The leader recognizes that the sanctions may force his or her ideology to change in the future, but there is no reason to not attempt to withstand the punishment. According to this leader, it is a choice between imminent assured destruction and the possibility of survival. In extreme cases, the leader may know that ending human rights abuses may lead to the final rise of a revolutionary group that the government has been suppressing, creating greater regime instability and possible collapse. In these scenarios, the loss of immediate and sustained power due to acquiescence to foreign demands is greater than the risk of loss from even universally imposed economic sanctions. Daniel Drezner argues that sanctions against North Korea failed for this exact reason, that “North Korea’s expectations of future conflict were so extreme that it preferred statement to total acquiescence.” Similarly, former President of Egypt Gamal Nasser’s anti-American sentiment during the U.S. imposition of sanctions to

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precipitate Egypt’s removal of troops from Yemen in 1963 concisely summarizes the reactions of a strong political ideology to foreign attempts to force submission with economic threats. “America was not going to give us wheat till we behaved better. But (...) the freedom we have bought with our blood shall not be sold for wheat, rice, maize, or anything else.” In political situations such as these, governments may often utilize the imposition of sanctions to rally citizens in support against foreign ideological invaders, as was the case in Cuba and North Korea. In such instances, economic sanctions to a large degree not only heighten the fervor of the opposing ruling power, but also result in a strengthening of nationalist resolve by the citizens in response to economic hardship from an attacking foreign nation. Ideological convictions are powerful political tools, and as strong as the beliefs in political stability and humanitarian righteousness of the intervening country may be, the leaders of the defending nation’s convictions are equally entrenched.

Moreover, in today’s global market system, even the purely economic effectiveness of sanctions continues to decline as countries have more outlets with which to support internal economic stability. Even in conditions of highly multilateral or universal sanctions, there exist strategic trade options to circumvent sanctions. For certain international players, the benefits of pursuing trade routes with countries under economic sanctions highly outweigh the risks of retribution (particularly in the form of economic sanctions) from the international community. Consider Iraq, whose ideological stance in and of itself appeared sufficient to withstand the international economic attacks; however, its position as the possessor of some of the world’s largest oil reserves granted it freedom in searching for ways in which to compensate for economic deficits. Multiple other countries, subject to economic sanctions ranging from unilateral to universal, neither conceded political defeat nor suffered in any significant way from the economic effects of the sanctions. China, for example, was placed under relatively heavy multilateral sanctions headed by the United States in 1989 in response to the Tiananmen Square Massacre. Despite heavy sanctions, China’s GDP grew at a rate of 10.2%, astonishing even in times of peace, during the first and most severe five years of sanctions. Unsurprisingly, the sanctions achieved no political concessions, and the government responsible for the killings continued to thrive. Similarly, during the political turmoil framing the Guatemalan society in 1977, the United States attempted to halt the mass murders from both leftist and conservative agents by instituting economic sanctions as well as halting military aid and loans. In the initial wake of the sanctions, Guatemala’s debt to GDP ratio doubled, but the country conceded no political ground in response to the economic hardship. In contrast, despite national political instability, Guatemalan GDP began to grow in 1985 and continued to rise at a rate of 4% per annum.

15 Ibid., p.3.
16 Ibid., p.12.
from 1990 to 1999. These findings argue that the majority of sanctions imposed are not actually successful, and that ‘successful’ sanctions mostly harm innocent citizens, as discussed below.

**The Unintended Casualties of International Economic Sanctions**

There are, as elicited in the HSE, examples of both political and economic successes as a result of purely economic sanctions; however, a tool that does not specifically instigate military war does not necessarily imply a lack of violence. The causal structure behind successful economic sanctions is considered to be as follows: economic pressure, economic hardship, social pressure or political unrest, and finally political change. Instigating social and political unrest strong enough to topple a nation’s regime while neither setting foot in the country nor oppressing innocent citizens would be the ideal form of political change. The fallacy of this structure, however, lies in the fact that the very people who suffer most noticeably from economic downfall are less likely to participate in the elite circles of policy-making.

Furthermore, given that a vast majority of sanctions promoted by the United Nations or influential countries like the United States are in response to undemocratic inequality or violations of human rights, it is quite a leap to assume that the social unrest of the common masses will lead to a political upheaval of the elite. In contrast, for some opposing undemocratic governments, the economic suppression of the common people during a time of a surge in humanitarian injustices may be a favorable outcome. If the people are economically oppressed, up to a certain point, it is easier for the controlling power to suppress and contain them.

Proponents of sanctions may argue that sanctions attempt to push the boundaries of this aforementioned “certain point,” and that with enough economic pressure, any mass of people will have no choice but to revolt against the ruling power for survival. If the intent, however, is to save the people from an unjust form of leadership, then how can success be defined as worsening their lives to a point far beyond the extent of their own government’s harsh rule so that there is no choice but to risk their lives in rebellion? In November of 1987, for instance, 30 people were killed in Haiti while attempting to vote. At the time, the United States was very influential in Haiti, purchasing 84% of Haitian exports and supplying 64% of the country’s imports. In response to the undemocratic murders, the United States suspended aid to Haiti with the imposition of increasingly severe sanctions culminating in the suspension of all aid. By 1994, the economic sanctions had been successful in ousting the ruling power, and sanctions were soon lifted. However, according to a study by American University, the sanctions imposed forced citizens to forage for food and led to disease and death in the poorest parts of Haiti. The report concludes that “those most affected by sanctions were children. Aid workers say children’s death rates, because of the sanctions, were 20 times the usual rate. The children died from treatable maladies, such as measles and

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22 Ibid.
24 Ibid., p. 182.
other commonly treatable viruses. This was because sanctions forced Haitian public-health programs to grind to a halt.”

This type of strategic economic foreign policy begs the question, “against whom are we fighting?” The unjust deaths of the 30 voters may have been avenged, but at the cost of the lives of innocent children dying from curable diseases. Placing a dependent country in a situation in which vaccinations against commonly curable diseases are either blocked by trade restrictions or inaccessible due to internal poverty and social unrest is a danger both to the people of the country and to international disease immunity.

Furthermore, the view that an unjust ruling body will automatically suffer in the event of economic hardship is similarly flawed. Faced with internal social upheaval and international attempts at coercion, there is abundant evidence that the leadership in control will go to further extremes of oppression in order to remain in power. During the United Nation’s mandatory economic sanctions on the Rhodesian white supremacist government in 1966, for example, the average income of whites rose while that of the native Rhodesians decreased. Moreover, according to U.S. Bureau of the Census statistics, as many as 567,000 Iraqi children died from diseases and malnutrition due to the imposition of economic sanctions by the United Nations Security Council as opposed to the 45,000 total military and civilian deaths counted during military warfare. The ideological, economic, and political structure of an oppressive ruling power is not likely to bow to the demands of foreign powers backed only with threats of economic instability for the common people of a nation. One only needs to examine Hitler’s Nazi Germany to recognize the extent to which a twisted regime will go to squeeze money out of its citizens, and to find an economic scapegoat upon which to place the burden of political instability.

**Conclusion**

Given the low effectiveness rate of international economic sanctions on both political reformation and economic decline in a target country, the imposition of such policies is ill-advised. Given the often-fatal effects of economic sanctions on the very people that the policies are being enacted to protect, the use of economic sanctions to achieve political goals is reprehensible.

After such an extensive analysis of the harms created by economic sanctions, it is natural for the reader and the researcher to wonder, if not sanctions as a replacement for war, then what? While a comprehensive plan for international political power is out of the scope of this paper, the conclusions outlined within will be emphasized through the following metaphor: if a doctor, in an attempt to cure an ill patient, discovers that the medicine he or she is administering offers no cure, and in fact has no effect on the patient’s body whatsoever, a medical professional will likely discontinue the treatment in search of a viable cure. However, if the doctor discovers that the treatment being administered causes a severe malady that may lead to a more rapid death of the patient, the

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doctor’s main priority is to first immediately forgo the treatment, regardless of whether or not there is another known cure. Having no cure for a chronic illness, even an illness that causes early death, is in no way an adequate excuse to purposefully instigate a separate serious and deadly malady. Economic sanctions are not the cure for the malady of war, and in the search of a more viable cure, world leaders must discontinue the use of a so-called remedy that incites a greater disease.
Zombie Lending and Soft-Budget Constraints in China’s State-Owned Sector

Tianlei Huang

The state-owned enterprise sector has long played a significant role in providing many people’s livelihoods. They not only provide employment, but also a range of social services including health care, education, and retirement protection. Unsurprisingly, the state has historically assessed the performance of state-owned enterprises based on their “capacity, production, and market share goals” instead of profitability or efficiency. Moreover, state-owned enterprises remain as major employers in many localities because they traditionally dominate many contestable industries with high labor intensity. Therefore, the decision to let a failed state-owned enterprise file bankruptcy has become a political decision rather than a corporate one.

For many unprofitable “zombie” companies, going bankrupt is a difficult process. Despite the 2007 Bankruptcy Law, which attempted to impose unified rules on both SOEs and non SOEs for mandatory liquidation during severe financial stress, most SOEs need to obtain consent from the government to initiate the lengthy bankruptcy process. Data from the Ministry of Finance shows both the number of loss-making SOEs and the amount of losses they incur has soared since 2010. At the end of 2017, about 69,000 SOEs across China are making losses, amounting to approximately RMB 1.4 trillion. Even so, bankruptcy from SOEs is limited, as shown in Table 1. The table shows the number bankruptcy cases, for both SOEs and non SOEs, accepted and adjudicated by China’s legal system.

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Close ties with the Chinese government have made state-owned banks largely insensitive to profitability goals but sensitive to party discipline and order. Banks are treated as a semi-government agency and are in effect operating as little more than cashiers for the government. As a result, state-owned banks are biased toward lending to state-owned enterprises, which to some extent has crowded out lending toward the non-state sector. These discriminatory lending policies have diminished the effectiveness of the state’s endeavor to promote private sector growth and to induce liquidation and restructuring within the state-owned enterprise sector.

**Table 1: Number of Enterprise Bankruptcy Cases Accepted and Adjudicated by China’s Legal System**

<table>
<thead>
<tr>
<th>Year</th>
<th>Accepted</th>
<th>Adjudicated</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015</td>
<td>3,683</td>
<td>2,352</td>
</tr>
<tr>
<td>2016</td>
<td>5,665</td>
<td>3,373</td>
</tr>
<tr>
<td>2017</td>
<td>9,542</td>
<td>6,257</td>
</tr>
</tbody>
</table>

*Source: Supreme People’s Court, People’s Republic of China.*

**Soft Budget Constraints**

As a legacy of China’s past command and control economic system, the post-1978 soft budget constraint of the state-owned sector in still remains largely in place. Sources of these soft-budget constraints include subsidies from central and local governments, negotiable and flexible tax rates, “soft administrative costs”, and “soft credit” from state-owned banks. Among these sources, the large amount of “soft credit” from state-owned banks to state-owned enterprises contributes directly to the deteriorated asset quality of state-owned banks. Resulting from two-decades of excess lending and borrowing, a non-performing loan crisis broke out in the late 1990’s. This forced the state...
to inject RMB 270 billion (approximately USD 32.53 billion) into the Big Four state-owned banks to prevent them from defaulting on their financial obligations to hundreds of millions of Chinese households. A decade later in the aftermath of the 2008 stimulus scheme, aggressive leveraging by state-owned enterprises has caused overcapacity, a credit squeeze for small to medium enterprises, shadow banking, and the resurgence of bad loans within the state-owned banking sector. This has brought the country’s vulnerable financial sector to the edge of another crisis.

Persisting soft budget constraints have created a moral hazard problem for both state-owned enterprises and state-owned banks. The soft budget constraints faced by state-owned enterprises encourages more risk-taking, which leads SOEs to turn to banks to employ more leverage. In addition, the pressure for SOEs to innovate and increase productivity is weak and, even sometimes absent, due to the belief that more credit will always be accessible from state-owned banks to help them out should they get into financial trouble.

Meanwhile, for the banks, it is the same expectation that makes them continue to extend credit to these unprofitable and sometimes even insolvent firms. Through the state’s several rounds of banking sector rehabilitation programs since the 1990s, the incentives of large state-owned banks to adopt prudent lending criteria have been largely undermined due to the expectation that “having bailed out troubled banks once, governments will do so again.” A vicious circle has been thus reinforced, ironically, by the state that intends to break it.

Over time, the incentive mechanisms for both state-owned enterprises and banks have been dreadfully twisted by the state that holds conflicting feelings towards the market. The Communist Party of China (CPC) has acknowledged the market’s decisive role in allocating resources, but it is also in constant fear of losing control of the Chinese economy.

However, without subjecting state-owned sector to hard budget constraints, no financial reform package can in effect solve the aggressive leverage problem in the Chinese economy.

In his Government Work Report delivered to the National People’s Congress on March 5, 2019, Chinese Premier Li Keqiang announced that China would adopt the principle of “competitive neutrality” (“竞争中性”), so that “when it comes to access to factors of production, market access and licenses, business operations, government procurement, public biddings, and so on, enterprises under all forms of ownership will be treated on an equal footing.” This is a positive sign. One of the most important steps in achieving competitive neutrality in China would be the imposition of hard budget constraints on both state-owned enterprises and the banking sector. This would require the divestiture of SOEs of social functions, less influence from the government on enterprise bankruptcies, and most importantly, market-oriented allocation of financial resources.

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Social Inclusion of Venezuelan Refugees

Chae Young (Kevin) Jung

In wake of the Venezuelan Refugee Crisis, the Colombian government should promote long-term oriented policies to better include the stark influx of refugees. Therefore, they need to strategically allocate government funds to better provide social services for Venezuelan refugees. By strategically following Germany’s open-door policy example, the current crisis can be converted into a long-term benefit through the expansion of public education and refugee reallocation.

The Venezuelan displacement has put the region’s refugee laws and cooperation to the test in the absence of a long-term international burden sharing strategy. Since the start of the Venezuelan political crisis in 2015, 1.9 million Venezuelans have left home with more than a million fleeing to its neighboring country, Colombia.¹ Using estimates from a World Bank report, the president of Colombia, Iván Duque, has publicly stated such an influx of refugees could cost approximately $1.5 billion, nearly 0.5% of Colombia’s GDP. However, these types of refugee crises are an international phenomenon. According to the UN Refugee Agency, there are 68.5 million forcibly displaced people worldwide, of which 19.9 million are refugees under the UNHCR mandate. In these figures reported in June 2018, 6.3 million refugees were from Syria, 2.6 million were from Afghanistan, and 2.4 million were from South Sudan (see Figure 1).² The UNHCR’s unofficial figure of growing Venezuelan outflow reached 3.4 million in February 2019 (see Figure 2).³ Thus, Colombia is in a position to set an international example of how to convert these refugee crises into long-term benefits for refugee hosting countries.

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When designing their policies, Colombia should look towards Germany. Germany’s inclusive approach to the Syrian refugee crisis between 2014 and 2016 shows how a proper policy design can turn short-term costs of integrating refugees into the long-term benefits of a stronger workforce and greater national productivity. During those years, Germany took in approximately 1.5 million refugees and migrants. Since then, Germany’s open-door policy has not only focused on fairly distributing them throughout the country, but also expanded its social infrastructure to educate and provide training. This is expected to help productivity in Germany, as 40% of its population will be over the age of 50 by 2050. The German model of refugee integration lays out a reasonable framework for the Colombian government to follow, as the challenges arising from the cultural difference that Germany faced are likely to be less severe in the case of Colombia.

There are two major actions the Colombian government should take: increase social services for Venezuelan refugees and fair, equal relocation. Increasing spending on public education to include young Venezuelan refugees will add significant synergies to both the Colombian society and Venezuelan refugees. School enrollment for refugees drop sharply from primary to secondary schooling, resulting in an untapped potential of future workforce productivity. A World Bank report suggests a short-term investment of 0.26% to 0.41% of Colombian GDP will be needed to increase social service access for refugees in order to fully reap the long-term economic benefits. These economic benefits can exceed the cost of investment as the majority of refugees are young. Some labor economists estimate that each year of schooling increases annual earnings of 5% to 13%. Given the shared language and history, Venezuelan refugees with proper social services and resources will be easily integrated into the Colombian society. The marginal benefit of refugee inclusion can be greater than the marginal cost when considering the future value to the labor force from these individuals.

As vulnerable refugees lack resources to move away from the border towns, the Colombian government should assist them to relocate, helping the national economy as well as the refugees. Any marginalized population is susceptible to corruption and mistreatment. Relocating refugees away from the border areas to where more demand for their labor exists will certainly promote economic synergies. Furthermore, as the crisis in Venezuela has unfolded rapidly, over half of the migrants fleeing from Venezuela have a college degree because “the poor are leaving because now everyone is poor,” Tomas Perez Bravo, a professional at the Central University of Venezuela diaspora think-tank, said during the
interview with The Straits Times. Yet, the amount of worldwide funding per person for the displaced Venezuelan is only a half of what Syrian refugees receive. If the refugees are placed to where they can bring the most value to the local economy, such as farmlands to boost agricultural growth, Colombia can turn crisis into an opportunity for economic growth (such an effort to encourage the production of staple crops was done by the government in 2015 through a program called Colombia Siembra).

In addition, the cost of integrating refugees into the Colombian society is significantly lower than the case of Germany, as the cultural assimilation of Syrian refugees has become the main challenge. This will be less problematic for the Latin American countries that share the same language and religion. In addition, compared to the Colombian labor force, Venezuelan refugees tend to be more educated and younger, which can create value for the economy.

Colombia can set an example for other countries in the region in promoting international economic stability by successfully converting regional migration problem to economic benefit. Given the current crisis, the best course of action is to introduce an immigration policy to systematically integrate refugees into society through social services. Colombia is one of the few OECD member countries (along with Chile and Mexico) in the region and has both solid institutions and capable policymakers. The country is uniquely positioned to deal with an inevitable issue by transforming a potential problem into an opportunity while providing social assistance to the Venezuelan refugees coming into Colombia. Colombia should carefully allocate government resources to provide public services that will bring long-term benefits to both the Venezuelan refugees and the Colombian economy.

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11 Unofficial data. During a high-level meeting in Colombia, it was unofficially reported that the worldwide support for Venezuelan migrants is $300 per person, while that of Syrian migrants is $600.
Figure 1: Forcible Displaced People Worldwide

68.5 million forcibly displaced people worldwide

- 40 million internally displaced people
- 25.4 million refugees
- 3.1 million asylum seekers

85% of the world’s displaced people are in developing countries.

57% of refugees worldwide came from these countries:
- South Sudan
- Afghanistan
- Syria

Source: UNHCR

Figure 2: Destinations and estimation of the Venezuelan diaspora

There are an estimated 3.4 million Venezuelan refugees and migrants, up from 0.7 million in 2015.

Source: International Organization for Migration
Please briefly introduce yourself (Your background and previous work/internship experience).

My name is Franck, I am from Burkina Faso. I came to the U.S. 6 years ago for my undergrad, after having lived in Senegal, Cameroon, and Guinea-Bissau. I got my Bachelor’s degree in International Business, Economics and Finance at Temple University in Philadelphia, then I joined the Global Equity practice at PwC where I worked for a year before joining MIEF.

How was your internship in Brookings? What do you like best about what you do?

My internship at Brookings was a very fulfilling experience. I did some research at the Africa Growth Initiative, within the Global Economy and Development program. My focus was on Sub-Saharan Africa, for which I researched the private sector and key industries, as well as local currencies and their role on the region’s development. Something that I really enjoyed at Brookings was the sense of independence in the research. I was often taking both opposing sides of an argument while reviewing work prior to publication. This helped eliminate any biases that may exist included in the pieces.

What type of economics are you most interested in?

I have great interest in understanding how alternative investments such as private equity or venture capital can be leveraged to contribute to economic growth in developing countries.
What do you enjoy most about MIEF and what impact has MIEF had on you?

I like that the program is interdisciplinary. While we are studying economics, we also study finance and get to better comprehend the linkages between the two. MIEF is also very practical, which helps to quickly transfer from school to work the technical skills we acquired. For me, MIEF was intellectually challenging and stimulating. It helped me build more character and resilience.

What do you like to do in your free time?

In my free time, I like working on my startup, called Bright Future Global. We distribute LED-integrated pens called 'Firefly Pens' to students in developing parts of the world, who lack access to the electricity they need to do their homework and study at night. The startup is currently present in Mali and Burkina Faso and is leading efforts to launch a solar-powered version of the pen. I also enjoy listening to different styles of music, dancing and cooking!

Tell me about your capstone topic. And why did you choose it?

My capstone looks at understanding the causes of success and failures of World Bank projects. It takes an approach which consists of looking at team leaders backgrounds as potential determinants. It’s heavy in Python coding and web scraping! I chose it because I worked on determination method of CEO pay in my previous job and wanted to understand how similar concept could be applied to development.

What are your career plans after the graduation?

After graduation, I am planning to work in infrastructure financing with a focus on Sub-Saharan Africa. I believe that infrastructure is a sine qua non of economic development!

What was your favorite MIEF class so far?

My favorite class this semester was Infrastructure Finance and Modeling. It gave me a good grasp of the workings of power plants, PPAs, and valuations.

Do you have any advice for the next MIEF cohort?

My advice for the next cohort would be brush up their statistics before the program starts. And when it starts, to lean-in 100% from the very first day! Focus on academics, be a sponge, and absorb as much as possible!

Any parting words to your current cohort?

I was very impressed by the caliber of my classmates and I have learned something from every single one of them, and I hope they have learned a thing or two from me as well. I would like to remind them of the privilege we were afforded to attend such a great institution, and of the responsibility that comes with this privilege. I know they will go on to realize amazing things and I hope they use this education to impact the lives of others, to create opportunities. Finally, I would like to close off with an African proverb that says: “if you think you are too small to make a difference, you haven’t spent a night with a mosquito.”
Please briefly introduce yourself (Your background and previous work/internship experience).

My name is Karry (Boyang) Sun and I am from Beijing, China. I obtained my Bachelor’s degree in Economics and Econometrics at University of International Business and Economics in Beijing. I have recently completed internships at World Bank Group, Export-Import Bank of the United States, and the Wilson Center.

How was your internship at the Export-Import Bank of the United States? What do you like best about what you do?

My research experience at the Export-Import Bank of the United States has been great and interesting. I mainly conducted economic research and data analysis regarding the export credit agencies and development finance institutions in the OECD countries. My work was challenging because it was a brand new area with limited previous research, and that is exactly what I like best, being challenged to explore the unknown.

What do you enjoy most about MIEF and what impact has MIEF had on you?

MIEF is an intense and wonderful program that provides intuition as well as quantitative skills in international economics and finance. I really enjoyed the solid quantitative skills that I acquired at MIEF, and MIEF offers a perfect platform to do relevant research on economics and finance with great academic advisors.
What do you like to do in your free time?

I usually watch movies or play basketball in my spare time. I also enjoy attending networking events at DC, where I can meet people with diverse backgrounds and cultures.

What type of economics are you most interested in?

My research area primarily includes international economics and micro-econometrics.

Tell me about your capstone topic. And why did you choose it?

Working together with Manchun Wang, I analyzed the current account sustainability in G-7 and BRICS countries, exploring the determinants for current account sustainability as well as some relevant policy implications. The sustainability of the current account has been an important issue in international economics as many countries are trying to deal with the problem of current account imbalance.

What are your career plans after the graduation?

I plan to work on relevant research regarding economics and econometrics, preferably taking advantages of the quantitative skills I have learned at MIEF.

What was your favorite MIEF class so far?

My favorite classes are the three econometrics courses taught at MIEF in the academic year. They were pretty helpful and useful, as well as interesting because we were able to confirm our assumptions or intuitions on economics with relevant data and econometric models.

Do you have any advice for the next MIEF cohort?

It is a perfect program for young professionals with specialization in economics and finance. Take full advantage of this wonderful program and enjoy it!

Any parting words to your current cohort?

This MIEF cohort is pretty great, consisting of talents from different professional areas and different countries around the world. They are always kind and helpful, and all of the MIEF alumni I met are nice guys shining in their professional fields. It was my great pleasure to meet and be friends with these wonderful people.
Could you briefly introduce yourself? What did you do before you came to the MIEF program? When did you graduate from MIEF?

My name is Sophia Jin, and I graduated from the MIEF program in 2018. Currently, I’m an associate at Business Relationship Management Corporate & Structured Credit team of Fitch Ratings, which is one of the “Big Three” credit rating agencies in the world. Before MIEF, I briefly worked at World Bank Group doing a Public-Private-Partnership research project after college. I have also worked as a research assistant for Thought Leadership, Economics and Private Sector Development team at International Finance Corporation (IFC) for 10 months, since my last semester at SAIS. I graduated from The George Washington University in May 2016, majoring in Finance and Mathematics.

What do you do at Fitch? What is your favorite part of your work as an associate at Fitch?

I’m working as a quantitative market research associate with North America Corporate and Structured Credit team at Fitch Ratings, and I’m responsible for research, development and preparation of pitch books material, including developing pricing and spread analysis of fixed income products through econometric.
analysis, developing market reports, and looking for business opportunities for the company etc.

I’d say my favorite part about working at Fitch so far is that I can not only work on the quantitative analysis projects, but I also get the opportunity to leverage my market knowledge and market sense from senior members of my team.

What skills had you learned from the MIEF program that you use on a daily basis at Fitch?

Since my daily job involves lots of quantitative analysis for the economic value of those bonds/loans with ratings from Fitch, I’ve used the knowledge that I learned from MIEF almost every day, which includes all the econometrics knowledges such as basic econometric modeling and time series knowledge, as well as the useful corporate finance knowledge.

What was your favorite part of the MIEF program?

MIEF program has definitely pushed me to become a more efficient version of myself, since MIEFers had to finish intense schoolwork within very limited time. However, I was greatly encouraged because I really enjoyed every single course, and the faculty members at MIEF are all inspiring. Also, due to the size of the MIEF program, every one became really good friends through school projects and social events, and it’s this kind of true friendship I will appreciate in the rest of my life.

From your perspective, what do you think is the most important knowledge or technique to take away from MIEF?

In my opinion, I would say that the combination of the understanding of basic finance and skills of using the data analysis tools such as STATA and Excel are my biggest takeaways. Personally, I know I always wanted to work in financial industry, but I also have the passion for economic research, so MIEF program has really helped me equip myself with the knowledges/skills in both areas.

If you were to do it all over again (SAIS or MIEF), what would you do differently? What would you do again?

If I were to do MIEF again, I think I would take more econometrics classes. Since I was also working at IFC the second semester at SAIS, I didn’t have the time to take as many courses as I wanted. Although I don’t regret working while doing schoolwork, but if I didn’t work at all that semester, I’d love to learn more for sure.

Any last words of advice for the graduating and incoming cohorts?

I hope everyone continues to be him/herself and enjoys MIEF as I did. Please never be afraid of changing or challenging yourself because you should believe all the effort you put in will pay you back eventually.
Could you briefly introduce yourself? What did you do before you came to the MIEF program? When did you graduate from MIEF?

I am originally from Minnesota, but grew moving around lot, mostly in Europe due to my fathers work. I studied economics in undergrad at Colby College in Maine. After college I served in the Peace Corps in Micronesia. After the Peace Corps, I moved to Beijing, China where I worked for a think tank that did research in international economics and finance focused on emerging markets. After about 2 and half years in China I applied to grad school and landed at SAIS in the inaugural MIEF class. We graduated in the summer of 2015 after which I joined the Federal Reserve Bank of New York.

What do you do at the Federal Reserve Bank of New York? What is your favorite part of your work there?

I work in the Markets Group of the New York, where I am part of two main functions: (1) open market operations to carry out monetary policy implementation and (2) analysis and monitoring of financial markets. There are a lot of things I like about my work, but one of my favorites is that every day brings new challenges.
and questions. I get to spend any day trying to solve macroeconomic and financial puzzles. For example, one day I may have to figure out why did long-term interest rates go up as equities went down and the dollar appreciated against the euro and the next day I am trying to figure out why both rates and equities went down and the dollar depreciated against the Japanese yen.

**What skills had you learned from the MIEF program that you use on a daily basis at the New York Fed?**

The main skills I use are the approaches and strategies I learned for solving problems related to economics and finance and the frameworks used for looking at the world. The MIEF program allowed me to enter my job with the right understanding of the broader contexts, histories, and reference points.

**What was your favorite part of the MIEF program?**

Again there are lots of things from the MIEF program I enjoyed, but my favorite was probably my classmates and the opportunity to work with them. I really enjoyed the strong collaborative nature of the program. Group work and collaboration skills have been a very large part of my job at the Fed and I am very thankful for the opportunity which allowed me to work with similarly smart and talented people during the MIEF program.

**From your perspective, what do you think is the most important knowledge or technique to take away from MIEF?**

Tough question. I leverage a lot of the skills I learned but some of the key classes or techniques I would highlight would be Corporate Finance and Multinational Corporate Finance. Having strong understanding of how assets are valued and general finance is key to my work. Skills in regression analysis and statistics, especially as they apply to global macroeconomics have also been very important.

**If you were to do it all over again (SAIS or MIEF), what would you do differently? What would you do again?**

I would definitely take the finance and statistics classes again and everything to do with monetary policy. I would maybe try sitting in on some other classes completely unrelated to my focus, just for a couple classes, to take advantage of some of the other areas SAIS excels at, maybe something like a strategy class or international relations. I would similarly try to connect more with the broader SAIS community.

**Any last words of advice for the graduating and incoming cohorts?**

When I went into the MIEF program my focus and background had been almost entirely in emerging markets and international economics. I had no intention of going to the New York Fed, let alone focusing on U.S. monetary policy, but I am so glad that’s where I ended up and it’s all because of what I learned and was exposed to at SAIS. So my advice is be open to new ideas of what a career could be for you and believe that you can do any job well with what you will learn at SAIS. Don’t let any preconceived notions about what you are good at or where you think you should go stop you from trying something new.
Book Recommendations

Whiteshift: Populism Immigration, and the Future of White Majorities
by Eric Kauffmann

“Anyone who is interested in understanding the political moment across so many of the world’s democracies – which should be all of us – can learn a lot from this provocative book. Kauffmann marshals a wealth of evidence, mainly from Western Europe and North America, but the lessons also apply, mutatis mutandis, to many countries in the so-called developing world (such as India), where we would not understand the majorities as white or even defined along racial or ethnic lines. While I do not agree with all of its elements, I find the book’s main thesis persuasive: overcoming the populist backlash to the increased diversity in our societies requires a reconceptualization of ethnic majorities towards a more inclusive vision. As a firm believer in the porosity and malleability of political identities, I believe this may well be our best bet for a politically healthier future.”

- Filipe Campante
Bloomberg Distinguished Associate Professor of International Economics,
Johns Hopkins SAIS

Review of Open: The Progressive Case for Free Trade, Immigration, and Global Capital
by Kimberly Clausing

“Until the recent upsurge of right-wing nationalism, advocates of anti-globalization were largely drawn from the progressive left (think of the “Battle in Seattle” protests at the 1999 WTO Conference). In this well-written and important book, Reed College Economics Professor Kimberly Clausing convincingly demonstrates that anti-globalist policies such as barriers to trade, immigration, and international capital mobility would mostly hurt the very people they purport to help. Clausing’s heart is with the stagnating middle classes and the displaced, but she is clear-headed about the causes of their circumstances and the policies that would most help them. She amasses an impressive range of empirical and anecdotal evidence to show that increased economic inequality is largely caused by technological developments, trends in market power and policies that have favored capital over labor. Her wide-ranging recommendations are aimed at maximizing the benefits of openness while protecting those that are hurt by it. She is particularly persuasive on the benefits of liberal immigration policies and more efficient and progressive tax policies (her critique of the 2017 U.S. tax cuts is compelling and devastating). Her expertise is evident in her advocacy of policies to minimize the shifting of corporate taxes to offshore tax havens. She also promotes pragmatic policies to help displaced workers and argues, as most economists do, for effective carbon taxation. Her book should be read by any well-meaning politician who is tempted to offer progressive-sounding but muddled solutions to today’s economic challenges.”

- Elie Canetti
Associate Practitioner in Residence of International Economics,
Johns Hopkins SAIS
Against the Gods: The Remarkable Story of Risk
by Peter Bernstein

“In Against the Gods, Peter Bernstein tells the fascinating history of how we think about risk and illustrates the profound impact that understanding risk has had on society. The story starts before formal probability theory was developed and where the winners of games of chance were therefore not viewed as some combination of lucky and smart, but rather, they were simply who the Gods had wanted to win. Over time, mathematicians developed new theory to help understand, quantify, and harness risk. Bernstein argues that: “by defining a rational process of risk-taking, these innovators provided the missing ingredient that has propelled science and enterprise into the world of speed, power, instant communications, and sophisticated finance that mark our own age.” This book is easy to follow, tells an engaging and important history, and I highly recommend it.”

- Nicholas Coleman
Principal Economist, Federal Reserve Board
Adjunct Lecturer, Johns Hopkins SAIS

The Third Pillar: How Markets and the State Leave the Community Behind
by Raghuram Rajan

“Rajan offers a fresh and intriguing perspective on the rise of populism in the United States and elsewhere. He convincingly links the rise to the deterioration of the safety net historically provided through the third pillar--the community. While the state and market (the first two pillars) have been widely studied, this book highlights the underappreciated role of the community, for example, as a backstop to protect the vulnerable during natural or economic disasters. As the community has weakened over recent decades, workers have been left unsupported when markets or the state fails. Rajan argues that relaxing state control and returning some power to local communities will calm the frustration and fear that drives workers to embrace extreme political movements.”

- Stephanie Curcuru
Assistant Director, Federal Reserve Board
Adjunct Lecturer, Johns Hopkins SAIS
Course Recommendations

International Money and Banking
Instructor: Professor Nicholas Coleman

This class examines the role of financial institutions and money in the international economic system. The course can be categorized into three parts. First, the course looks at the international financial regulation and closely examine the financial crisis and its lasting effect on the global economy. The second part of the course focuses on money, why different currencies exist, and how exchange rates are determined. The third part focuses on criticizing academic papers. You will learn how to read, analyze and evaluate an academic paper - a skill I find extremely helpful in both academic and professional fields. It will enhance your analytical skills, and you will leave this course with a very good understanding of the roles of banks in the economy. You will also become a good skeptic of new policies and regulations. I think this course is a great foundation if you are interested in a career in finance, economics or policy.

- Yara Eid
MIEF '19

Using Data to Understand Good Governance
Instructor: Professor Filipe Campante

If you are interested in exploring the potential of quantitative analysis to study topics that lack clear or easy to find data, this is course is worth a look. The bulk of the course involves reading, presenting, and discussing papers that aim to analyze how to make government more effective. Topics include corruption, ethnic diversity, and the impacts of foreign aid. The papers discussed often involve creative and complex study designs that opened my eyes to the kind of experiments that are possible in the real world. This course covers similar topics to a lot of the development classes SAIS offers, but from a really different perspective. It could serve as a standalone course for someone with a passing interest in governance issues or an important supplementary course for a student more focused on economic development. This class will make you a better, more insightful consumer of quantitative analysis, which depending on where you wind up working could be just as important as being able to produce these kinds of studies.

- James Applegate
MIEF '19

Economic Populism and Financial Crises in Emerging Markets
Instructor: Professor Monica de Bolle

This course reflects the multidisciplinary and international approach to economics that SAIS offers. The blend of advanced economic theory and its socio-political causes and implications is what makes this course particularly appealing. The lectures revolve around one of the most cendent and current topics in the world: the surge of economic nationalism and populism. We delve into the populist agenda of Latin American countries in the 80s and 90s, current examples as Turkey and in the economic nationalistic policies of China, South Korea or Germany. Additionally, country wise case studies underscore the significance of the socio-political trends while diving into macroeconomics and policy making. This course offers a unique opportunity to better comprehend a widely known but greatly misunderstood topic thanks to Professor de Bolle’s expertise.

- Alejandro Fiorito
MIEF ’19
Views on Economic Topics: Faculty vs Alumni and Students

Inspired by the Chicago Booth School of Business’ Initiative on Global Markets (IGM) Economic Experts Panel, we asked Johns Hopkins SAIS faculty, alumni, and students about current economic issues. During the Spring of 2019, 15 International Economics faculty members and 18 MIEF alumni and students responded to our 10 questions. Here are their insights:

Question 1

The recent trend toward populism globally is largely driven by economic (rather than social or other) factors.

Professor Jason Fichtner: “Perception is 9/10ths reality. While many countries are experiencing relatively strong economic growth, the gains are not necessarily distributed equally, and some people/groups perceive that the economy is leaving them behind. This perception can increase existing underlying social and cultural tensions. Hence, the recent trend toward populism is both an economic and a social/culture issue. You can’t view this issue in isolation.”

Professor Marta Giagheddu: “Economic factors as falling labor market income share and increased income inequality have contributed to creating a scope for populist propaganda. However, other social and political reasons, often country-specific, are also important contributing factors to populist escalation.”

Alejandro Fiorito (MIEF ’19): “It is, in the sense that economic shocks (i.e. the Global Financial Crisis of 2008) trigger socio-politic dynamics that challenge the status quo. The trend towards populism is determined by many factors, but the deciding and initial causes are economic shocks that lead to increasing inequality, discontent with institutions, etc.”

Michael Redmond (MIEF ’19): “The timing and breadth of the populist surge suggests social factors may be stronger than economic ones, though the two are intertwined.”
InFER INSIGHTS SURVEY

Question 2

The Chinese model of development using industrial policies (e.g. cheap loans, export subsidies, and local-content or technology-transfer requirements) is a viable alternative to the “Washington Consensus” world of relatively free trade and financial markets.

Professor Nicholas Coleman: “It may work in China (for now), but some of the policies may be very difficult to replicate in other, smaller countries. It is my understanding (without being a trade person), that the reason foreign companies put up with the local content policies and forced technology transfer rules is because China is such a big market that, on net, it is beneficial to do those things to access the market. For smaller markets with the same rules, foreign companies may just decide to go elsewhere. (Note: my views do not represent the Federal Reserve).

Professor Mark White: “Temporarily. Check back in thirty years.”

James Applegate (MIEF ’19): “While I think the Chinese economic experience is largely unique, China (as well as a number of other countries) have destroyed the theory that economic development and democratization have to go hand in hand.”

Question 3a

Assuming the dollar eventually loses its role as the dominant currency in global financial markets, financial markets are likely to quickly switch to using another single, dominant currency rather than maintaining a multiple currency equilibrium.
Views on Economic Topics: Faculty vs. Alumni and Students

**Question 3b**
Which currency could take over as the dominant one?

**Professors**

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**Alumni and Students**

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**Professor Michael Klein:** “The Eurozone would require significant enhancement - at least a serious banking union and reduction of uncertainty over the future of an “integrated” Europe; China would need to establish trust that it will not let short-term expediency or geo-political tension govern interference in currency markets.”

**Alejandro Fiorito (MIEF ’19):** “The dollar has been dominant because it is largely used as medium of exchange and because it has an intrinsic value and people see it as a safe asset. The Euro and the RMB are the only currencies that also have those two basic properties, due to the trading volume of the countries that use them and the strong economies and central banks that back them up.”

**Romina Ferreira (MIEF ’18):** “The Yuan could be in developing economies as Venezuela or African countries that are highly influenced by China, but I don’t see it becoming the global trend.”

**Question 4**
The financial system has grown safer since the crisis.

**Professors**

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**Alumni and Students**

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<tr>
<td>Strongly Agree</td>
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**Professor Elie Canetti:** “We should never be complacent, but at least with regard to the banking system, the wholesale revamping of bank capital and liquidity requirements has clearly made the banking system safer, as well as some other tighter regulations related to the credit allocation process (notably mortgage finance). But that’s a relative judgment.”
InFER INSIGHTS SURVEY

Professor Mark White: “The next crisis is always under construction and often out of sight.”

James Applegate (MIEF ’19): “Safer in some ways, less safe in others, but largely unchanged as post crisis reforms didn’t do much to begin with and have, in many cases, been walked back. Boring answer, but I think it’s right.”

Jorge de Leon Miranda (MIEF ’17): “Countries have implemented efforts in strengthening banking regulation and supervision but financial markets in many countries are still fragile.”

Michael Redmond (MIEF ’19): “The financial system is safer now that the crisis remains fresh in people’s minds, but this safety will inevitably recede as the financial industry slowly convince regulators to focus more on the costs of regulation rather than on the benefits.”

Question 5

Efforts by the Fed and the Treasury to support failing financial institutions during the financial crisis benefitted the average American household.

Professor Filipe Campante: “True, relative to the alternative of letting them fail. That doesn’t mean there weren’t important costs.”

Professor Jon Hoddenbagh: “Although it was politically unpopular, and ideally would have been avoided through sound preventative policies prior to the financial crisis, the bailout of systemically important financial institutions was vital to preventing a total meltdown of the global financial system and preventing a Great Depression 2.0.”

Professor Roger Leeds: “To save Main St. requires saving Wall St...’ unfortunate but true.”

Mac Casey (MIEF ’19): “Generally yes, but the moral hazard associated may not have helped if we see similar outcomes in the next crisis.”

Tunc Gursoy (MIEF ’16): “Maybe not every household at the same grade, as there is some evidence that the unconventional monetary policy have exacerbated the income inequality in the US, yet the average American household is doing better if QE was not put in place.”
Question 6

Income inequality on the scale seen in America today is a hindrance to economic growth, not just an issue of fairness.

Professor Gordon Bodnar: “I am not aware of any convincing research that growth is hindered by the current levels of income inequality.”

Professor Jason Fichtner: “Income inequality in and of itself is not a problem so long as a rising tide does indeed lift all boats.”

Professor Jon Hoddenbargh: “We are approaching robber baron levels of wealth inequality - it needs to be corrected somewhat. Income inequality - although rising - is less of an issue than wealth inequality. Most of the disagreement within the economics profession and policy realm stems from the “how” question - how do you address wealth inequality?”

Sydney Levine (MIEF ’19): “Income inequality need not be an issue of economic growth in order for it to be of concern to economists. The levels of inequality that we are seeing certainly do increase uncertainty, decrease confidence, and ultimately will lead to enough discontent that will be reflected in the markets. Whether or not inequality is affecting the macroeconomy, economists should demand a seat at the table when discussing how we will move forward towards a more equitable society.”

Question 7

Relatively poor nations have benefitted more from joining the eurozone than rich countries.
InFER INSIGHTS SURVEY

Alejandro Fiorito (MIEF ’19): “If we could go back in time, I think both large and small countries will agree that the extension of the Union was, at least, rushed. And that it should have been made differently, to avoid issues as the ones in Greece. Large countries have benefited from having a strong currency but there has been a large burden from the problems this strong currency has caused in peripheral countries. The Czech Republic with its own currency, for instance, has not faced these issues.”

Yanki Kalfa (MIEF ’18): “Well, it depends. Poor nations gained by having stronger institutions, but they have lost comparative advantage.”

Question 8
Economists do a poor job of communicating to the public.

Professor Jason Fichtner: “Some are better than others.”

Michael Redmond (MIEF ’19): “While quantitative rigor is undoubtedly important for grounding economic analysis with facts and theory, the field remains overly preoccupied with such rigor at the expense of real world applicability.”

Question 9
The Global Financial Crisis exposed failings in the models used by much of the Economics profession.
Views on Economic Topics: Faculty vs. Alumni and Students

**Professor Mark White**: “Every profession that advances learns from its failures. This is true for architects, engineers, scientists and even economists.”

**Apoorv Bhargava (MIEF ’19)**: “A model is as good as a modeler or econometrician in this case. Accounting for the tail risks and assumptions on the model lead to different results. This wouldn’t mean that necessarily the models are bad, but just bad assumptions.”

**Yara Eid (MIEF ’19)**: “I think it exposed failing in the interpretation of the models and not the models themselves.”

**Question 10**

Where do you see the future of economic education going?

**Professor Michael Klein**: “For students interested in non-academic jobs, i.e. most of them, what really counts is a good combination of “Economics 101 plus an understanding of politics” to paraphrase what Stanley Fischer once said when he left the World Bank as Chief Economist.”

**Professor Paul Piveteau**: “Less theory, and more empirical work, data analytics.”

**James Applegate (MIEF ’19)**: “We will need to be retrained to clean and maintain the robot economists who will replace us.”

**Michael Redmond (MIEF ’19)**: “I think there will eventually be less of a premium placed on strong math skills in the field. Computers are so much better at math than humans that it’s only a matter of time before economists start spending less time doing the quant work and more time ensuring the data match real world conditions.”
Interview with Professor Pravin Krishna

Pravin Krishna is the Chung Ju Yung Distinguished Professor of International Economics and Business at Johns Hopkins University. He is also a Research Associate at the National Bureau of Economic Research (NBER). His areas of research interest include international economics, international political economy, the political economy of policy reform, economic development and the political economy of India.

In recent years, India has witnessed several economic reforms. We discuss some of them with Professor Pravin Krishna today.

InFER: Do you think demonetization was effective in meeting its primary objectives of curtailing the shadow economy by fighting black money and reducing counterfeit cash? After two years, would you deem the policy effective?

Professor Krishna: The short answer to that question would be no, at least gauging from news reports that black money operations in India are continuing and their counterfeit cash is still being discovered in the new forms of the currency. On these dimensions, I would say that the demonetization policy has not been as effective as hoped.

InFER: The Goods and Services Tax (GST), often quoted as the “mother of all taxes” was a landmark reform in India. What do you believe are the challenges that played in its implementation?

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1 On 8th November 2016, Prime Minister (PM) Narendra Modi announced that 500 and 1000 Rupee notes—the largest denominations of the currency, and constituting some 86% of the Rupee notes in circulation were to be banned. The policy’s objective was to fight the black money and counterfeit cash used in human trafficking rings and terrorist financing.

2 Though the total amount of black money deposited in foreign banks by Indians is unknown, some reports claim a total of US$1.06 - $1.4 trillions is held illegally in Switzerland. “Swiss black money can take India to the top”

3 Implemented in July 2017, GST is a tax harmonization across different states in India. Prior its implementation, different Indian states had different tax rates on different goods, making for a complicated system of taxes and inefficiently low levels of inter-state trade. With the implementation of the GST, all states adhere to the same tax levels on various goods and services.
Interview with Professor Pravin Krishna

**Professor Krishna:** The debate over GST and how to get it done has preceded this government, I think it has been going on for roughly a decade. Just getting the different states in India that produce and consume many different goods, and have divergent political interests, to agree to the reform is quite challenging. The government had to do a variety of things to make that happen. There were many rounds of discussions to decide on tax brackets and on goods classification. Then there was the concern that some states may see lower revenues following GST. How do you reassure states whose tax revenues may decrease that they will be made whole come the GST? You needed to work out those mechanisms as well. For these reasons, just getting GST across the finish line was a major political success.

Additionally, there are significant implementation challenges. The GST is a value added tax system. What that means is for any producer that purchases an input and pays tax on that purchase before producing an output and selling it to somebody else, there are multiple levels of taxes here that have been paid and collected. Ideally, that producer should be relieved of the taxes been paid on inputs, paying taxes on sales. This creates an enormous informational burden. Overall, it is a large undertaking in terms of reporting, in terms of the actual management of the system, in terms of educating people on how to how the system operates. It is extremely challenging.

Full implementation is going to take a while, and this is not uncommon from a global standpoint. Some people expressed disappointment that it was not already brilliantly implemented or perfectly implemented on day one, or within a year. These things take time. When you look at the US Social Security system, it has been in place for decades and it is still not perfect. Setting up large scale systems takes time. One should not be surprised or disappointed that setting up large scale systems takes considerable time.

**InFER:** With multiple revisions to the tax structure, do you agree that such high and complex brackets would have led to considerable leakages and tax distortion and should have been avoided in the first place?

**Professor Krishna:** That is generally true, we would expect higher tax rates to increase incentive for evasion. We would expect people to try and reclassify the goods that they are buying or selling, based on the differential tax rates. None of this was a surprise or unknown to the people designing the system. I think there was a very active debate at the time as to the kind of system to be put in place as to how many different tax rates were warranted, including the GST. Some people argued that there should be fewer, saying from an economic standpoint or an implementation standpoint that fewer have been better and others arguing that we should be careful about revenue collection and we should be careful to differentiate between luxury goods and non-luxury goods and so on and so forth, that more brackets were needed for differentiation and the like. I am not terribly surprised that the government ended up with this type of tax structure, involving many more brackets. They also expressed that this should be seen partially as an experiment and there will be GST improvements and changes over time. Some of this is already taking place which is a positive thing.

**InFER:** A greater degree of formalization was expected from both GST and demonetization. With the temporary shocks from the introduction of both policies fading away, do you see any scope of further formalization?
**Professor Krishna:** Demonetization was a short term change, GST is much more of a kind of a permanent long run structural change. So with GST I do expect there to be more formalization of the economy overall. More people have to be brought into the formal system, meaning the government becomes aware of who you are, what your tax ID is, what are your activities, these start to get picked up into the system. And then because it is a value added tax system, everybody has an incentive to report something because I want to get sort of a tax rebate essentially on taxes that they have paid on their inputs.

My understanding is that you are seeing improvements in the number of people that have filed taxes following the demonetization and GST period. This I think is reported in the most recent Economic Survey of India. And that is formalization. Now, how do you take advantage of formalization? How do you make you better use of the platform you have built to either tax individuals or to give them benefits? This is up to the current government and future governments to think through and resolve. But should the country expect more formalization to take place? I absolutely think so.

**InFER:** With the banking sector in India under regulatory scrutiny for long, the failure of the NBFC, Infrastructure Leasing & Financial Service⁴, seemed to have further tightened the credit market. Though the Reserve Bank of India (RBI) charters a cautious path, the government still seems to be pushing on for a loose monetary policy. Your views on this?

**Dr. Krishna:** First let us actually get the global picture here. To the extent that governments are not worried about inflation, they would want lower interest rates. The interesting thing now is the following: It used to be the case that there was a pretty tight link between loose money and inflation. This was true the world over, and certainly in India. So governments would worry about too much loose money for too long, because this would generate inflation, which would annoy voters who would then throw the politicians out of office.

> What is interesting now in India, the US, and around the world is that inflation outcomes have consistently undershot the central bank’s inflation expectations. This has allowed people in government and elsewhere to make the claim that there is plenty of room to lower rates.

What is interesting now in India, the US, and around the world is that inflation outcomes have consistently undershot the central bank’s inflation expectations. This has allowed people in government and elsewhere to make the claim that there is plenty of room to lower rates. Certainly in the Indian context, where job and GDP growth have been less than what was hoped for, there will be temptation on the part of the government to pursue loose monetary policy.

Another boost to the argument of those pushing for lower rates is that India is not at full employment. In the US, unemployment rates are now so low relative to historical benchmarks that you could say there is just no slack left in the economy, no room for lower interest rates without inflation. This is not the case in India, where GDP and employment growth rates have not been as high and so one could reasonably claim more could be extracted out of the labor markets without inflation. These are all questions within a broader macroeconomic debate; I do not think either side is being utterly irresponsible.

**InFER:** In what ways do you think the Indian government should get more involved in creating the right conditions for economic growth? What developmental policies would you recommend?

**Professor Krishna:** My own sense is there is market orientation both in goods market and in factor market, we still have some ways to go. One example is the process of land acquisition. Land is an important factor for production, and is heavily regulated, heavily constrained and heavily inefficient. Making things better may involve the government getting out of

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⁴ IL&FS is an infrastructure lending non-banking financial company in India. Coined as “systemically important” by the Central Bank (RBI), it defaulted on its debt obligation in September 2018, sparking panic amongst investors.
the business of land allocation. Labor regulations is an important constraint which has prevented firms from growing to scale which in turn has prevented economies of scale. You will be astounded that a country like India, with its proud tradition of textile manufacturing going back hundreds of years has an average textile manufacturing firm size of less than 10 workers, whereas countries which are relatively recent entries into the game have firms that are over 10 times larger than that. In India, firms can not scale up because they do not have the land or can not hire because of labor regulations inhibiting scaling up. This is extremely costly for firms.

More generally, the government needs to ask what it can do or stop doing to make doing businesses easier. How do you enable firms to be freer in terms of being able to do what they need to be efficient and competitive? Likewise, infrastructural support such as better roads, better ports, fewer hindrances to movement of goods in the country from state to state all matter as well. And finally, health and education obviously matter a great deal as well. None of this is easy, India is extremely complicated. So without sort of suggesting that these are low hanging fruit that the government did not pick or that this or any government did not pick, let me say that these are the obvious priorities for the country.

**InFER**: What are some patterns in international trade that economists like yourself see as creating opportunities or challenges for India?

**Professor Krishna**: India needs to be able to use global markets to fuel its growth. Its trade/exports footprint in manufactures, for instance, is simply far too low. This requires greater productivity in low skill manufacturing and this brings us back to the issues we have just discussed as to the challenges that firms face in scaling up and becoming more productive.

There are broad systemic external challenges as well. The international trade system is obviously in a state of flux with some dramatic new challenges being brought by the aggressive actions of the President Trump. If Donald Trump’s attention, more narrowly, shifts from its current focus on China, European partners, Mexico, and so forth towards India in any more significant way, then that is a tough problem. And how you deal with that is going to be an interesting question for India.

I think from an American perspective, trade with India, quantitatively speaking, is not that large, so maybe relative to China or relative to other countries. So the fact that you are a smaller problem for the US is going to save you from aggressive actions by the US, but that is still an issue for India to worry about. All of this is taking place against a backdrop in India, where there appears to be a return to protectionist type of thinking and to increase protection outright and so that is a threat from within that should concern us all.
Interview with Professor Matthias Matthijs

Matthias Matthijs is an Assistant Professor of International Political Economy. He teaches graduate courses in International Relations, Comparative Politics, and International Economics. His research focuses on the politics of economic crises, the role of economic ideas in economic policymaking, the politics of inequality, the limits of regional integration, and the erosion of democratic legitimacy in the European Union (EU). Professor Matthijs is the recipient of a 2015 Johns Hopkins Catalyst Award in recognition of his work as a promising early-career investigator. At Johns Hopkins SAIS, he was awarded the Max M. Fisher Prize for Excellence in Teaching in 2011 and 2015. He will serve as Chair of the Executive Committee of the European Union Studies Association (EUSA) from May 2019 to May 2021.

InFER: Europe faces many uncertainties today: an unresolved Brexit, the emergence of neo-populist parties and governments, the elections to the European Parliament this year, Merkel’s exit in 2021, and the change in the presidencies of both the European Commission and the European Central Bank. How will these uncertainties affect the power structure and dynamics in Europe and the EU in general?

Professor Matthijs: Since 2010, every year has been a defining year for the European Union. Usually people get disappointed when they expect major changes or major calamities or crises and so on. The somewhat boring answer is that, as much uncertainty as there is, things tend not to change all that much because there is a broader underlying power structure that is hard to get around. What is problematic for Europe today is that there is this stubborn founding “myth” that crises are “good” for the European Union and that crises usually function as a catalyst for more Europe, for further integration, and for an ever-closer Union.

First of all, that’s simply not true. There have been many crises, but there’s rarely been a crisis that automatically led to big changes. There have been crises that occurred and then a few years later, elites got together, and agreed on how to avoid the next
"I think the most important leaps forward in Europe have come when there was a general consensus among the Big Four – Berlin, Paris, London, and Rome – on how to move forward."

Crisis. But I think the most important leaps forward in Europe have come when there was a general consensus among the Big Four – Berlin, Paris, London, and Rome – on how to move forward. There was a broad consensus around coal and steel in the 1950s, and in the 1980s there was a big push for the single market, on which all four agreed, as well as with Eastward Enlargement of the Union in the mid-1990s.

What I see today is four capitals going in very different directions. The status quo has become very “German” as it were – that is also why the Germans want to see the least change from the status quo. They are willing to tinker, tweak the edges, but they do not want any major change. They think the euro crisis has been solved. They would like to see some movement on refugees, but they have taken on most of the burden there and the deal with Turkey has taken care of the rest. They want to deal very cautiously with Putin’s Russia, and they want to tread very carefully with Donald Trump’s America, because they have too many commercial interests in both places. When it comes to Europe, the status quo works very well for them – they have an existing set of domestic preferences, and they have basically been able to upload them at the European level.

So, who is unhappy with the status quo? Well, first of all, the French. The French want more Europe that they can control. They basically want to use German power in the French national interest. That goes back to the old idea of trying to replace French power with European power, which is then very much steered by France. They have a new, young, French president, who has a series of exciting EU initiatives, new European institutions, new treaty changes, more solidarity in the Eurozone, and so on. And it is obvious that the Germans are lukewarm at best about these proposals.

Then you have the Italians, who want to go back in time to a sort of 1980s status quo, where, ideally, they would get rid of the Euro, even though they have now realized that that would be impractical and too costly. They want to have more domestic discretion, they want to have more leeway on their fiscal policy, and they want to take back control over their domestic banks. So, all the things that they had to give up over the last 20 years, they want back. And then there are the British, who want to leave, even though there is no consensus on how to achieve that. They want to take back complete control over their economy, even more so than the the Italians. They do not see themselves at all in this idea of an “ever-closer” Union. And depending on what happens with the UK – even if, despite all the odds, they end up staying – the EU-27 will have to ask themselves what kind of member are they going to be? My sense is that they are going to be a very frustrating member to deal with, because any UK Prime Minister in the next 20 years will not be able to put their signature under a new treaty that integrates Europe even further. So that is where I think the uncertainty comes from in Europe today: key national elites disagree on the way forward, and most of them have started to look much more inwardly to the politics in their own country.

InFER: How will these events shape the position and role of Europe in the world economy?

Professor Matthijs: There is a secular trend where Europe is in decline – relative decline – compared to the fastest growing parts of the world economy. The only way Europe can play a big role in shaping the rules of the world economy is by being united. The Euro remains a relatively weak currency, so it cannot play the international reserve role that the dollar plays. When there is another crisis of the Euro, or of the European economy, which is slowing down, people will respond by selling euros. When the US is in crisis, it affects the world economy, and people are worried that the rest of the world might be even worse off, so the dollar strengthens. That is not going to change. Also, there is a real risk that if the British leave the EU, they will lose global clout in shaping decisions.

At the same time, you could imagine that in the
IMF and the World Bank, the Eurozone or the EU will eventually start to speak with one voice. But try convincing a country like France to give up the power they have now. At the same time, given Donald Trump’s “neo-nationalist” policies here and the rise of China, Europe is our last hope for a genuine multilaterally functioning world. The EU will continue to promote such a world, but they have only effectively been able to do so in the past because of strong US support. And now that seems to be gone or at least uncertain, they have become much more of a rival to the US which is going to become a lot more challenging to manage for EU officials in Brussels.

InFER: How does the recently presented German National Industrial Strategy and the failed attempt of creating a “European Champion” fit in this scenario?

Professor Matthijs: That’s always been the big mystery of Europe for me. Remember, the competition policy of the European Union is a very orthodox one, but you have to fit this into the time when it was agreed on. The biggest agreements of the EU were struck in the mid-80s and the mid-90s, when there was a sort of strange consensus all over the world when it came to conducting economic policy: independent central banks, balanced budgets, free markets, not too much concentration of economic power… And so, the EU has been very effective in breaking up these kinds of big companies, thereby guaranteeing competition that benefits the consumer. Of course, when you see your main rivals or competitors in the world economy, the US and China, and they are using all kinds of industrial policy to get an edge or a competitive advantage; it is strange and almost self-defeating to not allow this at the European level. My own sense is that France historically thinks much more in geopolitical terms. Germany still thinks of itself as a small open economy and continues to acts like one. And so, they represent this sort of Dutch, Finnish, Danish, even Baltic, consensus view of a small country that needs to guarantee free and fair competition, and that then everything will be fine. The moment you start creating these industrial champions, heaven forbid, you start picking winners, and you create winners and losers. According to this view, industrial policy is going to benefit a few countries at the expense of the many and will hence create too much trouble for the EU.

But (industrial policy) would need a fundamental rethink in Brussels about what Europe today is for. This would fit within French president Emmanuel Macron’s idea of a “Europe that protects,” but the Germans have not come around to this view, as the status quo works for them. That being said, it could well be that if Donald Trump gets re-elected in 2020, and China doubles down on its industrial policy, then Europe is going to be pushed in this direction anyway. But it is not something that is in the DNA of the European Union as it was shaped in the mid-1980s, especially because you have so many small countries who are rightly skeptical of industrial policy at the EU level. Why would they invest taxpayer money into propping up failing German and French companies for the sake of their greater national glory?

InFER: Does it still make sense, or is it now even more necessary, to consider the possibility of a Europe of multiple speeds (understood as the idea that different parts of the European Union should integrate at different levels and pace depending on the political and economic situation in each country)?

Professor Matthijs: That is a very good question. I just published a paper on differentiation with two co-authors, one former SAIS student who is now doing her PhD at Stanford, Christina Toenshoff, and my friend Craig Parsons at the University of Oregon. Our paper is called “Ever Tighter Union? Brexit, Grexit, and Frustrated Differentiation in the Single Market and Eurozone”. All the talk since Brexit, is about the need of a Europe of multiple speeds, a Europe of concentric circles. And, of course, such a Europe already exists, right? There are countries that are members of the Euro, there are countries that are members of Schengen, that use or don’t use the Euro,

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1 France and Germany promoted a merger between Alstom and Siemens, but the European Commission rejected it.
Interview with Professor Matthias Matthijs

there are countries that are not in the EU within the single market, there are countries that are not in the EU that are in the Customs Union like Turkey... etc. So, a “differentiated Europe” already exists.

Now, it seems to me that when people talk about flexible integration and multiple speeds, they don’t generally define what they mean. What most countries want is more national discretion, domestic economic policy levers, and being able to respond to the legitimate grievances of their electorate – giving preference to domestic companies when it comes to public procurement, managing flows of immigration, having more freedom to use their public finances to spend against the wind or to invest in public infrastructure, etc. Now, what Europe has done since the Single European Act in 1987, and then the Maastricht treaty in 1992, is to systematically take away these national powers. So, if you think about it, once you are a member of the single market, once you are a member of the Euro, there actually is not that much flexibility any more. What David Cameron tried to do before the referendum was to make relatively minor changes to Britain’s membership within the Single Market. One of the “victims” was, of course, control of immigration. The EU said: “this is not debatable.” The Four Freedoms are sacred, they are linked. But is that an iron law of physics or a political choice? After all, NAFTA works perfectly fine with different currencies and with controls on immigration.

In the end, it is a political choice to have the Four Freedoms be non-negotiable. Same story goes for the Euro. The rules that govern the euro are political choices. Greece, in the end, did not really want to leave the Euro in 2015. What they wanted was much more flexibility on fiscal policy. Tsipras argued basically, for the next 3-4 years, let us invest and spend, let us grow out of it and let us then talk about debt relief and all kinds of other things. But the rules are very strict and (when) you don’t abide by these rules, according to Wolfgang Schäuble, the German Finance Minister (2009 – 2017) at the time, “then you have to leave.” It seems to me that once you are a member of the single market of the Euro, there is very little actual flexibility. Actually, if you compare this with the United States, the 50 states in some sense have much more flexibility on how to set their own economic policy priorities.

And in the end, that is where I think Europe will need to move if it is to survive, i.e. towards more national flexibility and domestic discretion. But that will need a treaty change, and there is a big North-South divide on this. And this is where the EU is kind of stuck at the moment. This is going to become a much bigger debate once the next economic downturn comes around the corner, and the EU will have less tools at its disposal. So, while it is a very interesting question, it seems to me that currently, once you are in the Euro or the single market, there is not so much “à la carte” Europe anymore.

InFER: After the Euro crisis, do you think that the common currency has become more or less resilient?

Professor Matthijs: The way I tend to think about this, and the way we talked about this in The Future of the Euro, was that you can think about whether the EU as an “Optimum Currency Area” (OCA) the way most economists do – and the Eurozone is not an OCA –, or you can think about it from a much more political point of view, i.e. what are the minimum conditions necessary to make it work? Once you take the latter view, you very quickly conclude that the Eurozone needs to have a fiscal union, it needs to have an economic government, it needs to have a banking union, a financial union and much more political legitimacy. All multi-state currencies that have worked in the past have had most of these elements.

So, Europe started to build this more ‘embedded currency area’ in 2012, with the agreement on banking union. And you could say that there has been real progress on that front. A single supervisory mechanism, a single resolution mechanism, though

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3 The Single European Act was the first major revision to the Treaty of Rome of 1957, where a single market was established and the European Political Cooperation was delineated. The Maastricht Treaty in 1992 was an agreement to further integration and founded the European Union

4 Defined in the Treaty of Rome in 1957 as the free movement of goods, services, capital and persons

5 The Future of the Euro (co-edited with Mark Blyth), New York: Oxford University Press, Published Hardcover/Paperback 2015.
no common deposit insurance. The latter is the reason why bank runs are still possible, especially in countries that are in crisis. There is also no common debt instrument, which means there is the risk of capital flight, and sudden stops can happen when money flees to safety and into German bonds, rather than into Euro bonds. Here in the US, if you worry about California bonds, you sell them and you buy Treasury bonds, and via the Federal Reserve System, somehow, liquidity finds its way back to California. US States cannot really be cut off from liquidity. While in Europe, that was exactly the problem with Greece in 2010, 2012, and 2015. Nobody wanted to buy Greek debt and so money left the country.

"(T)he euro is much more resilient than in 2010. (...) I think anyone, especially in the United States, who was skeptical of the euro surviving has to admit, after 20 years, that the political commitments to making this work are much stronger than many thought."

It is not clear that, if there is another crisis tomorrow, the EU has the tools to fight it. First of all, the ECB is at its limit on what much of Northern Europe wants to allow them to do in terms of monetary policy. And we continue to remain stuck in this “risk-sharing” versus “risk-reduction” dance, where the North is saying, “you guys in the South of Europe need to reduce your risk before we start sharing risk,” the South is saying, “well, hang on a minute, it is much easier for us to reduce risk when we share risk.” As long as this standoff is not resolved, we are stuck going around in circles.

That being said, the euro is much more resilient than in 2010. The European Central Bank has interpreted its mandate much more broadly, which has been very welcome, especially since Mario Draghi’s appointment as ECB president in November 2011. I think anyone, especially in the United States, who was skeptical of the euro surviving has to admit, after 20 years, that the political commitments to making this work are much stronger than many thought. So, it is an unhappy marriage right now, especially between North and South. But there are a lot of people who stay married until they die because it is simply too costly or too inconvenient to get a divorce... Does that make for a sustainable situation politically? I tend not to think so. People act on the legitimate grievances that they have, and although they may want to change things right now, they cannot. So, in short, we have a more sustainable euro today, but we yet have to see what the third decade in the single currency’s life will bring.

InFER: You’ve alluded to this, but, what do you think about the measures that are being debated by the Eurogroup such as the creation of a common budget or a deposit guarantee fund? What about the possibility of creating a European safe-asset or a “Euro-bond”?

Professor Matthijs: Quickly, because I did not completely answer this in the previous question. So, while there now is an agreement on the principle of a Eurozone budget, it will be just one single line on the European Commission budget for the next seven years. It is going to be very small, and it may make some kind of public investment in various projects that are viable. This thing is not going to have a macroeconomic stabilizing force – for that you would need multiple percentages of the Eurozone’s GDP. So, while it is small, it is symbolically important that there is now some sort of Eurozone budget. And once it is there, supposedly in the future it can grow, even though that is uncertain.

Southern Europe in particular wants the common deposit insurance system but Germany isn’t there yet politically. The idea of German taxpayer money guaranteeing savings of Greek or Italian citizens is not something that the German Constitutional Court, the German Bundestag, or much of the German political establishment is ready for. So, I do not think it’s going to happen anytime soon. The same is true for Eurobonds. You probably will need another crisis for it to be obvious that those things are needed to guaranteed financial stability and secure the euro’s integrity. So, I don’t think it’ll happen in the next few years.
Interview with Professor Matthias Matthijs

InFER: Finally, given the recent turmoil we have discussed in different spheres, which do you think are the most imperative structural economic and/or political reforms that the EU should tackle?

Professor Matthijs: First, when it comes to the European Central Bank, there is currently a feeling that we need to go back to the way things were: “focus on inflation.” I think those days are over. Inflation! There’s no inflation, right? You need to worry about financial stability, you need to worry about deflation, or too low inflation in the Eurozone for that matter. So, here, I think the ECB has gone in the right direction.

From an economic point of view, the EU needs to start thinking as a unit, as a whole. I mean, sure, some countries need a healthy dose of austerity, but then there are other countries that have enough fiscal room to maneuver and could probably stimulate their economies a bit. Germany has the lowest public investment of all European countries. The popular idea of these perfectly run German trains, and these wonderful highways... that is from the 1980s. They have not invested in any of this, and there is a real decay of their infrastructure, just like here (in the US), really. And mostly because of this kind of obsession that “the government should not spend too much.” These seem to me like things that could be done at the European level. If you want the EU to work as an integrated economy, you need top notch infrastructure. If the Chinese can do this, the Europeans can do this. And then, like anywhere in the West, where there are aging populations, they have to give incentives for people to work longer, to earn more of their own retirement. Even incentives to stay healthier, because these are the kinds of things that, with an aging population, will take the bulk of the resources, and in the end, that does not make for a very dynamic economy. They should invest in youth, in education, and take a much more pragmatic line on immigration.

I wish I could just give you one or two things that they could do and all would be fixed, but the main problem -- and this is what I have been repeating throughout much of this interview -- is that economic policy elites in Europe are still stuck in the mindset of the early 1990s. There have been all kinds of new economic thinking in the U.S. and in China, and there are a lot of good ideas out there on how to conduct economic policy for this day and age. The European Union in the end turbocharged neoliberal policies with steroids by putting some of these rules in a supranational treaty that can only be changed by unanimity. And there are 27 -- including the UK, 28 -- member states in the EU, and without consensus, we will remain stuck in a rut.

In much of my previous academic work, I have argued that a crisis creates the conditions for political entrepreneurs to come in with new ideas (or old ideas!), and force people to change on how they think about things. This allows them to change the status quo and existing institutions. That is much easier to do in one single country. At the European level, it is much harder because you are locked in institutionally and there’s constant positive feedback from the treaties of the past. And, I think a fundamental change of mindset will need to happen in Europe. Strikingly, for so long, we used to think of Mao’s China and Nehru’s India as too rigid ideologically. They had a certain idea on how to run their economies and they stubbornly stuck to it. Europe and the US used to be these pragmatic places where they conducted economic policy based on what worked. Interestingly enough, we have moved towards the other direction where you see emerging markets actually being very undogmatic about what to do; being gradual, open minded reformers. Europe could learn a bit from the new world in that way, when it is thinking about how best to conduct its economic policy. Let me end on that hopeful note!
The Financial Market Impact of the 2018 US-China Trade War¹

Professor Heiwai Tang

On March 22, 2018, the Trump administration issued a presidential memorandum, proposing to impose 25% tariffs on over $50 billion worth of Chinese imports. On July 10, 2018, a further set of 10% tariffs were imposed on another set of Chinese imports worth $20 billion. Both times, the Chinese government retaliated immediately, imposing tariffs on US imports of similar value. Our study assesses the impact of the trade war on the US economy by evaluating firms’ equity market responses to the various trade war announcements by both the US and Chinese governments in 2018 (Huang, Chen, Liu and Tang, 2018). We find that within an industry, firms’ reactions to the announcements are heterogeneous, depending on their direct and indirect exposure to US-China trade. More specifically, US publicly listed firms that are more dependent on exports to and imports from China showed lower equity returns but higher default risks in the three-day window around March 22—the day Trump signed the first executive memorandum imposing tariffs on Chinese exports. Chinese publicly listed firms that are more reliant on the US as a market for final sales (but not inputs) were also affected significantly more than firms with zero direct exposure within the same industry. We also find that firms’ indirect exposure to US-China trade through domestic input-output linkages impacted their responses to the announcement.

These findings suggest that the structure of US-China trade is much more complex than is suggested by the simplistic view that the trade war against China will shift profits from China to the US and only harm Chinese companies that depend on the US markets. Consumers and firms in both countries that are indirectly linked to supply chains involving American and Chinese companies will also be affected. Tariff-induced increases in production costs can get amplified down supply chains until the final stage, when goods are sold to consumers.

Figure 1A. Public Interests over Trade War & Equity Market Index (US)

Figure 1B. Public Interests over Trade War & Equity Market Index (China)
As Figure 1 illustrates above, the S&P 500 index dropped by 4.5% between March 21 and March 23 in response to the US presidential memorandum based on Section 301 of the Investigation of China’s Laws, Policies, Practices, or Actions. Public interest in the trade war peaked on March 22, as measured by the frequency of searches for “trade war” on Google. Similar declines in the stock market index and spikes in public interests are also observed for the other two announcement dates, April 3 and 4, suggesting that the US presidential memorandum signifying the trade war came as a surprise. In China, the US presidential memorandum in March also came as a surprise, bringing down the China Securities Index (CSI) 300 index by 4.5% between March 22 and March 24.

We apply an event-study approach to examine publicly listed firms’ market responses to the announcement in both countries. We use a novel dataset that reports firms’ intertwining input-output relationships, together with various data sets on companies’ financial outcomes and international trade, to assess a US (Chinese) firm’s direct exposure to imports from and exports to China (the US), as well as US firms’ indirect exposure to trade with China through their engagement in global value chains.

We find significant and heterogeneous responses to the announcement of tariff hikes across listed firms in both countries. In the three-day window surrounding March 22, 2018, US publicly listed companies that export more to or import more from China experienced lower stock returns, as illustrated by Figure 2. Specifically, in the 3-day window around March 22, we find that after controlling for standard firm-level characteristics and industry fixed effects, a 10 percentage-point increase in a firm’s share of sales to China is associated with a 0.5% lower average cumulative abnormal stock return, while firms that directly source inputs from China have a 0.6% lower average cumulative abnormal stock return than those that do not. In addition, firms that are more exposed to US-China trade experienced higher default risks, as revealed by a sudden increase in the implied CDS spread over the same 3-day period.

Our research also analyzes the lists of highly disaggregated products that are subject to tariffs imposed by either government. Using natural language processing on 10-K reports filed by US listed firms to the Securities and Exchange Commission (SEC), we measure a company’s share of sales that are subject to the different rounds of tariffs, based on product descriptions. We find that US-listed firms deriving proportionally larger sales from products subject to the tariffs imposed by the Chinese government on March 23 experienced a larger drop in the cumulative equity returns around the announcement date on average. Using US bill of lading data, we can also measure US firms’ dependence on imported inputs from China that were subject to tariffs. We find that the weighted average of a US firm’s import tariffs is negatively correlated with its 3-day cumulative stock return around the announcement date. These results complement the finding that US tariffs can substantially raise the prices of

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1 The weighted averages are constructed based on the US’ April 3 list, with weights equal to import shares in the firm’s total imports.
imported inputs from China, and thus US firms’ costs of production.

We find that these negative financial market responses are not the result of overreactions to news. The 30-day effects are significantly larger. The responses of more exposed US firms’ to subsequent trade war announcements continue to be negative, but weaker. This suggests that markets were not particularly surprised by news of a further deteriorating US-China relationship. We also find significantly more positive market responses for the exposed firms to the progress made in the US-China trade talks that took place in Beijing between January 7 and 9, 2019. Taking together, these findings suggest that in the absence of real-time economic data, one can use high-frequency financial market data to evaluate the impact of a policy shock on individual firms’ and possibly macroeconomic outcomes.

The effects of the March 22 memorandum on the Chinese financial market were substantial. Chinese-listed firms that are more dependent on sales in the US demonstrated lower stock returns in that three-day window. Specifically, after controlling for standard firm characteristics and industry fixed effects, a 10 percentage-point increase in the share of exports to the US in total sales is associated with a 1% larger drop in the firm’s cumulative abnormal stock return in the three-day window surrounding March 22. However, Chinese firms that import US intermediate inputs did not experience lower stock returns.
We also find that a firm’s indirect exposure through global value chains matters. Figure 3 illustrates the production networks up to two levels of suppliers upstream in the supply chain (i.e., suppliers of a company’s suppliers) of two important US multinational firms—General Electronic and General Motors. The network graphs clearly show that both firms have dense production networks in the US and that most of the firms’ direct and indirect suppliers have exposure to China through input sourcing.

Using the network data, we gauge firms’ equity market reactions to the trade war announcements, due to their direct and indirect exposure to US-China trade through supply chain linkages. On the import side of US listed companies, both direct and indirect exposure to Chinese imports through domestic production networks matter, with the direct exposure to input suppliers in China having a greater quantitative effect. On the export side of US firms, both direct and indirect exposure to sales in China matter, but it is the indirect exposure through downstream US firms’ exports to China that has a greater negative impact on firms’ stock returns, compared to the direct sales exposure.

Our research highlights significant financial market losses—in addition to, possibly, economic losses—in both the US and China due to the trade war in 2018. Our findings for the US reveal adverse effects induced by the perceived increases in the prices of inputs from China due to US tariffs and the perceived reduction in sales in China due to China’s retaliatory tariffs. Our analysis on Chinese listed firms demonstrates that firms’ export exposure—but not their import exposure—determines their responses to the US’ announcement of tariffs against China.

These firms’ market responses demonstrate that the structure of US-China trade is much more complex than the simplistic view of global trade that prompted Trump’s trade war. Our findings show that the winners and losers in the US-China trade war depend on firms’ positioning in and exposure to the global value chains shared by the two countries. While raising the prices of imported goods can transfer profits from foreign to domestic businesses, our study shows that the benefits are far outweighed by the increases, real and perceived, in input costs.
References


Evaluating the Oil–Dollar Relationship: An Examination of Real Prices, Real Bilateral Exchange Rates, and Global Demand and Supply Shocks

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1. Introduction

Oil is the world’s largest globally traded commodity, though its size does not guarantee price stability. The relative price responsiveness of demand and supply create a market that is subject to times of extreme volatility. Denominated globally in U.S. Dollars, oil prices are affected by and have a significant impact on macroeconomic fundamentals. Understanding the dynamic relationship between oil prices, the value of the U.S. Dollar, and global demand and supply shocks is important to a wide range of market participants and policymakers because of the broad and deep implications of fluctuations in both oil prices and the value of the Dollar. This paper evaluates the long-term relationship between both variables, as well as the sensitivity, direction, and robustness of this potential relationship.

1.1 Perspective & Motivation

Oil price dynamics are extremely consequential to a wide range of market participants and policymakers, which makes better understanding and characterizing their dynamics a valuable focus of macroeconomic research. Prior research has estimated the consequential impact of oil price shocks on
the macro-economy, and the relationship of these price shocks with periods of recession. Better understanding the dynamics of oil prices may lead to an improved ability to forecast prices. This would prove valuable not just to individuals, firms, or countries with financial stakes in the production or consumption of oil, but monetary policymakers and others concerned with the performance of the broader economy.

The oil–Dollar relationship, describing the potential correlation between movements in the price of oil and movements in the value of the Dollar, as measured by various exchange rates, is one aspect of oil price dynamics which is especially unclear and potentially mischaracterized. Better understanding this specific relationship may prove useful not only to investors seeking arbitrage opportunities between the two investments, but to policymakers and others concerned with the full characterization of oil price dynamics and the ability to forecast prices into the future.

The oil–Dollar relationship has been theorized by many to be an inverse relationship. This theory is a commonly held view in practice, despite some disagreement amongst prior literature. In theory, there are numerous channels through which this inverse relationship may operate. On the demand side, an appreciation of foreign currency relative to the U.S. Dollar (a USD depreciation) increases the purchasing power of foreign consumers for USD denominated goods. This would increase demand for oil in foreign markets, thereby putting upward pressure on prices, giving rise to an inverse relationship in which USD depreciation results in a higher price of oil. On the supply side, an appreciation of foreign currency in a large oil producing country, where most costs are denominated in local currency, may cause production in that foreign market to decrease as a result of increasing costs. This decrease in production would, all else equal, increase the price of oil. Here as well, foreign appreciation (a USD depreciation) would result in an increase in the price of oil, again underlining the theorized inverse relationship between the value of the U.S. Dollar and the price of oil.

However, there are periods of time when it is clear this inverse relationship does not hold. In the attempt to better characterize oil price dynamics, evaluating the extent to which this potential inverse oil–Dollar relationship holds or does not hold, it is important to be able to better understand and forecast price cycles in the future.

1.2 Literature Review

Previous work has varied widely in its approach to analyzing the oil–Dollar relationship. The literature differs in its use of real versus nominal variables, bilateral versus effective exchange rates, direction of causality, estimation method, and sample period, though it generally finds an inverse relationship between the price of oil and the value of the Dollar. De Schryder & Peersman’s (2014) approach looks directly at the effect of a change in the value of the USD on the demand for oil, finding a significant negative effect of the U.S. REER on global oil demand. Amano and Norden (1998), employ an error correction model on the U.S. REER and real price of oil to produce better forecast results than a random walk of exchange rates, using a direct (positive) relationship between the two variables. Breitenfellner and Cuaresma (2008), however, find an inverse relationship between the nominal USD / Euro exchange rate and the nominal price of oil using a vector error correction model. Reboredo, Rivera–
Castro, and Zebende (2013) make use of a wide sample of nominal bilateral exchange rates and find an inverse relationship when applying a detrended cross-correlation analysis technique. The authors also identify differences between pre- and post- financial crisis sample periods. Grisse (2010) estimates the Oil–Dollar relationship using the Nominal Effective Exchange Rate measure of the value of the U.S. Dollar and incorporates controls for global economic development into the model. With a structural Vector Autoregressive (VAR) model, that study also finds an inverse relationship between the value of the U.S. Dollar and oil prices.

Following that literature, this paper investigates the relationship between the real value of the Dollar and the real price of oil. However, this work incorporates measures of global demand and supply shocks into the standard model and importantly draws a distinction between the real effective exchange rate indices that are most commonly used in research and the real bilateral exchange rates that represent actual, observable market prices. These refinements to the standard framework result in a finding that is counter to much of the literature: the inverse relationship between oil and the U.S. Dollar may not be so robust.

2. Data

The variables whose characteristics will be modeled include measures of the real price of oil, global supply shocks, and global demand shocks. The key independent variables of interest are the exchanges rates that measure the value of the U.S. Dollar. These data are sourced from the Federal Reserve Economic Database (FRED), the U.S. Energy Information Administration, the IMF and World Bank’s data portals, and Baker Hughes’s international rig count source. The frequency of the data is monthly with the sample period beginning in December of 1999 and ending in December of 2017.

2.1 Variables

Though a system of equations will be modeled such that each variable is endogenously determined, the key variable of interest that will be forecasted and whose impulse shock responses will be evaluated is the real price of oil. Using the West Texas Intermediate (WTI) benchmark for crude oil, as most of the literature has also used, and adjusting to real terms using the Consumer Price Index (CPI), the real price of oil is calculated as follows, with January of 2000 serving as the base period:

\[
Real \ WTI \ Price \ of \ Oil_t = Nominal \ WTI \ Price \ of \ Oil_t \times \left( \frac{CPI_{US,2000(1)}}{CPI_{US,t}} \right)
\]

The key independent variables of interest are the various measures of the value of the U.S. Dollar. Though several different exchange rate measures are available to model, the choice of measure is very consequential. The literature has explored both effective exchange rate measures in addition to some bilateral exchange rates. Effective exchange rates suffer from both theoretical and empirical limitations. In theoretical terms these indices are mental constructs, not traded in any financial market where actual value can be determined. Empirically, these indices are constructed by weighting various bilateral exchange rates by the amount of trade between those countries and the U.S. When modeling these effective exchange rates, one cannot distinguish between correlations between changes in the included
exchange rates and changes in the price of oil or correlation between changes in the trade weights and changes in the price of oil. This empirical limitation is especially important given the important role oil plays in trade between the U.S. and many of the countries included in these indices.

Real bilateral exchange rates are thus the focus in this study as measures of the real value of the U.S. Dollar. The 4 currencies, other than the U.S. Dollar, that make up the IMF’s Special Drawing Rights’ (SDR) currency basket are the Chinese Renminbi (RMB), the Japanese Yen (JPY), the E.U.’s Euro (EUR), and the British Pound (GBP). These 4 currencies, along with the U.S. Dollar, are the most substantial and consequential currencies for trade flows, international reserves, and the global economy more broadly. Each of these exchange rates with the U.S. Dollar thus provide substantiated estimates for the real value of the U.S. Dollar. As this model utilizes real values, the bilateral exchange rates are adjusted to real terms using the ratio of U.S. CPI to the various countries’ CPI levels:

\[
\text{Real Exchange Rate}_{\text{Foreign}_t} = \text{Nominal Exchange Rate}_{\text{Foreign}_t} \times \left( \frac{\text{CPI}_{\text{US},t}}{\text{CPI}_{\text{Foreign},t}} \right)
\]

Models which incorporate the various effective exchange rate measures are also included for comparison. These effective rates are calculated based on different baskets of currencies as defined by the Federal Reserve Board. The Major, Broad, and Other Important Trading Partners (OITP) indices reflect the weighted average of the Dollar’s value against the various baskets of currencies. Below are displayed the logged real price of oil with the four logged real bilateral exchange rates (RER) as well as the three logged measures of the real effective exchange rates (REER). Consistent with past literature, it appears that a potential inverse relationship generally holds when evaluating the value of the U.S. Dollar with the effective exchange rates. However, the various bilateral exchange rates do not appear to share the strong inverse relationship throughout the sample period.
As the price elasticities of demand and supply for oil are low, storage of oil plays an important role in responding to shocks in the market and thus are important to include when modeling oil price dynamics. The change in global inventories is thus included in the models as a measure of supply and demand shocks. To obtain this, global consumption and global production on a monthly frequency is first constructed. Given limited data availability, the construction of these variables relies on the assumption that the ratio of U.S. monthly consumption to U.S. annual consumption is the same as the ratio of global monthly consumption to global annual consumption. The same assumption is made for production. The following set of equations describe this estimation:

\[
\text{Global Consumption}_{Monthly} = \left( \frac{\text{Global Consumption}}{\text{U.S. Consumption}} \right)_{Annual} \times \text{U.S. Consumption}_{Monthly}
\]

\[
\text{Global Production}_{Monthly} = \left( \frac{\text{Global Production}}{\text{U.S. Production}} \right)_{Annual} \times \text{U.S. Production}_{Monthly}
\]

where the available data obtained from the U.S. Energy Information Administration (EIA) includes U.S. annual and monthly consumption and production in addition to global annual consumption and production. The EIA uses “product supplied” as an estimate for U.S. production. From these measures of global consumption and production on a monthly basis, the monthly change in global inventories is estimated by:

\[
\Delta \text{Global Inventories}_{Monthly} = \text{Global Consumption}_{Monthly} - \text{Global Production}_{Monthly}
\]

Further, the monthly change in global inventories is made relative to the total level of global production as a scaled measure, such that:

\[
\frac{\Delta \text{Global Inventories}_{Monthly}}{\text{Global Production}_{Monthly}} = \frac{\text{Global Consumption}_{Monthly} - \text{Global Production}_{Monthly}}{\text{Global Production}_{Monthly}}
\]

The expected relationship between the change in global inventories and the price of oil is inverse. Intuitively, should a negative shock to supply occur, the price of oil would be expected to increase in response and inventory levels would decrease to try and address the sudden drop in supply, thus the change in inventories would be negative. Below is displayed the logged real price of oil alongside the relative change in global inventories.
One of the limitations of the relative change in the global inventories variable is the inability to distinguish between supply and demand shocks within the model as changes in either can affect a change in global inventories. Additional variables are included alongside measures of the exchange rates in some models that estimate shocks to demand and supply separately. As explained by Hamilton (2010), income, not prices, matters most in driving the demand for oil, and thus, global GDP can be used to proxy global demand and measure demand shocks. It would be expected that positive (negative) changes in global income (GDP) are correlated with a positive (negative) response in the change in oil price. The relationship between the logged level of global GDP and the logged real price of oil is displayed below.

Baker Hughes produces a monthly international rig count that tracks the number of active rotary oil rigs, where being active is defined as actively drilling – and thus producing – for most of the month in which the rig was surveyed. The expected relationship between the number of active rigs and the price of oil would also be positive as higher prices would expectedly induce greater drilling activity. One important limitation of the international rig count is the inability to collect data from key markets, most notably Iran and Russia. The relationship between the logged level of the international rig count alongside the logged real price of oil is displayed below.
These variables, which approximate global demand shocks, global supply shocks, and demand and supply dynamics as affected through bilateral exchange rates, modeled together could offer important predicative capability of the future real spot price of oil.

2.2 Time Series Properties

Fully characterizing and understanding the time series properties of the variables of interest is important in order to formulate an empirical model that accurately characterizes the series and ensure the model is accompanied with correct statistical inference. In order to identify any long-run relationship between the variables of interest, the variables must first be identified as unit root processes or as non-stationary and integrated of order one. The autocorrelation functions (ACF) displayed below indicate that each of the series exhibits high levels of persistence for at least 20 months, though some real bilateral exchange rates do not display the same high levels of autocorrelation as the number of lagged months increases. The variables displayed below are in log-level form, except for the relative change in global inventories variable, which is scaled by global production as discussed previously:
Furthermore, in examining the first differences of each of the series from above, the autocorrelation functions of the monthly change in each variable do not share the same high autocorrelation over 20 months as do the logged-levels. Both these sets of autocorrelation functions suggest that all variables exhibit non-stationary tendencies and may be integrated of order one, containing a unit root.
To further investigate and ensure that all the series are non-stationary, Augmented Dickey-Fuller (ADF) tests are conducted for each of the variables in their log-level and first differenced forms. The ADF test takes the following form, regressing the variable of interest on a lag of itself and several lags of the variable’s first difference, with the null hypothesis being that the coefficient on the lagged value is 1:

\[
p_{t} = \alpha + \rho \times p_{t-1} + \sum_{i=1}^{n} \beta_{i} \Delta p_{t-i} + u_{t}
\]

\( T - Test: H_{0}: \rho = 1 \)

These tests are conducted over the time periods 2000 – 2017, 2000 – 2008, and 2009 – 2017. All tests are conducted with the inclusion of 12 lags. Furthermore, the ADF tests are repeated for each variable and in each sample period without the inclusion of a constant, with the inclusion of a constant, with the inclusion of a constant and trend, and with the inclusion of a constant, trend, and seasonal dummy variables. The null hypothesis, as shown above, is that the lag coefficient equals 1. By failing to reject the null hypothesis that the coefficient on the lagged value is not statistically significantly different from 1, for the log-level form variables, the conclusion can be reached that the series is non-stationary. Conversely, by rejecting the null hypothesis that the coefficient on the lagged value is equal to 1 for the
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test on the first differences, it can be concluded that the log-level series is non-stationary. The table below summarizes all of the ADF tests conducted, with a check mark indicating that the ADF test results support the conclusion that the log-level series is non-stationary and an X mark indicating that the ADF test results did not support the conclusion that the log-level series was non-stationary. The Akaike Information Criterion (AIC) was used to determine with which lag to evaluate the null hypothesis.

<table>
<thead>
<tr>
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<tr>
<td>Test Variant</td>
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<td>C+T</td>
<td>C+T+S</td>
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<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>rmb-usd</td>
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<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>jpy-usd</td>
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<td>✓</td>
</tr>
<tr>
<td>eur-usd</td>
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<td>✓</td>
<td>✓</td>
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<td>REER_oitp</td>
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<td>✓</td>
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<tr>
<td>d_rig_count</td>
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</tbody>
</table>

Note: This table shows the test statistics for stationarity, with a check mark signaling the series fails to reject the null hypothesis that the series is non-stationary and an x signaling there is enough statistical evidence to believe the series is stationary. Variants of the ADF test are shown; blank indicates the test is run without a constant, C indicates there is a constant, C+T indicates there is both a constant and a trend, and C+T+S indicates seasonal dummy variables are added as well.

The results above show that across all sample periods and across all variants of the ADF test, the null-hypothesis fails to be rejected in most tests conducted for the log-level series. Despite some differences in results, when seasonal variation is accounted for in the ADF tests on the log-level variables, evidence exists for the presence of a unit root within each process across all sample periods. For the first
differenced series, the various tests do not always yield results consistent with the differenced series being stationary and thus the log-level form being non-stationary. However, given the highly persistent autocorrelation functions, and the results of the ADF tests for the target sample period, 2000 – 2017, the variables will be modeled as non-stationary, so that the models can be tested for the presence of a cointegrating relationship.

3. Methodology

Having established the series as being generally non-stationary, this section will offer the empirical methods used to establish a cointegrating relationship amongst the series. Consequently, the series can be modeled together to account for both their long-run relationship and their short-run dynamics around this long-run relationship.

3.1 Cointegration

A multi-equation dynamic modeling approach will treat each series within the estimated model as endogenously determined. Following the Johansen method to test for cointegration, a Vector Autoregressive (VAR) model can be estimated to evaluate the rank of the long-run relationship matrix, and thus the number of cointegrating relationships by which to model a Vector Error Correction Model (VECM).

The following long-run relationships are postulated, which include three different ways by which to evaluate the value of the U.S. Dollar. The first model includes the four real bilateral exchange rates, the second includes the broad real effective exchange rate, and the third model includes both the major and other important trading partners (OITP) real effective exchange rates.

\[
poil_t = \beta_0 RMB_{rer_t} + \beta_{JP} Y_{rer_t} + \beta_{EU} EUR_{rer_t} + \beta_{GBP} GBP_{rer_t} + \epsilon_t
\]

\[
poil_t = \beta_B REER_{broad_t} + \epsilon_t
\]

\[
poil_t = \beta_M REER_{major_t} + \beta_O REER_{oitp_t} \epsilon_t
\]

In addition, six more models are evaluated which build off the three base models above. The first set of additional models includes the relative change in global inventories variable alongside each of the above measures of the exchange rate, while the second set of additional models includes the global GDP and rig count variables alongside each of the above measures of the exchange rate.

From this long-run relationship, a VAR is estimated. This system of equations can be shown in matrix form as shown below. Note, the process is repeated for all 9 models, though the below model is written out only for the bilateral exchange rate model that includes the relative change in global inventories variable:
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Rewritten in compact matrix form as:

\[ X_t = \Phi(L)X_{t-1} + u_t \]

This VAR can be re-estimated with first differences as:

\[ \Delta X_t = \Gamma(L)\Delta X_{t-1} + \Pi X_{t-1} + u_t \]

In the long run, where the growth rates of the vectors equal zero (\( \Delta X_t = \Delta X_{t-1} = 0 \)), this would result in:

\[ \Pi \ast X = 0 \]

It is from this long-run relationship that the rank of the matrix \( \Pi \) is evaluated, through estimation of the VAR, which provides the number of cointegrating relationships, whose value is used to later estimate the VECM.

### 3.2 Long-Run Model

A Vector Error Correction Model will allow for the estimation of the long-run equilibrium relationship in each of the 7 equations within the system, as well as the short-run dynamics that measure how variables within the system return to the long-run after short-run deviations from the equilibrium. After estimating the rank of the long-run matrix in the VAR model, the VECM can be modeled specifying the number of cointegrating relationships. The VECM can be expressed in matrix form as:
Where the long-run relationship can be expressed as:

$$ A \times B = \begin{bmatrix} \alpha_P \\ \alpha_R \\ \alpha_J \\ \alpha_E \\ \alpha_G \\ \alpha_I \end{bmatrix} \begin{bmatrix} \beta_P & \beta_R & \beta_J & \beta_E & \beta_G \end{bmatrix} = \begin{bmatrix} \alpha_P \beta_P & \alpha_P \beta_R & \alpha_P \beta_J & \alpha_P \beta_E & \alpha_P \beta_G \\ \alpha_R \beta_P & \alpha_R \beta_R & \alpha_R \beta_J & \alpha_R \beta_E & \alpha_R \beta_G \\ \alpha_J \beta_P & \alpha_J \beta_R & \alpha_J \beta_J & \alpha_J \beta_E & \alpha_J \beta_G \\ \alpha_E \beta_P & \alpha_E \beta_R & \alpha_E \beta_J & \alpha_E \beta_E & \alpha_E \beta_G \\ \alpha_G \beta_P & \alpha_G \beta_R & \alpha_G \beta_J & \alpha_G \beta_E & \alpha_G \beta_G \\ \alpha_I \beta_P & \alpha_I \beta_R & \alpha_I \beta_J & \alpha_I \beta_E & \alpha_I \beta_G \end{bmatrix} = \Pi $$

The VECM can be expressed in compact matrix form as:

$$ \Delta X_t = \Gamma(L) \Delta X_{t-1} + \Pi X_{t-1} + u_t $$

where the vector $\Gamma$ represents the contemporaneous relationship and the vector $\Pi$ gives the long-run relation between the real price of oil, real bilateral exchange rates, global inventories, and global GDP. The beta vector ($B$) represents the cointegrating vector with the coefficients ($\beta$) giving the long-run relationship between the three variables. The alpha vector ($A$) contains the loading coefficients ($\alpha$) which give the rate at which the variables return to their long-run relationship from short-run deviations. In estimating the VECM, the beta coefficient on the lagged value of the real price of oil ($\beta_P$) is normalized to 1, such that $\beta_P = 1$. Even though each variable is endogenously determined and explained as a dependent variable in the model, the real price of oil remains the variable of interest.
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4. Results

The VAR and VECM models as specified above are estimated. No cointegrating relationship is found in the models that include just the Broad measure of the real effective exchange rate, and thus only the 6 models summarized below are evaluated:

<table>
<thead>
<tr>
<th>Model 1 ((\Delta X_t))</th>
<th>Model 2 ((\Delta X_t))</th>
<th>Model 3 ((\Delta X_t))</th>
<th>Model 4 ((\Delta X_t))</th>
<th>Model 5 ((\Delta X_t))</th>
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<td>(\Delta \text{EURrer}_t)</td>
<td>(\Delta \text{R}<em>{\text{Chg}</em>\text{Inventory}}_t)</td>
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<td>(\Delta \text{r}_{\text{ig}}_t)</td>
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</tbody>
</table>

The VAR and VECM models are all conducted with the inclusion of 5 lags and with seasonal dummy variables. They are each estimated over the sample period 2000 – 2017 with 12 observations (corresponding to 12 months) withheld for forecasting purposes in the VECM models.

4.1 Cointegration and VECM Results

Estimating a VAR for each of the models yields varying results in terms of the estimated rank of the long-run coefficient matrix. The number of cointegrating relationships is evaluated using both a trace test and a maximum eigenvalue test. Additionally, results for the degrees of freedom adjusted test statistics are reported. The test statistics are reported with their associated p-values as well as an indication of the statistical significance of any of the results. The results of these test for models 1–3, which utilize the 4 real bilateral exchange rates, are summarized in the table below:

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Model 1</td>
<td>0</td>
<td>77.79 [0.009]**</td>
<td>31.36 [0.096]</td>
<td>68.61 [0.060]</td>
<td>27.66 [0.237]</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>46.43 [0.066]</td>
<td>23.19 [0.169]</td>
<td>40.95 [0.191]</td>
<td>20.46 [0.321]</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>23.24 [0.242]</td>
<td>13.78 [0.398]</td>
<td>20.50 [0.400]</td>
<td>12.16 [0.545]</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>9.46 [0.331]</td>
<td>7.83 [0.405]</td>
<td>8.34 [0.437]</td>
<td>6.91 [0.509]</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>1.63 [0.202]</td>
<td>1.63 [0.202]</td>
<td>1.44 [0.231]</td>
<td>1.44 [0.231]</td>
</tr>
<tr>
<td>Model 2</td>
<td>0</td>
<td>97.93 [0.033]***</td>
<td>36.80 [0.112]</td>
<td>84.07 [0.243]</td>
<td>31.59 [0.338]</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>61.13 [0.023]</td>
<td>21.54 [0.650]</td>
<td>52.48 [0.531]</td>
<td>18.49 [0.845]</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>39.59 [0.240]</td>
<td>17.72 [0.530]</td>
<td>33.98 [0.507]</td>
<td>15.21 [0.732]</td>
</tr>
</tbody>
</table>
The results indicate there is at least some evidence that the null hypothesis of 0 cointegrating relationships present can be rejected, and thus the variables can be modeled with the long-run matrix ranked of order 1. The results from the Johansen test for models 4–6 which utilize the Major and OITP real effective exchange rates are displayed below:

The 4th and 6th models offer clear evidence of 1 cointegrating relationship, while the 5th model offers evidence of at least 1 cointegrating relationship, though unclear results as to if more than 1 cointegrating relationship exists. Despite this, all 6 models will be evaluated with the rank of the long-run matrix being one.
Evaluating the Oil–Dollar Relationship: An Examination of Real Prices, Real Bilateral Exchange Rates, and Global Demand & Supply Shocks

The VECMs are estimated with 5 lags, seasonal dummy variables, with 12 observations withheld for forecasting, and over the full sample period 2000 – 2017. The long-run coefficient on the real price of oil is normalized to 1 in each model. The specifications of the long-run models which include the measures of the 4 bilateral exchange rates, models 1–3, are:

Model 1: \( p_{oil,t} = \beta_R RMB_{rer,t} + \beta_J JPY_{rer,t} + \beta_E EUR_{rer,t} + \beta_G GBP_{rer,t} + \varepsilon_t \)

Model 2: \( p_{oil,t} = \beta_R RMB_{rer,t} + \beta_J JPY_{rer,t} + \beta_E EUR_{rer,t} + \beta_G GBP_{rer,t} + \beta_I \Delta Global \ Inventory_t + \varepsilon_t \)

Model 3: \( p_{oil,t} = \beta_R RMB_{rer,t} + \beta_J JPY_{rer,t} + \beta_E EUR_{rer,t} + \beta_G GBP_{rer,t} + \beta_D GDP_t + \beta_s rig_t + \varepsilon_t \)

The results of the beta coefficients are displayed below with standard errors below each value of the coefficient:

<table>
<thead>
<tr>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>( \beta )</td>
</tr>
<tr>
<td>Model 1</td>
</tr>
<tr>
<td>(se)</td>
</tr>
<tr>
<td>Model 2</td>
</tr>
<tr>
<td>(se)</td>
</tr>
<tr>
<td>Model 3</td>
</tr>
<tr>
<td>(se)</td>
</tr>
</tbody>
</table>

The specification of the long-run models 4–6 which include the real effective exchange rate measures are:

Model 4: \( p_{oil,t} = \beta_M REER_{major,t} + \beta_0 REEROip_t + \varepsilon_t \)

Model 5: \( p_{oil,t} = \beta_M REER_{major,t} + \beta_0 REEROip_t + \beta_I \Delta Global \ Inventory_t + \varepsilon_t \)

Model 6: \( p_{oil,t} = \beta_M REER_{major,t} + \beta_0 REEROip_t + \beta_D GDP_t + \beta_s rig_t + \varepsilon_t \)
The results of the beta coefficients are displayed below with standard errors below each value of the coefficient:

<table>
<thead>
<tr>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Model 4</td>
</tr>
<tr>
<td>---------</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>(se)</td>
</tr>
<tr>
<td>Model 5</td>
</tr>
<tr>
<td>(se)</td>
</tr>
<tr>
<td>Model 6</td>
</tr>
<tr>
<td>(se)</td>
</tr>
</tbody>
</table>

The long-run coefficient estimate results contain useful information in evaluating the direction, magnitude, and significance of the relationship between the real price of oil and the various other independent variables. In all models the variables that control for supply and demand shocks behave according to theory, with a positive relationship between prices and GDP as well as rig count, but an inverse relationship between changes in global inventories and the real price of oil.

The key interest of these models is the little evidence they provide for an inverse relationship between the real price of oil and the real value of the dollar. In models 1–3, when using bilateral exchange rates, the direction of the relationship is either direct (positive) and statistically significant, direct (positive) and statistically insignificant, or in only a few cases inverse (negative) and statistically insignificant. In no cases is there statistically significant evidence for an inverse relationship between real bilateral exchange rates and the real price of oil.

Models 1–3 utilize the real effective exchange rates as used in much of the literature. As discussed earlier, their use suffers from theoretical and empirical limitations. In models 4 and 5, the results indicate an inverse relationship between the real effective exchange rate which is statistically significant. However, once controlling for demand and supply shocks in the 6th model, the relationships become direct (positive) and statistically insignificant in the case of the Major REER but direct (positive) and statistically significant in the case of the OITP REER.

4.2 Forecasts

Forecasting serves the dual purpose of testing the goodness of fit of the model as well as capturing the underlying value of the research by providing predictive accuracy. Each of the VECM models are used to forecast the last 12 months (January 2017 – December 2017) which are compared to the actual observed values of the real price of oil. The forecasts are conducted using a 1-step ahead approach. The root mean square errors (RMSE) and mean absolute percentage errors (MAPE) of the forecasts from each model are displayed in the table below:
Evaluating the Oil–Dollar Relationship: An Examination of Real Prices, Real Bilateral Exchange Rates, and Global Demand & Supply Shocks

<table>
<thead>
<tr>
<th>Model</th>
<th>RMSE</th>
<th>MAPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model 1</td>
<td>0.0809</td>
<td>1.6078</td>
</tr>
<tr>
<td>Model 2</td>
<td>0.0754</td>
<td>1.0838</td>
</tr>
<tr>
<td>Model 3</td>
<td>0.0822</td>
<td>1.9416</td>
</tr>
<tr>
<td>Model 4</td>
<td>0.0668</td>
<td>1.4075</td>
</tr>
<tr>
<td>Model 5</td>
<td>0.0613</td>
<td>1.2338</td>
</tr>
<tr>
<td>Model 6</td>
<td>0.0891</td>
<td>1.794</td>
</tr>
</tbody>
</table>

Evaluating both the RMSE and the MAPE, Model 2 provides the forecast with the smallest error amongst the models which utilize the bilateral exchange rates. The forecast of Model 2 is displayed in the graph below, with confidence bands of plus or minus two standard errors:

Though the models that incorporate the real effective exchange rates tend to perform better in terms of forecast error, there is a strong potential for their mischaracterization of the oil–Dollar relationship given previously noted limitations. Thus, it appears that Model 2 is the superior model, whose characteristics will be examined further.
4.3 Congruency and Stability

The residual properties of the second VECM model are important to evaluate to ensure that proper statistical inference can be applied to the estimated parameter values. A few congruency tests are conducted and are displayed in the table below:

<table>
<thead>
<tr>
<th>Variable</th>
<th>Test Statistic [P-Value]</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>wti_real</strong></td>
<td>ARCH 1-7 test: F(7,186) = 1.2035 [0.3028]</td>
</tr>
<tr>
<td></td>
<td>Normality test: χ²(2) = 3.2645 [0.1955]</td>
</tr>
<tr>
<td></td>
<td>Hetero test: F(71,128) = 1.3454 [0.0733]</td>
</tr>
<tr>
<td><strong>rer_ch</strong></td>
<td>ARCH 1-7 test: F(7,186) = 3.1975 [0.0032]**</td>
</tr>
<tr>
<td></td>
<td>Normality test: χ²(2) = 17.017 [0.0002]**</td>
</tr>
<tr>
<td></td>
<td>Hetero test: F(71,128) = 1.6498 [0.0071]**</td>
</tr>
<tr>
<td><strong>rer_jp</strong></td>
<td>ARCH 1-7 test: F(7,186) = 1.6081 [0.1354]</td>
</tr>
<tr>
<td></td>
<td>Normality test: χ²(2) = 1.1442 [0.5643]</td>
</tr>
<tr>
<td></td>
<td>Hetero test: F(71,128) = 0.93025 [0.6268]</td>
</tr>
<tr>
<td><strong>rer_eu</strong></td>
<td>ARCH 1-7 test: F(7,186) = 1.3561 [0.2264]</td>
</tr>
<tr>
<td></td>
<td>Normality test: χ²(2) = 0.085256 [0.9583]</td>
</tr>
<tr>
<td></td>
<td>Hetero test: F(71,128) = 1.0220 [0.4507]</td>
</tr>
<tr>
<td><strong>rer_uk</strong></td>
<td>ARCH 1-7 test: F(7,186) = 1.2533 [0.2760]</td>
</tr>
<tr>
<td></td>
<td>Normality test: χ²(2) = 6.3073 [0.0427]*</td>
</tr>
<tr>
<td></td>
<td>Hetero test: F(71,128) = 1.4374 [0.0379]*</td>
</tr>
<tr>
<td><strong>R_Chg_Inventory</strong></td>
<td>ARCH 1-7 test: F(7,186) = 2.9394 [0.0061]**</td>
</tr>
<tr>
<td></td>
<td>Normality test: χ²(2) = 10.603 [0.0050]**</td>
</tr>
<tr>
<td></td>
<td>Hetero test: F(71,128) = 1.2415 [0.1444]</td>
</tr>
</tbody>
</table>

Notes: These congruency tests examine whether there is serial correlation (ARCH 1-7) in the error term, whether the residuals are normally distributed, and whether the error terms display heteroskedasticity. One * indicates the test is statistically significant at the 10% confidence level, while ** indicates confidence at the 5% level.

The results indicate above that in large part, the residuals do not contain serial correlation in the error term, the residuals are normally distributed, and finally that the error terms are homoscedastic. The notable failures of these tests lie in the RMB-USD real exchange rate and the relative change in global inventory residuals, both of which fail normality and homoskedasticity tests. The residuals of the model appear to be randomly distributed around 0, as displayed below, and thus the residuals will be treated as congruent when applying statistical inference.
Another important evaluation of the model is the constancy of the parameters. Parameter constancy is important to evaluate in order to ensure that as the sample changes, the parameters do not change drastically. The models are estimated with recursive estimation techniques so as to evaluate the constancy of parameters given changes in the sample period of the model. The constancy of the parameters from the second VECM model are displayed below:
These results suggest that each of the parameters in the second VECM model are constant over time. Given the constancy of parameters in addition to the residual properties, the OLS statistical inference so far applied to the estimated coefficient values is appropriate.

4.4 Shock Response

An additional component of these time series is the information provided by simulating and modeling a one-time shock to each of the variables in the model and measuring the effect on the dependent variable. The impulse responses of the real price of oil to shocks in the lagged value of the real price of oil, a shock to each of the real bilateral exchange rates, and a shock to the relative change in global inventories are displayed below. The shocks are displayed over the course of 200 months and modeled as ceteris paribus, where all else is held equal over the course of the shock.

The impulse response functions show how the real price of oil responds to the various individual shocks, with the price stabilizing within 25 months of most of the shocks.

5. Conclusion

The results of this research suggest the relationship between the real value of the U.S. Dollar and the real price of oil is not necessarily, as often assumed, inverse. As estimated through a vector error correction modeling approach using real bilateral exchange rates, in addition to variables that control for demand and supply shocks, the data indicate there is either no statistically significant relationship between exchange rates and oil prices, or that the direction of the relationship is direct (positive). The
results show also that when modeling effective exchange rates rather than bilateral exchange rates, the results more likely suggest the presence of an inverse relationship, though their inclusion in models suffer from important theoretical and empirical limitations.

There are several limitations to the research conducted in this study. The first is the reliance on constructed monthly variables due to a lack of publicly available data. These estimates may therefore provide inconsistent or biased results should they be notably different from the actual observed monthly data. The various models as estimated also fail a few congruency checks. Should the residuals of the model not be congruent, the statistical inference used to interpret the results of the model may not be appropriately applied. Additionally, the use of monthly data may be a limiting factor given that oil prices and exchange rates are evolving at a daily, if not mere second or minute rate. Finally, while the reliance on bilateral exchange rates over effective exchange rates avoids the theoretical and empirical limitations of the effective exchange rates that have already been discussed, the limited number of bilateral exchange rates included may leave out important characteristics of other currency values relative to the U.S. Dollar. While the four selected bilateral exchange rates are regarded as more consequential to the global economy, trade, and international financial markets, they may not be the only exchange rates important specifically to the global oil market.

Despite these limitations, the results of this research highlight the importance of sample selection and variable selection in modeling the oil–Dollar relationship. One key factor in evaluating the oil–Dollar relationship is the question over which “Dollar” to model. Results differ not just between bilateral and effective exchange rates, but among bilateral exchange rates as well. Further research may incorporate panel data that models individual country demand and supply as a function of exchange rates and other oil demand and supply variables. Additional research may also focus on time sensitivity of the relationship given major changes in the structure of the global oil market.

References


RESEARCH


World Economic Outlook, IMF DataSets. International Monetary Fund. http://www.imf.org/external/datamapper/NGDP_RPCH@WEO/OEMDC/ADVEC/WEOWORLD

Quantifying the 2018 Trade War between the U.S. and China in Terms of Welfare and Trade Effects

Yulia Vnukova (MIEF ’18)

Advisor: Professors Fernando Parro and Monica De Bolle

This Research Paper was submitted to fulfill the capstone requirement for the Master of Arts in International Economics and Finance (MIEF) Johns Hopkins SAIS Washington, D.C.

1. Introduction

Since 2007, China has been the largest source of U.S. imports, growing from 321.4 billion USD in 2007 to 505.2 billion USD in 2017 (Figure 1). In 2017, the U.S. imports from China comprised 21.85 percent of total U.S. imports. The U.S. was also the largest export destination for China at 19.01 percent of total Chinese exports in 2017. Before 2017-2018, the economic relationship between the United States and China has been important to both nations. However, during the 2017-2018 U.S. presidential campaign, US protectionist views increased because of concern over the growing bilateral U.S.-China trade merchandise deficit during the recent decade, the perceived job losses in the U.S. due to overseas lower-cost manufacturing, and the U.S. investigation finding China’s intellectual property practices harmful for the U.S. patent and technology license holders. These developments gave rise to fully-fledged trade protectionist policies under the U.S. administration in 2018.
On March 23, 2018, a U.S. Presidential Proclamations came into force imposing a 25 percent ad valorem tariff on all imported steel and a 10 percent tariff on all imported aluminum articles. On the same day, as a result of the U.S. investigation under the Section 301 of the Trade Act of 1974, the U.S. increased the tariffs on 1333 products (at HS 8-digit level) imported from China. In the tit-for-tat response, China announced tariff rate increases on 234 items (at HS 8-digit level) originating from the U.S. These announced tariff rates serve as the foundation for the analysis conducted in this study. The summary of the tariff hikes (as of April 4, 2018) converted from the Harmonized System to ISIC rev.4 sector classification is presented in Table 3.

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5. 234 items originated from the US include 128 items per the China’s government announcement on March 23rd, 2018 (http://www.mofcom.gov.cn/article/ae/aq/201803/20180302722664.shtml) and 106 items per the announcement on April 4th, 2018 (http://www.mof.gov.cn/zhengwuxinxi/caizhengxinwen/201804/t20180404_2862341.htm)
Table 1. Tariff Rates (Percent) Included in The Analysis per Two Scenarios (ISIC Rev. 4 Sector Classification)

<table>
<thead>
<tr>
<th>WIOD (ISIC rev 4) sectors</th>
<th>Scenario 1: Unilateral</th>
<th>Scenario 2: Bilateral</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>US tariffs on Steel and Aluminum imports*</td>
<td>US: 25 percent tariffs on 1333 imports from China (as of 04/04/2018)</td>
</tr>
<tr>
<td>Agriculture</td>
<td></td>
<td>20</td>
</tr>
<tr>
<td>Forestry and logging</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fishing and aquaculture</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mining and quarrying</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manufacturing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Food products, beverages and tobacco</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>Textiles and apparel</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wood, except furniture</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Paper and paper products</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Printing and reproduction of recorded media</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>Coke and refined petroleum products</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>Chemicals</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>Pharmaceutical products</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rubber and plastic products</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>Other non-metallic mineral products</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Basic metals (steel and aluminum)</td>
<td>17.5</td>
<td>25</td>
</tr>
<tr>
<td>Fabricated metal products</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>Computer, electronic and optical products</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>Electrical equipment</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>Machinery and equipment n.e.c.</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>Motor vehicles, trailers and semi-trailers</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>Other transport equipment</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>Furniture; other manufacturing</td>
<td>25</td>
<td></td>
</tr>
</tbody>
</table>

Note: with the exceptions of Australia, Argentina, Brazil, and South Korea (as of May 31st, 2018).

The unilateral tariff measures have important ramifications not only for the domestic economies of the U.S. and China, but for the entire global trade order and global supply chains. The U.S. has increased tariffs on the largest imported goods from China such as electronics, machinery, furniture, motor vehicles and other transport equipment. In response, China has announced tariffs on mostly politically important sectors for the U.S. such as soybeans, wine and whiskies, auto sector, rubber and plastic articles. The U.S. imports mostly capital goods and consumer goods from China (in total of 91.1 percent of total imports from China), while China’s imported capital goods and consumer goods from the U.S. account for only 59.22 percent of total imports from the U.S. The remaining share comprises

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20.8 percent of raw materials and 19.71 of intermediate goods (Figure 2). Tariff increases on imported intermediate and final goods raise prices across sectors, and therefore, have a significant ripple effect on domestic (tradable or non-tradable) sectors in the rest of economy, as well as on export prices.

**Figure 2: US - China Bilateral Trade in Terms of Type of Goods (2016, Percent of Imports)**

![Chart showing trade percentages](chart.png)

*Source: Author’s calculations based on UN Comtrade, retrieved May 2018.*

The main purpose of this study is to use the general equilibrium model environment from Caliendo and Parro (2015) to estimate the effect of the unilateral U.S. tariff increases in 2018 and retaliation from China on: (i) the U.S. and China’s total welfare (the terms of trade and volume of trade), (ii) the U.S. and China’s real wages, and (iii) how these tariff changes affect the U.S. and China’s main trade partners, as well as the rest of the world. The counterfactual analysis in relation to the 2014 baseline includes the following two scenarios: (i) the unilateral U.S. tariff increases on 1,333 items imported from China and global tariffs on imported steel and aluminum, and (ii) the U.S. tariff increases described in the first counterfactual scenario but with China’s retaliatory tariff measures on 234 imported goods from the U.S. as well.

As of June 2018, the contribution of this study is novel for two reasons. First, it uses the actual U.S. tariff rates (announced in March 2018) to estimate the effects of the trade tensions between USA and China in the general equilibrium environment. Previously published studies, such as Li et al (2018), use the speculative tariff rates available at the end of 2017, which were higher than the actual tariff hikes in 2018. Second, this study uses the general equilibrium model from Caliendo and Parro (2015) which accounts for the intermediate goods linkages, such that trade policy effects are estimated for twenty-four tradable sectors. These detailed linkages haven’t been modeled in the earlier literature estimating the effects of the potential trade war between USA and China during the past two years.
Quantifying the 2018 Trade War between the U.S. and China in Terms of Welfare and Trade Effects

The structure of this study is as follows. Section 2 briefly reviews the essential literature. Section 3 summarizes the data used for input matrices in this study. Section 4 describes the model calibration and the overview of the Caliendo and Parro (2015) model components used in this study to calculate the welfare and real wage effects. Section 5 presents the estimated results. Sections 6 and 7 conclude with final thoughts and considerations for further research, respectively.

2. Brief Literature Review

Literature that is essential to this study comes from several strands:

First, the trade theory literature on the evolution of Ricardian and General Equilibrium models:

- The very first trade theory model – the original Ricardian model (1817) encompassed only one factor of production (labor), two countries, and two goods.
- Eaton and Kortum (2002) introduced realistic geographic features (such as the barriers to trade) into the Ricardian model and built it in the general equilibrium environment.
- Caliendo and Parro (2015), on which this study is based, offered a rigorous general equilibrium model that extended the Eaton and Kortum (2002) Ricardian model by introducing the following innovative elements, which hadn’t been included in the earlier generations of Ricardian models: (i) linkages between tradable and non-tradable sectors; (ii) trade in intermediate goods (per input-output data tables), and (iii) heterogeneity in sector productivities to estimate the effects of trade policy. The authors demonstrated that estimated effects on total welfare from trade policy changes were significantly lower in models where intermediate goods or input-output linkages weren’t factored in.

The comparative overview of these main models is summarized in Table 2.

The second strand of literature relates to estimating the recent effects of U.S.-China trade tensions:

- Li et al (2018) use a multi-country computable global general equilibrium (CGE) model to estimate the effects of a potential China-US trade war, in terms of tariff and non-tariff trade effects. However, they use the speculative tariff rates that were available at the end of 2017, which turned out to be higher than the actual US tariffs. Therefore, their results likely overestimate the effects from the actual tariff changes.
- Balistreri and Hillberry (2017) utilize the GTAP\(^7\) data in a GTAP-in-GAMS framework to calculate the economic effects of trade policies proposed by the US government during the presidential campaign. Thus, the same calibration issue applies.

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\(^7\) Global Trade Analysis Project (GTAP) (https://www.gtap.agecon.purdue.edu/)
### Table 2. Generations of Ricardian Models

<table>
<thead>
<tr>
<th></th>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td><strong>Set-up</strong></td>
<td>1 x 2 x 2</td>
<td>1 x 2 x 2</td>
<td>1 x M x M</td>
</tr>
<tr>
<td>· 1 factor of production: L (mobile within a country, between sectors)</td>
<td></td>
<td></td>
<td>· 1 factor of production: L (mobile within a country across sectors, but not across countries)</td>
</tr>
<tr>
<td>· 2 countries</td>
<td></td>
<td></td>
<td>· Multi-country (N counties)</td>
</tr>
<tr>
<td>· 2 goods</td>
<td></td>
<td></td>
<td>· Multi-sector (J sectors)</td>
</tr>
<tr>
<td><strong>Key Features</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Specialization along comparative advantages</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Perfectly competitive markets</td>
<td>Y</td>
<td>Y</td>
<td></td>
</tr>
<tr>
<td>Technological productivity differences b/w countries</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Production is at constant returns to scale</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Heterogeneity of productivity across sectors and producers</td>
<td></td>
<td></td>
<td>Y</td>
</tr>
<tr>
<td>Trade in intermediate goods</td>
<td></td>
<td></td>
<td>Y</td>
</tr>
<tr>
<td>Sectoral heterogeneity in productivity</td>
<td></td>
<td></td>
<td>Y</td>
</tr>
</tbody>
</table>

*Source: Author’s summary.*

### 3. Data Summary and Model Calibration

The input datasets used in the general equilibrium model per Caliendo and Parro (2015) have been constructed in the matrix format, calibrated for the MATLAB environment and matched to 56 tradable and non-tradable sectors per ISIC Rev.4. The data sources are presented in Table 3. The visual overview of the ten countries selected for this study and thirty-three countries that comprise the rest of the world category is presented in Figure 3. In addition, the main trading partners of the US and China have been selected to observe the trade diversion effect of the U.S.-China trade tensions. These countries are: Australia, Brazil, Canada, Japan, South Korea, Mexico, UK. Therefore, the model in this study is calibrated as following:

- Multiple countries: 10 countries and ROW (which includes thirty-three countries)
- Multiple sectors: 56 total sectors: 24 tradable sectors and 32 non-tradable sectors (Sector classification is per 2-digit ISIC Rev. 4)
Table 3. Summary of Data Sources

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Source</th>
<th>Website</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bilateral trade flows</td>
<td>UN COMTRADE</td>
<td><a href="https://comtrade.un.org/">https://comtrade.un.org/</a></td>
</tr>
<tr>
<td>Inter-industry commodity flows within and across countries (Input-Output matrices)</td>
<td>WIOD (World Input-Output Database), 2014 release</td>
<td><a href="http://www.wiod.org/">http://www.wiod.org/</a></td>
</tr>
<tr>
<td>Share of value added in gross output across sectors and countries (Betas)</td>
<td>WIOD (World Input-Output Database), 2014 release</td>
<td><a href="http://www.wiod.org/">http://www.wiod.org/</a></td>
</tr>
<tr>
<td>Share of Intermediate Consumption in gross output across sectors and countries (Gammas)</td>
<td>WIOD (World Input-Output Database), 2014 release</td>
<td><a href="http://www.wiod.org/">http://www.wiod.org/</a></td>
</tr>
<tr>
<td>Gross output across sectors and countries</td>
<td>WIOD (World Input-Output Database), 2014 release</td>
<td><a href="http://www.wiod.org/">http://www.wiod.org/</a></td>
</tr>
<tr>
<td>Estimated sector trade elasticities</td>
<td>Caliendo and Parro (2015), traditionally obtained from the econometric literature.</td>
<td></td>
</tr>
</tbody>
</table>

Figure 3. Map of 10 Countries and ROW Selected for This Study Based on WIOD Data Availability

Source: Created at www.mapchart.net

The underlying theoretical model in this study is based on the structural general equilibrium model from Caliendo and Parro (2015) – one of the most recent and innovative generations of the Ricardian models in the general equilibrium environment. The Caliendo and Parro (2015) structural quantitative model used in this study computes the following nine interconnected main components: (i) Cobb-Douglas household preferences; (ii) Intermediate goods, (iii) Composite intermediate goods (or materials); (iv) International trade costs and prices; (v) Expenditure shares; (vi) Total expenditures and trade balance; (vii) Equilibrium in relative changes; (viii) Relative changes in real wages; and (ix) Total welfare effects from tariff changes. During the computation, the model produces over sixty intermediate and final matrices (variables) per counterfactual simulation.

<table>
<thead>
<tr>
<th>Main model components</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Cobb-Douglas Household Preferences</td>
</tr>
<tr>
<td>2) Intermediate goods</td>
</tr>
<tr>
<td>3) Composite intermediate goods (materials)</td>
</tr>
<tr>
<td>4) International trade costs and prices</td>
</tr>
<tr>
<td>5) Expenditure shares</td>
</tr>
<tr>
<td>6) Total expenditure and trade balance</td>
</tr>
<tr>
<td>7) Equilibrium in relative changes</td>
</tr>
<tr>
<td>8) Relative change in real wages</td>
</tr>
<tr>
<td>9) Welfare effects from tariff changes</td>
</tr>
</tbody>
</table>

Since the main focus of this study is to estimate (i) the welfare effect and (ii) the real wage effect per our two counterfactual scenarios, we elaborate below only two respective final equations from the Caliendo and Parro (2015) methodology. As depicted in

Equation 1, the total welfare effects in the counterfactual scenarios are computed as a sum of “the terms of trade” (sectoral and bilateral) and “the volume of trade” (sectoral and bilateral), both weighted by the household income (In). The computed total welfare effect reflects the multilateral and multi-sectoral effects of the underlying variables.

\[
d\ln W_n = \frac{1}{\ln} \sum_{j=1}^{J} \sum_{i=1}^{N} \left( E_{n_i}^{j} d \ln c_{n_i}^{j} - M_{n_i}^{j} d \ln c_{n_i}^{j} \right) + \frac{1}{\ln} \sum_{j=1}^{J} \tau_{n}^{j} M_{n_i}^{j} \left( d \ln M_{n_i}^{j} - d \ln c_{n_i}^{j} \right) \\
\text{Terms of trade} \hspace{1cm} \text{Volume of trade} \hspace{1cm} \text{Multilateral and multisectoral effect}
\]

8 Caliendo and Parro (2015) solved the model’s equilibrium in terms of relative changes in prices and wages under a counterfactual tariff policy compared to a baseline tariff structure.
Quantifying the 2018 Trade War between the U.S. and China in Terms of Welfare and Trade Effects

Where $W_n$ – Welfare of the representative consumer in country $n$

$I_n$ – Household income (final absorption in country $n$)

$\sum_{j=1}^J$ – Sectoral terms of trade

$\sum_{i=1}^N$ – Bilateral terms of trade

$E_{nl}^j$ – Exports

$c_{nj}^j$ – Input bundle cost, sector $j$, country $n$

$\tau_{nj}$ – Tariff, sector $j$

**Equation 2. Relative Changes in Real Wages (Relative to The Base Year 2014), Model with Trade Deficit**

$$
\frac{d \ln \left( \frac{W_n}{P_n} \right)}{P_n} = - \sum_{j=1}^J \frac{\alpha_n^j}{\Theta^j} \ln \bar{p}_{nj}^j - \sum_{i=1}^I \frac{\alpha_n^i}{\Theta^i} \frac{1 - \gamma_n^i}{\gamma_n^i} \ln \bar{p}_{ni}^i - \sum_{j=1}^J \frac{\alpha_n^j}{\gamma_n^j} \ln \left( \prod_{k=1}^K \frac{\bar{p}_n^k}{p_n^i} \right) \gamma_n^{k,j}
$$

Where $P_n$ – Change in consumption prices

$\alpha_n^j$ – Share spent on final goods from sector $j$

$\Theta^j$ – Frechet-shape parameter (trade elasticity)

$\pi_{nn}$ – Change in the share of domestic expenditure in each sector

$\gamma_n^j$ – Value added share (in gross output)

$\gamma_n^{k,j}$ – Share of materials from sector $k$, used in the production of intermediate goods

As depicted in Equations 1 and 2, the final output formula for the relative change in real wages per country (as the nominal wage deflated by price index) is calculated as the change in the “share of domestic expenditure” (on final and intermediate goods) per each sector from which the costs on sectoral linkages (the changes in sectoral prices $P_n$) are subtracted.

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10 Ibid.
5. **Estimated effects of the US – China tariff escalation per counterfactual scenarios**

This section presents the estimated results of (i) the total welfare effects (as terms of trade and volume of trade) and (ii) the real wage effects for our data with trade deficits per our two counterfactual scenarios: (i) the unilateral U.S. tariff increases on 1,333 items imported from China and global tariffs on imported steel and aluminum, and (ii) the U.S. unilateral tariffs increases described in the first scenario but with China’s retaliatory tariff measures on 234 imported goods from the U.S.

Table 5 exhibits the results comparing the effects of the first counterfactual scenario (the case of the US unilateral tariff increases) with the baseline year 2014. The total welfare effect of the US tariff increases is negative for the United States, as it is lower by 1.845 percentage points compared with the baseline year. While the Terms of Trade effect is positive (1.035 percentage points higher than the baseline year scenario), that benefit is more than fully offset by the negative change in the Volume of Trade effect (-2.88 percentage points below the baseline scenario). Such dynamics fully align with trade theory - when a large country imposes an import tariff, its terms of trade increase, while the volume of trade decreases. The channel through which the terms of trade increase as a result of increased import tariffs could be due to an increase of real wages (as with the US +0.029 percentage points), which lead to an increase of export prices, thereby boosting the terms of trade.

Table 5. Total Welfare and Real Wage Effects (in Percentage Points): Counterfactual 1 vs Baseline 2014, Model with Trade Deficit

<table>
<thead>
<tr>
<th></th>
<th>Welfare effects</th>
<th>Real Wage effect</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total Welfare effect</td>
<td>Terms of Trade effect</td>
</tr>
<tr>
<td>AUS</td>
<td>-0.473%</td>
<td>-0.478%</td>
</tr>
<tr>
<td>BRZ</td>
<td>-1.705%</td>
<td>-1.388%</td>
</tr>
<tr>
<td>CAN</td>
<td>-9.734%</td>
<td>-9.239%</td>
</tr>
<tr>
<td>CHN</td>
<td>-2.939%</td>
<td>-1.436%</td>
</tr>
<tr>
<td>GER</td>
<td>-2.088%</td>
<td>-1.557%</td>
</tr>
<tr>
<td>JPN</td>
<td>-1.885%</td>
<td>-1.530%</td>
</tr>
<tr>
<td>KOR</td>
<td>-0.845%</td>
<td>-0.596%</td>
</tr>
<tr>
<td>MEX</td>
<td>-3.681%</td>
<td>-2.500%</td>
</tr>
<tr>
<td>UK</td>
<td>0.016%</td>
<td>0.071%</td>
</tr>
<tr>
<td>USA</td>
<td>-1.845%</td>
<td>1.035%</td>
</tr>
<tr>
<td>ROW</td>
<td>-0.059%</td>
<td>-0.074%</td>
</tr>
</tbody>
</table>

Meanwhile, in the first counterfactual scenario, the real wage effect for the US is small but positive (higher by 0.029 percentage points above the baseline year 2014), which might be explained by labor productivity (absolute advantage). However, the real wage effect is an incomplete measure of welfare.

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11 Terms of Trade is the index of the average export prices per average import prices.
since it does not include the tariff revenues; therefore, the analysis will focus mainly on the Total Welfare effect.

The US unilateral tariffs will indeed hurt China, but the losses are affordable – total welfare is lower by -2.939 percentage points below the baseline 2014. The country that will be most hurt by the US tariffs is Canada, where total welfare will be lower by 9.734 percentage points compared to the baseline year.

Overall, the unilateral US tariffs will hurt many countries, including the United States and its allies. The losses will come from the disruption of the established global supply chains, as countries are deeply integrated globally, as well as from inefficient trade diversion.

In the second counterfactual simulation (Table 6), when China retaliates with tariffs on the US-originated items, we can observe that USA will be hurt more harshly in terms of the total welfare (lower by -5.639 percentage points compared to the baseline year 2014). The negative total welfare effect is driven by both negative terms of trade and volume of trade components. Meanwhile, when China retaliates, China’s Total Welfare is minimized to only 0.726 percentage points, which is driven by the positive gain in the Terms of Trade (+3.678 percentage points), though the Volume of Trade effect remains negative (lower by -4.404 percentage points). Across the countries, there are more positive gains than losses.

Table 6. Total Welfare and Real Wage Effects (in Percentage Points): Counterfactual 2 vs Baseline 2014, Model with Trade Deficit

<table>
<thead>
<tr>
<th>Country</th>
<th>Total Welfare effect</th>
<th>Terms of Trade effect</th>
<th>Volume of Trade effect</th>
<th>Real Wage effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>AUS</td>
<td>-2.069%</td>
<td>-2.221%</td>
<td>0.152%</td>
<td>0.015%</td>
</tr>
<tr>
<td>BRZ</td>
<td>0.913%</td>
<td>0.633%</td>
<td>0.281%</td>
<td>0.008%</td>
</tr>
<tr>
<td>CAN</td>
<td>-1.019%</td>
<td>-1.096%</td>
<td>0.077%</td>
<td>-0.083%</td>
</tr>
<tr>
<td>CHN</td>
<td>-0.726%</td>
<td>3.678%</td>
<td>-4.404%</td>
<td>-0.031%</td>
</tr>
<tr>
<td>GER</td>
<td>1.573%</td>
<td>1.045%</td>
<td>0.528%</td>
<td>0.015%</td>
</tr>
<tr>
<td>JPN</td>
<td>3.087%</td>
<td>2.470%</td>
<td>0.618%</td>
<td>0.018%</td>
</tr>
<tr>
<td>KOR</td>
<td>0.763%</td>
<td>0.354%</td>
<td>0.409%</td>
<td>0.021%</td>
</tr>
<tr>
<td>MEX</td>
<td>1.443%</td>
<td>0.877%</td>
<td>0.566%</td>
<td>-0.068%</td>
</tr>
<tr>
<td>UK</td>
<td>0.279%</td>
<td>0.164%</td>
<td>0.115%</td>
<td>0.016%</td>
</tr>
<tr>
<td>USA</td>
<td>-5.639%</td>
<td>-1.512%</td>
<td>-4.128%</td>
<td>-0.201%</td>
</tr>
<tr>
<td>ROW</td>
<td>-0.002%</td>
<td>0.023%</td>
<td>-0.024%</td>
<td>0.059%</td>
</tr>
</tbody>
</table>

Table 7 and Table 8 summarize the sector-level relative changes of a contribution of terms of trade to the total welfare in the first and second counterfactual scenarios (compared to the baseline). In both simulations, the most negatively affected sectors in China are fishing and aquaculture, printing and reproduction of recorded media, other non-metallic mineral products, food products, beverages and tobacco.

Table 9 and Table 10 exhibit the sector-level relative changes of a contribution of volume of trade to the total welfare in the first and second counterfactual scenarios (compared to the baseline). In the
first counterfactual simulation (Table 9), it is striking that while the volume of trade of the US basic metals sector is higher (due to aluminum and steel tariffs) by a substantial 29.34 percentage points in terms of relative changes compared to its contribution to the total welfare in the baseline year, many other sectors will experience a decline in the volume of trade that would offset the gain in the basic metals sector. Since the industries are highly connected and most of them purchase equipment from China, the tariffs will negatively affect the volume of trade in the interconnected sectors.

When China retaliates (Table 10), the following Chinese sectors will experience an increase in the volume of trade: chemicals by 66.52 percentage points, rubber and plastic products by 41.19 percentage points, refined petroleum products by 24.06 percentage points relative to the baseline year.

6. Conclusions and Policy Implications

- The estimated results for both counterfactual scenarios confirm that tariff increases have enormous global ripple effects: the fact that the USA and China are deeply integrated in the global supply and value chains should not be ignored by policy makers.
- Unilateral U.S. tariffs will hurt the U.S. and its allies (mostly, Canada). China’s losses are small; the protected US basic metals sector will experience growth in the trade volume, but many other sectors will decline, thereby offsetting the gain. Effect on ROW is mixed due to trade diversion.
- If China retaliates, the U.S. will experience a more severe hit in its total welfare, whereas China would experience a smaller loss than in the first counterfactual scenario.
- Comparing the effects of both scenarios on China and the U.S., the U.S. will lose more than China.
- Integration of intermediate goods and sectoral linkages in general equilibrium (GE) models increases the trade and welfare effects from changes in tariff rates. Therefore, models that do not use the intermediate goods underestimate the effects.

7. Considerations for further research

One consideration for further research could be to analyze the sectoral input-output flows by country in more detail to explain the dynamics behind the sector-level contributions to total welfare. Another consideration could be to model and calculate additional effects of tariff increases, such as on TFP and exchange rates. Also, since the Caliendo and Parro model is structured to compare only two years of outcomes—the baseline and counterfactual—estimating the model for a longer time frame could be explored.
### Table 7. Scenario 1: Sector-level Contribution of Terms of Trade (ToT) to Total Welfare (Relative Changes vs 2014 Baseline)

<table>
<thead>
<tr>
<th>Sector</th>
<th>AUS</th>
<th>BRZ</th>
<th>CAN</th>
<th>CHN</th>
<th>GER</th>
<th>JPN</th>
<th>KOR</th>
<th>MEX</th>
<th>UK</th>
<th>USA</th>
<th>ROW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture</td>
<td>3.3%</td>
<td>1.6%</td>
<td>9.1%</td>
<td>-15.6%</td>
<td>2.5%</td>
<td>2.6%</td>
<td>1.0%</td>
<td>-1.7%</td>
<td>-0.2%</td>
<td>-2.0%</td>
<td>-0.8%</td>
</tr>
<tr>
<td>Forestry and logging</td>
<td>0.9%</td>
<td>1.3%</td>
<td>13.5%</td>
<td>-1.6%</td>
<td>4.3%</td>
<td>0.9%</td>
<td>1.4%</td>
<td>-6.8%</td>
<td>-1.0%</td>
<td>1.6%</td>
<td>-1.6%</td>
</tr>
<tr>
<td>Fishing and aquaculture</td>
<td>3.6%</td>
<td>1.4%</td>
<td>3.9%</td>
<td>116.2%</td>
<td>6.9%</td>
<td>-11.8%</td>
<td>11.7%</td>
<td>-0.9%</td>
<td>-0.8%</td>
<td>1.1%</td>
<td>-1.6%</td>
</tr>
<tr>
<td>Mining and quarrying</td>
<td>4.0%</td>
<td>-11.7%</td>
<td>3.8%</td>
<td>3.0%</td>
<td>0.3%</td>
<td>4.0%</td>
<td>-1.5%</td>
<td>0.4%</td>
<td>0.1%</td>
<td>2.0%</td>
<td>-1.1%</td>
</tr>
<tr>
<td>Manufacturing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Food products, beverages and tobacco</td>
<td>3.0%</td>
<td>1.9%</td>
<td>-1.5%</td>
<td>-31.8%</td>
<td>7.8%</td>
<td>1.6%</td>
<td>2.0%</td>
<td>-8.0%</td>
<td>-0.2%</td>
<td>-6.2%</td>
<td>-2.0%</td>
</tr>
<tr>
<td>Textiles and apparel</td>
<td>-4.8%</td>
<td>1.3%</td>
<td>-3.1%</td>
<td>-4.5%</td>
<td>-1.4%</td>
<td>4.5%</td>
<td>1.0%</td>
<td>-0.2%</td>
<td>0.2%</td>
<td>2.8%</td>
<td>-2.0%</td>
</tr>
<tr>
<td>Wood, except furniture</td>
<td>-6.6%</td>
<td>-4.5%</td>
<td>3.9%</td>
<td>-14.9%</td>
<td>35.7%</td>
<td>3.9%</td>
<td>-0.5%</td>
<td>-4.9%</td>
<td>0.0%</td>
<td>-0.4%</td>
<td>0.2%</td>
</tr>
<tr>
<td>Paper and paper products</td>
<td>-6.7%</td>
<td>-4.3%</td>
<td>-1.3%</td>
<td>-0.4%</td>
<td>-0.3%</td>
<td>-0.3%</td>
<td>-0.5%</td>
<td>-3.6%</td>
<td>0.1%</td>
<td>-0.3%</td>
<td>-1.0%</td>
</tr>
<tr>
<td>Printing and reproduction of recorded media</td>
<td>-0.4%</td>
<td>-52.0%</td>
<td>6.7%</td>
<td>113.2%</td>
<td>57.7%</td>
<td>-10.8%</td>
<td>9.7%</td>
<td>-3.2%</td>
<td>-1.5%</td>
<td>-9.0%</td>
<td>4.3%</td>
</tr>
<tr>
<td>Coke and refined petroleum products</td>
<td>-5.4%</td>
<td>-8.1%</td>
<td>-8.2%</td>
<td>-20.3%</td>
<td>0.9%</td>
<td>3.2%</td>
<td>0.0%</td>
<td>-1.3%</td>
<td>0.0%</td>
<td>-0.6%</td>
<td>-1.5%</td>
</tr>
<tr>
<td>Chemicals</td>
<td>-5.3%</td>
<td>-4.4%</td>
<td>-2.0%</td>
<td>0.1%</td>
<td>-1.4%</td>
<td>-5.5%</td>
<td>2.3%</td>
<td>-2.5%</td>
<td>0.1%</td>
<td>1.4%</td>
<td>-1.4%</td>
</tr>
<tr>
<td>Pharmaceutical products</td>
<td>1.5%</td>
<td>0.8%</td>
<td>-2.8%</td>
<td>-10.8%</td>
<td>-2.3%</td>
<td>1.1%</td>
<td>6.6%</td>
<td>-3.1%</td>
<td>0.2%</td>
<td>-0.4%</td>
<td>-2.3%</td>
</tr>
<tr>
<td>Rubber and plastic products</td>
<td>-5.8%</td>
<td>-8.8%</td>
<td>-2.8%</td>
<td>0.8%</td>
<td>0.4%</td>
<td>2.1%</td>
<td>-1.3%</td>
<td>-3.3%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>-0.9%</td>
</tr>
<tr>
<td>Other non-metallic mineral products</td>
<td>-7.2%</td>
<td>-4.9%</td>
<td>-2.2%</td>
<td>-33.4%</td>
<td>6.6%</td>
<td>2.6%</td>
<td>-1.1%</td>
<td>-1.8%</td>
<td>-0.3%</td>
<td>0.6%</td>
<td>-0.3%</td>
</tr>
<tr>
<td>Basic metals</td>
<td>3.5%</td>
<td>-3.3%</td>
<td>12.3%</td>
<td>-7.0%</td>
<td>0.8%</td>
<td>2.4%</td>
<td>0.0%</td>
<td>0.4%</td>
<td>0.2%</td>
<td>-5.7%</td>
<td>0.3%</td>
</tr>
<tr>
<td>Fabricated metal products</td>
<td>-10.6%</td>
<td>-28.2%</td>
<td>-3.2%</td>
<td>0.3%</td>
<td>1.0%</td>
<td>-12.4%</td>
<td>0.5%</td>
<td>4.7%</td>
<td>-0.2%</td>
<td>-5.8%</td>
<td>-0.5%</td>
</tr>
<tr>
<td>Computer, electronic and optical products</td>
<td>-4.7%</td>
<td>-3.9%</td>
<td>-3.0%</td>
<td>7.5%</td>
<td>-2.0%</td>
<td>2.5%</td>
<td>-0.9%</td>
<td>1.6%</td>
<td>0.2%</td>
<td>2.7%</td>
<td>-1.9%</td>
</tr>
<tr>
<td>Electrical equipment</td>
<td>-5.0%</td>
<td>-99.4%</td>
<td>-3.4%</td>
<td>3.9%</td>
<td>-0.1%</td>
<td>3.3%</td>
<td>0.9%</td>
<td>1.3%</td>
<td>0.2%</td>
<td>1.0%</td>
<td>-1.0%</td>
</tr>
<tr>
<td>Machinery and equipment n.e.c.</td>
<td>-5.3%</td>
<td>-63.3%</td>
<td>-3.2%</td>
<td>2.5%</td>
<td>2.7%</td>
<td>-23.7%</td>
<td>0.1%</td>
<td>0.8%</td>
<td>0.1%</td>
<td>0.0%</td>
<td>-1.4%</td>
</tr>
<tr>
<td>Motor vehicles, trailers and semi-trailers</td>
<td>-5.7%</td>
<td>1.1%</td>
<td>-5.1%</td>
<td>-0.3%</td>
<td>-1.6%</td>
<td>-6.8%</td>
<td>-1.4%</td>
<td>1.3%</td>
<td>0.1%</td>
<td>-0.4%</td>
<td>-1.4%</td>
</tr>
<tr>
<td>Other transport equipment</td>
<td>-8.8%</td>
<td>-4.0%</td>
<td>-3.2%</td>
<td>-14.6%</td>
<td>-1.7%</td>
<td>-13.5%</td>
<td>4.2%</td>
<td>1.0%</td>
<td>0.2%</td>
<td>-4.5%</td>
<td>-1.6%</td>
</tr>
<tr>
<td>Furniture; other manufacturing</td>
<td>-5.5%</td>
<td>-0.5%</td>
<td>-1.4%</td>
<td>7.5%</td>
<td>-1.2%</td>
<td>2.7%</td>
<td>0.3%</td>
<td>0.8%</td>
<td>0.1%</td>
<td>1.1%</td>
<td>-2.0%</td>
</tr>
<tr>
<td>Repair and installation of machinery and equipment</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>-86.4%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>-10.3%</td>
<td>-1.2%</td>
<td>-9.1%</td>
<td>4.2%</td>
<td></td>
</tr>
<tr>
<td>Electricity, gas, steam, air conditioning supply</td>
<td>2.5%</td>
<td>0.9%</td>
<td>27.9%</td>
<td>-77.6%</td>
<td>70.0%</td>
<td>-40.4%</td>
<td>492.1%</td>
<td>-98.8%</td>
<td>-8.5%</td>
<td>-17.0%</td>
<td>14.6%</td>
</tr>
</tbody>
</table>
Table 8. Scenario 2: Sector-level Contribution of Terms of Trade (ToT) to Total Welfare (Relative Changes vs 2014 Baseline)

<table>
<thead>
<tr>
<th>Sector</th>
<th>AUS</th>
<th>BRZ</th>
<th>CAN</th>
<th>CHN</th>
<th>GER</th>
<th>JPN</th>
<th>KOR</th>
<th>MEX</th>
<th>UK</th>
<th>USA</th>
<th>ROW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture</td>
<td>1.9%</td>
<td>4.3%</td>
<td>-5.2%</td>
<td>-15.9%</td>
<td>0.2%</td>
<td>6.2%</td>
<td>0.2%</td>
<td>-1.8%</td>
<td>0.0%</td>
<td>-2.0%</td>
<td>-0.9%</td>
</tr>
<tr>
<td>Forestry and logging</td>
<td>0.4%</td>
<td>2.2%</td>
<td>6.1%</td>
<td>-2.1%</td>
<td>4.1%</td>
<td>4.4%</td>
<td>0.9%</td>
<td>-6.8%</td>
<td>-1.0%</td>
<td>1.7%</td>
<td>-1.1%</td>
</tr>
<tr>
<td>Fishing and aquaculture</td>
<td>1.4%</td>
<td>2.5%</td>
<td>-6.8%</td>
<td>113.4%</td>
<td>11.0%</td>
<td>-10.8%</td>
<td>14.1%</td>
<td>-1.3%</td>
<td>-3.6%</td>
<td>1.0%</td>
<td>-1.0%</td>
</tr>
<tr>
<td>Mining and quarrying</td>
<td>5.1%</td>
<td>-8.9%</td>
<td>-7.2%</td>
<td>2.2%</td>
<td>-1.5%</td>
<td>7.6%</td>
<td>-2.3%</td>
<td>-0.3%</td>
<td>0.2%</td>
<td>2.0%</td>
<td>-0.7%</td>
</tr>
<tr>
<td>Manufacturing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Food products, beverages and tobacco</td>
<td>-0.4%</td>
<td>3.3%</td>
<td>6.4%</td>
<td>-31.1%</td>
<td>12.3%</td>
<td>5.0%</td>
<td>1.2%</td>
<td>-7.2%</td>
<td>-0.2%</td>
<td>-6.0%</td>
<td>-2.2%</td>
</tr>
<tr>
<td>Textiles and apparel</td>
<td>-3.7%</td>
<td>0.9%</td>
<td>5.8%</td>
<td>4.1%</td>
<td>-1.7%</td>
<td>8.2%</td>
<td>2.5%</td>
<td>0.0%</td>
<td>0.3%</td>
<td>2.8%</td>
<td>-2.0%</td>
</tr>
<tr>
<td>Wood, except furniture</td>
<td>-4.5%</td>
<td>-11.9%</td>
<td>-7.1%</td>
<td>-15.0%</td>
<td>42.7%</td>
<td>7.6%</td>
<td>-1.3%</td>
<td>-2.2%</td>
<td>0.2%</td>
<td>-0.3%</td>
<td>0.0%</td>
</tr>
<tr>
<td>Paper and paper products</td>
<td>-7.5%</td>
<td>-11.1%</td>
<td>2.9%</td>
<td>-0.5%</td>
<td>-0.7%</td>
<td>2.6%</td>
<td>-0.1%</td>
<td>-0.6%</td>
<td>0.2%</td>
<td>-0.2%</td>
<td>-0.6%</td>
</tr>
<tr>
<td>Printing and reproduction of recorded media</td>
<td>-2.9%</td>
<td>-57.0%</td>
<td>-5.9%</td>
<td>-99.3%</td>
<td>60.7%</td>
<td>-7.3%</td>
<td>7.5%</td>
<td>-1.1%</td>
<td>-1.6%</td>
<td>-8.8%</td>
<td>4.4%</td>
</tr>
<tr>
<td>Coke and refined petroleum products</td>
<td>-6.3%</td>
<td>-17.5%</td>
<td>-6.0%</td>
<td>-18.3%</td>
<td>-0.5%</td>
<td>6.8%</td>
<td>0.7%</td>
<td>0.3%</td>
<td>-0.2%</td>
<td>-0.9%</td>
<td>-0.6%</td>
</tr>
<tr>
<td>Chemicals</td>
<td>-4.7%</td>
<td>-9.5%</td>
<td>1.6%</td>
<td>2.8%</td>
<td>-1.1%</td>
<td>-7.8%</td>
<td>-4.4%</td>
<td>0.0%</td>
<td>-0.1%</td>
<td>1.4%</td>
<td>-1.5%</td>
</tr>
<tr>
<td>Pharmaceutical products</td>
<td>-2.9%</td>
<td>0.5%</td>
<td>4.9%</td>
<td>-10.0%</td>
<td>-2.9%</td>
<td>3.7%</td>
<td>5.7%</td>
<td>-0.7%</td>
<td>0.0%</td>
<td>-0.5%</td>
<td>-2.2%</td>
</tr>
<tr>
<td>Rubber and plastic products</td>
<td>-4.7%</td>
<td>-14.9%</td>
<td>2.1%</td>
<td>2.0%</td>
<td>-0.1%</td>
<td>6.2%</td>
<td>-2.2%</td>
<td>0.6%</td>
<td>0.1%</td>
<td>0.2%</td>
<td>-1.0%</td>
</tr>
<tr>
<td>Other non-metallic mineral products</td>
<td>-5.9%</td>
<td>-10.1%</td>
<td>6.1%</td>
<td>-29.9%</td>
<td>9.7%</td>
<td>6.4%</td>
<td>-2.0%</td>
<td>-1.6%</td>
<td>-0.2%</td>
<td>0.7%</td>
<td>-0.3%</td>
</tr>
<tr>
<td>Basic metals</td>
<td>4.3%</td>
<td>-7.7%</td>
<td>-35.4%</td>
<td>-5.0%</td>
<td>-0.1%</td>
<td>6.1%</td>
<td>-0.2%</td>
<td>5.5%</td>
<td>0.2%</td>
<td>-5.6%</td>
<td>-0.3%</td>
</tr>
<tr>
<td>Fabricated metal products</td>
<td>-11.1%</td>
<td>-41.9%</td>
<td>4.6%</td>
<td>0.6%</td>
<td>-0.7%</td>
<td>-28.7%</td>
<td>1.0%</td>
<td>25.4%</td>
<td>-0.1%</td>
<td>-5.7%</td>
<td>-0.1%</td>
</tr>
<tr>
<td>Computer, electronic and optical products</td>
<td>-3.4%</td>
<td>-8.0%</td>
<td>5.7%</td>
<td>6.3%</td>
<td>-3.3%</td>
<td>1.6%</td>
<td>-0.7%</td>
<td>0.8%</td>
<td>0.2%</td>
<td>2.6%</td>
<td>-2.1%</td>
</tr>
<tr>
<td>Electrical equipment</td>
<td>-3.7%</td>
<td>-192.6%</td>
<td>5.2%</td>
<td>4.8%</td>
<td>-1.0%</td>
<td>6.3%</td>
<td>0.1%</td>
<td>1.0%</td>
<td>0.3%</td>
<td>1.0%</td>
<td>-1.4%</td>
</tr>
<tr>
<td>Machinery and equipment n.e.c.</td>
<td>-4.2%</td>
<td>-163.3%</td>
<td>5.0%</td>
<td>4.1%</td>
<td>8.6%</td>
<td>-61.8%</td>
<td>0.0%</td>
<td>8.1%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>-1.5%</td>
</tr>
<tr>
<td>Motor vehicles, trailers and semi-trailers</td>
<td>-5.1%</td>
<td>1.6%</td>
<td>1.9%</td>
<td>-0.2%</td>
<td>-1.5%</td>
<td>-15.4%</td>
<td>0.7%</td>
<td>0.8%</td>
<td>0.2%</td>
<td>-0.3%</td>
<td>-1.7%</td>
</tr>
<tr>
<td>Other transport equipment</td>
<td>-14.7%</td>
<td>-11.7%</td>
<td>4.6%</td>
<td>1.0%</td>
<td>-1.7%</td>
<td>-53.9%</td>
<td>7.1%</td>
<td>0.6%</td>
<td>0.0%</td>
<td>-3.7%</td>
<td>-1.9%</td>
</tr>
<tr>
<td>Furniture; other manufacturing</td>
<td>-5.7%</td>
<td>-3.5%</td>
<td>1.8%</td>
<td>5.9%</td>
<td>-1.3%</td>
<td>5.7%</td>
<td>-2.3%</td>
<td>0.4%</td>
<td>0.1%</td>
<td>1.0%</td>
<td>-2.1%</td>
</tr>
<tr>
<td>Repair and installation of machinery and equipment</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>92.2%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>-8.4%</td>
<td>-1.1%</td>
<td>-9.2%</td>
<td>5.0%</td>
<td></td>
</tr>
<tr>
<td>Electricity, gas, steam, air conditioning supply</td>
<td>0.0%</td>
<td>2.1%</td>
<td>37.6%</td>
<td>-77.4%</td>
<td>71.6%</td>
<td>-38.4%</td>
<td>487.8%</td>
<td>-94.1%</td>
<td>-8.5%</td>
<td>-17.2%</td>
<td>14.7%</td>
</tr>
</tbody>
</table>
Table 9. Scenario 1: Sector-level Contribution of Volume of Trade to Welfare (Relative Changes vs 2014 Baseline)

<table>
<thead>
<tr>
<th>Sector</th>
<th>AUS</th>
<th>BRZ</th>
<th>CAN</th>
<th>CHN</th>
<th>GER</th>
<th>JPN</th>
<th>KOR</th>
<th>MEX</th>
<th>UK</th>
<th>USA</th>
<th>ROW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture</td>
<td>0.17%</td>
<td>-0.99%</td>
<td>-0.16%</td>
<td>0.35%</td>
<td>-0.48%</td>
<td>-0.43%</td>
<td>0.04%</td>
<td>0.53%</td>
<td>-0.06%</td>
<td>-2.95%</td>
<td>-0.06%</td>
</tr>
<tr>
<td>Forestry and logging</td>
<td>0.19%</td>
<td>0.03%</td>
<td>0.00%</td>
<td>0.18%</td>
<td>28.60%</td>
<td>-0.45%</td>
<td>0.71%</td>
<td>1.00%</td>
<td>0.03%</td>
<td>-2.98%</td>
<td>0.01%</td>
</tr>
<tr>
<td>Fishing and aquaculture</td>
<td>0.00%</td>
<td>-0.47%</td>
<td>-0.50%</td>
<td>0.80%</td>
<td>-0.50%</td>
<td>-0.09%</td>
<td>1.92%</td>
<td>0.88%</td>
<td>-0.01%</td>
<td>-2.93%</td>
<td>-0.15%</td>
</tr>
<tr>
<td>Mining and quarrying</td>
<td>0.41%</td>
<td>-0.96%</td>
<td>-0.36%</td>
<td>1.03%</td>
<td>-0.54%</td>
<td>-0.32%</td>
<td>-0.29%</td>
<td>-0.35%</td>
<td>-0.06%</td>
<td>-3.08%</td>
<td>-0.20%</td>
</tr>
</tbody>
</table>

Manufacturing

<table>
<thead>
<tr>
<th>Sector</th>
<th>AUS</th>
<th>BRZ</th>
<th>CAN</th>
<th>CHN</th>
<th>GER</th>
<th>JPN</th>
<th>KOR</th>
<th>MEX</th>
<th>UK</th>
<th>USA</th>
<th>ROW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food products, beverages and tobacco</td>
<td>0.03%</td>
<td>-0.20%</td>
<td>0.16%</td>
<td>0.01%</td>
<td>-0.53%</td>
<td>-0.23%</td>
<td>-0.38%</td>
<td>0.39%</td>
<td>-0.05%</td>
<td>-3.00%</td>
<td>-0.09%</td>
</tr>
<tr>
<td>Textiles and apparel</td>
<td>-0.01%</td>
<td>-0.05%</td>
<td>-0.78%</td>
<td>-0.48%</td>
<td>-0.47%</td>
<td>-0.31%</td>
<td>-0.18%</td>
<td>-0.26%</td>
<td>-0.03%</td>
<td>-2.89%</td>
<td>0.70%</td>
</tr>
<tr>
<td>Wood, except furniture</td>
<td>-0.01%</td>
<td>1.05%</td>
<td>-0.51%</td>
<td>-0.60%</td>
<td>-0.53%</td>
<td>-0.37%</td>
<td>-0.39%</td>
<td>0.73%</td>
<td>-0.06%</td>
<td>-3.03%</td>
<td>0.07%</td>
</tr>
<tr>
<td>Paper and paper products</td>
<td>-0.02%</td>
<td>-0.04%</td>
<td>-0.52%</td>
<td>-0.05%</td>
<td>-0.86%</td>
<td>0.00%</td>
<td>-0.79%</td>
<td>-0.03%</td>
<td>-0.12%</td>
<td>0.00%</td>
<td>-0.19%</td>
</tr>
<tr>
<td>Printing and reproduction of recorded media</td>
<td>0.15%</td>
<td>0.81%</td>
<td>-0.34%</td>
<td>-0.21%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>-0.71%</td>
<td>-0.57%</td>
<td>0.00%</td>
<td>-2.94%</td>
<td>-0.20%</td>
</tr>
<tr>
<td>Coke and refined petroleum products</td>
<td>0.00%</td>
<td>0.04%</td>
<td>-0.44%</td>
<td>-0.03%</td>
<td>-0.42%</td>
<td>-0.26%</td>
<td>-0.23%</td>
<td>-0.21%</td>
<td>0.06%</td>
<td>-2.34%</td>
<td>0.35%</td>
</tr>
<tr>
<td>Chemicals</td>
<td>0.01%</td>
<td>0.27%</td>
<td>-0.75%</td>
<td>0.21%</td>
<td>-0.47%</td>
<td>-0.13%</td>
<td>-0.28%</td>
<td>-0.46%</td>
<td>0.00%</td>
<td>2.97%</td>
<td>-0.10%</td>
</tr>
<tr>
<td>Pharmaceutical products</td>
<td>0.11%</td>
<td>-0.07%</td>
<td>-0.52%</td>
<td>0.29%</td>
<td>-0.38%</td>
<td>-0.12%</td>
<td>-0.33%</td>
<td>-0.47%</td>
<td>-0.05%</td>
<td>-2.98%</td>
<td>0.28%</td>
</tr>
<tr>
<td>Rubber and plastic products</td>
<td>0.04%</td>
<td>0.25%</td>
<td>-0.79%</td>
<td>-0.05%</td>
<td>-0.42%</td>
<td>-0.14%</td>
<td>-0.22%</td>
<td>-0.43%</td>
<td>-0.04%</td>
<td>1.60%</td>
<td>0.01%</td>
</tr>
<tr>
<td>Other non-metallic mineral products</td>
<td>-0.15%</td>
<td>1.85%</td>
<td>-0.36%</td>
<td>0.07%</td>
<td>-0.46%</td>
<td>-0.22%</td>
<td>-0.28%</td>
<td>0.49%</td>
<td>-0.02%</td>
<td>-3.05%</td>
<td>-0.02%</td>
</tr>
<tr>
<td>Basic metals</td>
<td>-0.14%</td>
<td>11.22%</td>
<td>-0.90%</td>
<td>0.34%</td>
<td>0.61%</td>
<td>0.72%</td>
<td>2.72%</td>
<td>4.17%</td>
<td>0.26%</td>
<td>29.34%</td>
<td>0.21%</td>
</tr>
<tr>
<td>Fabricated metal products</td>
<td>0.14%</td>
<td>1.09%</td>
<td>-0.65%</td>
<td>0.80%</td>
<td>0.75%</td>
<td>0.96%</td>
<td>0.82%</td>
<td>0.53%</td>
<td>-0.19%</td>
<td>-0.99%</td>
<td>0.30%</td>
</tr>
<tr>
<td>Computer, electronic and optical products</td>
<td>-0.03%</td>
<td>-0.11%</td>
<td>-0.81%</td>
<td>-0.82%</td>
<td>-0.49%</td>
<td>-0.28%</td>
<td>-0.27%</td>
<td>-0.80%</td>
<td>-0.03%</td>
<td>-1.55%</td>
<td>-0.13%</td>
</tr>
<tr>
<td>Electrical equipment</td>
<td>0.10%</td>
<td>0.24%</td>
<td>-0.93%</td>
<td>-0.15%</td>
<td>-0.33%</td>
<td>-0.18%</td>
<td>-0.20%</td>
<td>-0.52%</td>
<td>0.02%</td>
<td>1.91%</td>
<td>0.17%</td>
</tr>
<tr>
<td>Machinery and equipment n.e.c.</td>
<td>0.12%</td>
<td>0.30%</td>
<td>-0.77%</td>
<td>0.46%</td>
<td>-0.31%</td>
<td>0.74%</td>
<td>0.10%</td>
<td>-0.73%</td>
<td>0.03%</td>
<td>2.47%</td>
<td>-0.03%</td>
</tr>
<tr>
<td>Motor vehicles, trailers and semi-trailers</td>
<td>0.00%</td>
<td>0.12%</td>
<td>-1.14%</td>
<td>2.09%</td>
<td>0.93%</td>
<td>0.00%</td>
<td>0.59%</td>
<td>-0.06%</td>
<td>0.06%</td>
<td>2.84%</td>
<td>-0.13%</td>
</tr>
<tr>
<td>Other transport equipment</td>
<td>0.08%</td>
<td>-0.68%</td>
<td>-0.90%</td>
<td>-0.11%</td>
<td>-0.52%</td>
<td>0.00%</td>
<td>-0.22%</td>
<td>-1.45%</td>
<td>-0.11%</td>
<td>9.78%</td>
<td>-0.12%</td>
</tr>
<tr>
<td>Furniture; other manufacturing</td>
<td>-0.03%</td>
<td>0.62%</td>
<td>-0.47%</td>
<td>-0.29%</td>
<td>-0.32%</td>
<td>0.05%</td>
<td>-0.66%</td>
<td>-0.43%</td>
<td>-0.02%</td>
<td>0.37%</td>
<td>-0.28%</td>
</tr>
<tr>
<td>Repair and installation of machinery and equipment</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>-0.33%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>-0.09%</td>
<td>-2.94%</td>
<td>-0.14%</td>
</tr>
<tr>
<td>Electricity, gas, steam, air conditioning supply</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>-0.01%</td>
<td>0.00%</td>
<td>0.00%</td>
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<td>0.05%</td>
</tr>
<tr>
<td>Industry</td>
<td>AUS</td>
<td>BRA</td>
<td>CAN</td>
<td>CHN</td>
<td>GER</td>
<td>JPN</td>
<td>KOR</td>
<td>MEX</td>
<td>UK</td>
<td>USA</td>
<td>ROW</td>
</tr>
<tr>
<td>----------------------------------------------</td>
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<td>-------</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
</tr>
<tr>
<td><strong>Agriculture</strong></td>
<td>-0.60%</td>
<td>2.11%</td>
<td>0.32%</td>
<td>9.12%</td>
<td>-0.16%</td>
<td>0.63%</td>
<td>-2.38%</td>
<td>-1.03%</td>
<td>0.04%</td>
<td>-2.85%</td>
<td>0.32%</td>
</tr>
<tr>
<td><strong>Forestry and logging</strong></td>
<td>-1.36%</td>
<td>-3.61%</td>
<td>0.00%</td>
<td>-12.07%</td>
<td>-160.08%</td>
<td>0.90%</td>
<td>-6.49%</td>
<td>-3.30%</td>
<td>-0.39%</td>
<td>-2.63%</td>
<td>-0.09%</td>
</tr>
<tr>
<td><strong>Fishing and aquaculture</strong></td>
<td>0.00%</td>
<td>-0.57%</td>
<td>1.41%</td>
<td>-10.98%</td>
<td>0.36%</td>
<td>-0.82%</td>
<td>-13.37%</td>
<td>-1.77%</td>
<td>-0.22%</td>
<td>-2.72%</td>
<td>0.27%</td>
</tr>
<tr>
<td><strong>Mining and quarrying</strong></td>
<td>-1.19%</td>
<td>1.58%</td>
<td>1.22%</td>
<td>-15.09%</td>
<td>0.65%</td>
<td>0.65%</td>
<td>-0.13%</td>
<td>1.85%</td>
<td>0.22%</td>
<td>-2.55%</td>
<td>0.81%</td>
</tr>
<tr>
<td><strong>Manufacturing</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Food products, beverages and tobacco</td>
<td>-0.09%</td>
<td>-0.06%</td>
<td>-0.21%</td>
<td>-4.48%</td>
<td>-0.07%</td>
<td>-0.32%</td>
<td>0.06%</td>
<td>-0.31%</td>
<td>-0.01%</td>
<td>-3.03%</td>
<td>-0.07%</td>
</tr>
<tr>
<td>Textiles and apparel</td>
<td>0.23%</td>
<td>-0.59%</td>
<td>0.65%</td>
<td>-7.76%</td>
<td>0.28%</td>
<td>0.32%</td>
<td>-0.28%</td>
<td>-0.51%</td>
<td>-0.09%</td>
<td>-3.06%</td>
<td>-3.10%</td>
</tr>
<tr>
<td>Wood, except furniture</td>
<td>0.13%</td>
<td>-9.09%</td>
<td>1.19%</td>
<td>-6.69%</td>
<td>0.15%</td>
<td>0.55%</td>
<td>0.03%</td>
<td>-1.38%</td>
<td>0.01%</td>
<td>-2.78%</td>
<td>-0.40%</td>
</tr>
<tr>
<td>Paper and paper products</td>
<td>0.33%</td>
<td>-0.48%</td>
<td>0.95%</td>
<td>-9.24%</td>
<td>1.83%</td>
<td>0.00%</td>
<td>2.31%</td>
<td>-0.70%</td>
<td>0.32%</td>
<td>0.00%</td>
<td>0.57%</td>
</tr>
<tr>
<td>Printing and reproduction of recorded media</td>
<td>-1.17%</td>
<td>-3.28%</td>
<td>0.95%</td>
<td>-8.70%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>1.65%</td>
<td>1.37%</td>
<td>0.00%</td>
<td>-3.11%</td>
<td>0.26%</td>
</tr>
<tr>
<td>Coke and refined petroleum products</td>
<td>0.00%</td>
<td>-1.25%</td>
<td>1.26%</td>
<td>24.06%</td>
<td>-0.13%</td>
<td>0.24%</td>
<td>-0.05%</td>
<td>0.12%</td>
<td>-0.31%</td>
<td>-2.34%</td>
<td>-1.48%</td>
</tr>
<tr>
<td>Chemicals</td>
<td>-0.20%</td>
<td>-1.77%</td>
<td>0.99%</td>
<td>66.52%</td>
<td>0.46%</td>
<td>-0.39%</td>
<td>0.53%</td>
<td>-0.27%</td>
<td>-0.19%</td>
<td>3.26%</td>
<td>0.58%</td>
</tr>
<tr>
<td>Pharmaceutical products</td>
<td>-0.47%</td>
<td>-1.31%</td>
<td>1.07%</td>
<td>-10.15%</td>
<td>-0.15%</td>
<td>-0.44%</td>
<td>0.01%</td>
<td>1.22%</td>
<td>0.00%</td>
<td>-2.33%</td>
<td>-0.91%</td>
</tr>
<tr>
<td>Rubber and plastic products</td>
<td>-0.62%</td>
<td>-2.02%</td>
<td>1.02%</td>
<td>41.19%</td>
<td>0.27%</td>
<td>-0.24%</td>
<td>0.22%</td>
<td>-0.37%</td>
<td>-0.07%</td>
<td>1.74%</td>
<td>0.04%</td>
</tr>
<tr>
<td>Other non-metallic mineral products</td>
<td>-0.80%</td>
<td>-6.83%</td>
<td>1.12%</td>
<td>-9.56%</td>
<td>-0.24%</td>
<td>-0.06%</td>
<td>-0.07%</td>
<td>-0.79%</td>
<td>-0.01%</td>
<td>-2.85%</td>
<td>-0.09%</td>
</tr>
<tr>
<td>Basic metals</td>
<td>-0.04%</td>
<td>2.33%</td>
<td>1.05%</td>
<td>16.61%</td>
<td>0.90%</td>
<td>0.86%</td>
<td>0.29%</td>
<td>3.81%</td>
<td>0.49%</td>
<td>28.59%</td>
<td>0.59%</td>
</tr>
<tr>
<td>Fabricated metal products</td>
<td>-0.44%</td>
<td>-0.50%</td>
<td>0.97%</td>
<td>-8.17%</td>
<td>-0.09%</td>
<td>-0.21%</td>
<td>-0.47%</td>
<td>0.84%</td>
<td>-0.06%</td>
<td>-0.93%</td>
<td>0.00%</td>
</tr>
<tr>
<td>Computer, electronic and optical products</td>
<td>-0.07%</td>
<td>-0.23%</td>
<td>1.04%</td>
<td>-5.76%</td>
<td>0.32%</td>
<td>0.38%</td>
<td>0.22%</td>
<td>-0.96%</td>
<td>-0.07%</td>
<td>1.41%</td>
<td>0.45%</td>
</tr>
<tr>
<td>Electrical equipment</td>
<td>-0.35%</td>
<td>-0.18%</td>
<td>0.85%</td>
<td>-7.09%</td>
<td>0.68%</td>
<td>0.36%</td>
<td>0.54%</td>
<td>0.21%</td>
<td>0.03%</td>
<td>1.72%</td>
<td>-0.01%</td>
</tr>
<tr>
<td>Machinery and equipment n.e.c.</td>
<td>-0.44%</td>
<td>-0.20%</td>
<td>1.00%</td>
<td>-8.09%</td>
<td>0.52%</td>
<td>-1.16%</td>
<td>-0.03%</td>
<td>0.24%</td>
<td>0.03%</td>
<td>2.22%</td>
<td>0.21%</td>
</tr>
<tr>
<td>Motor vehicles, trailers and semi-trailers</td>
<td>-0.04%</td>
<td>0.04%</td>
<td>0.88%</td>
<td>10.32%</td>
<td>-0.63%</td>
<td>0.00%</td>
<td>-0.61%</td>
<td>0.60%</td>
<td>0.01%</td>
<td>2.57%</td>
<td>0.18%</td>
</tr>
<tr>
<td>Other transport equipment</td>
<td>-0.20%</td>
<td>1.05%</td>
<td>0.73%</td>
<td>10.73%</td>
<td>0.73%</td>
<td>0.00%</td>
<td>0.17%</td>
<td>0.47%</td>
<td>0.05%</td>
<td>9.35%</td>
<td>-0.02%</td>
</tr>
<tr>
<td>Furniture; other manufacturing</td>
<td>-0.20%</td>
<td>-1.89%</td>
<td>1.07%</td>
<td>-7.40%</td>
<td>0.07%</td>
<td>-0.38%</td>
<td>1.42%</td>
<td>0.40%</td>
<td>-0.04%</td>
<td>0.21%</td>
<td>0.68%</td>
</tr>
<tr>
<td>Repair and installation of machinery and equipment</td>
<td>-0.09%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>-1.09%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>-0.21%</td>
<td>-2.89%</td>
<td>-0.31%</td>
</tr>
<tr>
<td>Electricity, gas, steam, air conditioning supply</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>-1.74%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.09%</td>
</tr>
</tbody>
</table>
Quantifying the 2018 Trade War between the U.S. and China in Terms of Welfare and Trade Effects

Reference


U.S. Presidential Proclamation as of March 22, 2018 on the resolution of the Section 301 investigation: https://www.whitehouse.gov/presidential-actions/presidential-memorandum-actions-united-states-related-section-301-investigation/
RESEARCH

U.S. Presidential Proclamation as of May 31, 2018 on aluminum and steel tariffs, with the only exemption of Australia, Argentina, Brazil, and South Korea:

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JOHNS HOPKINS
SCHOOL of ADVANCED INTERNATIONAL STUDIES
library("insights")
infer <- function(x) {
  x <- read.data (world)
  plot (x=time, y=reality)
  analyze (x)
  x
}