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FALL 2017 ESSAY CONTEST

“ Theorize the impact UBI would have on consumption, government spending, and/or the labor market in the United States. Discuss and assess applications of UBI (domestically and abroad) in your response. ”



Against UBI



Maurice Ang
Class of 2019
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Across developed economies, zero lower bound interest rates have become the new normal. This sentiment encouraged new radical economic policies among politicians and the general public. From President Nixon to Mark Zuckerberg, proponents of Universal Basic Income (UBI) believe that this is the inevitable future. However, does the inevitable future have unlimited resources to fund this program? Absolutely not. After all, economics itself is the study of the allocation of scarce resources.

The concept of UBI can be described as exclusively Scandinavian, only applicable to countries with a strong social welfare system. In the United States, although we have an existing welfare system, it would prove difficult to implement UBI throughout the 50 states. Each state has a different standard of living. One thousand dollars might be sufficient for an individual living in Montgomery, Alabama, but that would not even cover rent for someone in San Francisco, California.

One of the biggest concerns against UBI is that the program would serve as a disincentive for people

to work, particularly for the unemployed. The argument is that people would

engage in more innovative work if monetary constraints are removed from an individual to pursue his or her passions. However, we cannot be certain that a high proportion of the population has a commitment mechanism in place given time-inconsistent preferences. Currently, there is no extensive study done on this specific issue.

Evenly distributing a fixed amount of income to everyone also results in the inefficient allocation of resources as there are segments of the population that do not even need UBI, ensuing deadweight loss. Even with the elimination of welfare programs replaced with UBI, government expenses would increase dramatically. Rather than effectively targeting welfare to those who qualify for it, the government would be inefficiently providing welfare to individuals who would not normally qualify.

Consumption of goods would definitely increase given the implementation of UBI. However, current in-kind welfare such as food stamps work perfectly to achieve a specific goal set by the government. Hoynes and Schanzenbach, for example, found that the poor react to in-kind transfers by reducing their out-of-

pocket spending on the targeted good, while total consumption of the targeted good increases (2009). The same researchers also found that food vouchers lead to minimal disruption in consumption choice in comparison to when the welfare was given in cash. And of course, realistically, there would be more public support for an in-kind program compared to a cash-based system.

Theoretically, UBI sounds perfect. I mean, who wouldn't want an extra \$1,000 in their pocket each month? Declaring support of UBI provides good publicity for politicians from millennials. But the underlying risks of this program far outweigh the benefits it could create. I would like to reiterate that increases in government spending would inevitably ensue after the implementation of UBI. Existing targeted social welfare such as food stamps are by no means without their flaws, but they sufficiently achieve what UBI is trying to do.

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UBI: A Future Tool for Economic Growth



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The controversial subject of Universal Basic Income (UBI) or the guaranteed income model is gathering momentum as a tool to promote greater socioeconomic equality and reduce potentially higher unemployment due to increased automation in the future. Supporters of UBI argue that providing basic income to those in need will reduce poverty and wealth inequality by redistributing income from the rich to the poor (Rouse 2017). Critics, however, challenge the very notion of giving away “free money,” the fiscal feasibility of UBI, and its potential ripple effects. They argue that UBI could lead to social unrest, reduced incentive to work, and, eventually, poor economic growth (Rouse 2017).

By providing the poorest Americans more money to spend on goods and services, UBI has the potential to increase aggregate demand. An extra \$1000 per month could significantly help the unemployed or individuals with low income, thus increasing consumption of necessity goods and possibly improving living standards, which could ward off economic doldrums. But while these benefits are convincing, they are largely theoretical. In reality, the degree of change in consumption is highly dependent on consumer preferences. Consumption and economic growth may not change significantly if consumers decide to save the extra money rather than spend it.

Government spending will soar as the government attempts to provide basic income to the country’s citizens. To implement UBI, the government may have to compromise fiscally, reducing

spending in other areas like infrastructure maintenance, and such a compromise could impede the country’s growth. The government would thus need to rely on taxing the rich to fill their treasury (Greenstein 2017). Undoubtedly, an unprecedented increase in taxation is likely to cause tax evasion and social unrest at some point. Hence, rather than entirely depending on tax increases to fund UBI, the government could consider removing existing inefficient welfare and social schemes and instead divert the available funds towards a single UBI model. Another idea to avoid funding issues would be for the government to provide UBI as an interest-free loan for a fixed time period (Greenstein 2017). While alleviating a budget crunch, this could kindle entrepreneurial spirit among recipients, thus incentivizing work and eventually improving quality of life.

Given the potential ramifications, any significant policy initiative like UBI needs to be piloted in smaller areas before being applied to large countries such as the US. In India, the state of Madhya Pradesh successfully implemented UBI in rural areas, leading to improved economic activity, higher enrollment in schools, improved nutrition, and lower illness rates (Unconditional Basic Income: Two Pilots In Madhya Pradesh 2017). Canada, Finland, and Brazil are also experimenting with UBI (“Universal Basic Income: UBI Pilot Programs Around The World” 2017). Ultimately, the implementation and success of UBI in each country depends on circumstances unique to them.

Overall, UBI is indeed a significant concept worthy of continued focus and

evaluation. If implemented properly along with other sound economic policies, it could certainly result in improved quality of life among its recipients.

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A Universally Bad Idea

The past few decades have seen amazing improvements in technology. For some, this progress is alarming. Many have lost their jobs to robots and others fear future job loss to driverless cars. These changes have many scrambling for solutions to the loss of income that could accompany a fully automated economy. One of the proposed solutions is a universal basic income (UBI). While a UBI sounds good, implementing one before the economy is fully automated would likely be problematic.

Most conceptions of a UBI propose that everyone receive some type of lump sum payment that would cover basic needs. The idea is not a new one. Thomas Paine argued for a kind of UBI in the 1700s, and Milton Friedman argued for a negative income tax in the 1960's and 70's that would replace all other welfare and social insurance programs. More recently, Finland has begun to give a random sample of citizens €560 a month, and Alaska residents receive up to \$1,000 a year in oil dividends just for being an Alaskan resident.

In the spirit of Friedman's proposal, libertarian thinker, Charles Murray, has recently proposed doing away with all social welfare programs in favor of a \$13,000 a year UBI. Murray claims that his proposal would be revenue neutral as there would be no change in government spending. Setting aside the political impossibility of abolishing existing social programs, a revenue neutral UBI would be the most fiscally feasible. If such a UBI were

implemented before the labor market became fully automated, Americans would have a chance to adjust while there is still flexibility. However, it would likely not work out as well as many would anticipate.

With a slight boost to disposable income, consumption spending would increase in proportion to society's marginal propensity to consume. Through the money multiplier process, consumption driven increases in planned expenditure would lead to increases in production. Increased production means higher demand for labor, lower unemployment, and rising wages. Increased production also means higher demand for inputs, rising prices on inputs, and rising prices of finished goods and services. This means a rise in inflation. To cool the economy and bring inflation back to target, the Fed would raise interest rates, leading to lower production via the money multiplier process and rising unemployment. This process would repeat until inflation was under control and unemployment was back to its natural rate. In terms of employment, it would be as though the UBI never happened. The only lasting change would be an increase in the price level.

If the economy ever becomes fully automated, a UBI may be necessary. Until then, however, federal dollars would be better spent targeting assistance to those most in need.

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SANCTIONING RUSSIA: A FORECASTING MODEL OF ECONOMIC EFFECTS UNDER ALTERNATIVE OIL PRICE SCENARIOS

BY: Forrest Daugherty (Princeton University)





Sanctioning Russia:
A Forecasting Model of Economic Effects
Under Alternative Oil Price Scenarios

by

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Advisor: Silvia Weyerbrock

Submitted to Princeton University

Department of Economics

In Partial Fulfillment of the Requirements for the A.B. Degree



Pledge

This thesis represents my own work in accordance with University regulations.



Abstract

In 2014, Russia annexed the Crimean Peninsula and interfered in the Eastern Ukraine. Western nations were outraged and levied sanctions in response. This paper estimates the impact of Western sanctions on Russia's economy under various oil price scenarios. Using VAR techniques, I develop forecasting models for Russia's ruble and its macroeconomy through Q3 2019. Forecast results demonstrate the ruble's dependence on oil prices but indicate that sanctions against Russia weaken the ruble. Moreover, sanctions negatively impact Russia's macroeconomy. Their removal affects whether Russian GDP returns to positive trend growth or remains in stagnation.

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1 Introduction

Since the first naval blockades interrupted commercial trade, economic sanctions have remained a staple policy tool of international politics. While the goal of encouraging change in policy remains the same, the methods are more nuanced and sophisticated. Nations routinely use sanctions to address objectionable actions and practices by foreign states, entities, or persons (Davis, 2003, p. 190). Sanctions now come in many forms. The most focused sanctions target individuals. Others are broad in their reach and target entire industries. Some chisel away at the income of a targeted nation by attacking its exports. Others restrict imports to limit access to goods and technologies (Davis, 2003, p. 190). More recently, sanctions have targeted “international financial flows” to restrict access to capital and reduce financial foreign aid (Davis, 2003, p. 191). This paper uses vector autoregressive techniques to quantify the economic impact of recent Western sanctions on Russia’s ruble and its economy.

The two and a half decades following the collapse of the Soviet Union have been tumultuous for Russia. Several recessions have plagued the economy of the once-super power as it struggled to adjust to a new world order. The countries that once made up the Eastern Bloc have also been adjusting to an existence independent of the USSR. Some of these nations embraced their Western neighbors, while others sustained their tight bond with Mother Russia. With sporadic inclusion efforts coming from the West and nearly all of its energy and trade flows coming from Russia, Ukraine is stuck between the two.

Today, Ukraine is deeply divided. The remnants of the Soviet system have festered. Public outrage over corruption and insufficient economic reform fueled the 2014 *Euromaidan* movement against Ukraine’s pro-Russian president. When Ukraine established a Western-leaning government, Russia cut off financial assistance and gas exports to Ukraine and then quickly annexed the resource-rich Crimean Peninsula (Dreger et al., 2016, p. 297). In a display of international objection to the annexation of Crimea, the European Union and United States levied the first sanctions against Russia in March 2014. Australia, Canada, and Japan quickly followed suit. Albania, Montenegro, Iceland, and Norway levied sanctions in early April as the EU and US imposed even more sanctions (see Table 11 in the Appendix for a description of each of these sanctions).

As the conflict developed, efforts for peace were threatened, the level of Russian involvement became more apparent, and more waves of sanctions were imposed. Most sanctions banned particular Russians and Crimeans from traveling, while others froze internationally-held assets. Later on, sanctions targeted entire sectors, prohibiting the import and export of certain goods and technologies. In response, Russia banned food imports from Western countries that had imposed these sanctions (see Table 10 in the Appendix for a description of these retaliatory sanctions). So far, Western sanctions have not triggered any policy change. Russia still occupies the Crimean Peninsula and supports



the separatists fighting in Eastern Ukraine (Olearchyk, 2017).

I use detailed indices capturing the strength of these sanctions to forecast their economic impact on Russia's economy and ruble. I build daily indices representing the strength of sanctions levied against Russia, those Russia imposed in response, and a measure of sanction-specific market bias introduced by the media. I estimate long-run cointegrating relationships between the ruble-dollar exchange rate, the overnight ruble interest rate, the Brent oil price, and Western sanctions. I then forecast Russia's ruble in several scenarios to estimate the ruble's response to fluctuations in oil prices and to the removal or continued implementation of Western sanctions.

By converting the daily indices for Western sanctions, Russia's retaliatory sanctions, and media bias into quarterly measures, I more accurately model the impact of sanctions on Russia's macroeconomy than recent economic work. Instead of a dummy variable bluntly entering the system of equations, individual sanctions, or sanctions levied by particular nations can be removed from or included in the index to parse out their particular economic impact. Using data through Q3 2016, the results are timely and contribute to the ongoing discussion regarding these sanctions. I forecast Russian GDP in scenarios adjusting oil prices and the level of sanctions against Russia. Forecast results suggest that Western sanctions depreciate the ruble and depress the Russian economy. The removal of all sanctions frees up Russia's economy to recover and return to its growth trend.

In this thesis I describe the creation of these indices and the data and methodology used to build forecasting models for Russia's ruble and macroeconomy. I demonstrate the impact of sanctions through six forecasting scenarios. Finally, I conclude with the results of these forecasting scenarios and recommend directions for future research.



2 Literature Review

There is a vast body of sanctions literature and research. Hufbauer et al. (2007) provide an in-depth and comprehensive study of sanctions regimes worldwide through the early 21st century. Drezner (1999) develops a game theoretic explanation for understanding the intuition and decision-making behind sanctions episodes. While there are many broad studies of sanctions regimes, the works most applicable to the study of Russia consider the economic effects of sanctions on oil-dependent nations. Torbat (2005) focuses on anti-Iranian sanctions and Yahia and Saleh (2008) analyze the oil price in conjunction with economic sanctions. Yahia and Saleh's (2008) study is most similar to recent literature regarding the Russian economy. Dreger et al. (2016) reveal the effect of the oil price and sanctions on the Russian ruble and Tuzova and Qayum (2015) focus on their impact on larger macroeconomic indicators.

Hufbauer et al. (2007) develop a basic framework for understanding sanction regimes. Hufbauer et al. (2007) divide sanctions into three categories: those that limit exports, restrict imports, or impede financial flows (p. 44). The authors note that financial sanctions have gained popularity; they are easier to enforce and often have far-reaching effects due to international reliance on financial markets (Hufbauer et al., 2007, p. 46). Hufbauer et al. contend that the success of sanctions should be measured in two ways: "the extent to which the policy *result* sought by the sender country was in fact achieved and the *contribution* to success made by sanctions." (p. 49)

Hufbauer et al.'s (2007) discussion of imposition motives is particularly relevant to the contemporary regime targeting Russia. They note that of 19 worldwide sanctions episodes that were designed to disrupt military action, 15 sanctions regimes failed while only 4 succeeded (Hufbauer et al., 2007, p. 68). They also show that in 80% of sanctions episodes, the sender's GNP was more than ten times greater than the target's GNP (Hufbauer et al., 2007, p. 89). Sanctions are not free. Incurring economic costs on a targeted nation entails costs to the imposing nation; cutting off the exports to a targeted nation will hurt the domestic firms that supply those exports (Davis, 2003, p. 191). Accordingly, countries imposing sanctions tend to be "larger and more economically and militarily powerful" than the countries they target (Davis, 2003, p. 191). Usually, these costs are greater relative to the target nation than the imposing nation given a power imbalance between the two (Davis, 2003, p. 191). However, Russia is not weak or tiny. These facts suggest that we should not expect any policy concessions from the Russian government and that the economic impact of Western sanctions might not be as potent as in other cases. I utilize Hufbauer et al.'s (2007) terminology and base my results in their findings.

Drezner (1999) uses a game theoretic approach to understand sanctions. He uses the terms *sender* and *target* to refer to the nations imposing sanctions and those being sanctioned, respectively (Drezner, 1999, p. 2). His model takes into account the variety of factors affecting sanction-based



decisions. Imposing sanctions incurs a cost to both sender and target. Since senders tend to be larger, more economically powerful nations, this cost is more sustainable for the sender than the target. Moreover, a target's concession to a sender's demands implies another cost: "the redistribution of political assets between the target and sender" (Drezner, 1999, p. 4). This redistribution matters to the target if they believe it might harm their "bargaining position in the future" (Drezner, 1999, p. 4). In other words, if they concede now, what will they have to give up next time? In this, Drezner (1999) reveals the sanctions paradox. Expectation of future conflict makes senders more likely to levy sanctions, but also makes the target less willing to concede. Sanctions, then, are most likely to be used when they are least likely to be effective (Drezner, 1999, p. 4).

Drezner (1999) also identifies relevant factors that work against sanctions' success. They may be imposed erratically and target countries may not feel their effects at all—or, they will find a way to substitute their way around the sanctions. Additionally, target nations can spin the story behind sanctions to work in their favor and create a "rally-around-the-flag" effect (Drezner, 1999, p. 12). He also notes that for sanctions to be successful, the target nation's elites "must suffer as much" as their wider populations (Drezner, 1999, p. 13). I draw on Drezner's (1999) terminology and use his framework to understand the anti-Russian sanction regime.

Few studies have focused on the imposition of sanctions against oil-dependent nations. Torbat (2005) presents a broad study of sanctions on Iran. Sanctions were originally imposed in 1979 under the Carter administration and have remained in place in a variety of forms (Torbat, 2005, p. 407). Sanctions followed the beginning of a drawn-out hostage crisis. Later, they were intensified as Iran began pursuing the development of nuclear, biological, and chemical weapons. Despite the general trend of multilateral sanctions, US allies have not always joined the US in imposing sanctions and the potential impact of sanctions was often limited (Torbat, 2005, p. 409). US sanctions have taken the form of oil, aviation technology and dual-use military good embargoes, prohibition of aid and military assistance, asset freezes, penalties for foreign corporations conducting FDI, and financial market restrictions (Torbat, 2005, p. 410).

Torbat (2005) concludes that of all the sanctions imposed, the most effective create a poor investment climate by generating excess charges for the Iranian market and increasing interest charges on debt (p. 421). Despite the significant economic costs sanctions have caused to the Iranian government, no policy or regime changes have followed (Torbat, 2005, p. 429). Ultimately, Torbat (2005) argues, that due to the potential for greater, unavoidable economic impact, policy makers should favor financial sanctions (p. 432).

Yahia and Saleh (2008) conducted an empirical study of the impact of the oil price and sanctions on the Libyan economy and employment rate (Yahia & Saleh, 2008, p. 1713). Similar to Iran, Libya has been the target of sanctions since the early 1970s and sanctions have been in place for decades. Yahia and Saleh (2008) use logarithmic data from 1970 through 2005 for Libyan employment, the oil price, and a dummy variable for economic sanctions. The dummy variable takes on



a value of 1 from 1990 through 2003, when UN sanctions were lifted following Libyan cooperation with UN directives. They analyze the entire period, as well as nearly-decade-long periods typified by similar trends in the oil price (Yahia & Saleh, 2008, p. 1715). Yahia and Saleh (2008) confirm that the oil price played a significant role in determining employment levels (p. 1717). They also confirm that economic sanctions negatively impact the Libyan labor market by pushing out skilled non-Libyan workers (Yahia & Saleh, 2008, p. 1717). They recognized that sanctions were only a piece of the equation for oil-dependent nations like Libya. Although Yahia and Saleh (2008) focus solely on employment, they were one of the first to include oil price and a measure of economic sanctions within one model. Their work informs Dreger et al. (2016).

Few economists have analyzed the impact of recent sanctions on the Russian Federation. Dreger et al. (2016) develops a vector autoregressive model to quantify the impact of both sanctions and fluctuating oil prices on Russia's ruble. They use daily data from January 1, 2014 through March 31, 2015 for the Brent oil price, a sanctions index, a media index, the Ruble OverNight Index Average (RUONIA), and nominal exchange rates (RUB/USD and RUB/EUR) (Dreger et al., 2016, p. 300). Dreger et al. (2016) build an index of sanctions that functions as a stock variable representing the cumulative strength of sanctions imposed. They organize each sanction by date and assign a weight to each entry following Hufbauer et al.'s (2007) taxonomy of sanctions. This taxonomy designates each sanction as belonging to one of three groups: those imposed against individuals, against entities, and against entire industries. These are weighted 1, 2, or 3, respectively and then multiplied by the imposing nation's trade share with Russia (Dreger et al., 2016, p. 301). Following these principles, Dreger et al. (2016) build an index for Russia's retaliatory sanctions (p. 302).

Dreger et al. (2016) construct a similar index representing media excitement regarding Russian-specific sanctions. They search main news outlets of Western nations for the terms "Russia" and "sanctions" and compile, scale, and aggregate these measurements to build another stock variable (Dreger et al., 2016, p. 303). They contend that this media index represents opinions about "already materialized" sanctions and expectations about future sanctions (Dreger et al., 2016, p. 304). Dreger et al. (2016) then use all three indices to measure how well the media predicts the levying of sanctions. They regress the media index on the leads of the two sanctions indices and use the regression residuals to quantify the error, or bias, introduced by the media's predictions: the "unexpected component of sanctions" (Dreger et al., 2016, p. 304).

Together with the sanctions indices, these measures present a much more detailed study of sanctions' role in daily exchange rate fluctuations. Findings of Dreger et al. (2016) confirm the ruble's sensitivity to international oil prices. They find that while shocks to the price of Brent crude and the RUONIA rate will generate a shock that will still be visible in 45 trading days, the ruble is generally resilient to sanctions. However, they find that should sanctions be different than expected, they will introduce additional volatility into the system, affecting both international commodity prices and the ruble. I build sanctions and media indices following Dreger et al.'s (2016) guidelines.



These permit deeper analysis than dummy variables. Next, I follow their methodology in estimating cointegrating vectors. However, I use data through September 30, 2016 and forecast medium-run scenarios to assess the potential lasting impact of sanctions.

Dreger et al. (2016) base their media index in the foundations established by a number of other economists. Doms and Morin (2004) build on The Economist's daily "R-Word" indicator that counts the number of appearances of "recession" in *The Washington Post*. Using a variety of key-words, including "recession," "economic slowdown," "layoff," and "job cuts," they create a number of news indices to measure consumer sentiment. They find that these news indices have a significant explanatory role in consumers' decisions and, at times, may even drive consumer tendencies away from what economic fundamentals might suggest (Doms & Morin, 2004, p. 1).

Similarly, Dominguez and Panthaki (2006) find that news releases regarding economic fundamentals and non-fundamental news have a significant impact on exchange rate returns and volatility (p. 168). They conclude that models of exchange rate determination should include some measure of these news variables (Dominguez & Panthaki, 2006, p. 168). Following Dreger et al.'s (2016) guidelines, I construct a media index and incorporate it into my model.

Rautava (2013) uses VAR techniques to model and forecast recession periods in the Russian economy. Using quarterly data for GDP, imports, the real-effective exchange rate, the price of Urals crude oil, and a measure of excess uncertainty from 1995 through 2013, he estimates long-run cointegrating equations following his established methodology and incorporates these into a short-run forecasting model (Rautava, 2013, p. 78). He imposes specific restrictions on this VEC model to create a structural vector-error correction model (SVEC). His excess uncertainty variable is the square of the first difference of a nominal ruble basket and reflects shocks in private sector uncertainty (Rautava, 2013, p. 79).

Using this SVEC model, he forecasts 3 scenarios: (1) holding oil prices flat, (2) instigating a collapse in the oil price, and (3) instigating a collapse in the oil price simultaneous with a positive shock in excess uncertainty. He finds that, despite Russia's known dependence on energy prices, a massive shock to the oil price alone will not generate a recession of the same magnitude as that of 2008-2009, when Russia's GDP retracted by more than any other nation. Instead, a jolt of market uncertainty must simultaneously occur (Rautava, 2013, p. 86). Rautava's cointegration vectors provide a measure of trend growth in the Russian economy and the long-run impact of the oil price and imports on GDP. His proven SVEC model is foundational in my macroeconomic model for the Russian economy. I follow Rautava's (2013) methodology for estimating long-run cointegrating relationships among macroeconomic variables, building a SVEC model, and for reducing short-run forecasting models.

Using Rautava's (2013) methodology, within Daugherty (2016), I develop a similar forecasting model for the Russian economy given oil price scenarios and measures of excess uncertainty. This model does not concern sanctions. Where Rautava (2013) uses only an index based on



the ruble's exchange rate to measure uncertainty, I add a Russia-specific economic policy-based index into the VAR and SVEC analysis. The index measures the appearances of specific terms in the Russian newspaper *Kommersant*. Terms include the Russian equivalents of the words “policy”, “tax”, “spending”, “regulation”, “central bank”, “budget”, and terms relating to political institutions like the Duma (Baker et al., 1995-2015). I find that this index provides a statistically significant and diverse measure of the uncertainty present in the economy. In conjunction with a negative shock in the oil price, positive spikes in the ruble-based uncertainty index and the economic policy uncertainty index generate a contraction in Russian GDP as deep as that of the 2008-2009 global financial crisis (Daugherty, 2016, p. 24).

Tuzova and Qayum (2015) build a vector autoregressive model to analyze and forecast the effect of the oil price and Western sanctions on real GDP, the real effective exchange rate, inflation, real fiscal expenditures, real consumption expenditures, and external trade (p. 140). They use quarterly data from 1999 through Q1 2015 for the real macroeconomic indicators and a dummy variable as an indicator of Western sanctions. Their sanctions variable takes on a value of 1 after Q1 2014. They express all variables in real terms and model them as their first differences (Tuzova & Qayum, 2015, p. 143). They forecast three scenarios for the Russian economy, where sanctions are removed in 2016, 2017, and 2018.

They find that if sanctions were used through 2017, as indicated by the dummy variable, real GDP should fall annually by 21.74% in 2015, 16.32% in 2016, and 19.21% in 2017 (Tuzova & Qayum, 2015, p. 148). Should sanctions be removed at the end of 2016, the outlook for 2017 is much improved. They find that if sanctions were removed at the end of 2015, the Russian economy would actually experience growth of 4.33% in 2016 and 5.15% in 2017 rather than recession (Tuzova & Qayum, 2015, p. 148). Their results suggest that Western sanctions play a significant role in depressing the Russian economy.

Where Tuzova and Qayum (2015) use a dummy variable, I apply a trade-weighted index of sanctions. This allows the model to parse out the effect of sanctions more specifically and over time. Next, I apply Rautava's (2013) framework to Tuzova and Qayum's (2015) methodology in order to build a SVEC model before estimating forecasting scenarios. My findings corroborate the directionality of their findings, but do not predict such a harsh recession.

This thesis draws most heavily on the recent work by Dreger et al. (2016) and Tuzova and Qayum (2015). I work with more recent data and modify their modelling techniques. In the first part of the paper, I replicate Dreger et al.'s (2016) sanctions and media indices and use a similar model to build actual forecasting scenarios for the Russian ruble. Next, I add the sanctions index to a VAR model based on that of Tuzova and Qayum (2015) and incorporate SVEC techniques to create a more targeted macroeconomic model and forecasting scenarios.

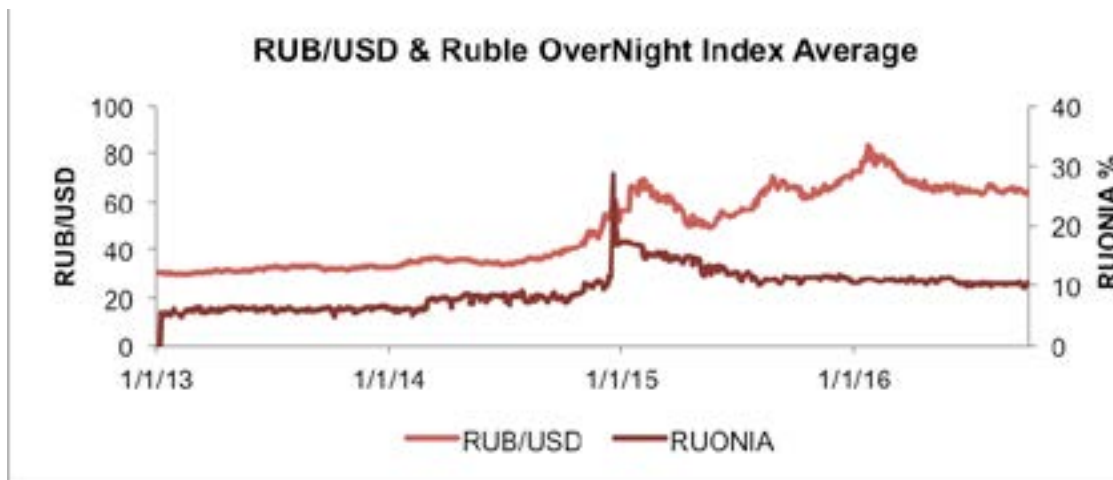


3 Data

I collect two separate sets of data for the models presented in this paper. To model and forecast Russia's ruble, I use daily data. To model and forecast Russian GDP and its components, I use quarterly data. I construct three indices that represent sanctions and measures of the news media. The sanction indices are the cumulative, trade-weighted strength of each sanction levied by or against Russia. I build these as daily series and then convert them into quarterly measures so they might be used in both models. In this section, I describe each component of these data sets in detail.

3.1 Ruble Model Data

Figure 1

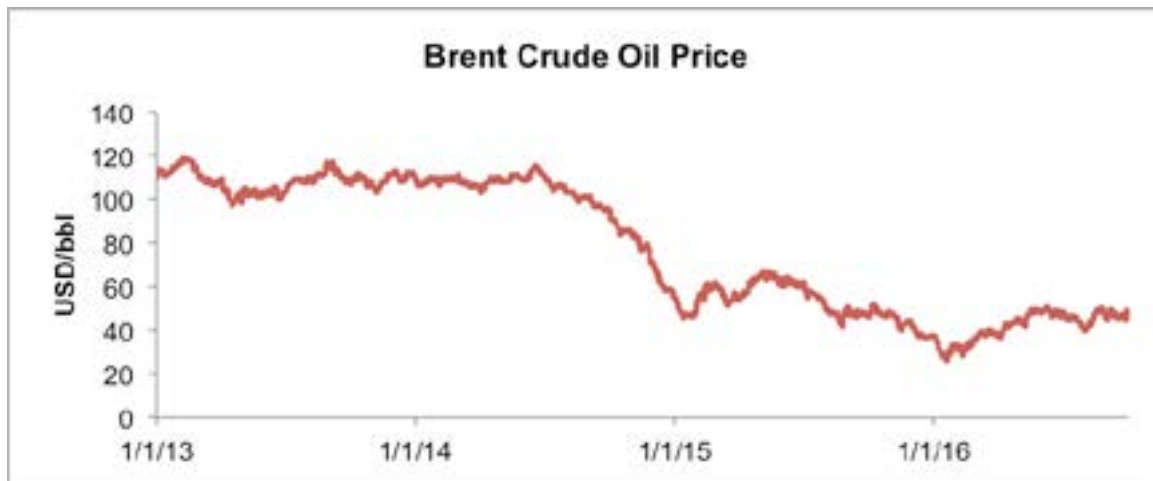


Source: Datastream International, Central Bank of the Russian Federation

In the ruble model, I use daily data from January 1, 2013 through September 30, 2016 for the RUB/USD exchange rate, the Brent oil price, and the interest rates for overnight loans in rubles (Ruble OverNight Index Average, RUONIA). I use Datastream International to retrieve daily data for the exchange rate and the oil price. The RUONIA rate is reported by the Central Bank of Russia. These series are shown in Figures 1 and 2. The estimation period includes the recent ruble crisis that began in mid-December 2015.



Figure 2



Source: Datastream International

Since 1999 the Central Bank of Russia has conducted monetary policy under a “managed floating exchange rate regime” (Central Bank of the Russian Federation, 2000-2017). The central bank has gradually decreased its influence. From October 2010 to November 2014, the Bank of Russia used a dual-currency basket based on 0.45 EUR and 0.55 USD (Central Bank of the Russian Federation, 2000-2017). Over this period, the acceptable “operational band” was slowly widened and in November the bank announced that they had moved to a free floating regime with intervention only to compensate for financial instability (Central Bank of the Russian Federation, 2000-2017). In 2014, the Central Bank had \$400bn in foreign exchange reserves. Half was considered “easily accessible” and some \$90bn was earmarked to specifically “cushion the blow” of a potential collapse in oil prices (Anderson, 2014).

In early 2013, at the start of the observation period, international oil prices swelled to over \$100/bbl. Economic optimism and dwindling supply stockpiles drove prices up. Simultaneously, some concern regarding political turmoil in Egypt pushed prices even further up (Hargreaves, 2013). As shown in Figure 2, oil prices declined gradually throughout 2014. Diminished demand, increasing production, and growing stockpiles initiated the decline (Sussman, 2014). By December 23, oil prices had declined for 89 days straight and continued downwards until bottoming out at \$48/bbl in early February 2015 (Isidore, 2014).

Significant lack of confidence in the Russian economy, compounded by falling oil prices, triggered a run on the ruble. The Bank of Russia had ample reserves to intervene, but was forced to raise its policy interest rate and spent \$10bn in December 2014 alone to support the ruble (Anderson, 2014). Note the lagged effect of the increase in the RUONIA rate in Figure 1. Despite the central bank’s proclamation regarding preparedness to intervene and raising interest rates, the ruble did not



begin to appreciate relative to the dollar until early February 2015.

3.2 Sanctions Indices

To create daily sanctions indices, I first record and date every sanction imposed by using news articles and legislation press releases. I use Dreger et al.'s (2016) methodology and the index, is composed according to the following formula:

$$S_t^r = \sum_{t=1}^t \sum_{i=1}^I \sum_{j=1}^J w_i^r w_j^r s_{tij}^r \#(1)$$

Where $r = \{\text{West, Russia}\}$; w_i is the weight of sanction i , described later in Equation 3; w_j is the average trade share of country j and is shown in Table 1 on the following page; and is an indicator function of individual sanction i by or to country j belonging to country group r defined as:

$$s_{tij}^r = \begin{cases} 1 & \text{if sanction } i \text{ is in action in period } t \\ 0 & \text{otherwise} \end{cases} \#(2)$$

The implications of trade-weighting the sanctions index are significant. Note the weights computed and reported in Table 1. I use data reported by the UN Comtrade database. Since the EU accounts for over 50% of Russian exports and imports, its sanctions carry the most weight in the index. Both Ukraine and the US each account for roughly 5% of Russia's trade. This index does not account for signaling effects of sender nations; US sanctions and Ukrainian sanctions carry nearly the same weight despite the difference in geopolitical power.



Table 1

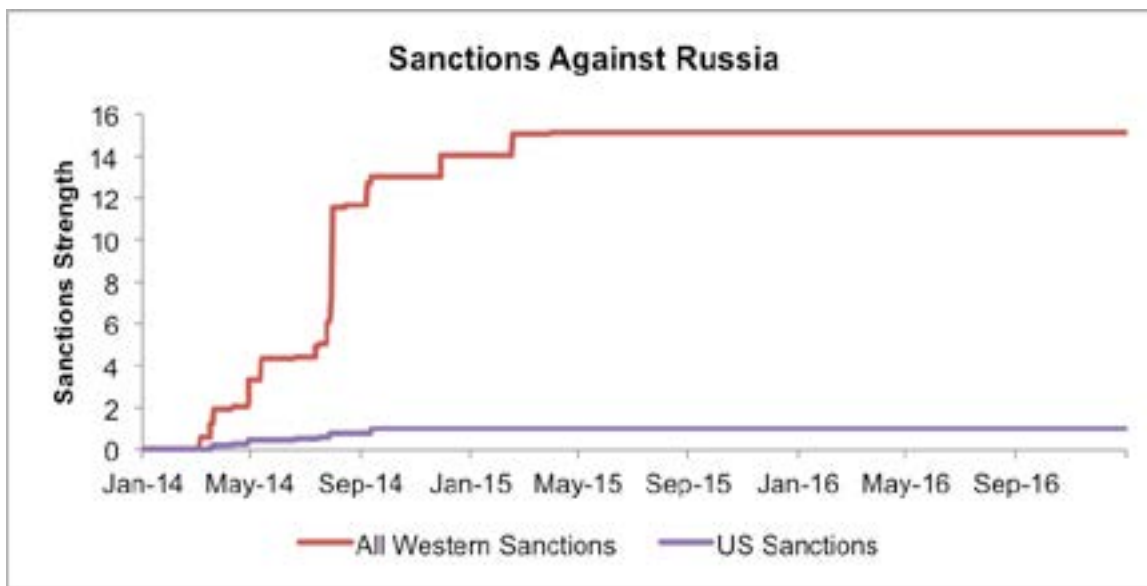
Russia's Average Trade Share (2009-2013)	
Country	Trade Share
EU	52.49%
Ukraine	5.23%
US	5.04%
Japan	3.65%
Switzerland	0.67%
Norway	0.41%
Canada	0.36%
Australia	0.19%
Iceland	0.02%
Albania	0.02%
Montenegro	0.00%

Source: United Nations Comtrade Database, Author's calculations

Sanctions vary in terms of targets and potential impact on the economy. Accordingly, Dreger et al. (2016) include three types of sanctions: 1) those directed against individuals; 2) those directed against specific entities; and 3) those directed against entire sectors of the economy (p. 301). I assign weights to each type of sanction following Dreger et al.'s (2016) weighting scheme based on the basic assumption that sanctions targeting individuals must have a weaker impact than sanctions targeting an entire economic sector. The resulting index depends heavily on the weighting scheme. The assigned weights are shown in Table 5 and correspond to the following scheme:

$$w_i^T = \begin{cases} 1 & \text{if against persons: blocking property or suspension of entry} \\ 2 & \text{if against entities: blocking property or suspension of entry} \\ 3 & \text{if against industries: restricted access to capital markets or exports} \end{cases} \quad \#(3)$$

Figure 3



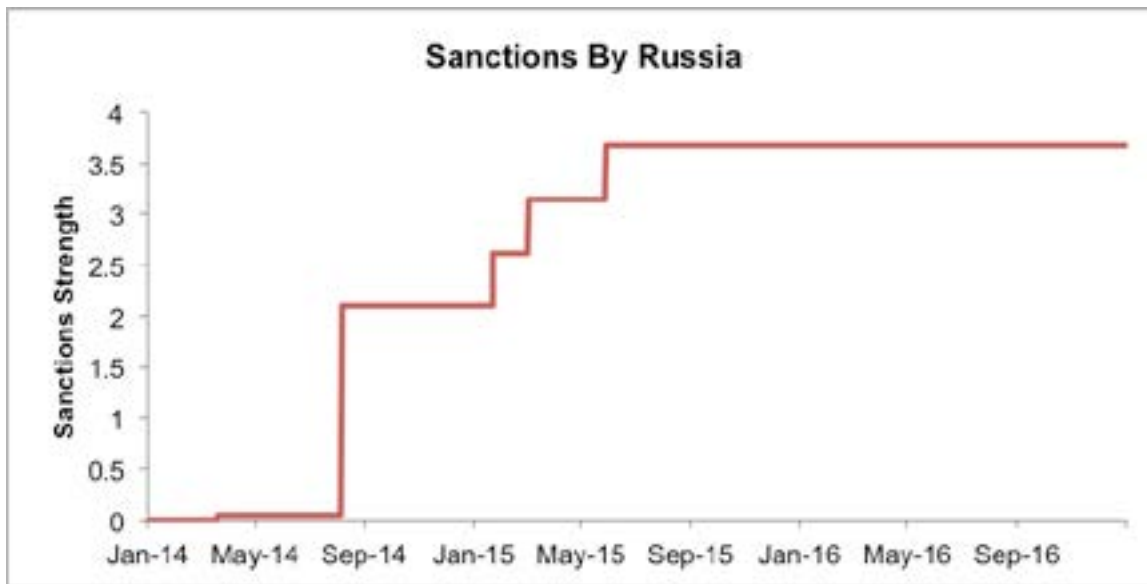
Source: Author's calculations

The resulting sanctions indices, and , are shown in Figures 3 and 4. Figure 3 shows the sum of all trade-weighted Western sanctions and those of the US in particular. Note the different scales on the vertical axes of Figures 3 and 4; the cumulative strength and number of Western sanctions is much greater than those levied by Russia against Western nations. The US was the first nation to impose sanctions following the Russian invasion of Crimea. The EU, Canada, Japan, and Australia followed suit a few days later. The US, EU, Canada, and Australia have tended to apply sanctions in close succession to one another. Ukraine, Switzerland, Albania, Iceland, and Montenegro have also levied sanctions. In Figure 3, the smaller steps represent the quick, successive implication of these follow-on sanctions.

The jump in sanctions in August 2014 reflects the sanctions levied immediately after the crash of Malaysian Airlines Flight 17. Russia retaliated to these Western sanctions in August 2014 by banning food imports from the nations that had levied sanctions against them. Figure 4 shows this significant jump in sanctions strength. Since then, Russia has sanctioned certain EU member politicians and officials. The increasing steps in sanctions strength in mid-2015 evidence these sanctions.



Figure 4



Source: Author's calculations

3.3 Media Index

To capture expectations regarding sanctions, I build a media index according to Dreger et al.'s (2016) algorithm (p. 303). The index is based on the daily occurrences in significant publications of the key words "Russia" and "sanctions" in the United States, United Kingdom, Spain, France, Italy, Germany, and Russia. For the most part, these publications have a large subscription base and are some of the most notable in the respective nation. As I use *LexisNexis*' academic search features, I am limited to those publications within its database. Optimally, I would have included Germany's *Süddeutsche Zeitung* and *Frankfurter Allgemeine Zeitung*, but did not have access to these publications. Instead, I use a composite of significant regional newspapers. The keywords and each publication are reported in Table 2:

Table 2

Media and Search Words		
Country	Publications:	Search words:
United States	New York Times, Wall Street Journal	Russia, sanctions
United Kingdom	Financial Times, Times of London	Russia, sanctions
Spain	ABC, País	Rusia, sanciones
France	Le Figaro, Le Monde, Les Echos	Russie, sanctions
Italy	La Stampa, La Nazione, Corriere Della Sera	Russia, sanzioni
Germany	Rheinische Post, Sudwest Presse, Die Welt, Die Zeit	Russland, sanktionen
Russia	Kommersant, Novaya Gazeta, Rossiyskaya Gazeta	Rossiia, sankcii

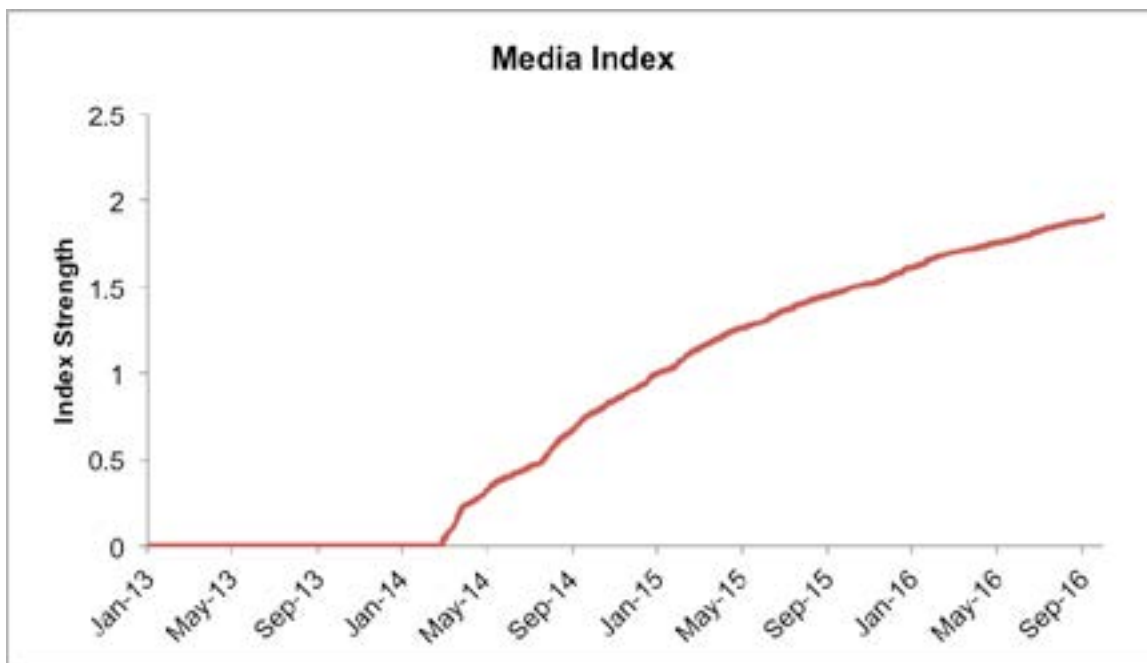


I search each publication for articles mentioning the keywords in each native language, shown in Table 2 from January 1, 2014 through September 30, 2016. The results are compiled and sorted in order to count the number of articles released per day. Next, I follow these steps to build the cumulative index shown in Figure 5:

1. Occurrences are aggregated by day at the national level.
2. I scale each national index by dividing by the total number of occurrences in 2014 so each daily value is relative to a baseline level of media excitement.
3. I compile these indices by averaging the country specific indices.
4. The index is set to zero for the period 1/1/13 until 2/26/14 to eliminate general sanctions chatter prior to the Ukraine Crisis.

Shown in Figure 5, the media index represents media excitement specific to the Ukraine crisis. Note that the index is set to zero until the beginning of the crisis in late February 2014. The index initially increases rapidly, but this growth tapers over the following year. This is likely due to the initial frenzy of media coverage following the Russian invasion of the Crimea and then tapering of media excitement as the novelty of the invasion and sanctions episodes wore off in the news cycle.

Figure 5



Source: Author's calculations

Dreger et al. (2016) note that without the full text of each of the article it is impossible to identify the context and angle of each data point (p. 304). In order to estimate potential bias intro-



duced by the media into the ruble market, I regress the media index on the leads of the two sanctions indices. The regression framework is below:

$$C_t = \alpha + \sum_{\tau=1}^{L_1} \beta_{\tau} S_{t+\tau}^{West} + \sum_{\tau=1}^{L_2} \gamma_{\tau} S_{t+\tau}^{Russia} + u_t \# (4)$$

The composite media index, C_t , is regressed on leading values of the Western sanctions index, $S_{t+\tau}^{West}$, and on leading values of the Russian sanctions index, $S_{t+\tau}^{Russia}$. Here τ indicates the lead of the corresponding variable and L_1 and L_2 represent the maximum lead length used in the regression. If the media perfectly predicted sanctions episodes, the error term, u_t , would be nonexistent. However, this is not the case. These residuals represent the bias introduced by the media. Since currency markets interpret news information immediately, inaccurate information or irrational expectations fuels ruble market developments.

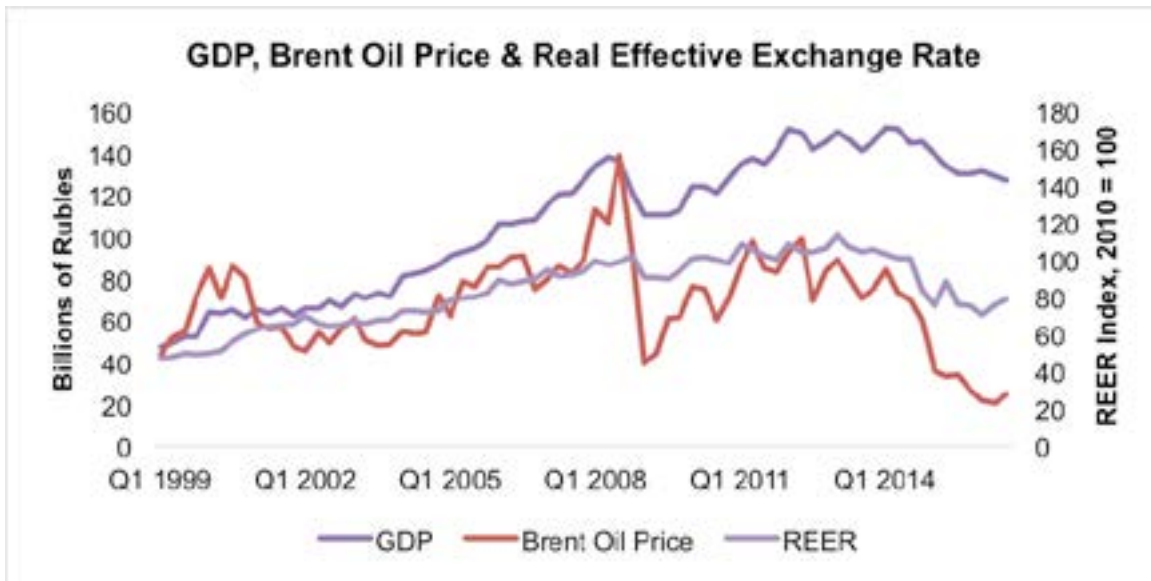
Table 3

Media Bias Estimation Results			
Variable	Coefficient	t-value	t-prob
<i>against_-1</i>	-0.0848677	-2.63	0.009
<i>against_-2</i>	0.0995905	3.12	0.002
<i>by_-1</i>	0.3555197	36.54	0
<i>Constant</i>	0.0461976	6.24	0

The coefficients for the regression of C_t are presented above in Table 3. The first and second leads of the Western sanctions index, *against_-1* and *against_-2*, and the second lead of the index representing sanctions levied by Russia, *by_-1*, are all significant. Note the large coefficient on the lead of the Russian sanctions index, implying strong expectations for retaliatory sanctions.

3.4 Macroeconomic Model Data

Figure 6



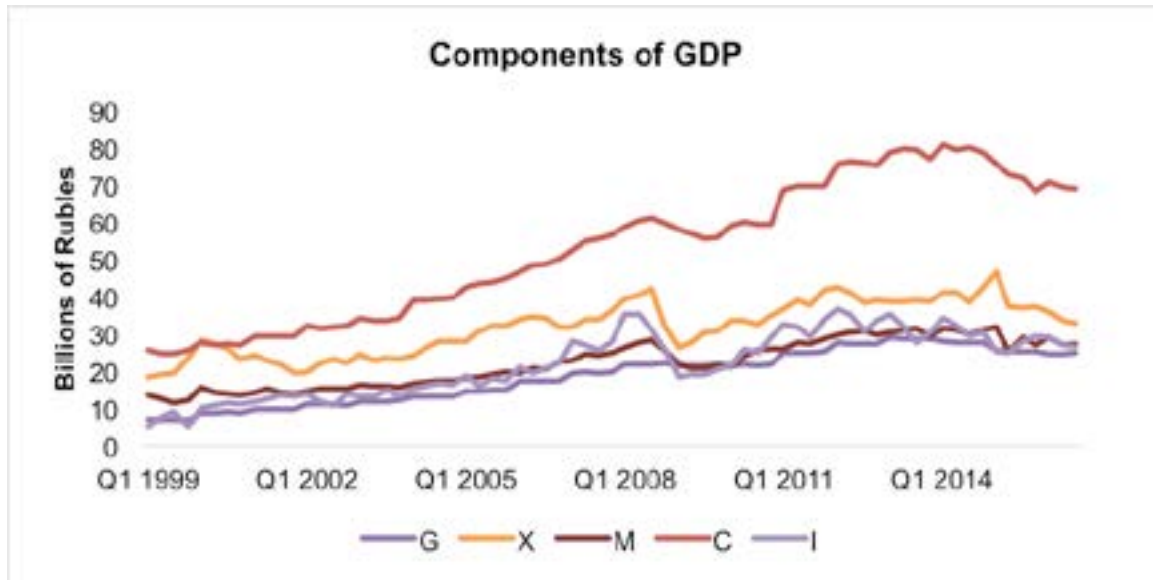
Source: Datastream International, Russian Federal State Statistics Service

For the macroeconomic model, I use quarterly data from Q1 1999 through Q3 2016. Using Datastream International, I obtain nominal, unadjusted data for Gross Domestic Product (GDP), Household Consumption (C), Investment (I), Exports (X), Imports (M), the Real Effective Exchange Rate of the ruble (REER), the Brent crude oil price, and Russia's Consumer Price Index (CPI). Russian-specific data is reported by Russia's Federal State Statistics Service, Rosstat. I deflate each variable using Russia's CPI to convert from nominal to real values. Next, each quarterly term is divided by the annual average and then readjusted by its respective quarter's historical proportion. The real, seasonally adjusted quarterly data for GDP, the Brent oil price, and the REER is shown in Figure 6. The REER and the Brent oil price are plotted on the secondary axis.

There appear to be significant trends running between these variables. The oil price collapses of 2008 and 2014 correspond with a weakening exchange rate and recessionary trends in the macroeconomy. Quarterly data for the components of GDP are shown below in Figure 7.



Figure 7



Source: Datastream International, Russian Federal State Statistics Service

While Tuzova and Qayum (2015) use the same macroeconomic variables and a simple dummy variable, with values 0 or 1, to capture the effect of sanctions on the Russian economy, I take the daily sanctions index created for the ruble model, , and convert it into a quarterly index. The macroeconomic model may then parse out the effects of imposing and removing specific sanctions. This also allows me to differentiate between removing all sanctions and only removing the sanctions imposed by the US.

4 Methodology

The analysis in this thesis is conducted in two separate portions. I model and forecast Russia's ruble and then GDP and its components. In general, I use vector autoregressive techniques. Since I use two separate data sets, one with quarterly observations and another with daily observations, I use different information criterion to determine lag length (Ivanov & Kilian, 2005, p. 30). Fortunately, my tests confirm the lag-order selection in Dreger et al. (2016) and Tuzova and Qayum (2015). For Russia's ruble, I start by estimating long-run cointegration vectors to check the directionality of the interactions among significant variables and to estimate the trends of their relationship. Next, I estimate a basic VAR model and then impose restrictions to reduce the system. In accordance with Dreger et al. (2016), I do not embed the cointegration vectors as error correction terms in modeling the ruble. The general formula of this VAR model with three lags is as follows:



$$y_{i,t} = \Gamma_1 y_{i,t-1} + \Gamma_2 y_{i,t-2} + \Gamma_3 y_{i,t-3} + \Pi_u y_n + \psi D_t + \epsilon_t \quad \#(5)$$

Equation 5 shows how the values of endogenous variables, $y_{i,t}$, depend on their own lagged values, the lagged values of other endogenous variables, where Γ contains each lag of the other endogenous variables, Π_u some predetermined and exogenous variables, and an error term, ϵ_t .

Similarly, in modeling Russia's macroeconomic environment, I begin by estimating cointegration vectors using data prior to the introduction of sanctions. While Tuzova and Qayum (2015) do not use cointegration techniques, I find that the variables are non-stationary and cointegrated of rank 3. Upon a first review of their model, the results suggest a drastic impact of sanctions. In order to incorporate the trends among variables and to build a better-specified model, I incorporate the cointegration vectors as error-correction terms in a short-run model using first-differences (a vector error-correction (VEC) model). Finally, I impose restrictions on the system to build a structural vector error-correction (SVEC) model. The generic structure of this model, used with one lag, is as follows:

$$\Delta y_{i,t} = \Pi_0 y_{i,t-1} + \Gamma_1 \Delta y_{i,t-1} + \Pi_u y_{n,t-1} + \psi D_t + \epsilon_t \quad \#(6)$$

Equation 6 shows how the first differences of the endogenous variables, $\Delta y_{i,t}$, depend on their own lagged values, the lagged values of other variables in the system, where Γ contains each coefficient for the other first-differenced variables, Π_u some exogenous variables, and an error term, ϵ_t . The matrix Π is the product of two matrices, α and β , such that $\Pi = \alpha\beta'$. The α matrix represents the speed-of-adjustment coefficients and the β matrix contains the long-run cointegration vectors established among the variables.

5 Long-Run Cointegration Analysis Results

I use cointegration techniques to estimate long-run trends between the variables in both the ruble system and the macroeconomic model. I use the PcGive module of OxMetrics for model formulation and estimation. I rely heavily on Rautava (2013) and Doornik and Hendry (2009). I follow their strategies closely. This section discusses the cointegration analysis performed for both systems.

5.1 Ruble Model Cointegration Analysis

Dreger et al. (2016) use a cointegrating VAR model of rank 1 with 3 lags to model the trending relationship between the ruble-dollar exchange rate, the Ruble Overnight Index Average (RUONIA), the price of Brent crude oil, and sanctions. Using Stata for preliminary analysis I find that the



lag order selection test, varsoc, confirms Dreger et al.'s (2016) selection of 3 lags according to the Akaike Information Criterion. The results are shown below in Table 4.

Table 4

Ruble Model Lag Selection Criteria								
Lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	-9551.39				4.86E-02	14.0035	14.0121	14.0264
1	10266.2	39635	36	0	1.3E-14	-14.9805	-14.9204	-14.82
2	11308.3	2084.2	36	0	2.90E-15	-16.4547	-16.343	-16.1564
3	12433.3	2250	36	0	5.8e-16*	-18.050*	-17.887*	-17.614*
4	12467.2	67.89*	36	0	5.90E-16	-18.0472	-17.8326	-17.4737

With data imported into OxMetrics, I convert RUB/USD rates and Brent oil prices to logarithmic form. The RUONIA rate is expressed as a percentage and weighted sanctions are real continuous numbers. I estimate a cointegrating VAR model with 3 lags. The PcGive module of OxMetrics reports the according and matrices. I normalize for the ruble rate in the matrix and then impose restrictions on the system according to Dreger et al.'s (2016) methodology. The resulting matrix is shown below, where *ruble* is the logarithm of the RUB/USD exchange rate, *oil* is the logarithm of the Brent crude oil price, *RUONIA* is the RUONIA rate as a percent, and *against* is the trade-weighted level of Western sanctions.

$$\beta = \begin{pmatrix} \text{ruble} \\ \text{oil} \\ \text{RUONIA} \\ \text{against} \end{pmatrix} \begin{pmatrix} 1.000 \\ -0.74199 \\ -1.0631 \\ 0.0065466 \end{pmatrix}$$

The vector in captures the following long-run cointegrating equation:

$$\text{ruble} = -1.0631\text{RUONIA} - 0.74199\text{oil} + 0.0065466\text{against} \#(7)$$

Equation 7 implies that a 10% increase in the price of Brent crude oil will result in a 7.4% appreciation of the ruble. The role of Western sanctions has a slight negative effect over the long run: a 10% increase in the level of trade-weighted sanctions against Russia will result in a ~0.7% depreciation of the ruble. The RUONIA's impact on the ruble is evident in in and demonstrates the central bank's power over the currency. A 10% increase in the overnight interbank lending rate should trigger appreciation of roughly 10.6%. Equation 7 echoes expectations regarding the relative impact of the international oil prices and sanctions on the ruble. Commodity prices clearly play a significant role in the ruble's volatility, but the negative effects of Western sanctions should not be underesti-



mated. Given the relationship implied above and the number of sanctions, the ruble should be actively undervalued while sanctions remain in place. Note that Dreger et al. (2016) assert that these long-run relationships are implicitly embedded in the short-run forecasting model. Accordingly, I do not incorporate the above cointegration vector into the forecasting model as an error-correction term.

5.2 Macroeconomic Model Cointegration Analysis

Table 5

Macroeconomic Model Lag Selection Criteria								
Lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	656.082				1.10E-17	-19.1666	-18.9843	-18.706
1	924.513	536.86	49	0	1.6e-20*	-25.7168	-24.897*	-23.644*
2	971.958	94.891	49	0	1.80E-20	-25.6704	-24.2121	-21.9849
3	1009.95	75.987	49	0	2.90E-20	-25.3419	-23.2455	-20.044
4	1085.18	150.5*	49	0	1.70E-20	-26.125*	-23.3904	-19.2146

Tuzova and Qayum (2015) use a basic VAR model with 1 lag. Their forecasting scenarios suggest that if sanctions remain in place, Russia's economy will enter a depression. They predict an annual GDP decline of roughly 20% for 2015 through 2017 (Tuzova & Qayum, 2015, 148). These estimates seem unreasonably large. To correct for this, I follow Rautava (2013). He estimates long-run cointegrating relationships and incorporates them as error-correction terms in a forecasting model. Using Stata for preliminary analysis, I find that the lag order selection test, varsoc, suggests 1 lag according to both the Schwarz Bayesian Information Criterion and the Hannan-Quinn Information Criterion. The output is shown in Table 5 on the preceding page.

Next, I use vecrank to check the cointegrating rank using Johansen tests for cointegration. I find that there are 3 cointegrating relationships. I proceed to estimate these long-run cointegrating relationships so they might be used as error-correction terms in the short-run forecasting model.

With data imported into OxMetrics, I add an unrestricted trend variable and convert all data into logarithmic form. Using OxMetrics' multiple-equation dynamic modeling function in PcGive, I estimate a cointegrating VAR model of rank 3 from Q2 1999 to Q4 2013. This sample period allows me to estimate long-run relationships prior to the introduction of sanctions so as not to confuse their impact on the economy with the effects of the other variables within the system. PcGive produces the according and matrices. I impose restrictions on the matrix to normalize for Gross Domestic Product (*gdp*), Imports (*M*), and Exports (*X*). I make the decision to normalize for these variables according to Rautava (2013) and trial and error. He normalizes for GDP and imports, whereas I estimate a system of rank 3 rather than rank 2. The third vector produced the most logical results when normalized and reduced for exports rather than other variables in the system. This may be due to the



prominence of the oil price in the system and in determining export levels.

I follow Rautava's (2013) methodology to reduce the system and check my findings for the GDP and imports equations against his results. The following is the resulting matrix:

$$\beta = \begin{pmatrix} gdp \\ M \\ X \\ reer \\ oil \\ trend \end{pmatrix} \begin{pmatrix} 1.0000 & 1.0972 & 0.0000 \\ 0.0000 & 1.0000 & 0.0000 \\ 0.0000 & 0.0000 & 1.0000 \\ 0.0000 & 0.081862 & -0.77381 \\ 0.88196 & 0.0000 & 0.19498 \\ 0.004098 & 0.0000 & 0.0000 \end{pmatrix}$$

The vectors in capture the following long-run cointegrating equations:

$$gdp = 0.88196oil + 0.04098trend \#(8)$$

$$M = 1.0972gdp + 0.081862reer \#(9)$$

$$X = 0.19498oil - 0.77381reer \#(10)$$

Equations 8 and 9 are similar to Rautava's (2013) findings regarding the long-run relationships between GDP, imports, and the real effective exchange rate of the ruble.

Over the long-term, a 10% increase in the oil price should induce an 8.8% increase in GDP. The *trend* term suggests that Russian trend growth for this period is roughly 1.6%. He finds annual trend growth to be 2% using data from Q1 1996 through Q4 2011 to estimate the cointegrating vectors (Rautava, 2013, p. 81). In extending analysis through Q3 2016, the recent recession enters into the data and lowers GDP trend estimates. Compared to Rautava (2013), I find that the oil price plays a more significant role over the long-run. It may be over-weighted in my model, but given the 2014 crash in prices and subsequent ruble crisis and recession, there may be reason to believe that *oil* should take on a greater coefficient than 0.2 in the long run.

Equation 9 suggests that increases in GDP and the real effective exchange rate both positively impact imports. A 10% increase in the real effective exchange rate should boost imports by 0.8% while the same increase in GDP will raise imports by 10.9%. These are conservative estimates relative to Rautava's (2013) findings. Their directionality, however, is consistent and supports economic intuition. Equation 10 estimates the long run equation for Russian exports and suggests dependence on oil price and the real effective exchange rate. A 10% increase in the oil price will boost exports by roughly 1.9% and the same increase in the real effective exchange rate will reduce exports by 7.7%. Similarly, the directionality is consistent with economic intuition.

Variability between these equations and Rautava's (2013) findings may be due to different estimation periods, estimating a larger model, use of the real instead of nominal oil price, or due to the

construction of our data sets. In compiling quarterly macroeconomic data, I was forced to combine a more recent data series, with adjusted measures from Q1 2011 through Q3 2016, with an older, discontinued set that ran from Q1 1999 through Q3 2015 to cover the full estimation period. Russia's Federal State Statistics Service has continually made revisions, so some values may differ between Rautava's (2013) data set and my own. In keeping with Tuzova and Qayum's (2015) methodology and to be able to compare results, I use real oil prices, corrected for Russian CPI-based inflation where Rautava (2013) uses the nominal oil price.

6 Forecasting Scenarios

Table 6

Forecasting Scenarios		
Scenario	Sanctions	Oil Price
1	All Maintained	Flat
2	All Maintained	Increasing
3	All Removed	Flat
4	All Removed	Increasing
5	US Removed	Flat
6	US Removed	Increasing

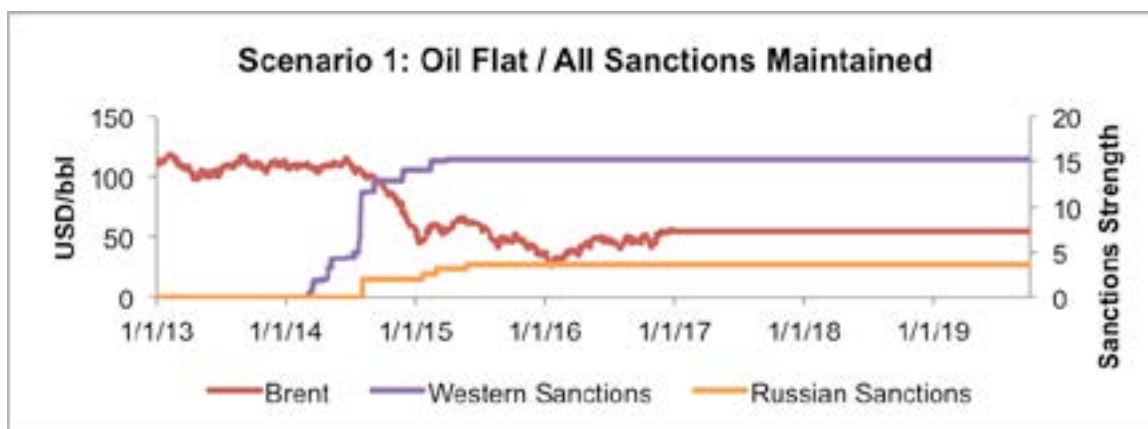
To estimate the future impact of sanctions and fluctuating oil prices on Russia's economy, I construct 6 scenarios, numbered and described in Table 6. Inputs for sanctions levels and oil prices vary in each scenario. Given recent political discussion regarding sanctions, the use of forecasting scenarios allows the model to estimate the potential economic consequences of maintaining or lifting sanctions. Since the sanctions index measures the cumulative strength of levied sanctions, particular sanctions, like those implemented by the US, may be removed and the rest of the world's sanctions left in place. As Russia's economy relies on international energy prices, the scenarios capture the effect of both stagnant energy prices and an energy boom. The forecasting period extends from the beginning of Q4 2016 through the end of Q3 2019. Since I create the scenarios using daily data, I average the values of the daily scenarios to generate corresponding quarterly scenarios through Q3 2019. I use the daily scenarios to forecast the ruble and their quarterly counterparts to forecast Russia's macroeconomy.

Brent crude oil hit \$55/bbl in mid-December 2016 following OPEC's supply cuts. I use actual data for the Brent oil price through late December 2016. In the flat oil price scenario, the nominal price of Brent crude oil is held at \$55.02/bbl from late December 2016 through Q3 2019. Given OPEC supply cuts and Wall Street estimates, I do not present scenarios where the oil price falls. Bullish Wall Street analysts estimate that oil prices may rise as high as \$80/bbl by the end of 2017

(Verhage, 2016). To present a bullish scenario for international oil prices, which should greatly benefit the Russian economy, I use actual prices through late December 2016 when oil hit \$55.02/bbl and then add ~\$0.12/bbl per day to boost Brent oil prices up to around \$95/bbl in early 2018 and sustain the growth until topping out around \$137/bbl in Q1 2019. This linear increase returns the nominal oil price to some of its absolute highest levels over the course of 2 years.

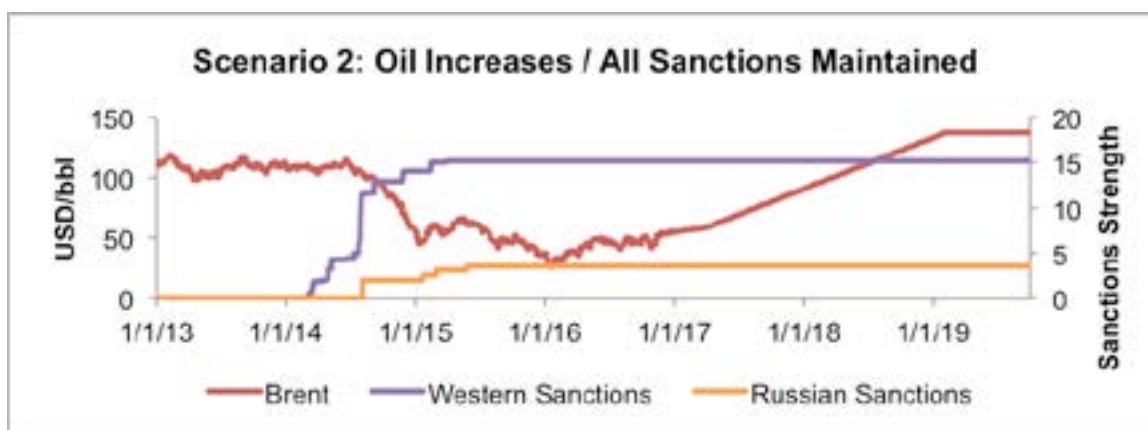
Since all variables in the macroeconomic model are expressed in real terms, I deflate the nominal oil price by the CPI-based inflation rate. This model does not consider CPI-based inflation forecasts, so I adjust the forecasted values of the nominal oil price given a flat, CPI-based inflation rate of 4%. This is the Central Bank of Russia's inflation target for 2017 and for the future over the "medium-run" (Central Bank of the Russian Federation, 2000-2017). Forecasting scenarios, with levels of nominal oil prices and sanctions are graphed and described over the following pages.

Figure 8



Source: Author's calculations

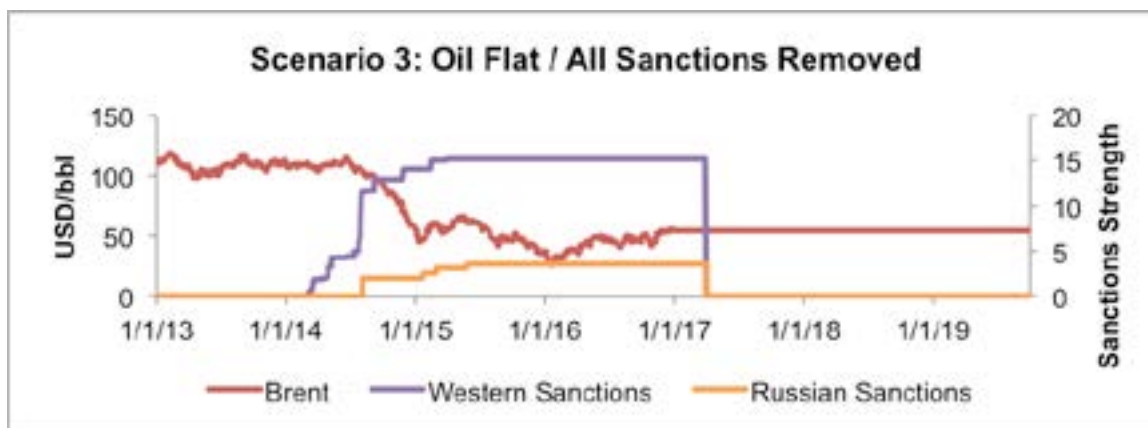
Figure 9



Source: Author's calculations

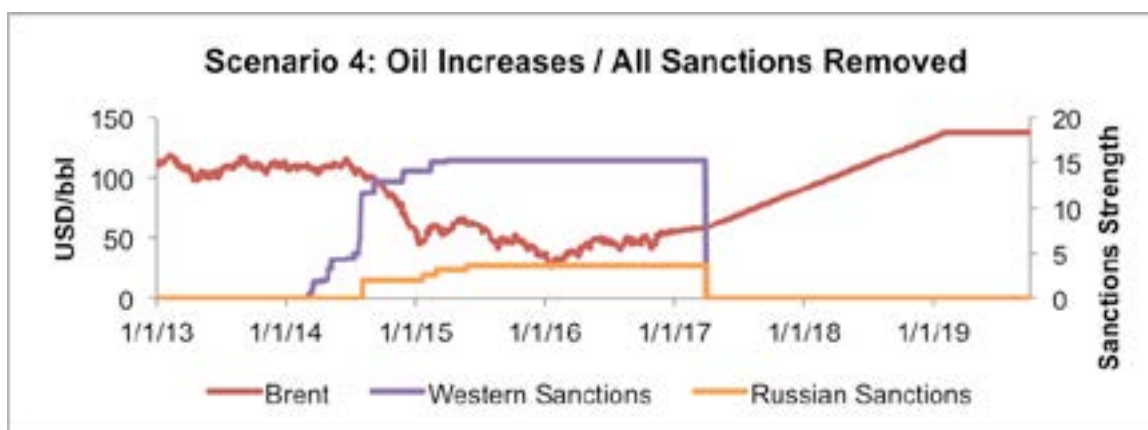
Scenarios 1 and 2 are shown in above in Figure 8 and Figure 9. In both of these scenarios, all nations maintain sanctions against Russia, and Russia keeps all of its retaliatory sanctions in place. The oil price remains at \$55.02/bbl in Scenario 1 and increases until Q1 2019 in Scenario 2. With a flat oil price and all nations maintaining sanctions, Scenario 1 should produce the most negative outlook for Russia's economy. Scenario 2 grants the Russian economy the benefit of an increasing oil price despite maintained Western sanctions.

Figure 10



Source: Author's calculations

Figure 11

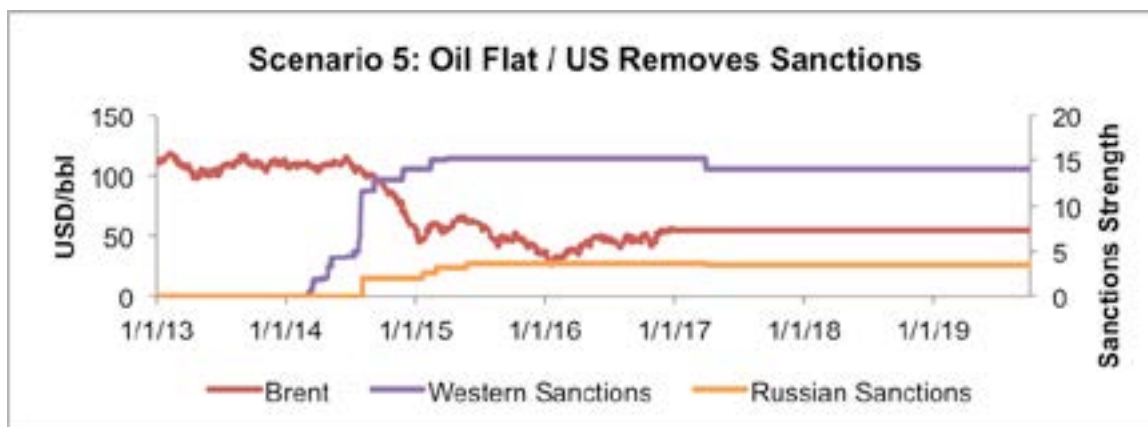


Source: Author's calculations

Scenarios 3 and 4 are shown in Figure 10 and Figure 11 above. In both of these scenarios all nations remove their sanctions against Russia at the end of Q1 2017. Russia responds accordingly by removing all of its retaliatory sanctions. Note the immediate reduction to zero of both sanctions indices. In Scenario 3, the oil price remains at \$55.02/bbl to purely estimate the future impact of lift-

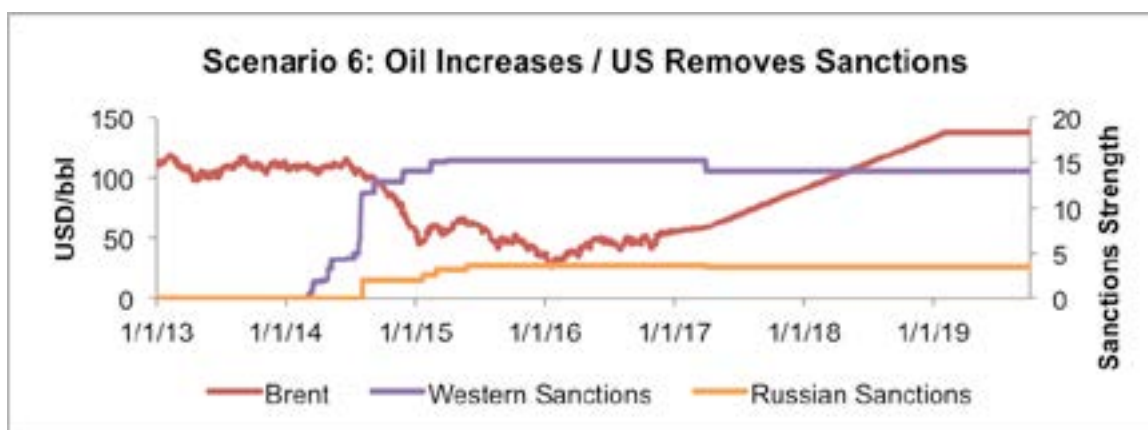
ing all sanctions. Scenario 4, in which the oil price increases and all sanctions are removed, should produce the most beneficial circumstances for the Russian economy.

Figure 12



Source: Author's calculations

Figure 13



Source: Author's calculations

As this paper seeks to evaluate the economic impact of the sanctions currently levied against Russia, I model scenarios where they are maintained through Q3 2019 and where they are removed at the end of Q1 2017. Donald Trump's election led to speculation that US sanctions against Russia might be removed. In Scenarios 5 and 6, shown above in Figures 12 and 13, the US lifts its sanctions, but all other nations maintain their sanctions against Russia. In response, Russia lifts the retaliatory sanctions it levied against the US, but leaves them in place against all the other nations maintaining sanctions.



7 Short-Run Forecasting Model Results

In this section I describe the results of both forecasting models for the ruble and Russia's macroeconomy. The ruble model is based on the VAR structure while I embed cointegration vectors into the macroeconomic model as error-correction terms. I present the models' structures and the steps taken to reduce them. Finally, I describe the significant findings of the six forecasting scenarios.

7.1 Ruble Model Forecasting Results

I estimate a basic VAR model with 3 lags where the ruble-dollar exchange rate and the RUONIA rate are endogenous, dependent variables and the Brent oil price, both sanctions variables, and their resulting media bias component are exogenous. I use daily data from January 1, 2013 through September 30, 2016 to estimate the initial model. Next, I reduce the model by eliminating unnecessary terms. The model results are shown in Table 7 on the following page.

The coefficients reveal the ruble's dependence on the oil price, RUONIA rate, and its own lagged values. The basic VAR model confirms the directionality of the oil price-ruble relationship: increasing oil prices will trigger an appreciation of the ruble. Note that while the coefficients of the lagged values of the oil price, *Lbrent_1* and *Lbrent_3*, have opposite signs, their net impact on the system is negative, implying that an increase in oil prices will trigger appreciation of the ruble. Similarly, the coefficients of the lagged values of the RUONIA rate, *ruonia_1* and *ruonia_3*, also have opposite signs and their net effect on the system indicates that increasing the RUONIA rate will also induce appreciation.

Table 7

Ruble Forecasting Model Results			
Equation for LRUBUSD			
Variable	Coefficient	t-value	t-prob
<i>Lrubusd_1</i>	0.911449	46.1	0
<i>Lrubusd_3</i>	0.0626125	3.23	0.0013
<i>ruonia_1</i>	0.135492	2.65	0.008
<i>ruonia_3</i>	-0.181394	-3.6	0.0003
<i>Lbrent_1</i>	-0.106927	-8.49	0
<i>Lbrent_3</i>	0.0857296	6.61	0
<i>against_3</i>	0.0010012	4.44	0
<i>by_1</i>	-0.00357476	-3.07	0.0022
<i>bias_1</i>	-0.00594207	-2.47	0.0136
<i>Constant</i>	0.192478	4.87	0
Equation for RUONIA Rate			
Variable	Coefficient	t-value	t-prob
<i>Lrubusd_2</i>	0.00501454	3.73	0.0002
<i>ruonia_1</i>	1.17917	45.2	0
<i>ruonia_2</i>	-0.229052	-8.84	0
<i>against_3</i>	0.000356812	4.81	0
<i>by</i>	-0.00170702	-4.42	0
<i>bias_3</i>	-0.00196394	-2.43	0.0154
<i>Constant</i>	-0.0144396	-3.23	0.0013

The sanctions terms, *against* and *by*, representing Western and Russian sanctions, respectively, are significant in the model. Western sanctions assume a positive coefficient, indicating that they weaken the ruble. Russia's retaliatory sanctions may compensate for this impact: note the negative value on the coefficient for the lagged retaliatory sanctions, *by_1*, implying that Russian sanctions trigger appreciation of the ruble. These findings corroborate Dreger et al.'s (2016) analysis. The media bias variable, the residuals of the media-sanctions regression, plays a very slight role in determining the ruble's exchange rate. The coefficient of the lagged value of the media bias term, *bias_1*, assumes a negative value in the system. This follows the formulation of the bias term discussed earlier.

Since the regression that generated the residuals weighs expectations of retaliatory sanctions more heavily than expectations of more Western sanctions, the residuals term influences the ruble market by incorporating heavy expectations for more Russian sanctions. Since Russian sanctions in the model, *by*, generate appreciation of the ruble, it follows that when the media expects more Russian sanctions against Western nations, the ruble tends to appreciate whether those sanctions materialize or not in the short-run. Dreger et al. (2016) find that the bias term may be valuable in explain-

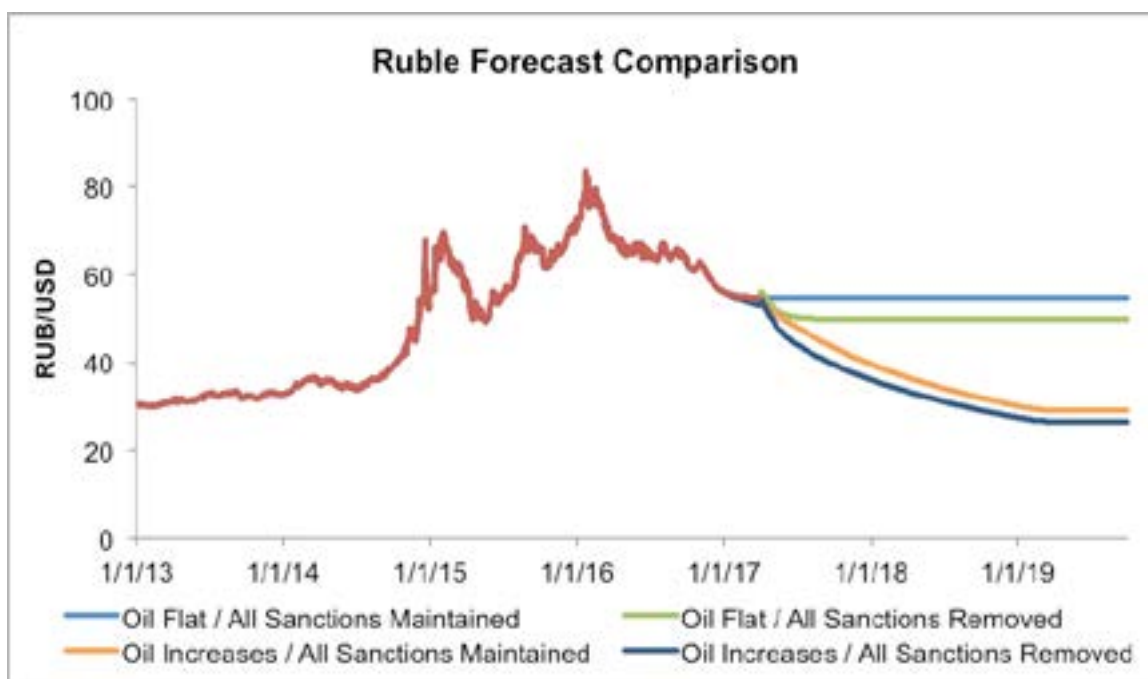
ing some of the ruble's "conditional volatility" (p. 307).

The model suggests that the RUONIA rate is primarily determined by the ruble's exchange rate and its own lagged values. Its own lagged values carry significant weight. This is likely due to the relatively low volatility in the series. Fluctuations in the ruble can generate a response in the RUONIA rate; when the ruble/dollar exchange rate increases, the Russian Central Bank will raise the RUONIA rate in response.

Next, I use this short-run model to estimate the response of the ruble given the set of six scenarios described earlier. I present forecasts for the ruble given flat oil prices, an increase in oil prices, and whether Western nations maintain or remove sanctions. Results are shown in Figure 14 on the next page.

When sanctions are removed at the end of Q1 2017 the ruble appreciates significantly and suddenly. At the end of Q2 2017 maintaining sanctions results in roughly an 8% weaker ruble than if sanctions were removed. Relative to fluctuations in the oil price, this is a small effect. Note the greater appreciation induced by increasing the oil price. While removing sanctions triggers a slight appreciation of the ruble, increasing the oil price induces much greater appreciation. In 2019, if oil prices return to some of their highest levels ever achieved, as in these bullish scenarios, the ruble will strengthen accordingly.

Figure 14

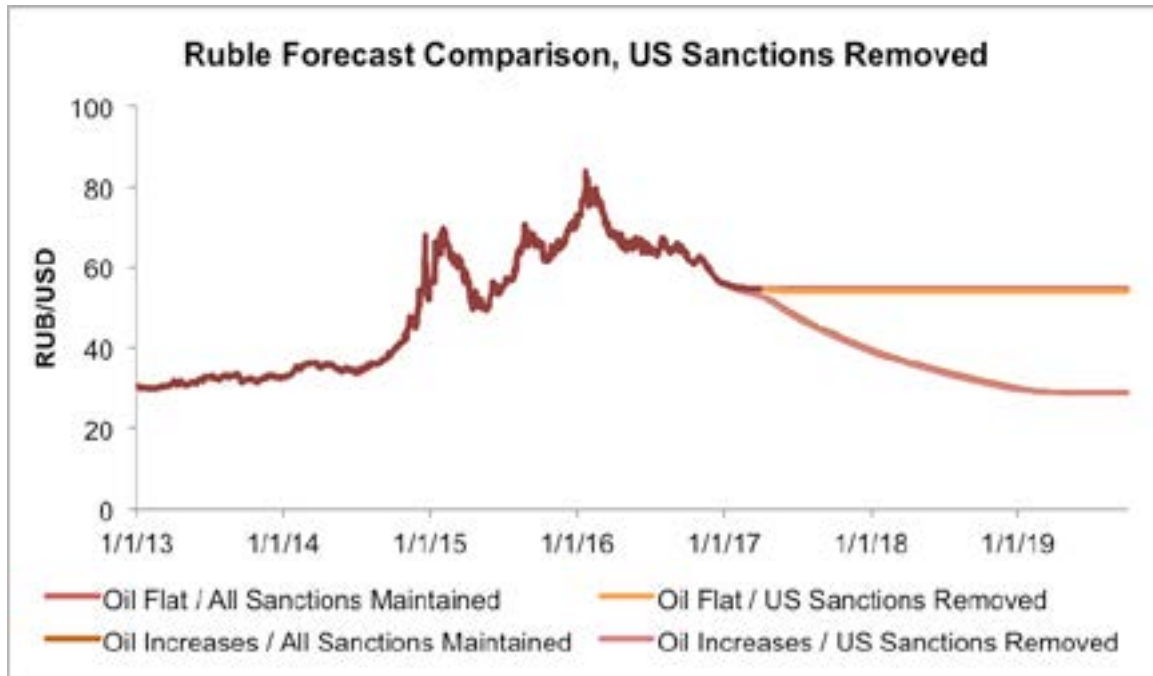


Source: Author's calculations



Despite the exchange rate's greater dependence on the oil price, sanctions depreciate the ruble. Sanctions counteract the beneficial effects of increasing oil prices. A weaker ruble entails higher costs to Russian firms searching to fulfill international debt obligations; moreover, these findings suggest that by weakening the ruble, sanctions make imports costlier to the Russian economy. Weakening the ruble also contributes to overall price inflation in the Russian economy. Over the long-run, sanctions should incur great costs to Russian firms, the Russian government, and the public.

Figure 15



Source: Author's calculations

The forecast results for the removal of US sanctions are shown above in Figure 15. Due to the trade-weighted basis of the index, the removal of US sanctions does not yield the same appreciation of the ruble that occurs when all nations remove their sanctions against Russia. There is no significant appreciation of the ruble when the US removes its sanctions against Russia, yet the forecast results in Figure 14, on the preceding page, suggest that the cumulative effect of sanctions weakens the ruble.

7.2 Macroeconomic Model Forecasting Results

To model Russia's macroeconomy, I build a SVEC model by including the long-run cointegrating equations established earlier as error-correction terms. I begin with a VAR model with one



lag and use real, first-differenced data in logarithmic form. The endogenous variables in the system are GDP, household consumption, investment expenditure, government expenditure, exports, imports, and the real effective exchange rate. Since energy prices are determined on international commodity markets, the Brent crude oil price remains exogenous with Western sanctions. In accordance with Rautava (2013), I include time dummies to account for the 2008-2009 financial crisis and for Russia's poor recovery in the post-crisis period (Rautava, 2013, p. 77). The lag of the first-differences of the cointegrating equations for GDP, exports, and imports are included in their respective regressions as error-correction terms (*ECgdp_1*, *ECimports_1*, and *ECexports_1*). The model's results, equations for the first difference of each variable in logarithmic form, are shown in Table 8 and Table 9 on the following pages. The majority of coefficients are well-specified and significant at the 95% level.

Table 8

Macroeconomic Forecasting Model Results			
Equation for DLGDP			
Variable	Coefficient	t-value	t-prob
<i>DLgdp_1</i>	-0.376433	-4.66	0
<i>DLexports_1</i>	0.129938	3.25	0.0021
<i>DLbrent</i>	0.049309	3.1	0.0031
<i>against</i>	-0.00176453	-2.16	0.0353
<i>ECgdp_1</i>	-0.00923979	-1.1	0.2757
<i>Constant</i>	0.0562369	1.68	0.099
<i>2008_Dummy</i>	-0.063167	-3.13	0.0029
Equation for DLHousehold			
Variable	Coefficient	t-value	t-prob
<i>DLgdp_1</i>	-0.0475436	-0.591	0.5571
<i>DLgovernment_1</i>	-0.0724713	-1.08	0.2852
<i>DLexports</i>	0.20379	1.95	0.0565
<i>DLreer_1</i>	0.187302	3.11	0.0031
<i>against_1</i>	-0.000959783	-1.17	0.2479
<i>2008_Dummy</i>	-0.0177716	-0.919	0.3626
<i>Growth_Dummy</i>	0.0143484	1.95	0.0562
Equation for DLGovernment			
Variable	Coefficient	t-value	t-prob
<i>DLinvestment_1</i>	-0.0915286	-3.66	0.0006
<i>Constant</i>	0.0128456	2.12	0.0388
<i>2008_Dummy</i>	-0.0260238	-1.02	0.3105
<i>Growth_Dummy</i>	-0.00330848	-0.357	0.7224
Equation for DLInvestment			
Variable	Coefficient	t-value	t-prob
<i>DLinvestment_1</i>	-0.342762	-3.6	0.0007
<i>DLgdp_1</i>	0.43151	1.22	0.2266
<i>2008_Dummy</i>	-0.168885	-2.27	0.0274
<i>Growth_Dummy</i>	0.0212097	0.829	0.411

Table 9

Macroeconomic Forecasting Model Results (cont.)			
Equation for DLExports			
Variable	Coefficient	t-value	t-prob
<i>DLbrent</i>	0.118438	4.01	0.0002
<i>DLreer_1</i>	-0.300164	-2.79	0.0075
<i>against</i>	-0.00194918	-0.996	0.324
<i>ECexports_1</i>	-0.0125644	-3.11	0.0031
<i>2008_Dummy</i>	-0.0687298	-1.92	0.0605
<i>Growth_Dummy</i>	-0.0166206	-1.06	0.2963
Equation for DLImports			
Variable	Coefficient	t-value	t-prob
<i>DLhousehold_1</i>	0.275051	2.04	0.0462
<i>DLinvestment_1</i>	-0.0925667	-3.03	0.0038
<i>DLreer_1</i>	0.269547	2.41	0.0196
<i>DLbrent_1</i>	0.0282283	1.32	0.1941
<i>against</i>	-0.000300632	-0.189	0.8506
<i>ECimports_1</i>	0.00097352	1.17	0.2482
<i>2008_Dummy</i>	-0.074563	-2.55	0.0139
<i>Growth_Dummy</i>	0.00472842	0.33	0.7429
Equation for DLREER			
Variable	Coefficient	t-value	t-prob
<i>DLgovernment_1</i>	-0.278735	-2.9	0.0055
<i>DLimports_1</i>	0.138311	1.84	0.0722
<i>DLbrent</i>	0.0884645	4	0.0002
<i>against</i>	-0.00086047	-0.63	0.5312
<i>2008_Dummy</i>	-0.0042225	-0.154	0.8782
<i>Growth_Dummy</i>	0.00289004	0.239	0.8119

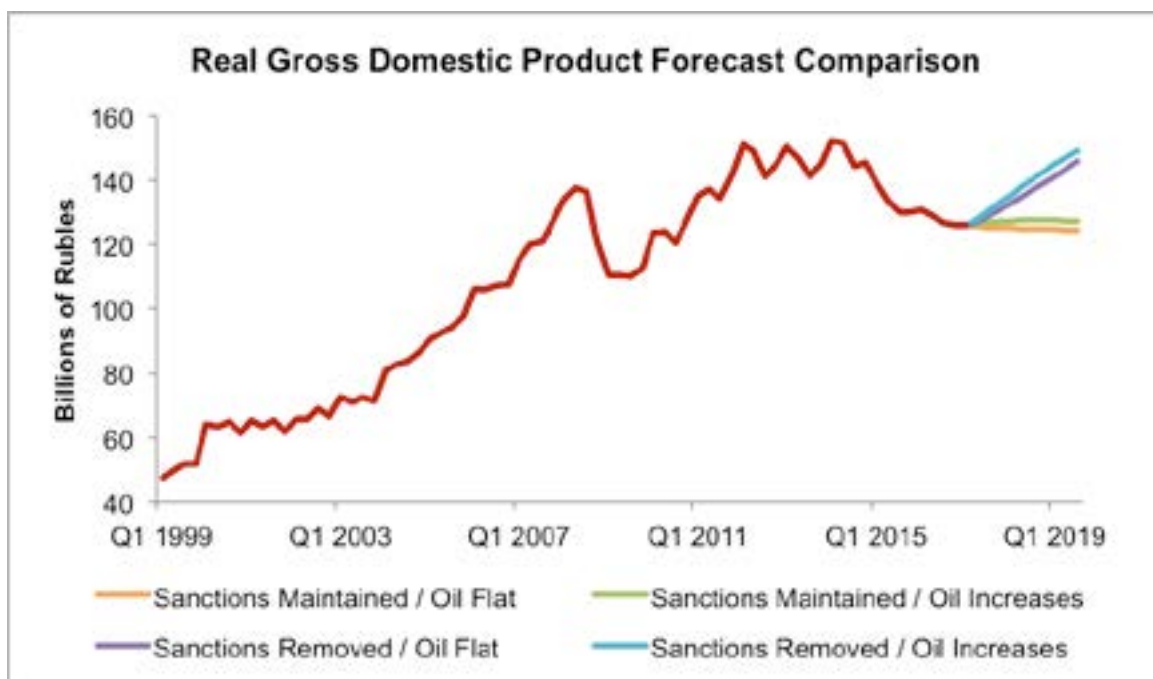
Generally, the model confirms economic intuition regarding the relationship between variables in the system. The equation for the first difference of logarithmic GDP demonstrates the significance of the oil price through both the current change in oil prices, *DLbrent*, and the lagged change in export levels, *DLExports_1*. The coefficient for Western sanctions, *against*, is significant in the GDP equation. It is significantly negative, suggesting that Western sanctions reduce Russian GDP.

Household expenditure and import and export levels rely on the lagged change in the real effective exchange rate, *DLreer_1*. The results indicate that Western sanctions negatively impact each of these variables. Similarly, sanctions push the real effective exchange rate downwards, indicating a weakening impact. Government expenditure depends primarily on a constant and the lagged change in investment, *DLinvestment_1*. Similarly, investment expenditure depends on the lagged change in

GDP, $DLgdp_1$, and the change in the prior period's investment levels. Sanctions affect these two variables through GDP and its components. Since sanctions have a significant negative impact on GDP, investment opportunities in Russia seem less appealing, thereby reducing investment expenditure.

Western sanctions, represented by the variable *against*, assume negative coefficients for most variables in the system. In accordance with Dreger et al.'s (2016) methodology, Western sanctions enter the model as a continuous index rather than a first-differenced series. This means that although the sanctions coefficients shown in the results tables are smaller relative to coefficients for other variables, they imply a significant impact on the system.

Figure 16



Source: Author's calculations

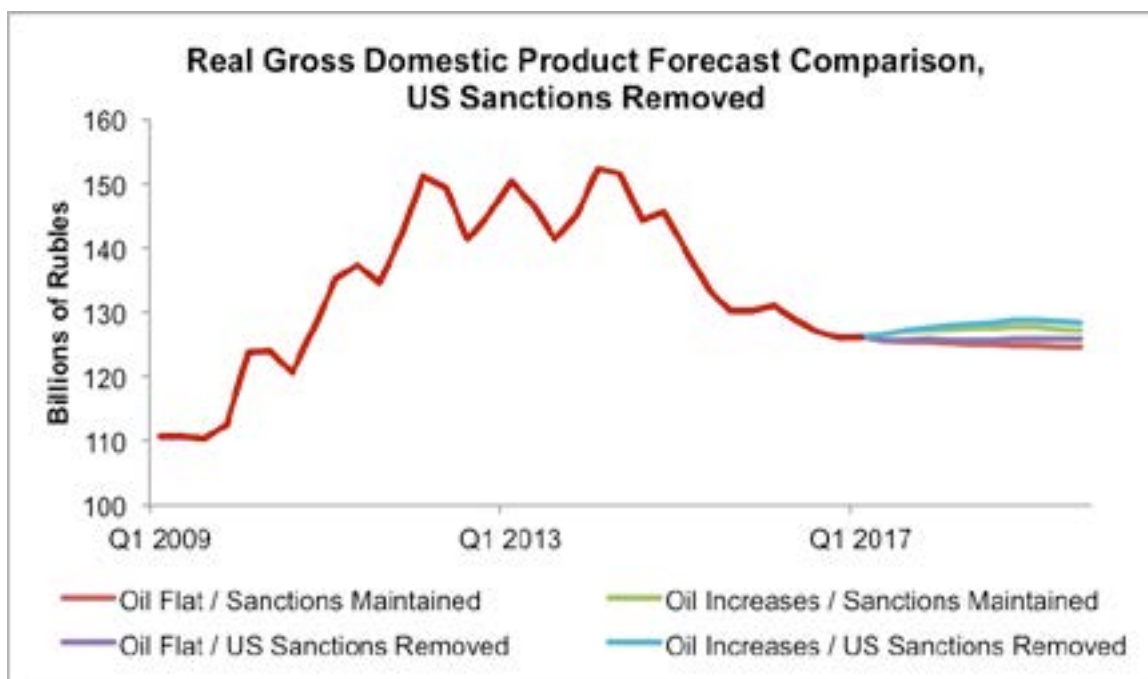
Consider the forecasting results of the same scenarios presented in the ruble model. Sanctions play a significant role in determining Russian GDP over the next three years. Figure 16, shown above, shows the plotted forecast results of Scenarios 1-4. In Scenario 1 and 2, all nations maintain sanctions against Russia and Russia maintains its retaliatory sanctions. In Scenarios 3 and 4, all sanctions, levied both against and by Russia, are removed at the end of Q1 2017. Two distinct pairs of forecasts for Russian GDP emerge. If sanctions remain in place, the outlook for Russia's economy is bleak. If oil prices increase, output will remain in stagnation, as shown in light green in Figure 16. If oil prices remain flat, the economy will slide into a weak recession, as shown in orange. Removing all sanctions against Russia boosts the Russian economy, as shown in purple and light blue in Figure

16. The increase in the oil price generates added growth over flat oil price scenarios. These findings suggest that Western sanctions will cause significant consequences for the Russian economy.

Given the prior research of Rautava (2013), I expected forecasts for Russian GDP to depend more heavily on the oil price. The results shown in Figure 16 do not suggest that increases in the real oil price can entirely overcome the negative effect of Western sanctions. These findings may, in part, be due to the use of the real rather than nominal oil price. Depending on inflation dynamics, changes in the nominal oil price may be greater than the real oil price. If this is the case, then the discrepancy might reveal some inflation of the benefit of nominal oil prices; the gains they produce may be less meaningful than anticipated.

Using the real oil price and a dummy variable for sanctions, Tuzova and Qayum (2015) predict that quarter-to-quarter real GDP will decline on average by a staggering 19% when sanctions remain in place (p. 140). Rautava (2013) uses the nominal oil price to forecast GDP and finds that oil is the primary determinant of Russian economic performance (p. 86). The results presented in Figure 16 place this thesis' results between Tuzova and Qayum (2015) and Rautava (2013). Where Tuzova and Qayum (2015) forecast a harsh recession for Russia, I estimate that if all sanctions remain in place and oil prices remain flat, Russian quarter-to-quarter GDP will decline on average by only 0.65% from Q4 2016 through Q3 2019. If the oil price increases, GDP growth will essentially remain flat, declining by 0.03%. When sanctions are removed, Russian GDP may grow by 4.76% over the same period given flat oil prices and 5.58% given increasing oil prices.

Figure 17



Source: Author's calculations



The forecast results of removing only the US sanctions against Russia are shown in Figure 17. Since the Western sanctions index is trade-weighted and the US accounts for a relatively small portion of Russia's trade share, the forecast results for the US removal of sanctions are barely distinguishable from the forecast results for when all sanctions are maintained against Russia; instead, if the rest of the world maintains their sanctions, whether Russian GDP grows or remains stagnant depends on whether the oil price increases or holds flat. Figure 17 does not capture the potential signaling effects that US foreign policy decisions carry nor do the results reflect the role of the US as a financial and geopolitical leader.



8 Conclusion

This thesis estimates the economic impact of sanctions on Russia's economy using VAR techniques and forecasting models. I generate indices representing the cumulative strength of sanctions levied against Russia by Western nations, sanctions levied by Russia, and the media's focus on Russian-specific sanctions. Incorporating these indices into models for the Russian ruble and macro-economy grants insight into the impact of particular sanctions on Russia's economy.

I present forecasting scenarios for the ruble and Russian GDP through Q3 2019. These scenarios present the models with alternative oil prices and levels of sanctions. The forecast results demonstrate the positive impact of oil prices on both Russia's ruble and its GDP; moreover, they show that sanctions weaken the Russian ruble: Sanctions depreciate the ruble by 8% relative to the scenarios in which sanctions against Russia are removed.

Forecasting results indicate that whether Western nations and Russia maintain or remove their sanctions affects Russia's future GDP growth. If all nations remove their sanctions against Russia, Russian GDP will grow by 4.76% when oil prices hold flat and 5.58% when oil prices increase. If sanctions remain in place, the Russian economy will remain stagnant given an increase in oil prices and dip into a weak recession given flat oil prices.

These results confirm both economic intuition and recent findings in the literature. Sanctions should be costly to Russia and to the nations imposing them. Although my forecasting results for Russia's GDP land between Rautava (2013) and Tuzova and Qayum (2015), I expected an increase in the oil price to induce greater Russian GDP growth. The use of real instead of nominal oil prices may partially weaken the impact of an energy boom on the system over the next few years. Like in Tuzova and Qayum (2015), sanctions may be slightly over-weighted in the analysis. They use a dummy variable that takes a value of zero until sanctions were implemented and a value of one for the remainder of the estimation period. Given the detailed structure of my sanctions indices and their ability to represent the accumulated strength of sanctions over time, they should present a more accurate estimation of the impact of Western sanctions.

Future analysis might reconsider the weights assigned to each nation in the sanctions index. Given the trade-weighted basis of the index, sanctions by the EU carry significantly more weight than the United States. Since the EU accounts for ~50% of Russian trade and the US accounts for only ~5%, EU sanctions carry ten times the strength of US sanctions in the index. Sanctions strength only slightly decreases when the US removes sanctions. Given the role of the US as a leader in financial markets and international geopolitics, the strictly trade-weighted index does not capture potential signaling effects of US sanctions.

Moreover, the weights assigned to particular sanctions might also be adjusted. Sanctions against individuals or industries might be more or less impactful than they are assumed to be in this



model. In the index, sanctions against individuals assume a weight of one-third that of sanctions against industries. Restricting access to capital markets and imports may be more than three times as costly as sanctioning individuals. Deeper analysis might assign unique weights to each sanction given its particular targets.

Similarly, the media index includes a variety of news publications. Although the media bias indicator is significant in the ruble model, the index does not include the same caliber of publications from each nation. I was limited to the publications within the *LexisNexis* database. For the German component of my media index, I use an agglomeration of medium-size news outlets rather than the news sources with the largest circulation. Future analysis might reconstruct this index using only the most prominent financial publications and might also include large online-only news sources.

In conclusion, the Russian economy has struggled over the last decade. Recession and lagging growth have plagued the former superpower. The 2014 Ruble Crisis eroded much of Russia's recovery since the Global Financial Crisis. Western nations levied sanctions against Russia during a period of great economic vulnerability, and these sanctions will tax Russia severely over the next few years. Even if international energy prices increase, Russia's economy will not be able to reap the benefits if Western nations keep sanctions in place.



9 Appendix

Table 10

Sanctions By Russia				
Year	Month	Day	Sanction Description	Sanction Type
2014	3	20	Suspension of entry of specific US persons	1
2014	3	24	Suspension of entry of specific Canadian persons	1
2014	8	6	Prohibition of imports of agricultural products from all countries that imposed sanctions against Russia	3
2015	1	23	Suspension of entry of a Lithuanian MEP	1
2015	3	3	Suspension of entry of a Latvian MEP and Polish	1
2015	5	29	Suspension of entry of 89 EU politicians and officials	1

Source: The Ministry of Foreign Affairs of the Russian Federation, Reuters

Table 11

Sanctions Against Russia					
Year	Month	Day	Countries	Sanction Description	Type
2014	3	5	EU	Blocking property and suspension of entry of specific persons	1
2014	3	6	US	Blocking property and suspension of entry of nonspecific persons	1
2014	3	17	US	Blocking property and suspension of entry of specific persons	1
2014	3	17	EU	Blocking property and suspension of entry of specific persons	1
2014	3	17	Canada	Blocking property and suspension of entry of specific persons	1
2014	3	17	Japan	Freezing negotiations regarding visa regulation, new investment, space cooperation	3
2014	3	19	Canada	Blocking property and suspension of entry of specific persons	1
2014	3	19	Australia	Blocking property and suspension of entry of specific persons	1
2014	3	20	US	Blocking property and suspension of entry of specific persons/entities	2
2014	3	21	EU	Blocking property and suspension of entry of specific persons	1
2014	3	21	Canada	Blocking property and suspension of entry of specific persons/entities	2
2014	4	11	US	Blocking property and suspension of entry of specific persons/entities	2
2014	4	11	Ukraine	Blocking property and suspension of entry of specific persons	1
2014	4	11	AL, ISL, MNE, NOR	Blocking property and suspension of entry of specific persons	1
2014	4	28	US	Additional restrictive measures on defense exports to Russia	3
2014	4	28	Canada	Blocking property and suspension of entry of specific persons/entities	2
2014	4	29	EU	Blocking property and suspension of entry of specific persons/entities	2
2014	4	29	Japan	Suspension of entry of specific persons	1
2014	5	4	Canada	Blocking property and suspension of entry of specific persons/entities	2
2014	5	12	Canada	Blocking property and suspension of entry of specific persons	1
2014	5	12	EU	Blocking property and suspension of entry of specific persons/entities	2
2014	5	21	Australia	Blocking property and suspension of entry of specific persons/entities	2
2014	6	20	US	Blocking property and suspension of entry of specific persons	1
2014	6	21	Canada	Blocking property and suspension of entry of specific persons/entities	2
2014	7	12	EU	Blocking property and suspension of entry of specific persons	1
2014	7	16	US	Blocking property and suspension of entry of specific persons/entities	2
2014	7	24	Canada	Blocking property and suspension of entry of specific persons/entities	2
2014	7	25	EU	Blocking property and suspension of entry of specific persons/entities	2
2014	7	29	US	Additional Treasury sanctions on Russian financial institutions and a defense technology entity	3
2014	7	30	EU	Blocking property and suspension of entry of specific persons/entities	2
2014	7	31	EU	1) Restrictions on exports of certain dual-use goods and technology	2
			2) Restrictions on the sale, supply, transfer or export of certain technology for the oil industry	3	
			3) Restrictions on access to the capital market for certain financial institutions	3	
2014	8	5	Switzerland	Blocking property and suspension of entry of specific persons/entities	2
2014	8	6	Canada	Blocking property and suspension of entry of specific persons/entities	2
2014	8	14	Ukraine	Blocking property and suspension of entry of specific persons/entities	2
2014	8	14	Switzerland	1) Restrictions on exports of dual-use goods and technology	3
2014	8	14	Switzerland	2) Restrictions on exports of oil extraction goods and technology	3
2014	9	8	EU	Blocking property and suspension of entry of specific persons/entities	2
2014	9	12	US	1) Additional Treasury sanctions on Russian financial institutions	2
			2) Restrictions on the export of goods, services and technology in support the oil industry	3	
2014	9	16	Canada	Blocking property and suspension of entry of specific persons/entities	2
2014	11	29	EU	Blocking property and suspension of entry of specific persons/entities	2
2014	12	19	Canada	1) Blocking property and suspension of entry of specific persons/entities	2
			2) Prohibition of exports of oil-related equipment	3	
2015	2	16	EU	Blocking property and suspension of entry of specific persons/entities	2
2015	2	17	Canada	Blocking property and suspension of entry of specific persons/entities	2
2015	3	31	Australia	1) Restrictions on export or import of arms	3
			2) Export of oil industry equipment	3	
			3) Restrictions on access to the capital market for certain financial institutions	3	
2015	6	29	Canada	Blocking property and suspension of entry of specific persons/entities	2
2016	3	18	Canada	Blocking property and suspension of entry of specific persons/entities	2

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TRASITIONAL COMMUNITIES OR POVERTY TRAPS?: AN ASSESSMENT OF SLUM RESIDENTS' UPWARD MOBILITY POTENTIAL IN DELHI, INDIA

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Transitional Communities or Poverty Traps: An Assessment of Slum Residents' Upward Mobility Potential in Delhi, India

by

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OVERVIEW

In 2009, the movie *Slumdog Millionaire* was released, and it instantly became an international sensation. The movie depicts the story of Jamal, a teenager from Mumbai, as he competes on a game show about random trivia. As a poor boy growing up in a slum, Jamal knows the answers to the questions on the show because of his challenging life experiences and clever street smarts. Though the movie is fictional, it does convey the harsh realities — hunger, crime, corruption, violence — that children growing up in slum settlements often face. Yet the movie also illustrates the ambition of slum residents who, despite the numerous challenges, have this indubitable sense of hope for a better future. The following paper aims to explore the notion of upward social mobility as it relates to slum communities: do individuals growing up in economically disadvantaged settlements truly have opportunities to break the cycle of poverty? More specifically, are slum communities in Delhi, India conducive to upward mobility or do they impede a resident's ability to migrate to legal housing?

This paper utilizes three groups of data to better understand the state of slum communities in Delhi, India. Beginning with a discussion of education and earnings trends for families in Delhi, the following thesis moves to evaluate the changes in national slum communities between 1993 and 2012. The paper then analyzes primary household data from three slum communities in New Delhi, before closing with a reflection on the government's role in supporting disenfranchised informal settlements. Throughout this paper, it is critical to consider that Delhi slum communities are often treated as a single entity. Policies and improvement programs are directed at "slum communities" without accounting for the expansive range of diversity within the category. The final section of this paper aims to disaggregate some of the data, in order to assess if the broad use of "slums" hinders the potential of social programs to ameliorate conditions in these settlements. Thus, the question of this paper takes on an added dimension, by asking additionally: what role should the government take to encourage upward social mobility?



INTRODUCTION

Over half of the world's population lives in urban areas, and the number of urban dwellers continues to skyrocket.¹ As more families move to cities, urban growth stratifies income classes. Informal settlements, colloquially referred to as “slums,” are neither a new phenomenon nor confined to a singular geographic region, but have become a pressing challenge for many urban centers. They were a “distinctive feature of European and U.S. cities during the Industrial revolution”² and are now located in countries all over the world. Two of the largest informal settlements, Dharavi and Orangi Town,³ are situated in urban regions in South Asia. According to the Delhi Urban Shelter Board, the state of Delhi alone is home to nearly 700 informal settlements. These communities are spread throughout the state and vary in size from less than ten households to over five-thousand. As the population of India continues to grow and urban areas become increasingly overcrowded, the government needs to prioritize assisting slum residents.

In 2009, India proposed that it would be a slum-free country within five years. The central aim of the project was to “upgrade [their] current situation rather than dislocating slum dwellers.”⁴ The government has experimented with a wide array of approaches to transform these slum communities, but it has achieved minimal to no success. Informal settlements are a critical focus for the Delhi government, and “while issues of illegality may not per se hamper the provision of basic services, they often hinder any kind of initiative to look for permanent solutions to problems of inefficiencies.”⁵ Basic policy approaches have “failed to mitigate the expansion of slums in the developing world.”⁶ The unresponsiveness of the government to the direct needs of its lower-class constituents has led to the “proliferation of ‘unauthorized’ colonies in the urban-rural fringe on agricultural land not meant for urbanization.”⁷ However, Dupont conveys that one thing is certain about these informal colonies: economic development is not indicative of a uniform pattern in slum growth.

1 Benjamin Marx, Thomas Stoker, and Tavneet Suri, “The Economics of Slums in the Developing World,” *Journal of Economic Perspectives* 27, no. 4 (2013): 187.

2 Ibid, 188.

3 United Nations, Department of Economic and Social Affairs, Population Division (2014). World Urbanization Prospects: The 2014 Revision, Highlights (ST/ESA/SER.A/352).

4 Rakhi Mehra., “Designing for Livelihoods in Government Slum-Rehabilitation Projects: Sundernagari, Delhi,” *Urb.im.* <http://www.urb.im/mm/120723de>.

5 Aditi Dimri and Amiya Sharma, “Living on the Edge and Paying for It: A Study in Sanjay Colony, Okhla Phase II, Delhi,” *SSRN Electronic Journal*, (2006).

6 Veronique Dupont, “Socio-spatial Differentiation and Residential Segregation in Delhi: A Question of Scale?” *Geoform* 35, no. 2, (2004): 158.

7 Ibid, 161.



A. Slum Terminology

In the capital of India, 44% of urban households live in slum communities.⁸ According to a study conducted in 2008, “about three-fourths of Delhi’s total population lives in uncontrolled urban settlements, including slums and squatter spaces.”⁹ The terminology used to describe informal settlements lacks cohesion and consistency — “‘slums’ and ‘squatter settlements’ are used almost interchangeably,”¹⁰ although there are distinct differences involving size and tenure that are overlooked. The National Sample Survey Organization uses the following definition for a slum: “a compact settlement with a collection of poorly built tenements, mostly of temporary nature, crowded together with inadequate sanitary and drinking water facilities in unhygienic conditions.” The same definition applies to a squatter space, except squatter areas have less than twenty households, while areas with more than twenty households are considered slum territories.¹¹ With such ambiguous definitional parameters, categorization of slum settlements is a challenge itself, as the definition encompasses a wide variety of living areas. Within Delhi, eight different settlement types exist: JJ clusters, slum designated areas, unauthorized colonies, JJ resettlement colonies, regularized-unauthorized colonies, rural villages, urban villages, and planned colonies.¹² According to the same report, the type of settlement is determined according to “civic amenities and the status of houses and land.” Despite popular assumptions to the contrary, nearly 80% of existing Delhi slums are located on public land.¹³ JJ clusters, a popular type of slum in Delhi, are located on government lands, and the number of these colonies is growing rapidly. The term JJ, jhuggi jhopdi, directly translates to “hut of the poor.”¹⁴ By 2021, JJ clusters and slum-designated areas are expected to be home to nearly 8 million people in Delhi.¹⁵ However, government evictions are a frequent occurrence in Delhi slum communities, with less than 25% of households that are evicted receiving alternative resettlement places.¹⁶ While the government has put forth initiatives to aid people from disadvantaged communities, it has not shied away from evicting residents illegally settled on public lands.

8 Sohail Ahmad, Mack Joong Choi, and Jinsoo Ko, “Quantitative and Qualitative Demand for Slum and Non-slum Housing in Delhi: Empirical Evidences from Household Data,” *Habitat International* 38 (2013): 90.

9 Ibid, 91.

10 Benjamin Marx, Thomas Stoker, and Tavneet Suri, “The Economics of Slums in the Developing World,” *Journal of Economic Perspectives* 27, no. 4 (2013): 188.

11 Sohail Ahmad, Mack Joong Choi, and Jinsoo Ko, “Quantitative and Qualitative Demand for Slum and Non-slum Housing in Delhi: Empirical Evidences from Household Data,” *Habitat International* 38 (2013): 92.

12 Cities of Delhi, “Categorisation of Settlement in Delhi,” *Center for Policy Research* (2015): Web.

13 Abhijit Banerjee, Rohini Pande, and Michael Walton, *Delhi’s Slum Dwellers: Deprivation, Preferences, and Political Engagement among the Urban Poor*, (2005), 8.

14 Sohail Ahmad, Mack Joong Choi, and Jinsoo Ko, “Quantitative and Qualitative Demand for Slum and Non-slum Housing in Delhi: Empirical Evidences from Household Data,” *Habitat International* 38 (2013): 90.

15 Ibid, 92.

16 Gautam Bhan, “This is No Longer the City I Once Knew: Evictions, the Urban Poor, and the Right to the City in Millennial Delhi,” *Environment and Urbanization* 21, no. 1 (2009): 127.



B. The Map of Slums in Delhi

The haphazard layout of informal settlements in Delhi is perhaps an urban anomaly. While there is no pattern for slum distribution in Delhi, most communities are located on the periphery.¹⁷ Pushing slum communities to the edges of the state is a direct reflection of governmental neglect. Considering the notion of a rent gradient, demolition projects are undertaken with the intention of restoring the valuable land at the city center by displacing slum families to the outskirts of Delhi. These demolition projects dissuade residents from properly investing in their communities. The demolitions “systematically impoverish” affected families.¹⁸ While the vast number of cases of destruction is not the primary focus of this paper, they directly contribute to the debilitation of slum families.

When considering the inherent economic challenges slum residents face, it is also crucial to grasp the social hardships that many community members experience. While the caste system is purportedly dissolved, the “socio-spatial organization in contemporary Indian cities confirms the significance of caste as a factor of residential clustering” as mobility patterns are impacted by “the processes of social selection.”¹⁹ Bhattacharya even suggests that social factors, such as caste, are an overlooked factor in determining employment for those migrating to urban areas.²⁰

Not all evictions are government-driven though; some are a result of private interest

Some demolition projects are “the final result of several public interest litigations (PILs) filed in Delhi courts by non-poor resident welfare and trade associations.”²¹ The social stresses imposed on slum families are important to consider when gauging their aptness to migrate from informal settlements to legal housing.

C. Poverty Traps

Informal settlements began as transitory areas; places families intended to stay temporarily. The overarching objective of slum settlements still holds true: they are not meant to be permanent solutions to housing crises. However, do they act as temporary fixes or impede upward mobility? Poverty traps exist when residents do not have the ability to accumulate any savings. Some research shows that slum communities are indeed poverty traps: residents are unable to save enough to leave

17 Sunil Kumar and M. Ishtiyak. “Typology of Informal Settlements and Distribution of Slums in the NCT, Delhi.” *Journal of Contemporary India Studies: Space and Society Hiroshima University* 1 (2011): 37.

18 Veronique Dupont, “Slum Demolitions in Delhi since the 1990s: An Appraisal,” *Economic and Political Weekly*, JSTOR (2008): 81.

19 Veronique Dupont, “Socio-spatial Differentiation and Residential Segregation in Delhi: A Question of Scale?” *Geoform* 35, no. 2, (2004): 163, 173.

20 Prabir Bhattacharya, “Rural-to-Urban Migration in LDCs: A Test of Two Rival Models,” *Journal of International Development* 14, no. 7 (2002): 970.

21 Gautam Bhan, “This is No Longer the City I Once Knew: Evictions, the Urban Poor, and the Right to the City in Millennial Delhi,” *Environment and Urbanization* 21, no. 1 (2009): 128.



the community and are effectively trapped in a place of poverty. The aim of this thesis project is to determine: are areas within Delhi poverty traps? More importantly, is it innocuous for the government to treat slum communities as a single entity? Many policy objectives consider informal settlements to be homogenous areas, failing to factor in the extensive differences between different Delhi slums.

EXAMINING UPWARD MOBILITY POTENTIAL IN DELHI

A. Data Description

In order to examine individuals and households in Delhi, the Delhi portion of the National Sample Survey 2007-2008 (64th Round) was used. An initial data set was created to isolate individuals who identify as the heads of their households. It is important to establish that households are distinct from families. Households encompass all individuals residing within the same housing unit and sharing the same income. As this paper proceeds to discuss the relationship between the heads of households and children, this analysis only applies to children living within the household. A father may have two children, but if one of them was living in another household and supported by another income, this child was then considered an out-migrant and was not included in the child analysis.

Monthly Household Expenditures

Decile 1	3492
Decile 2	4238
Decile 3	5051
Decile 4	5730
Decile 5	6400
Decile 6	7231
Decile 7	8337
Decile 8	9920
Decile 9	13673

(Exhibit 1)



In the original survey, respondents were asked to characterize their relationship to the head of the household. Individuals who identified their relationship to the head as “self” were included in this first data set as heads, while all other observations were dropped. A total of 1,525 individuals comprise the dataset, with the mean age of a household head being 40.5 years and the mean education level being 8.9 years of schooling. This dataset was then merged with a second dataset containing respondents who identified as a child of the household head. This includes both married and unmarried children. A total of 2,497 child observations comprise this data set, with the mean level of education 7.2 years and the mean age 14.5 years. The following chart displays the monthly household expenditure deciles for households in Delhi, with the range showing a minimum sample value of 1,123 rupees and a maximum value of 56,379 rupees.

B. Education Levels

A simple regression was performed initially to establish the relationship between the education of the children and the education of the household head. Both education variables were measured as years of schooling. Observations with an education level higher than high school were also included: some university education was equated to 15 years of schooling, while postgraduate education levels were equated to 17 years.

The initial regression suggests a strong positive relationship between the education of the household head and the education of a child within the same household. The coefficient for the household head’s education in the regression is statistically significant at the 0.01 level, suggesting that for each year of education of the household head, the years of education of the child increase by 0.16. However, it is critical to recognize that while the regressor was statistically significant, the impact of the household head’s education on the child’s education was relatively low. Considering the low R-squared value for Regression 1, the result suggests that there are omitted variables that better explain the educational attainments of the children in the dataset.

As a tacit indicator of poverty, the NSS data contains a variable “social group” to identify individuals who belong to a scheduled tribe, scheduled caste, or other backward class. In the sample restricted to contain only Delhi data, there are a total of 1,188 ‘child’ observations that belong to one of the three groups. These groups were then combined to create the variable “Ethnic” to evaluate the impact of disadvantaged social groups (a proxy for poverty) on the

Child Educ	Reg 1	Reg 2	Reg 3	Reg 4
HH Educ	0.16*** (0.02)	0.11*** (0.02)	0.16*** (0.01)	0.15*** (0.01)
Ethnic		-1.55*** (0.21)	-0.31*** (0.11)	-0.22*** (0.11)
Age			0.81*** (0.02)	0.80*** (0.02)
Age-Squared			-0.01*** (0.00)	-0.01*** (0.00)
Female			-0.09 (0.10)	-0.08 (0.10)
Month Exped ¹				0.05 (0.01)
Constant	4.70*** (0.19)	5.91*** (0.24)	-3.74*** (0.18)	-3.93*** (0.19)
Number of Obs.	2497	2497	2497	2497
R ² Value	0.03	0.05	0.75	0.75

* p<0.05, ** p<0.01, *** p<0.001

(Exhibit 2)

education level of a child. In each regression, the indicator variable has a statistically significant negative influence on the educational attainment of a child within a household. In Regression 4, the coefficient of the “Ethnic” variable suggests that a child in one of the three groups finishes 0.22 fewer years of schooling than a child that is not from one the groups. The regression highlights the disadvantages children from “Ethnic” groups face in an educational setting.

¹ Note: Monthly expenditure per 1000 rupees

² Indian designation for grade level.

³ It should be noted that children not in school are excluded when calculating mean values, total



values, etc.

Holding all else constant, the coefficient of “Ethnic” (-0.22) suggests that a child from these groups was less educated than an identical peer.

The variables in Regression 3 were then used in a propensity score-matching model to estimate the treatment effect of a child belonging to an “Ethnic” group. The propensity score-matching model utilizes a single variable as a treatment variable; in this case, “Ethnic” was the treatment. The model then uses the series of independent variables (excluding “Ethnic”) from Regression 3 to ensure the treatment and control groups are highly similar, thus working to isolate strictly the treatment effect. When the propensity score-matching model was used, the treatment effect of a child’s ethnic group on their years of education was smaller (in absolute terms) than in Regression 3. The treatment effect, however, was identical to the coefficient of “Ethnic” in Regression 4, suggesting that Regression 4 appropriately captures the impact of “Ethnic” on a child’s education.

Child Educ	Coef.	SE	Z	P> z	[95% Conf. Interval]	
— ATE						
Ethnic						
(1 vs 0)	-0.22	0.20	-1.13	0.26	-.62	.17

(Exhibit 3)

The model, consistent with the “Ethnic” regressor in Regression 4, also suggests that children in ethnic groups complete 0.22 less years of schooling than peers who are not from ethnic groups. However, as indicated in the above table, the p-value for this regression is greater than 0.1 and therefore, statistically insignificant. As this model attempts to avoid biases between the treatment and control groups by utilizing similar subjects, the treatment effect is closer to the true value of the “Ethnic” group coefficient. Thus, Regression 4 is neither upwardly nor downwardly biased. The previous regressions, however, were upwardly biased as they overestimated how large (in absolute terms) the effect these ethnic groups have on a child’s education.

In order to further investigate the educational attainment of children living in ethnic groups, the composition of college students from the sample was broken down. From the sample, 862 children were eighteen years or older: 516 children did not belong to an ethnic group and 346 children did belong to an ethnic group. When looking at the fraction of students with a college education, according to their designated group, children from ethnic groups are not attending college at the same



rate as their peers. Only 9.25% of the children aged eighteen and older from an ethnic group had at least some level of college education. In stark contrast, 33.14% of children aged eighteen years or older and not from an ethnic group, had at least some level of college education. When looking at college educational attainment, there was a great difference between children from ethnic groups and their peers.

If a college-level education is required for an individual to obtain a satisfactory job, then the fact that only 9.25% of household children from ethnic groups had any college-level education is illustrative of the hurdles that exist for these disadvantaged populations. The mean education level for a child from an ethnic group, who is at least eighteen years old, is 9.54 years, with a standard error of 0.14 years. While the mean education level for a child not from an ethnic group who is at least eighteen years old, is 11.95 years, with a standard deviation of 0.19 years. This difference shows that the average adult child in an ethnic group only attends school through ninth standard², while those not from ethnic groups, on average, complete nearly all twelve years of schooling. When considering the jobs available to each group, there are far more possibilities for those with a completed education.

Another factor to consider when assessing education levels is gender. In each regression performed, the variable “Female” was included as an indicator variable for a female child. In each of the previous regressions, the variable “Female” was always statistically insignificant, suggesting that gender does not impact a child’s educational attainment. Consider the following regression:

$$\text{EducationChild} = a + b1(\text{EducationHH}) + b2(\text{Ethnic}) + b3(\text{Age}) + b4(\text{Female})$$

(Exhibit 4)

The regression function is run three times, each time within a specified age range. Regression 1 was restricted to only include child observations between the ages of 5 to 12 years. Similarly, Regression 2 was restricted to only include child observations between the ages of 13 to 20 years, while Regression 3 was restricted to only include child observations 21 years and older. The three regressions showed positive changes in the variables that best explain the educational attainment of a household child. Beginning with Regression 3, the oldest age group, the only two variables statistically insignificant were “Female” and “Age,” suggesting that these two regressors do not strongly explain educational attainment for children 21 years of age and older.

The statistical insignificance of “Female” supports the previous claim that gender does not influence a child’s educational attainment. However, the monthly household expenditure of a family and the ethnic group status were both statistically significant. The positive value for monthly household expenditure, 0.05, suggests that for each 1000 more rupees a family has in household expenditures, the education level of the child is greater by 0.05 years. This indicates that households with larger expenditures, and therefore higher incomes, have children with

² Indian designation for grade level.

higher education levels. The coefficient for “Ethnic” was statistically significant with a value of -1.28 years. The value of the coefficient for “Ethnic” obtained from this restricted regression is greater than Regressions 1 and 2. The value suggests that children over the age of 21, and from

Child Educ	Regress 1 (Ages 5-12)	Regress 2 (Ages 13-20)	Regress 3 (Ages 21 & up)
Ethnic	0.04 (0.11)	-0.28 (0.19)	-1.28*** (0.29)
HH Educ	0.04*** (0.01)	0.19*** (0.02)	0.32*** (0.03)
Age	0.40*** (0.02)	0.70*** (0.04)	0.02 (0.02)
Female	-0.11 (0.10)	-0.17 (0.17)	0.24 (0.34)
Month Expend	0.01 (0.01)	0.06*** (0.02)	0.05** (0.01)
Constant	-1.06*** (0.25)	-5.30*** (0.68)	8.32*** (0.66)
Number Obs.	770	802	552
R ² Value	0.31	0.42	0.34

* p<0.05, ** p<0.01, *** p<0.001

(Exhibit 5)

an ethnic group, finish approximately 1.3 fewer years of education than their peers. Dividing regressions by age ranges provides insight into generational changes that may be occurring. A value of -1.4 years is much greater than the value of 0.07 obtained from the propensity score-matching method used on the aggregate data set. As the age range switches to assess education of children between the ages of 13 and 20, the ethnic group of the child is statistically insignificant. For this middle group of students, the “Monthly Expenditure” coefficient indicates that households with higher expenditures have children with higher education levels. When the data set was restricted to only children between the ages of 5 (the start of schooling) and 12 years of age, the gender of



a child being female also did not have a strong negative effect on the educational attainment of a child, as the coefficient proved to be statistically insignificant. In addition, the coefficient of the other indicator variable, “Ethnic,” also stayed statistically insignificant in Regression 1. This may indicate a trend toward improvement for the schooling opportunities of children in slum communities. For this age group, the monthly expenditure of a household does not have a statistically significant impact on the schooling years of the child. However, the statistical insignificance of the “Ethnic” and “Monthly Expenditure” variables may also reflect the notion that more children in the low age range, regardless of ethnic group, attend school than older children. Perhaps variables such as “Ethnic” and “Monthly Expenditure” do not have a strong influence on education at the lower levels, but rather, have a significant impact on children continuing to pursue education. The data from this survey round was collected before the Right to Education Act of 2009, a legislative action that provided free and compulsory education to children until the age of 14 years. Even if the results of Regression 1 reflected previous compulsory laws in place, then households from “Ethnic” groups were ensuring their children were attending the required schooling.

C. Earnings

Education holds the potential to facilitate upward economic mobility by improving the job opportunities available to a resident, thereby increasing possible earnings. In order to assess the effect of education on earnings — particularly for residents from ethnic groups — a regression was run on the log of total earnings and multiple variables shown in the following table. The logarithmic form was utilized to control for any earnings outliers in the data. The following dataset includes all observations with recorded total earnings. The initial regression reveals that the variable “Ethnic” was negatively correlated with earnings. In fact, the regression coefficient suggests that workers belonging to an ethnic group earned 20% less than their peers. The regression also revealed the rate of return on education: for each year of education, the total earnings increased by 9%. All the regressors in Regression 1 were statistically significant at the 0.01 p-levels.

A second regression introduced the interaction term of years of education and ethnic group status. When this term was introduced, the indicator “Ethnic” variable became statistically insignificant. This was not surprising, as the impact of “Ethnic” was then captured through the interaction term.

Regression 2 indicated that there was a larger negative correlation between gender and total earnings; female earnings were 18% lower than those of males. The regression output also suggests that people from ethnic groups experience a lower rate of return on education. The output indicates that the overall rate of return on education for the sample was 10%. However, individuals from ethnic groups experienced a rate of return on education of 7%. It may be difficult for poor residents to be incentivized to pursue education if they do not receive the same pay-offs as those not belonging to



an ethnic group.

Log(Earnings)	Regression1	Regression 2
Age	0.02*** (0.00)	0.02*** (0.00)
Female	-0.15*** (0.05)	-0.18*** (0.05)
Ethnic	-0.20*** (0.03)	-0.02 (0.07)
Years of Edu	0.09*** (0.01)	0.10*** (0.01)
Ethnic*Edu		-0.03*** (0.01)
Constant	5.96*** (0.06)	5.86*** (0.06)
Number of Obs.	1252	1252
R ² value	0.50	0.50

* p<0.05, ** p<0.01, ***p<0.001

(Exhibit 6)



NATIONAL ASSESSMENT OF INFORMAL SETTLEMENTS

A. Introduction: National Slum Dataset from 1993

From January to June 1993, the National Survey Sample Organization surveyed informal settlements in urban and rural communities. The survey took place in two sub-rounds, with the results aggregated into a data set, intended to be representative of the entire country. Though the original thesis of this paper centers on Delhi, the slum-specific data sets are small sample sizes with a limited number of slums included from the state of Delhi. Therefore, the following examination of slums over a period of nineteen years, weighted to be representative of the entire nation, will assess country-wide data. The initial survey abstract of the National Sample Survey 1993 (49th Round) detailed that the purpose of their research was to “ascertain the extent of civic facilities available.” A knowledgeable member of the slum community was interviewed about each settlement, and the results were recorded according to his/her responses. The sampling group utilizes both declared and undeclared sites in its survey research, with a total of 1,572 slums in the sample. A declared slum is recognized by the government and entitled to provisions of basic services, while an undeclared slum is not acknowledged by government agencies, but still identified as a slum by definition.

While the growth of slums is a pressing challenge today, it is beneficial to understand the average number of households in a slum in 1993. According to the sample, the mean number of households per slum is 82.8, with a standard deviation of 2.96. A simple regression was run in order to assess whether there was any correlation between slums with more households and declaration. The variable “Public” was also included in this regression in order to investigate if slums on public land have a higher chance of being declared. The sample generated the following weighted logistic regression equation:

$$\text{logit}(\text{SLUM DECLARED}) = \underset{(0.001)}{0.006}(\text{NUMBERHOUSEHOLDS}) + \underset{(0.23)}{1.77}(\text{PUBLIC}) - \underset{(0.17)}{2.60}$$

(Exhibit 7)

The variable “Number of Households” was statistically significant at the 0.01 p-level and positively correlated with a slum being declared. The variable “Public” was also statistically significant at the 0.01 p-level, suggesting that location on public land is positively correlated with slum declaration. The pseudo R-squared value was 0.15, suggesting that a small fraction of the variation in slum declaration can be explained by the regressors included in the logistic regression equation.

Developing a sense of the physical condition of the slums in the sample is critical when comparing these observations to the informal settlements in 2012. Using the weights from the 1993



sample indicates that 43.07% of slums are located on land that is privately owned. The sample also revealed that only 51.53% of slums had light sources available to use besides just streetlights. Only 13.36% of the slums had planned layouts, meaning the vast majority of settlements were not structured according to a pre-determined strategy. The 1993 survey classifies the housing structures within a slum as either: pucca, semi-pucca or katcha. Housing structures may be indicative of whether a slum is in an urban or rural area as “katcha houses are generally seen in most of the rural areas and pucca and semi-pucca houses are seen in most of the urban centres.”²² A katcha house is classified as a structure “built with non-durable materials like un-burnt bricks, mud, thatch, leaves and bamboo”²³ While a pucca housing structure is one built with “durable materials like oven-burnt bricks, concrete, cement, or iron.”²⁴ A semi-pucca structure is a combination of the two types. About 45.88% of slums from this survey round are either pucca, or semi-pucca structures. Though the locations of these slum communities cannot be confirmed from the information provided in the survey research, the housing type is the closest potential indicator of whether an informal settlement is rural or urban. The dataset for slums in 2012 only contained urban observations, and therefore all the collected data described slums with pucca structures. In order to compare similar sample groups between 1993 and 2012 when examining the improvements made during each of these time periods, the sample was restricted to only pucca dwellings.

The majority of slums in the sample (94.1%) used either hand-pumps, unprotected wells, or tap water as the source of drinking water for the community. None of the slums in the survey utilized certified filtered sources for drinking water. When considering sanitation concerns for slum communities, a pressing issue is sewage management. Only a startling 9.0% of the settlements had an underground sewage system, thus suggesting that the majority of communities have visible sewage channels. On a related note, 54.8% of slums do not have any coordinated garbage disposal system. Understanding the amenities, or lack thereof, is instrumental in acknowledging the challenges slum residents face within their communities. It also provides insight into potential factors that may influence household heads’ abilities to provide for the other household members. For example, a community with no electricity may affect the ability of a resident to do his/her homework because the student would be restricted to only working during daylight hours. While the sample does not include questions of this nature, the sample does provide details about living conditions and shows the daily challenges residents may face. When considering potential obstacles for children, the distance from the community to the nearest primary school may influence the likelihood of a child to attend school. About 97.5% of slums were 2 kilometers or less from a primary school, with 91.27% of slums within 1 kilometer of a primary school. These survey results reveal that for most slums, basic primary education was available and accessible to children living in the community. While the survey did not provide details about the quality of the primary education, the sample did determine that the majority

22 B. Datta-Ray, *Agenda for North-East India*, New Delhi: Concept Pub. Co., (2002): 173.

23 *Housing finance mechanisms in India*. Nairobi: United Nations Human Settlements Programme, (2008): 3.

24 Ibid.



of slum communities had a primary school within the vicinity of the settlement.

One of the questions in the survey asked if residents have a designated association. From the recorded responses, only 18.78% of the slum communities had an association dedicated to improving the condition of the settlement. When comparing survey responses from 1993 to those from 2012, it is essential to evaluate variables such as an affiliated association, when considering the involvement of residents in their community. Though the same slums were not sampled for each survey round, it will be instructive to note whether there is a trend toward an increasing number of associations. Residents' investment in the improvement of their communities is essential to generating change; considering that families living in informal settlements are often marginalized in society at large.

The final part of the survey evaluates whether improvements in the slum have occurred and identifies the sources of these improvements. The following table records whether any improvements have taken place in the last five years, and then breaks down the government involvement in these improvement projects.

	Recorded Improvement in Condition	Government Was Source of Improvement
Road	38.50%	90.30%
Water	46.60%	89.70%
Latrine	10.48%	78.80%
Sewerage	5.50%	83.72%
Garbage Disposal	15.07%	88.78%

(Exhibit 8)

Over 46% of slum communities reported that they had seen improvements in their water supply within the past five years. From the fraction of settlements that recorded improvements, 89.7% identified the government as the source of the improvement. While improvement in the water supply is a positive change for the slum, it is disconcerting that only 5.5% of slum communities reported any experience with improvement in the condition of sewage control. Similarly, less than 15% of settlements reported any improvement in latrine facilities and garbage disposal — two components critical to improving sanitation. While these challenges are structurally more complicated to combat, the



health of residents remains a large concern. It is evident, from these survey responses, that residents face many pressing challenges within their communities; however, not all of these challenges are easily remedied. The next dataset provides similar insights regarding informal settlements in 2012, however it is restricted to include only slums with pucca structures. Therefore, an additional table is displayed below that provides information about improvements for strictly pucca communities.

	Recorded Improvement in Condition	Government Was Source of Improvement
Road	45.30%	88.65%
Water	48.90%	85.23%
Latrine	18.84%	80.47%
Sewerage	10.55%	85.76%
Garbage Disposal	19.45%	85.77%

(Exhibit 9)

While there appears to be a minor increase in each improvement type for pucca housing communities, the same data patterns emerge. The three sanitation variables: latrine, sewerage, and garbage disposal, exhibit the least amount of recorded improvement. When analyzing the next dataset from 2012, it will be critical to examine two things: whether there is more recorded improvement and whether the government is becomes more involved as the source of these improvements.

B. National Slum Dataset from 2012

As indicated by the title, Urban Slums Survey: NSS 69th Round, the dataset from 2012 only includes information about slums in urban areas. According to the summary report from the Ministry of Statistics and Programme Implementation, the survey attempts to “assess the dynamics of the condition of slums – whether certain undesirable (“slum-like”) features were improving or worsening over time.”²⁵ The responses were generated from a sample of 881 slums, covering areas from all over India. The sample consists of slums that are both notified and non-notified. A notified slum is deemed an informal settlements that is declared a slum “by the concerned municipalities, corpora-

25 Government of India. *Key Indicators of Urban Slums in India*. Ministry of Statistics & Programme Implementation.



How could residents be incentivized to migrate to rented housing when they have a permanent housing structure, free of charge? While the remaining data does not provide additional information about these types of questions, it is critical to consider what housing structural choices may reveal about residents' attitudes toward mobility.

Amenity Frequency	1993 (restricted to pucca housing)	2012
Household electricity	69.70%	87.12%
Underground Sewage	17.10%	29.00%
Public Latrines	Not included in dataset	31.00%
Improvement Association(s)	21.68%	18.40%

(Exhibit 11)

Only 28.9% of the slums surveyed had an underground sewage system. On a similar note, only 31% of slums had public latrines, while a startling 31.3% of slums had no latrine facilities at all. Sanitation and waste removal are evidently pressing issues for many slum communities. The sample also indicates that 26.78% of informal settlements had no method of garbage disposal. While these variables do not explicitly describe upward mobility potential, they do provide insight into the quality of life of slum-dwellers. If the community cannot meet the basic needs of its residents, it may explain phenomena like low school attendance, as children face these inherent challenges in their daily lives. While there is no data to directly support this type of hypothesis, understanding the multitude of challenges residents experience in slum communities is essential to consider when assessing their behaviors.

In the 2012 sample, 87.69% of settlements were 1 kilometer or less away from a primary school. However, the closer proximity may instead have been reflective of the strictly urban sample. Despite the myriad community challenges residents face, only 18.4% of surveyed settlements had a residential association devoted to improving the condition of the slum.



	Recorded Improvement in Condition	Government Was Source of Improvement
Road	53.24%	97.90%
Water	42.85%	97.35%
Latrine	32.18%	73.50%
Sewerage	22.11%	98.00%
Garbage Disposal	34.01%	96.40%
Education Facilities	30.35%	80.60%

(Exhibit 12)

The fourth part of the survey described any improvements made to the slum community and identified the parties responsible for those changes. The exhibit above details these improvements and the involvement of the government in generating them. From the 2012 data, a larger percentage of slums recorded that there were improvements made to the latrine facilities within the past five years. While a larger percentage also reported improvements to their sewage control, it is evident that sewage improvement was not as prioritized as other areas in need of assistance. The sample also recorded improvement to educational facilities, with about 30% of slums showing improvements to their primary educational facilities. According to the Particulars of Slums survey write-up, “improvement in educational facility at primary level includes setting up a primary school closer to the slum, increase in number of teachers or seats for students, etc.”²⁸ This positive change suggests an investment in the early education for children. With education as a potential vehicle out of poverty, the improvement in primary educational facilities is a critical step toward assisting residents living in slums. According to Exhibit 12, it is clear that the government was responsible for generating a majority of these improvements. While the responses from the 1993 survey have been compared to those from the 2012 survey, it is important to reiterate that the strictly urban composition of the 2012 survey may explain some of these differences.

A final part of the dataset included weights in order to estimate the number of slums in each state. The following table displays the five states with the highest number of slums, according to the provided weights:

28 Government of India. *Key Indicators of Urban Slums in India*. Ministry of Statistics & Programme Implementation.



Maharashtra	7,722.73
Andhra Pradesh	4,538.55
West Bengal	3,957.28
Gujarat	2,923
Tamil Nadu	2,363.62

(Exhibit 13)

Delhi does not have nearly as many recorded slum communities, with a weighted number of 457.57 slums. From the list of JJ clusters provided by the Delhi Urban Shelter Board, this estimate is quite low; the Delhi Urban Shelter Board records 675 slum communities — only including those on publicly-owned land. This suggests that perhaps the weighted estimates underestimate the number of slums in each state.

The weighted summary of states also suggests that in 2012 at the national level, there were 33,510 urban slum settlements. However, when pucca housing was used as a proxy for urban slums, the 1993 sample suggests that there were 54,100 urban slum communities in India.

According to the weighted samples, there is a significant decrease in the number of slums nationwide. For example, in the 1993 dataset, there were 15,515 slum communities in Maharashtra alone. The examination of slum communities over time suggests that, as a whole, the conditions in slums are improving and the government is responsible for a larger part of these improvements. However, it also reveals that the aggregate number of slums in India decreased between 1993 and 2012. This poses the question: is there lesser demand for slums or are governments destroying these settlements?

SURVEY OF THREE SLUM COMMUNITIES

A. Introduction

According to the Delhi Shelter Board, the state of Delhi is home to 675 slums. However, this figure only accounts for those slums recognized by government agencies and municipal organiza-



tions. Determining whether slum communities in Delhi are poverty traps becomes further complicated by the inherent ambiguity surrounding the definition of “slum.” Though this has been a recurring theme of this paper, it is critical to reiterate that the list of 675 informal settlements only covered one designated category of slum. In addition, the list failed to account for the communities the government did not directly acknowledge as a “slum,” though these communities may fit the broad definition of it. It is important to recognize that not all families living in “slum conditions” were recorded as part of a slum: a group of 100 families illegally living behind a government agency may have been considered a JJ cluster, but a group of 20 families sleeping in pucca dwellings under a highway bridge may not have been counted. Simply stated, while the government agency list contains brief descriptions of 675 slums, the true count of slums is likely greater than 675 communities.

Considering the diversity of slums in Delhi, an initial question guiding the survey development was: should slums be treated by the government as a single entity? In order to further investigate this, three different communities were surveyed from the comprehensive list of JJ clusters. The first was the Indira Camp in Vikas Puri, located in West Delhi with an estimate of approximately 100 households. The second community chosen was Deepak Colony in Dilshad Garden, located in East Delhi with approximately 200 households. Finally, the third settlement was G-Block in Mangol Puri, located in Northwest Delhi with approximately 270 households. The three settlements were chosen via a method of random selection. Each slum on the JJ Cluster list was assigned a number 1 through 675. Using a random number generator, I chose three numbers. The three randomly selected numbers corresponded to the three aforementioned communities. It is evident from the brief descriptions of the settlements that there was variation in geographical and population size. When designing the survey, I initially planned to record the housing unit numbers of households in order to randomize interviews as well. However, two of the communities did not have readily available housing numbers; thus, two of the samples involve respondents who were not randomly selected.

From surveying these three slum settlements, I aspired to gauge whether there were substantial differences that would effectively demonstrate that the term “informal settlement” is too broad to classify all types of slums. From my previous experiences in Delhi, particularly with informal settlements, I noticed that there are significant differences between slum communities. For some, slum housing means a tarp roof, disintegrating brick walls and a dirt floor. For others, these dwellings are two stories with mortar painted walls, a water pipeline, and a bathroom specifically for the household. Both households are classified as part of an informal settlement, but do they both have the same opportunity to migrate out of their communities to legal housing? With this question in mind, the survey focuses on collecting information about migratory patterns, education investment, and the monthly household expenditures of households (as an indicator of a household’s potential to save).



B. Survey Discussion

The first section of the survey focuses on developing a profile of the household head. I was particularly interested in collecting data about the household head's occupation in order to gauge whether slum communities attract a common profile of worker — particularly, if the work is temporary and/or dependent on project availability. From my experience working with the Kathputli Colony settlement in central Delhi, I know that many of the residents are artists who do not have a consistent monthly salary. Instead, the artists experience large variations in monthly income as a result of their dependence on securing temporary work opportunities. I want to investigate whether this is true for other slums as it may help to explain saving challenges; saving income is potentially more challenging for those households without a consistent source of income. Secondly, household heads (or a knowledgeable household member speaking on behalf of the household head) were asked about migration information. The migration section poses a myriad of questions: if an individual was born in the informal settlement, and lives in the same community at the time of the survey, do they hope to emigrate out in the future? If not, why would they choose to remain? On a similar note, if a household head is instead an immigrant, from what type of community are they immigrating? I was particularly interested in identifying whether the individuals migrated from one slum to another; or if there were cases of downward mobility where an individual migrated from city housing to an informal settlement.

The second part of the survey further focuses on the migration of individuals and those within their community: their neighbors. Through asking slum residents about migration patterns, I aimed to better understand who, if anyone, was leaving the community. If a resident answered yes to knowing an individual who left, then the follow-up question asked for specification about where the individual went. A critical question in this section was also whether a resident had a desire to leave the community. The cultural ties and internal politics of informal settlements complicate determining whether an individual is capable of migration out of the settlement. Many communities are united by a common language or have families from neighboring villages. Others hold political roles within their communities and are empowered in the environment, a stark contrast to the disenfranchisement they experience outside of these communities. However, if a resident holds no desire to emigrate out of the slum, could this also be an indicator of the government failing marginalized constituents? This is a challenging and multifaceted phenomenon to consider: if a slum resident possesses the necessary financial capital to rent an apartment outside of the slum, why would they not leave? Do residents place a higher value on the community and free (illegal) housing than on independence and self-reliance? The answer is evidently not straightforward, but is a critical piece of the migration survey as it hones in on some behavioral economics within these communities.

The next section of the survey shifts the focus toward the educational attainment of the children of the household. If the respondent identified that children live within the household, then



their ages, genders, and education levels were added to the end of the survey. The survey specifically aimed to better understand the value placed on education: do parents spend part of their income on tuition services for their children? Are children completing high levels of education? Recording the ages of the children will also indicate if there are any trends in education for different age groups. Just as the education of household heads differed from that of the household children in the NSS dataset, perhaps this survey could reveal different education trends for children within disparate age groups.

The final part of the survey recorded the weekly household expenditure on food items.

Food expenditure patterns may indicate the potential a household has to save income. For example, if the household eats no meat or sugar products, and consumes very little dairy, this minimal expenditure may indicate the household has minimal income to save. As meat and sugar products are luxury goods, low weekly household expenditure may be an indication of lower income households.

C. Results

In order to investigate the type of work performed by residents from each community, I utilized the employment information of the household head to classify whether the type of work yielded consistent wages — including workers who performed temporary work. The following table breaks down the percentage of workers in each community who rely on wages from jobs where work is not dependable and/or not permanent:

	Percentage Workers Inconsistent
Vikas Puri	4%
Deepak Colony	56%
Mangol Puri	20%

(Exhibit 14)

While only 20% of surveyed residents from Mangol Puri performed jobs that do not have consistent, salaried incomes, nearly 60% of surveyed residents in Deepak Colony performed this type of work. The job of the household head is a critical consideration when evaluating upward mo-



bility potential.

A resident that does not have consistent income, and therefore consistent opportunities to save, was plausibly disinclined to migrate out of the slum. A key finding from the survey was that less than 13% of household respondents have any desire to migrate out of the slum. This piece of the survey revisits the notion of incentives: how could Delhi slum residents be incentivized to migrate out of slum communities? If slums were originally intended to be places of temporary housing, how can they reclaim this purpose?

The survey findings also revealed that few community members were emigrating out of the slums. While the subset migration data sample collected had only 10 data points, all of those observed migrated to either another slum or back to their village. Not a single household transitioned to legal housing within the city. Only two of the 55 households observed knew a neighbor in the past year who had migrated out of the slum. Though the sample size is small, the collected results suggest that families were migrating to the slum and staying; though this may not be a direct reflection of their inability to migrate, but rather their lack of desire to leave the community. The aggregate sample revealed that 81.08% of those who migrated from another state came from either Uttar Pradesh or Bihar, states that are culturally similar to Delhi. While the majority of the sample designated Hindi as the language spoken within the household, of those households that did not, 42.86% identified Bihari and 42.86% identified Rajasthani. When considering the plausible cultural ties that bind residents to their communities, the common languages and/or same home states may have influenced the decision of households to remain in the slum communities.

From the sample of 55 households, there are a total of 186 children. Eighty of these children were attending school, while 61 of them were also attending an after school tutoring program.³ The mean monthly school fee per enrolled student was 243.72 rupees, with a standard error of 656.4 rupees. The mean monthly tutoring fee per enrolled student is was 363.73 rupees, with a standard error of 575.81 rupees. The large standard errors were a result of the extreme variation in fees. While many children had no schooling fees, some of those children that did, also large fees. The maximum monthly school fee from the sample, for example, was 4,166 rupees — the equivalent of university tuition of a student-resident. From the sample, the mean total monthly schooling fees per household was 377.16 rupees, with a standard error of 960 rupees; while the mean total monthly tutoring fees per household was 424.26 rupees, with a standard deviation of 854.38 rupees. Though not every household was paying large sums for the education of their children, many households were investing in the education of their children.

When the years of education was age-restricted to household children over the age of 25 years, the mean level of education was 5.14 years, with a standard error of 0.66 years. However, when the mean years of education was age-restricted to observations between the ages of 16 to 24 years, the value increased to 8.23 years, with a standard error of 0.55 years. The difference of over 3 years between the two subsamples suggests that the mean number of years of education is increasing



as student-residents are pursuing more education.

In order to capture the variation in food expenditure, a principal components analysis was performed. The following exhibit details the breakdown of the principal components analysis:

	Principal Component	Mean Value	Calculated Product
Meat	0.31	289.1	89.621
Dairy	0.66	265.56	175.2696
Sweets	0.69	100.73	69.5037
		PCA:	264.8906

(Exhibit 15)

The principal components analysis simplified the data by capturing the large variances of each of the components. The end result, 264.9 rupees, was the maximum variance of these components, thus simplifying the expenditure value to be explained by this variance.

While I utilized caution when evaluating the data, as only 55 communities were included in the sample, disaggregating the sample by location would help to indicate if there were differences between communities. The mean total weekly food expenditure for a household in Vikas Puri was 690 rupees, with a standard error of 300 rupees. In Deepak Colony, the mean total weekly food expenditure was 717.2 rupees, with a standard error of 548 rupees. However, in Mangol Puri, the mean total weekly food expenditure was 566 rupees, with a standard error of 212.86 rupees. While there is inherent variation in the recorded expenditures, as indicated by the large standard errors, it is interesting to note that the mean weekly totals are all within one standard deviation of the other means. Effectively, we cannot reject the null hypothesis that there is no significant difference between these mean values. This finding contradicts works against the proposed hypothesis that there are differences between slum communities.

However, it is critical to note that the slum communities were not stratified before the three samples were selected. The slum communities should have been stratified into economically similar categories before the three communities were selected. This was an initial challenge during the



survey development, as I was not able to obtain information about tax brackets within Delhi — a method of stratification according to the income levels of the greater community. However, by simply selecting from the comprehensive list, I plausibly could have selected three communities that are economically similar.

A second potential flaw in the survey design was the question of household children.

Though translated survey specifically asked about children living within the household, I worry that many respondents may have simply replied with information about the children in their family

Defining households became challenging in areas where relatives live in the same areas. I initially believed that identifying a household would be clear; however, I realized during the survey phase that many household members move between area residences. Another potential harm to the survey results was the use of “sugar” in the expenditure portion of the survey. For

³ It should be noted that children not in school are excluded when calculating mean values, total values, etc.

this part of the survey, sugar consumption was meant to capture luxury good consumption sweets, like *mitthae*. However, it is plausible that many families included sugar consumed for non-luxury purposes in this calculation.

While the survey did have some challenges, overall the results indicate that many households highly value education and investment in the education of their children. The nearly unanimous response that household heads did not want to leave the slum provided insight into the cultural ties that may deter residents from migrating. The survey results appear to conclude that there is nothing transitional about Delhi slum communities.



CONCLUSION

I would like to begin my conclusion by providing a brief anecdote from the data collection process. During the summer of 2016, the Delhi government ramped up its eviction of Kathputli Colony residents. During the two prior years, I had worked with the community and had seen minimal evictions. When I arrived in the summer of 2016, entire blocks were destroyed and, the remaining houses were empty. I learned that people fled the dilapidated structures, often returning to their villages, rather than risking living in the community any longer.

I have a special relationship with the community as I have been welcomed by the community president. I met with him early on in the summer; he explained to me that residents who did not return to their villages, instead opted to live in the promised resettlement housing. Groups of families would leave for these camps, as they believed they would be supplied with fair housing. The president articulated to me that his biggest concern was that residents were not securing any formal documentation before leaving their shelters in Kathputli, therefore when they arrived at the resettlement camps, they were randomly assigned housing.

Many families also did not understand that the housing was temporary — the government assigned a two-year expiration date for the camp.

Before I could select the three communities to survey for my thesis, I needed access to the comprehensive list of JJ cluster slum communities in Delhi. The Delhi Urban Shelter Board, located on a dirt side road near the metro, published the updated list annually. I found the address for the office, and, after nearly four hours, finally met with the man responsible for identifying each JJ cluster in Delhi.

After securing the list, I politely asked him about the disarrayed state of the Kathputli Colony. With a smile on his face he said to me, “this is what they want. We are giving them a chance at a better life.” Now, whether that was a fabricated lie to divert my attention away from the government’s true motives, I will never know; but, it does bring me to an important piece of my conclusion: the friction between the government and slum-dwellers is impeding any progress toward sustainable solutions for slum communities. Kraay and McKenzie dispel the myth of poverty traps as they claim that poverty can persist without the presence of a poverty trap.²⁹ They further argue that while poverty traps can exist (though they are rare), the most substantial evidence for traps comes from people stuck in places of low productivity.³⁰ I agree with Kraay and McKenzie in that Delhi slums are not poverty traps, — I will revisit this point shortly — but instead are, as Marx describes, policy traps: communities with extreme policy neglect.

²⁹ Aart Kraay, and David McKenzie. “Do Poverty Traps Exist? Assessing the Evidence.” *Journal of Economic Perspectives* 28, no. 3 (2014): 128.

³⁰ Ibid, 145.



Earlier in the paper, three factors — education, migration, and expenditure (as a proxy for savings potential) — were identified as plausible indicators of upward mobility potential. Beginning with education, the data from both the NSSO 2007-2008 survey, in conjunction with the data I collected from the three communities, conveyed positive changes in education. Gender was statistically insignificant in determining the education attainment of a child. The average younger child is attending more years of schooling than children in older age brackets. Though it was observed that families from ethnic groups (as a proxy for slum communities) have lower rates of return on education, the data from my sample indicated that many households are still spending large portions of their income on the education of their children. The educational opportunities for children from slum communities have improved over time. There is no data to suggest that slum children are not able to attend schooling like their peers who do not live in slum settlements. Legislative acts such as the Right to Free and Compulsory Education (2009) state that children from economically weaker sections (EWS) need access to quality education, ensuring that 25% of students in private schools come from EWS communities. Universities even set aside a certain number of seats specifically for students from lower castes. While slum residents face discrimination in their daily lives, access to education is becoming less of a concern. Abhijit Banerjee even noted in his 2012 report of Delhi slum communities that while slum-dwellers were discontent with sanitation and access to water, education was not one of their concerns.³¹

When considering migration, the results from my survey, as well as the absence of a single ethnic group out-migrant from Delhi in the NSS 2007-08 data set, indicate that Delhi slum communities are far from transitional spaces. This brings us to an important point to consider: if a community is not transitional, does this automatically imply it is a poverty trap? When I first began this thesis, I believed that communities either existed as transitional or traps, but I have now realized the issue is multifaceted. Residents may have the ability to leave their slum communities; however, the data clearly indicates that the majority has no desire to leave. This brings us back to the notion of a policy trap. How can government policy shift so that residents aspire to transition out of slum communities?

In recent years, the Delhi Government and the Delhi Development Authority have moved from an “eviction driven approach to acknowledging, at least on paper, the need to incorporate the urban poor into their planning processes.”³² The Delhi Shelter Board official assumed he was capable of making the decision as to what was best for the Kathputli Colony. When I asked him if he had worked with any residents in formulating policy proposals, he could not claim he had. Ahluwalia summarizes the overall necessary shift: “we have to view slums as housing that can be upgraded and dignified.”³³ However, the Delhi government also needs to generate a plan for slum-dwellers to

31 Abhijit Banerjee, Rohini Pande, and Michael Walton, *Delhi's Slum Dwellers: Deprivation, Preferences, and Political Engagement among the Urban Poor*, (2005),

32 Subhadra Banda, Yashas Vaidya, and David Adler, “The Case of Kathputli Colony: Mapping Delhi's First In-situ Slum Rehabilitation Project,” *Centre for Policy Research* (2013).

33 Isher Judge Ahluwalia, *Transforming Our Cities: Postcards of Change*, (Noida, India: Harper Collins, 2014): 288.



move to formal housing. Dupont goes as far as to claim that the perpetuation of slum communities is a result of “the inadequacy of the various slum clearance programmes implemented since the 1950s as well as the inability of the DDA to provide affordable housing.”³⁴ Mehra further confirms that community engagement is a critical part of achieving a slum-free India.³⁵ The government needs to improve communication with informal settlements in order to create any sustained improvement. From my Kathputli Colony anecdote, it is evident that the miscommunication between the Delhi Shelter Board and slum residents led many Kathputli Colony dwellers to not grasp the conditions of the resettlement camps.

Ahluwalia also suggests that the “the government should not be a provider, but a facilitator.”³⁶ Progress is possible if the government involves more agencies and organizations in its improvement efforts. Considering the slum assessment data, while the government is often responsible for the majority of improvements in these communities, there are basic provision areas — like sanitation and garbage disposal — where it does not provide much improvement for slum communities. If the government involved other groups, including community residents, in the improvement process, perhaps there would be a substantial difference in meeting the basic needs of residents. It would also encourage residents to investment in their communities.

Dupont further points out that the Delhi Development Authority (DDA), a government agency responsible for slum planning, is not consistent as it “oscillates from laissez-faire to a posteriori regularisation, without excluding selective demolition of unauthorized constructions.”³⁷ Consistency of government action is another critical part of improving the relationship between slum-dwellers and city authority. In his 2012 report, Banerjee identified that most slum families are long-term migrants to the settlements³⁸. This simple observation provides tremendous insight into the need for government agencies to reconsider the role of slum communities. Perhaps the age of slums as transitional communities has ended. Rather than focusing on repeatedly dislocating a growing community of residents, government agencies should work with residents to improve the conditions of settlements — introducing tenure to housing units, supplying basic services, etc. Slum residents need to be better integrated into society and involved in the decisions regarding their communities. Consistent with the notion of disaggregating slum data, government organizations should recognize the specific needs of different slum communities. Ahluwalia highlights the importance of encouraging social inclusion of slum residents in direct government decisions.

I began this paper with the goal of identifying whether Delhi slums were transitional communities or poverty traps, and I have discovered they are neither. “Poverty trap” is an overgeneralized

34 Veronique Dupont, “Slum Demolitions in Delhi since the 1990s: An Appraisal,” *Economic and Political Weekly*, JSTOR, (2008): 80.

35 Rakhi Mehra, “Designing for Livelihoods in Government Slum-Rehabilitation Projects: Sundernagari, Delhi.”

36 Ahluwalia, 295.

37 Veronique Dupont, “Socio-spatial Differentiation and Residential Segregation in Delhi: A Question of Scale?” *Geoforum* 35, no. 2 (2004): 165.

38 Banerjee, 10.



term that does not address the intuitive motivations of community residents. It is implausible to conclude whether Delhi slum residents have the financial means to migrate when they have no intention of ever leaving the slum. The idea of a transitional community is also increasingly irrelevant when discussing Delhi slums. The sheer number of slum communities in Delhi prevents these settlements from ever fully restoring their role as transitional camps. However, instead of considering the community a vehicle of transition, it is essential to consider the community as the society transitioning. Rather than working to eradicate slums, the government should focus on supporting these communities and improving the lives of the people who live within them; finding avenues to encourage the formal recognition and legal support of these communities.

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PROFESSOR INTERVIEW



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TELL US A LITTLE BIT ABOUT YOUR BACKGROUND AND HOW YOU GOT INTERESTED IN ECONOMICS?

Sure. I grew up on the East Coast, in New York, and went to college and graduate school in New England. I became interested in economics while I was in college. I hadn't had any thought of going into economics before I went to college, but I took-- as do a lot of people going into economics -- introductory economics and found it very interesting and decided to major in Economics and Mathematics, and decided to pursue a PhD. And so I did. I got interested in particular issues I work in in economics while I was a graduate student, again because of courses I took that I felt were interesting.

WHAT WERE YOUR FAVORITE ECONOMIC CLASSES THAT YOU TOOK AS AN UNDERGRAD?

I'm not sure I had a favorite... I liked macroeconomics, mathematical economics, I liked most of the economics classes that I took.

WHAT TYPE OF ECONOMICS DO YOU SPECIALIZE IN, AND WHAT KIND OF RESEARCH ARE YOU CURRENTLY DOING?

I work in public finance, that's my main field, and in public finance, I work on issues of taxation, the effects of fiscal policy on the economy, the long-run budget issues how they're affected by demographic change and population aging. Those are the

issues that I have worked on. In taxation, I worked a lot on business and corporate taxation. These are issues that I have worked on for many years.

DO YOU MIND ME ASKING HOW YOU GOT INTO THE TOPIC OF TAXATION AND PUBLIC FINANCE?

Sure. It was a combination of the professors I had in graduate school. I did not take a course on that as an undergraduate, but I had some influential teachers in graduate school that worked in those areas and just led me to believe that that was an interesting area to work.

SO, PROFESSORS REALLY SHAPED THE DIRECTION OF YOUR EDUCATION?

Yes, absolutely.

YOU SERVED AS THE DEPUTY CHIEF OF STAFF ON THE US JOINT COMMITTEE ON TAXATION. CAN YOU TELL US WHAT THAT EXPERIENCE WAS LIKE AND THEN, EVEN IF IT IS A NONPARTISAN ORGANIZATION, DID IT HAVE A DIFFERENT CLIMATE THAN WORKING IN ACADEMIA?

I was teaching at the University of Pennsylvania then-- that was in the early 1990s-- and at that time, I had already had a lot of interaction with the government, testifying before congressional committees, consulting to the US Treasury and so forth, and the Chief of Staff of the Joint Committee on Taxation asked me if I wanted to spend some time there, on leave from

academia. I thought it would be an interesting thing to do at the time, and it was a very interesting year. It did not make me want to be a permanent government employee, but spending a year in Washington certainly gave me a broader perspective on how the legislative process works and what determines what tax policy is. It's very different from academics. In academics, we have a much longer horizon in thinking about issues. If I'm working on research projects, I might be working on it for several years, and sometimes things I work on don't work out and I'll turn to something else, or sometimes they do, but I work on a lot of different things that I'm interested in. If you're working for the government, you don't have the luxury of deciding what to work on and you also don't have such a long horizon. You have to get things done very quickly and move onto the next. So it's a different environment, but on the other hand, you're very involved in the policy process.

WITHIN WORKING IN THE GOVERNMENT, WOULD YOU SAY THAT YOU HAVE A SPECIFIC GOAL THAT YOU NEED TO MEET?

Right. I mean, you can influence. You can, when having discussions with people, you can say, "based on my research, or the research that others have done, these are the issues you should be thinking about," even if you're not, but typically there's an agenda there that you just have to follow. You can't really influence, at least not



in the short-term, the direction at which activity goes.

CURRENTLY, YOU'RE THE DIRECTOR AT THE ROBERT D. BURCH CENTER FOR TAX POLICY AND PUBLIC FINANCE. WHAT HAS BEEN YOUR EXPERIENCE IN ACTING AS THE DIRECTOR AND WHAT HAS BEEN YOUR GREATEST ACHIEVEMENT SO FAR?

What I do here, in directing the Burch Center, is organize conferences, help fund research, fun speaker series for the department, just a variety of fellowships for graduate students. Basically, it's just really there to promote research and learning in tax policy and public finance.

HOW DOES THAT INTERACT WITH BEING AT BERKELEY, IN GENERAL?

Well, it's a way of promoting the research activity that we do here anyway, as members of the faculty. Our interaction with undergraduate students is, of course, largely in the classroom, but a lot of the time we spend here is doing our own research, helping graduate students-- people who are doing their PhDs-- pursue their own research. The Burch Center more or less helps promote all of that activity.

WITH THE RECENT TAX LAW PLAN IN CONGRESS, WHAT ARE YOUR GENERAL THOUGHTS ON IT THUS FAR?

Well, I think that there are some important items that should be

considered for tax reform. I think some of them are being considered in the current legislation, others not. I think that also the approach of trying to do this very quickly is probably not productive, because these are complicated issues. I was involved the last time there, in the 1980s, the last time there was a major tax reform, and in that case, it took several years for the final proposal to be hammered out. There were a lot of ideas that came and then were rejected for various reasons, and I think that is the way it should go, and trying to press along in just a few weeks is bound to lead to some mistakes, where things are done without fully thinking through. That's really being driven by a political drive to get something done, but it's not necessarily the best way to do it.

HOW DO YOU VIEW FISCAL POLICY WITHIN THIS CURRENT POLITICAL CLIMATE?

Well, it has been hard for several years, because it's so partisan in Congress. When we had a very serious recession starting in 2008, it was difficult to get legislation through, which was really needed to support the economy during what could've been a really big depression. We managed to get some things through simply because it was such a dire circumstance, but it has been very difficult ever since then, and I think it makes policy less good to have that kind of partisanship.

AS OF RIGHT NOW, WITH THE CURRENT TREND OF HAVING JUST VERY LOW INTEREST RATES, DO YOU THINK THE IMPORTANCE

OF FISCAL POLICY HAS REALLY HEIGHTENED?

Yeah, I think it is important and I think that's likely to be a big issue the next time we have a recession. If we're still at very low interest rates, then monetary policy is not really able to do as much, and that will mean fiscal policy should be bearing more of the burden of counter-cyclical policy, but there may very well be two problems: One is if we go ahead with some version of the tax bill that is moving through in Washington right now, we may have much bigger national debt because they allow big deficits in that legislation. That will constrain our ability to have a fiscal response. In addition, if we have such polarization in Washington, it may make it very difficult for us to actually pass anything, because there will be such division.

TYING BACK TO THE TAX BILL, LIKE YOU MENTIONED, IT IS CURRENTLY BEING DEBATED, BUT IN A SHORT TIMELINE. IT HAS FACED A LOT OF SCRUTINY FROM THE OPPOSITION, WHO CLAIM THAT IT DISPROPORTIONATELY FAVORS THE WEALTHY. DO YOU SHARE THIS OPINION AND IF SO, DO THE BENEFITS OF CUTTING TAXES DISPROPORTIONATELY PAID BY THE WEALTHY, IN TERMS OF EFFICIENCY, OUTWEIGH THE COSTS IN TERMS OF EQUITY?

I think it does unduly favor the

"In fact, one of the most difficult challenges that graduate students face is making the transition from being a student to being a researcher."

wealthy, probably not as much as simple calculations suggest because I do think that some of the economic changes will help improve wages, for example. So I think it is probably not quite as unequitable as some people suggested, but it could have been made much more equitable, had it been designed in a different way. That probably would have been the outcome if it was done on a more bipartisan basis. But given the way it's happening, it's much more constrained in terms of what they can do.

LOOKING AT THE BILL, IF YOU COULD, WHAT WOULD BE SOME THINGS THAT YOU WOULD CHANGE?

There are some problematic provisions attempting to lower taxes on so-called pastor businesses which I think are going to be ultimately quite difficult to administer, because it is difficult to distinguish between individuals and small businesses, and I think in the end, a lot of those provisions are going to prove to be pretty unequitable in terms of helping very high-income people. So that's an example. There are some provisions to get rid of tax deductions to what we call tax expenditures – like mortgage interest deductions, deductions for state and local taxes – which I actually think is a move in the right direction, but I think it would have been much better to modify these changes to have them much more gradual, much less disruptive to the economy and to the markets involved, like the housing market.

IF THIS CURRENT BILL WERE TO PASS IN ITS CURRENT STATE, WHAT KIND OF IMPACTS WOULD YOU SEE COMING DOWN THE LINE?

I think there would be an increase in interest rates because of the increase in deficits, particularly in private interest rates. I think there would be some improvement in business activity in the US because of the lower corporate tax rate, and I honestly think if we were to pass some version of this tax bill currently pending, we would probably see additional tax legislation in the next few years because I think the deficits that these plans create really won't be sustainable and they'll have to do something about it.

WHERE, IN YOUR OPINION, IS MOST OF THE FUNDING COMING FROM? BECAUSE WHEN YOU SLASH TAXES, OBVIOUSLY IT HAS TO COME FROM SOMEWHERE ELSE.

It's going to come from future generations, younger people like you.

THERE HAVE BEEN A LOT OF ARTICLES POPPING UP ABOUT THE IMPACT OF DEDUCTIBLES ON STUDENT LOANS AND

SPECIFICALLY THE TUITION WAIVERS FOR GRADUATE STUDENTS. SO WHAT'S YOUR OPINION ON THAT?

That's a kind of example that you might think, in the long run, makes sense. For example, if I'm a university employee (not at Cal, but at some other private university), one of the benefits I get is a tuition benefit where our kids get some kind of a tuition subsidy that's not taxable. I don't think that's necessarily fair because most people don't get benefits like that. On the other hand, if you have a benefit like that one day, and then you just get rid of it, I think that's a pretty stark change and so I wouldn't do it that way. And that's true of taxing tuition waivers and other things. We can say that the current situation is unequitable, and so we want to eventually approach some system where we're not giving that benefit. But that doesn't mean we should do it immediately, or even in 5 or 10 years; it could be something you gradually phase in over a long period of time.

WHAT KIND OF ADVICE WOULD YOU GIVE TO PEOPLE WANTING TO PURSUE GRADUATE SCHOOL LATER ON?



I would say you should understand that it's different from studying economics as an undergraduate. In fact, one of the most difficult challenges that graduate students face is making the transition from being a student to being a researcher, I think. It varies by individual-- some people, as undergraduates, write a senior honors thesis, and they're already doing research and they just pursue it. Other people think more about studying economics as being a classroom student, then when it comes time to writing a research paper, it's hard. I think for a lot of people, overcoming that hurdle where you're really doing your own research is a challenge. If you're successful, that's what you need to become an economist.

HOW CAN STUDENTS GO ABOUT HAVING THIS TUITION WAIVER CUT, OR ANYTHING LIKE THAT, ESPECIALLY FOR CURRENT STUDENTS?

That's a good question. One question is how will the universities deal with that? As with a lot of things where the federal government is going to make things harder for state and local governments and universities, universities and state and local governments can jump in and try to offset these effects, but of course that is going to cost money. So, we'll have to wait and see.

I THINK WITHIN BERKELEY, ONE OF THE GRADUATE STUDENTS WROTE ONE OF THESE PAPERS AND IT JUST CIRCULATED AROUND, EXPRESSING THIS CONCERN ABOUT WHAT THEY

WILL DO?

This is a good example of the kind of thing that would benefit from a longer discussion in a few weeks: who is affected by this, and what would it do to access to higher education? We could answer these questions if we had more time, rather than just sort of seeing these provisions appear in a tax bill then scrambling to try to think about what the effects are going to be.

A LOT OF THE PROPONENTS OF THE BILL ARGUE THAT REDUCING THE NUMBER OF TAX BRACKETS WILL SIMPLIFY THE TAX CODE. WHAT DO YOU THINK ABOUT THIS?

I think that is completely wrong. The number of tax brackets isn't what makes the tax system complicated, it's the calculation of the income which involves deductions and credits and provisions like the Alternative Minimum Tax, and other things that make your tax calculation complicated. The tax bracket is just a calculation where you say ok here's my income, what is my tax on that income. It's a very simple calculation that you do at the end of calculating your taxes, and whether you have 7 tax brackets, or 3, or a non-linear function which involves essentially an infinite number of tax brackets really does not matter for complexity.

WHAT DO YOU THINK THEIR APPROACH WAS IN THINKING THAT REDUCING THE NUMBER OF TAX BRACKETS WOULD SIMPLIFY IT?

It's a common fallacy and I'm not sure why it hasn't died. This is not a controversial question among tax policy experts. They will all tell you that thinking about the number of tax brackets is just a waste of time, but it's an idea that lives on.

ANOTHER CONTROVERSIAL ASPECT OF THE TAX BILL IS REMOVING THE STATE AND LOCAL TAX DEDUCTIONS. MANY POLITICAL ANALYSTS ARGUE THAT THIS WAS A MOVE AGAINST BLUE STATES WHERE SUCH TAXES TEND TO BE HIGHER. ARE THERE ANY ECONOMIC REASONS FOR INCLUDING THIS IN THE BILL AND DO YOU AGREE WITH THEM?

I think they're probably right. You might put it a little less negatively by saying that the people putting the bill forward don't think of this as a very important provision because where they come from it may not be. This is a good example of the kind of provision, the kind of change that might make sense in the long-run but in the short-run can be quite disruptive. A lot of state and local taxes go to pay for services that some states enjoy. If we had better parks, better schools, better other kinds of public services because we pay higher taxes, it's not clear why the federal government should subsidize that by allowing deductions. On the other hand, a lot of what states do and a lot the reason why state taxes may be higher is that they may be providing services that are really in the national interest, such as taking care of the poor. It's not clear that you want the federal government to



crack down on that. Again, this would have been the kind of issue that would have merited more serious discussion.

FOR AN UNDERGRADUATE LOOKING FOR RESEARCH EXPERIENCES, HOW DO YOU SUGGEST THEY GO ABOUT THAT?

Well, ask your professor if they have any opening, and of course they often don't. Look for internships-- some government agencies hire undergraduates over the summer-- and looking for those, applying for them. Those are great opportunities. Those organizations in fiscal policy like the Congressional Budget Office, the Federal Reserve system, the individual banks and the Federal Reserve board have programs like that. Find out as much as you can about available internships. There may be private companies that hire people in the summer to work as research assistants. Even if you might be interested in public finance and that might be an area of anti-trust, that doesn't mean you won't learn from working there.

IF YOU DON'T MIND ME ASKING, DID YOU GO STRAIGHT FROM UNDERGRADUATE TO GRADUATE SCHOOL?

Effectively, I did. I worked for six months in between, but that was just while I was applying to graduate school. When I went to graduate school, I didn't feel like I was committing myself to a career as an economist. I felt I'm going to see how it goes and if I decide I don't like it I may try something else. Some people do that. I've



had students in the past who left graduate school part-way through to go work in government agencies or consulting firms, so it's not as though you're locking yourself into a 5 or 6-year sentence. I think it's fine to just say that this is what I'm interested in now and I'm going to see how it goes.

THROUGH YOUR EXPERIENCE OF GOING THROUGH GRADUATE SCHOOL, DID IT HELP YOU FIGURE OUT WHAT KIND OF PATH LATER ON YOU WOULD WANT TO GO INTO?

It did. Again, it was because of seeing what my professors were

working on. I worked as a research assistant as a graduate student and that helped me get a sense of how to do research and I think by the time I left graduate school, I had a much better idea of the kind of things I wanted to work on.

SO NOT NECESSARILY AS AN UNDERGRAD?

No, I think the thing I wrote my Senior Honors thesis on was a topic that I never really came back to after I went to graduate school. It was fine, it was interesting, I just ended up moving onto other things. □



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