The Sword and the Shield: The Economics of Targeted Sanctions*

Daniel P. Ahn, U.S. Department of State and Johns Hopkins University†

Rodney D. Ludema, Georgetown University‡

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Abstract

While broad economic sanctions have long been used as instruments of foreign policy, targeted sanctions focusing on specific individuals, entities, and transactions are relatively new and less understood. We present a model of firm performance under sanctions where the target government may be incentivized to "shield" some firms from the full brunt of sanctions. Then, using detailed firm and individual-level data, this paper empirically estimates the impact of targeted sanctions, focusing on sanctions deployed by the United States and the European Union against primarily Russian targets after the crisis in Ukraine in 2014 as a natural experiment. We find, on average, a sanctioned or associated company loses about one-quarter of its operating revenue, over one-half of its asset value, and about one-third of its employees relative to their non-sanctioned peers, suggesting targeted sanctions are quite "smart" in the sense of hitting the intended targets with relatively minimal collateral damage. We also find some evidence of spillover impact onto technically non-sanctioned targets. Finally, we find that "strategic" firms selling high-priority goods to the regime systemically outperform non-strategic firms under sanctions, consistent with our shielding hypothesis and demonstrating the policy tradeoff between the tactical and the strategic impact of targeted sanctions.

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†School of Advanced International Studies, Johns Hopkins University and the Office of the Chief Economist, U.S. Department of State. Email: pahn4@jhu.edu and AhnDP@state.gov.

‡Department of Economics and School of Foreign Service, Georgetown University. Email: ludemar@georgetown.edu.

1 Introduction

Economic sanctions have long been used as instruments of foreign policy. One of the earliest examples is the Megarian Decree in 432 BC banning Megarians from the harbors and marketplaces of the Athenian Empire.[1] More modern examples include the UN embargo against Iraq in 1990 and North Korea since 2006, and the U.S. embargoes against Cuba in 1960 and Iran in 1979. A common feature of these episodes is use of broad or comprehensive trade embargoes against entire states. In the last two decades, however, sanctions policy has shifted toward a more targeted approach focusing on specific individuals, companies and transactions. Targeted sanctions have emerged as a leading policy tool as practitioners and scholars have increasingly recognized that the effectiveness of a sanction in modifying behavior by a target government depends not on the overall economic damage the sanction causes but on whether the target government itself and its key domestic constituencies feel concentrated economic pain from non-compliance.[2] Thus, sanctions are considered "smart" if they target the responsible parties while minimizing collateral damage.

How smart are targeted sanctions in practice? Do they actually cause economic harm to the specific targets? If so, is the harm confined or does it spill over to non-targets? Can the government of the sanctioned country successfully shield targets from the sanctions, and if so, at what cost? This paper addresses these questions in the context of the sanctions programs undertaken by the U.S., the European Union (EU), and others against primarily Russian targets in response to Russia's annexation of Crimea and its support of the insurgency in Ukraine since 2014.

We begin by presenting a model of how firm performance is affected by sanctions and use this model to study the incentive of the target government to shield certain firms from

[1] According to Thucydides, the Decree was a significant trigger in the run-up to the Peloponnesian War.

[2] For example, see Rosenberg, Goldman, Drezner, and Solomon-Strauss (2016) for an overview of recent policy developments regarding targeted sanctions.

sanctions. Sanctions are modeled as limits on targeted firms' access to foreign intermediate inputs. They thus raise targeted firms' cost of production, which feeds through to lower consumption, both private and public, and may also drive some firms to exit. If the target government places sufficient value on procuring the output of a targeted firm, i.e. the firm has some "strategic" value, it may elect to shield the firm's profits from the sanction rather than allow it to exit, thus transfering the cost of the sanction from the targeted firm to the target government.

Drawing from detailed firm and individual-level data, which allows us to match official lists of sanctioned entities (consisting of individuals and companies) to nearly 600 unique firms and over 2,000 subsidiaries throughout the world, we use a difference-in-difference approach to compare the financial performance of the targeted firms to their non-targeted peers before and after sanctions were imposed. Country-sector-time fixed effects are used to control for time-varying, sector-level shocks, which is crucial because the sanctions regime coincided with a period of macroeconomic turbulence, notably a dramatic decline in the price of oil, Russia's main export.

Our main finding is that targeted companies are indeed harmed by sanctions relative to their non-targeted peers. On average, a targeted company loses roughly one-quarter of its operating revenue, over one-half of its asset value, and about one-third of its employees after being added to a targeted sanctions list compared to non-targeted peer companies. These estimates, which are large and appear highly statistically robust, suggest targeted sanctions do have a powerful impact on the targets themselves.

We also find some evidence of spillover of sanctions, though the scope is fairly narrow. For example, we find that minority-owned subsidiaries of sanctioned companies (which technically are not themselves sanctioned) suffer similar losses as majority-owned subsidiaries (which technically are).

Finally, we find strong evidence that certain targeted firms, which were designated by the

Russian government as "strategic" prior to the sancions regime, are largely spared the effects of sanctions, which is consistent with our shielding hypothesis developed in the model. An important policy take-away is that shielding simply shifts the burden of the sanctions from the target firms to the target government.

The outline of the remainder of this paper is as follows: Section 2 reviews the literature. Section 3 presents our model and derives the theoretical results. Section 4 presents the data. Section 5 presents the estimation of the model, robustness checks, and quantification. Section 6 concludes.

2 Literature Review

The literature, both theoretical and empirical, on economic sanctions is vast. However, most empirical studies cover the period when policymakers invoked comprehensive sanctions involving broad country-wide trade embargoes rather than selective sanctions against specific targets. The literature on comprehensive sanctions, such as those against Iraq after the 1990-91 Gulf War, has tended to give mixed support for the effectiveness of sanctions. Many studies have focused on the unintended secondary effects of sanctions on corruption and humanitarian consequences without matching political dividends. This in turn has led to a burgeoning literature recommending "smart" or targeted sanctions designed to concentrate harm against decision-making elites rather than the wider populance. Recent surveys are provided in Hufbauer et al. (2007), Lowenberg and Kaempfer (2007), and Drezner (2011).

To be clear, our paper does not directly address the question of whether sanctions "work" in the sense that they change regime behavior. In the case of the U.S.-EU sanctions against Russia, it clearly has not (yet) acheived the desired outcome of restoring Ukraine's territorial integrity. However, it does demonstrate a policy tradeoff between the tactical benefits of concentrating economic harm upon tactical targets vs. economically impacting the underlying

regime, thus relating to a more recent theoretical literature exploring the political economy of targeted sanctions, such as Kaempfer, Lowenberg, and Mertens (2004) and Beladi and Oladi (2015).

Empirical studies of targeted sanctions are much fewer, partially due to the relatively short history of targeted sanctions programs and the related paucity of examples involving purely targeted sanctions instead of becoming part of a broader comprehensive sanctions program. Indeed, the U.S.-EU targeted sanctions program against Russia in the wake of the 2014 annexation of Crimea and the conflict in Ukraine represents a rare example of a purely targeted sanctions program against an economy reasonably well integrated into the global economic and financial system, and in related fashion, has relatively better quality data.

Yet economists attempting to empirically estimate the impact of sanctions on Russia face the challenge of disentangling the impact of sanctions from the confounding effects of the broader political uncertainty stemming from the Ukraine crisis and the dramatic drop in oil prices mentioned above. Most studies conclude that oil prices were far more important in explaining Russia's post-2014 macroeconomic weakness, with a relatively small effect ascribed to sanctions. IMF (2015), using a generic macroeconomic model, forecasted that sanctions could reduce Russia's real output by about 1 to 1.5 percent of GDP via weaker investment and consumption. A World Bank (2015) study similarly argues that sanctions against Russia and counter-sanctions may have affected investment and consumption but does not provide any specific numbers. Neither of these studies attempts to directly measure the economic impact of sanctions. Dreger et al. (2015) used a VAR model featuring oil prices, the ruble exchange rate, and a sanctions news index to argue that the oil price drop was the primary driver of the ruble depreciation but that sanctions news surprises may have had some impact on the ruble's conditional volatility. The study does not consider the effect on GDP or imports. Tuzova and Qayub (2016) presents another reduced-form VAR model featuring a variety of Russian macroeconomic variables including GDP, the real exchange

rate, inflation, fiscal and consumption expenditures, and external trade to argue that oil prices were the main cause of Russia's poor macroeconomic outlook. Moret et al. (2016) also looked at country-level trade data and compared trading volumes between Russia and the EU pre- and post-crisis to conclude that the Baltic states suffered the greatest relative losses, similar to the findings of Ahn and Ludema (2016).

However, the studies above still generally use macroeconomic or survey data to assess the economic impact of sanctions. Studies that use firm, individual, or transactions-level data are much fewer. Nevertheless, we would argue the targeted rather than macroscopic nature of recent sanctions programs necessitate going down to the similarly "micro" level of firms and individuals. This approach is necessary not only to effectively estimate the impact of the sanctions themselves, but also to assess potential endogeneous consequences, such as action by the target government to protect sensitive targets. Furthermore, there has been widespread anecdotal reports of "de-risking" by the private sector, whereby international companies disconnect business relationships with even legitimate counterparties wholesale in certain sectors and regions out of an over-abundance of caution in managing the regulatory burden of sanctions compliance. This paper also follows an increasing trend in the conflict literature using subnational micro-data to provide empirical support for theory, including Berman and Laitin (2008), Berman, Shapiro, and Felter (2011), Berman, Callen, Felter, and Shapiro (2011), Dube and Vargas (2013), Berman, Felter, Shapiro, and Troland (2013), Crost, Felter, and Johnson (2014), and Dell (2015).

To estimate the impact of Russia sanctions, Crozet and Hinz (2016) use detailed monthly trade data at both the country level and firm level for France. They find large impacts on trade between Russia and many EU economies, arguing that this is 'collateral damage.' However, the authors acknolwedge that most of this effect is due to oil prices, Russian economic underperformance, and political uncertainty. Haider (2017) uses export customs data to track the impact of sanctions and export deflection of Iranian non-oil exports after

the imposition of United Nations non-oil export sanctions in 2008, and finds significant evidence of export deflection. However, the data studied goes up to 2011 and does not cover the oil-related or targeted financial sanctions from 2012 onwards. Draca et al. (2017) uses an event study methodology on the evolution of nuclear-related sanctions relief for Iran during the P5+1 negotiations in Geneva leading up to the Joint Comprehensive Plan of Action (JCPOA) agreement to study the asset prices of firms listed on the Tehran Stock Exchange, finding firms linked to sanctioned entities saw a significant positive return during the window of the diplomatic breakthrough. Similarly, and perhaps the closest to our paper, is Stone (2016), which uses a similar event study methodology to study the impact of Russia sanctions news events on the asset prices of the 11 largest energy firms and banks in Russia. The paper finds a negative impact on the asset prices of targeted sectors compared to non-targeted sectors but no significant difference between targeted and non-targeted firms within a sector, which is interpreted as evidence of "de-risking."

Compared to the literature, our paper is unique in several respects. First, ours is the first to use detailed firm and individual-level networked data to estimate empirically the impact on the real economic performance (such as operating revenue, assets, and employment) of the targets themselves. Second, we consider a comprehensive sample of all targeted firms, including privately held firms and those firms linked to the network of sanctioned individuals, and not only the smaller number of publicly traded firms.

3 The Model

Sanctions can harm targeted firms by limiting their ability to supply foreign markets or by limiting their access to foreign inputs. For simplicity, our model focuses on the latter channel.[3]

[3]This channel best represents the situation present in our data. With the exception of energy products, the exports of which are not directly limited by sanctions, Russia exports very little to the U.S. or the EU.

We consider a model of two countries, the sanctioning country (S) and the target country (T). The focus is on firms in country T, which are assumed to combine inputs – domestic and imported – to produce final goods for sale to both private consumers in T and the government of T. The model unfolds in four stages. First, the government of S imposes sanctions on select downstream firms in T. We treat this choice as exogenous, as it depends on range of political and legal factors outside of the model. A firm under sanction loses access to certain imported inputs, thus forcing it to rely more on domestic inputs. Second, the government of T offers a contract to each firm to procure final goods for government consumption. In the event the firm rejects to offer, the government has the option to nationalize the firm at some cost. Third, each firm learns its market demand. Fourth, all firms produce and sell as permitted under the sanctions regime, the agreed procurement terms and realized market demand.

3.1 Markets

Consumer demand for final good j in country T is given by

$$q_j = \theta_j p_j^{-\sigma} \tag{1}$$

where q_j is quantity demanded, p_j is the price charged by firm j, $\sigma > 1$ is the demand elasticity and $\theta_j > 0$ is a firm-specific demand shifter. We assume θ_j is an i.i.d. random variable drawn from the distribution $H_j(\theta)$, with density $h_j(\theta)$, on $\mathbb{R}^+$.

The government's valuation of good j is given by

$$G_j(g_j) = {\gamma_j}^{\frac{1}{\sigma}} {g_j}^{\frac{\sigma-1}{\sigma}} \tag{2}$$

where g_j is the quantity procured. The term γ_j measures the importance of final good j in

Its imports are primarily capital goods. A notable exception is food imports, but these were blocked by Russia's own counter-sanctions, which we do not consider here.

government consumption. This specification allows for a wide array of interpretations: g_j could be interpreted as a public good or more narrowly as as private good, such as "crony services," of value only to the leader. It may be that the government values final good j for its usefulness in the sanctioned policy (e.g., forcibly annexing a neighbor), or for unrelated reasons. For simplicity we assume the government and consumers share the same demand elasticity, but none of our conclusions depend on this assumption.

Each final producer incurs a fixed cost of production F, after which final good j is produced from a continuum of intermediate inputs on the interval $[0, n_j]$, according to a CES production function

$$y_j = \left[\int_0^{n_j} x_j(\omega)^{\frac{\xi-1}{\xi}} d\omega\right]^{\frac{\xi}{\xi-1}} \tag{3}$$

where y_j is output, $x_j(\omega)$ is the firm's chosen level of input ω, and $\xi > 1$ is the elasticity of substitution between inputs.

Supply of each input is infinitely elastic, and we normalize the price of each input to 1. This implies that each final final producer has a constant marginal cost that depends only on the measure of its set of available inputs

$$c_j = n_j^{1/(1-\xi)} \tag{4}$$

Let $z < 1$ be measure domestic inputs, and let $1 - z$ be the measure of inputs available in S. If firm j is not subject to sanction, then $n_j = 1$, whereas a complete blocking sanction would imply $n_j = z$. Any partial sanction would be represented by $n_j \in [z, 1)$. Given the one-to-one relationship between marginal cost and the number of available inputs, a sanction can be represented as a choice of marginal cost in the range $c_j \in \left[1, z^{1/(1-\xi)}\right)$.

If the downstream firm chooses to sell to the private sector, then based on (1) it charges

a price $p_j = \frac{\sigma}{\sigma-1} c_j$, and earns an operating profit from market sales equal to

$$\pi_j^m = A\theta_j {c_j}^{1-\sigma} \tag{5}$$

where $A = \sigma^{-\sigma}(\sigma-1)^{\sigma-1}$. Note that market revenue is proportional to operating profit, i.e., $r_j^m = \sigma A\theta_j {c_j}^{1-\sigma}$.

Although the firm sells to the government in addition to the market, it is useful as a point of reference to define the break-even market demand for a firm that sells only to the private sector:

$$\theta_j^m = FA^{-1} {c_j}^{\sigma-1}$$

3.2 The Bargaining Game

We assume the government of T makes a take-it-or-leave-it offer to each final producer, which also faces an underlying threat of nationalization. As the offer is made prior to the realization of market demand, we allow the government to offer a state-contingent contract $(g(\theta), t(\theta))$, where $g(\theta)$ is the quantity of government consumption and $t(\theta)$ is the transfer payment from the government to the firm, conditional on realized market demand θ (note that we drop the subscripts for the remainder of this section). Let $\Gamma(\theta) = G(g(\theta)) - t(\theta)$ and $\Pi(\theta) = \pi^m(\theta) + t(\theta) - cg(\theta) - F$ denote the realized payoffs of the government and firm, respectively. The optimal contract must satisfy,

$$\underset{g(\theta),t(\theta)}{max}\ E[\Gamma]\ \ s.t.\ E[\Pi] \geq E[\bar{\Pi}] \tag{6}$$

where $E[\bar{\Pi}]$ is the firm's expected profit from rejecting the offer. Solving (6) produces,

$$\begin{aligned} g^* &= (\sigma - 1) A\gamma c^{-\sigma} \\ G^* &= \sigma A\gamma c^{1-\sigma} \\ t^*(\theta) &= E[\bar{\Pi}] - \pi^m(\theta) + F + cg^* \end{aligned} \tag{7}$$

for all $\theta \geq \underline{\theta}$, where $\underline{\theta} = max[0, sup\{\theta \mid \Gamma(\theta) + \Pi(\theta) < 0\}]$. Note that the optimal contract always chooses the efficient level of government procurement. The transfer is chosen to hold the *ex post* profit of the firm equal to its expected value from rejecting the offer. For all $\theta < \underline{\theta}$, the good cannot be profitably supplied, and the optimal contract is to simply shut down the firm. Using (7), we can solve for the demand cut-off $\underline{\theta}$ as:

$$\underline{\theta} = max[0, \theta^m - \gamma] \tag{8}$$

The firm's expected profit from rejecting the offer depends on whether or not it is credible for the government to nationalize the firm. We assume that under nationalization the resulting government-run entity would continue to supply both the government and the market (provided doing so is *ex post* efficient) but incurs an *ex ante* nationalization cost $\beta > 0$. Thus, the government would choose to nationalize if $\int_{\underline{\theta}}^{\infty} [\Gamma(\theta) + \Pi(\theta)]\, dH(\theta) \geq \beta$. Note that the left-hand side of this condition is monotonically increasing in γ.[4] Thus, provided $\int_{\theta^m}^{\infty} [\pi(\theta) - F]\, dH(\theta) < \beta$ (i.e., the government would not nationalize a market-only firm), there exists a $\gamma^n > 0$ such that for all $\gamma \geq \gamma^n$, it is credible for the government to nationalize the firm; otherwise, nationalization is not credible.

Thus, we have two possible cases, depending on the realization of private market demand θ and the government's valuation of the firm's output γ, as shown in Figure 1.

[4] If $\underline{\theta} = 0$, then $\frac{d}{d\gamma} \int_0^{\infty} [\Gamma(\theta) + \Pi(\theta)]\, dH(\theta) = Ac^{1-\sigma} > 0$, whereas if $\underline{\theta} = \theta^m - \gamma$, then $\frac{d}{d\gamma} \int_{\underline{\theta}}^{\infty} [\Gamma(\theta) + \Pi(\theta)]\, dH(\theta) = Ac^{1-\sigma} [1 - H(\theta^m - \gamma)] > 0$.

Case 1 occurs if γ exceeds the threshold γ^n, in which case nationalization is a credible threat and $E[\bar{\Pi}] = 0$. Expected negotiated payoffs are,

$$\begin{aligned} E\left[\Gamma\right] &= \textstyle\int_{\underline{\theta}}^{\infty} \left[Ac^{1-\sigma}\left(\gamma+\theta\right) - F\right] dH(\theta) \\ E\left[\Pi\right] &= 0 \end{aligned} \tag{9}$$

Because the firm can obtain no profits outside of its relationship with the government, the government extracts all profits in negotiations. Not only does the firm earn zero expected profits, it also earns zero profits *ex post*, as the negotiated transfer schedule in (7) vacuums up all profits in every state. However, this also implies that the firm is entirely *shielded* from shocks, including the shock of being sanctioned. As the residual claimant, the government absorbs all of the losses due to higher input costs from sanctions and increases transfer payments to compensate the firm. In particular, the marginal impact of a sanction on the expected government payoff is equal to total expected ouput of the firm, i.e., $\partial E\left[\Gamma\right]/\partial c = -E\left[q+g\right]$.

Case 2 occurs if $\gamma < \gamma^n$, in which case nationalization is not a credible threat. In this case, the firm retains ownership but supplies the private market only, provided this is profitable. Private-only profitability requires $\theta \geq \theta^m$, thus $E[\bar{\Pi}] = \int_{\theta^m}^{\infty} \left[\pi(\theta) - F\right] dH(\theta)$. We derive the expected negotiated payoffs to be,

$$\begin{aligned} E\left[\Gamma\right] &= Ac^{1-\sigma}\gamma\left[1 - H(\underline{\theta})\right] + \textstyle\int_{\underline{\theta}}^{\theta^m} \left[Ac^{1-\sigma}\theta - F\right] dH(\theta) \\ E\left[\Pi\right] &= \textstyle\int_{\theta^m}^{\infty} \left[Ac^{1-\sigma}\theta - F\right] dH(\theta) \end{aligned} \tag{10}$$

As the firm now can earn profits outside of its relationship with the government, its negotiated payoffs will be affected by sanctions. In particular, the marginal effect of a sanction on expected payoffs are $\partial E\left[\Pi\right]/\partial c = -E\left[q\right]$ and $\partial E\left[\Gamma\right]/\partial c = -E\left[g\right]$. That is, expected firm profits decline by the amount of expected market sales, while the government loses by the amount of expected government sales.

Comparing the two cases, it is clear that that sanctions have a larger effect on the government when the government is sufficiently dependent on the firm's output as to make nationalization credible (Case 1). This is because the government absorbs the firm's profits, which implies that the government also absorbs the impact of sanctions as it shields the firm. Shielding does not eliminate the sanctions impact. Rather it *redirects* the impact from the firm to the government. And sanctioning strategic targets the government is forced to shield is ultimately more damaging to the government, if less so to the firm. [5]

3.3 Effects of Sanctions on Observable Measures of Firm Performance

In this section, we dig deeper into the marginal effects of a sanction on the performance of a targeted firm. Our data allow us study firm survival rates and as well changes in various observable firm performance measures, conditional on survival.

Survival. As long as $\gamma < \theta^m$, the firm's probability of survival is $1 - H(\underline{\theta})$. A marginal tightening the sanction lowers the survival probability by,

$$-(\sigma - 1)\, h(\underline{\theta})\, (\theta^m / c) < 0 \tag{11}$$

For $\gamma > \theta^m$, the survival probability is equal to 1. Thus, for sufficiently high γ, sanctions have no effect on the firm's survival probability.

Log Output. Conditional on survival, the elasticity of *ex post* output with respect to marginal cost is $-dln\,(q+g)\,/dln(c) = \sigma$. This impact on output is the same whether the firm enjoys high demand or low demand with a shielding government contract. The reason is that in both cases, output is chosen to maximize the surplus, and the optimal quantity

[5] Note that we have assumed government cares about the firm only to the extent that the firm supplies the government with output. Were we to assume instead that the profits of the firm enter directly into the government's objective function, then impact of sanctions on the government would be the same in each case.

declines as the cost of production increases. Shielding therefore occurs entirely through the transfer the government makes to the firm, not in the quantity the government procures. In the data, we proxy quantity with employment.

Log Revenue. We observe operating revenue in our data, which theoretically is the sum of market revenue and the transfer, $R = r^m + t$. Thus, conditional on survival, *ex post* revenue is equal to

$$R = (\sigma - 1)Ac^{1-\sigma}(\gamma + \theta) + E[\bar{\Pi}] + F \tag{12}$$

and the elasticity of revenue with respect to marginal cost is

$$-dln(R)/dln(c) = (\sigma - 1)\left[\frac{1}{1+\Phi}\right] \tag{13}$$

where $\Phi = \frac{F}{(\sigma-1)A(\theta+\gamma)c^{1-\sigma}+E[\bar{\Pi}]} > 0$. The term Φ is strictly decreasing in $E[\bar{\Pi}]$, and thus the elasticity of revenue is greater if $\gamma < \gamma^n$ (i.e., $E[\bar{\Pi}] > 0$) than if $\gamma > \gamma^n$ (i.e., $E[\bar{\Pi}] = 0$). In other words, if the firm is sufficiently important to the government as to be shielded from loss under sanctions, then the elasticity of its revenue with respect to sanctions is smaller than that of a non-shielded firm.

Finally, note that operating profit is proportional to revenue, similar expressions apply.

To summarize the predictions of the model, sanctions lower the survival rate of targeted firms on average but have no effect on survival if the government's valuation of the good γ is sufficiently high. Conditional on survival, log revenue, log operating profit, and log output all decline with sanctions; however, the declines in log revenue and profit (but not log output) are mitigated for firms with high γ. This mitigation occurs because the government wishes to maintain its access to the firm's product at all times, and thus assumes the firm's potential losses from sanctions in the optimal contract.

Of course, this model does not provide an exhaustive picture of the all the ways sanctions

affect firms or all the reasons the government might wish to bail out firms under sanction. It is, however, a workable model, with plausible assumptions and sharp predictions.

4 Data

4.1 Overview of the Targeted Sanctions Program

On March 6, 2014, the President of the United States declared a national emergency and issued the first of four Executive Orders to deal with the threat posed by the situation in Ukraine, including the actions of the Government of the Russian Federation.[6] Issued in March and December of 2014, these Executive Orders provided the authority for various agencies of the U.S. Government, including Treasury, State, Commerce, and others, to impose targeted sanctions on primarily Russian entities. The U.S. Department of Treasury's Office of Foreign Asset Control is the primary entity responsible for implementing targeted sanctions, with the targets determined by the Secretary of the Treasury, in consultation with the Secretary of State, after an exhaustive investigation and vetting process.

U.S. targeted sanctions with respect to the Ukraine/Russia crisis broadly fall into two categories:

- SDN Sanctions: Blocking sanctions against individuals and entities on the List of Specially Designated Nationals and Blocked Persons (SDN) List
- SSI Sanctions: Sectoral sanctions against entities operating in the financial, energy, and defense sectors of the Russian economy listed on the Sectoral Sanctions Identification (SSI) List

Designated SDN entities and individuals face asset freezes and travel bans in the United States. And unless otherwise authorized or exempted, all trade and financial transactions

[6] These are E.O. 13660 (March 6, 2014), E.O. 13661 (March 16, 2014), E.O. 13662 (March 20, 2014), and E.O. 13685 (December 19, 2014).

and other economic activities by U.S. persons (individuals or entities) with these designated SDN individuals and entities are prohibited. Furthermore, the U.S. goverment adopted the following "50% Rule" where transactions with an entity that is 50 percent or more owned, whether individually or in the aggregate, directly or indirectly, by an SDN designated entity or individual, are also implicitly sanctioned, regardless of whether the entity itself is explicitly listed.

Finally, according to FAQ 400 [08-13-2014], U.S. sanctions generally prohibit transactions involving, directly or indirectly, a blocked person, absent authorization from OFAC, even if the blocked person is acting on behalf of a non-blocked entity. Therefore, to quote directly from the U.S. Treasury, "U.S. persons should be careful when conducting business with non-blocked entities in which blocked individuals are involved."

Meanwhile, the SSI entities represent those entities for which U.S. persons are prohibited from engaging in certain transactions. Notably, U.S. persons cannot transact in or issue debt of longer than 30 days maturity or acquire new equity with targeted companies in the Russian financial sector or the Russian defense sector. Similar restrictions also apply to debt of longer than 90 days maturity with targeted companies in the Russian energy sector. Furthermore, U.S. persons are prohibited from transacting in certain technology and services related to deep-water, Arctic offshore, or shale oil activity with the Russian energy sector. The 50% Rule also applies to SSI entities.

The EU also developed a targeted sanctions policy in the form of EU Council Regulations starting in March 2014.[7] From these EU Council Regulations, the European Union maintains a categorization of targeted sanctions similar to that of the United States in response to the events in Ukraine/Russia in 2014:

- Restricted Measures List: Asset freezes and visa bans apply to entities and individuals designated on the EU Restricted Measures List.

[7] EU Council Regulations No. 269/2014, 284/2014, 433, 2014, 833/2014, and No 960/2014.

- Sectoral Sanctions List: The EU also prohibits EU nationals and companies from transacting in equity or debt instruments with a maturity exceeding 30 days with entities on the EU Sectoral Sanctions List.

Analogous to the U.S. SDN sanctions, EU persons are restricted from engaging in business transacitons with funds and economic resources owned or controlled by targeted individuals or entities. Also, similar to U.S. sectoral sanctions, the EU imposed an embargo on trade in arms and dual-use goods/technology with Russia, covering all items on the EU common military and dual-use lists, as well as on the export of certain energy-related equipment and technology for offshore deep-water, Arctic, or shale oil exploration and production. Like the United States, the EU also adopted a 50% ownership rule whereby an entity that is 50 percent or more owned, whether individually or in the aggregate, directly or indirectly, by an EU restricted entity or individual, is also considered sanctioned.[8]

4.2 Identification of Targets

Our empirical approach first requires an examination of the sanctions lists of the U.S. and the EU for potential overlap to identify all unique targets. Our micro-level firm and individual networked data come from business intelligence provider Bureau van Dijk (BvD) Orbis and the LexisNexis Risk Solutions WorldCompliance databases.[9]

We consider the list of entities and individuals explicitly targeted by the U.S. and EU via its Russia/Ukraine-related sanction authorities from March 17, 2014 to December 1, 2016. Figure 2 provides a summary of the targets categorized by type and by sanctioning

[8]The U.S. and EU also imposted restrictions on economic investment and trade with the Crimea region, and the economic impact of this is only considered in so far as individuals or entities engaged in Crimea also face explicit or implicit sanctions.

[9]Bureau van Dijk's Orbis database compiles and standardizes financial data on over 200 million firms around the world, both publically traded and private, from a variety of regulatory and other sources. Similarly, LexisNexis Risk Solutions' WorldCompliance tracks roughly 140 million high-risk individuals. More information about the databases can be found on Bureau van Dijk's homepage at www.bvdinfo.com and at LexisNexis Risk Solutions' homeage at risk.lexisnexis.com.

government. Altogether, the U.S. has designated 128 individuals and 102 entities on its SDN List as related to its Russia/Ukraine-related sanctions program. Also, the U.S. has explicitly designated 229 entities on its SSI List facing sectoral sanctions. Meanwhile, the EU placed 149 individuals and 37 entities on its EU Restricted Measures List and 20 entities onto its EU Sectoral Sanctions List. Figure 3 shows the timeline of when these various sanctioned targets were designated.

Given the large number of sanctioned individuals which U.S. and EU persons are also prohibited from having economic transactions with, we further classify sanctioned individuals into two categories: political and business figures, using BvD's standardized positions database, which tracks the network of significant business individuals and their economic relationships with firms. We classify a political figure as an individual whose primary occupation is political rather than commercial in nature, such as a legislator, a government official, or a militia commander. However, a named individual would still be classified as a business figure (even if he/she worked in public service) if the individual could be identified as being "associated" with a company according to BvD's database. These associations include being a major shareholder, part of corporate management, or on the board of directors.

According to this classification, of the 128 individuals on the U.S. SDN List, 104 appear to be purely political figures, while 24 appear to have business associations. Hence, of the U.S. SDN individuals, about one-fifth are business figures. Meanwhile, the EU sanctions against individuals are skewed even more heavily toward political figures. Of the 149 individuals on the EU Restricted List, only 6 appear to have business associations. We subsequently identified 269 distinct companies as being economically "associated" with U.S. or EU sanctioned business figures.

There can be considerable overlap between the 6 lists of sanctioned firms: U.S. SDN entities, companies associated with U.S. SDN individuals, U.S. SSI entities, EU restricted entities, companies associated with EU restricted individuals, and EU sectorally sanctioned

entities. Figures 4 and 5 presents a Venn diagram of the space of U.S. and EU sanctioned entities by category, including those firms associated with sanctioned individuals. As discussed above, this tabulation captures only those entities or individuals explicitly listed by the U.S. and EU governments. Altogether we have identified 584 unique targets.

However, as mentioned above, both the U.S. and EU follow a 50% ownership rule whereby those subsidiaries 50% or more owned, directly or indirectly, by an explicitly sanctioned entity also implicitly face the same sanctions. The United States appears to be more forward-leaning in explicitly adding to its lists by subsidiaries subsequently identified to be facing sanctions according to this rule. We therefore used BvD's corporate ownership database to compile all known subsidiaries of the explicitly sanctioned entities before sorting them into those whose ownership stake by the sanctioned entity either directly or indirectly exceeds 50% or is below 50%.

4.3 Strategic Firms

As discussed in the preceeding modeling section, we predict strategic firms providing high-priority goods to the government may be endogeneously shielded by the regime from the full effect of sanctions. Indeed, we found numerous anecdotes and other qualitative intelligence documenting how the target government (i.e. the Government of the Russian Federation) may be providing various firms of state largess to some of these targeted firms via a variety of mechanisms. These include the granting of government contracts and monopolies, state-backed loan guarantees, capital injections by the state, and tax breaks.

For example, in April 2014, about one month after the imposition of sanctions, the Russian government gave sanctioned Bank Rossiya the sole contract to service the $36 billion dollar domestic wholesale electricity market, promising rich revenues to the target. Sanctioned VTB Bank also asked for $5.4 billion in state capital aid to offset losses from sanctions. Often these shielded firms appear to be providing high-priority services to the government,

such as managing Russia's sovereign bond issuances, providing bank services to the annexed territories of Crimea, or helping build the Kerch bridge connecting Crimea to the Russian mainland.[10]

We construct a list of 374 strategic firms which the Government of the Russian Federation may value for providing strategic high-priority services by combining three official lists. The first is a list of 165 'national security' firms the Russian government deems of "strategic importance for national defense and state security, protection of morality, health, rights, and the lawful interest of Russian citizens."[11] The second is a list of 201 'backbone' firms which have a "significant effect on the formation of GDP, employment, and social stability."[12] The last is a list of 35 systemically important financial institutions required to have improved capitalization measures.[13]

While the motivations for the target government shielding a particular firm may be opaque and context-specific and the form of shielding diverse, the strategic firms that appear on these lists appear to be more likely candidates for receiving state aid. Many (though not all) of the firms that are anecdotally reported to have been shielded by the state appear on one or more of these strategic lists. Figure 10 shows the Venn Diagram of the overlap between these three lists, while Figure 11 shows the overlap between the overall strategic list and the list of sanctioned targets. We see that of the 374 strategic firms, 40 face targeted sanctions.

[10]Newspaper reporting from The Moscow Times in 2014, some of which are cited in the references, document some of these close state-firm relationships.

[11]The original list was made by a Presidential Decree on August 4, 2004 and we used the version of the list updated on March 28, 2015.

[12]This list was made by the Commission on Economic Development, February 5, 2015, N. 1.

[13]As established by the Deposit Insurance Agency on February 2, 2015 and the Central Bank of Russia, Ordinance No. 3737 dated July 22, 2015.

4.4 Description of the Data

As mentioned above, our data come from the Bureau Van Dijk (BvD) Orbis and LexisNexis WorldCompliance databases, which tracks over 200 million firms and 140 million individuals worldwide, including over 18 million firms in Russia.[14] From this larger database, we isolate 80,902 firms, including 545 of the 584 firms identified as being explicitly sanctioned above that are also present in the BvD database.[15] Also included are 2,392 firms that BvD identified as being subsidiaries of the 545 explicitly sanctioned firms. The remainder is a control group of 77,995 peer companies, constructed by collecting all companies that share the same home country and sector of business operation as the sanctioned companies in the global BvD database as well as as the 334 non-sanctioned strategic firms described above.[16] For each company, we track its home country location, sector of business operation (according to the 4-digit NACE Rev. 2 code specification), and its total Operating Revenue, Total Assets, and Number of Employees for the years 2012 to 2016. We also track the status of the firm, whether it remains active or whether it has become bankrupt, liquidated or dissolved, or changed to some other non-active status.

Table 1 and 2 show the summary statistics for the sanctioned and non-sanctioned firms respectively for Operating Revenue ($OpRev$) in thousands of dollars, Total Assets ($Asset$) in thousands of dollars, Number of Employees (Emp), as well as a status variable (d_Active) which is equal to 1 when the firm is active and 0 when it is inactive. As we shall discuss further in the robustness section, sanctioned firms tend to be larger in every measure of financial health than non-sanctioned firms.

[14] We paste together the data using the Ruslana historical data discs provided by BvD to get as comprehensive and nationally representative a dataset as possibly, as recommended by Kalemli-Ozcan et al. (2015).

[15] We use fuzzy logic and NLP (natural language processing) machine-learning tools to match firm and individual names identified as being sanctions to the BvD database due to the possibility of multiple ways in which Cyrillic names could be Romanized. Those explicitly sanctioned firms that could not be found in the BvD database appear to be mainly Ukrainian rather than Russian entities.

[16] Bureau van Dijk assigns a unique identification number that tracks a company through potential name and ownership changes.

Table 1: Summary Statistics for Sanctioned Entities

Variable	Obs	Mean	Std. Dev.	Min	Max
d_Active	14,160	.911	.285	0	1
OpRev	6,995	695,624	6,009,979	0	1.61e+08
Asset	7,078	1,341,157	1.42e+07	0	5.56e+08
Emp	6,738	1,349	13,428	0	450,000

Table 2: Summary Statistics for Non-Sanctioned Control Group

Variable	Obs	Mean	Std. Dev.	Min	Max
d_Active	389,975	.982	.132	0	1
OpRev	146,056	10,708	258,042.7	0	3.43e+07
Asset	155,054	35,638	1,280,498	0	2.68e+08
Emp	144,105	48	2,012	0	330,447

5 Empirical Analysis

5.1 Estimation Strategy

Our benchmark econometric specification is a standard difference-in-differences ordinary least-squares (OLS) approach as follows:

$$ln\left(y_{isct}\right) = \alpha_i + \lambda_{cst} + \beta d_{it} + \epsilon_{isct}$$

where the subscript i denotes the unique company identification, s denotes the sector, c denotes the home country, and t denotes the time period. The left-hand side dependent variable y_{isct} tracks the particular firm i's financial metrics of total Operating Revenue, Total Asset value, and Number of Employees. Also, for our final left-hand side dependent variable, we construct a dummy variable which equals 1 if the firm is active in that year versus 0 if the firm loses its active status due to a bankruptcy, liquidation, etc.

The variables α_i capture company fixed-effects, λ_{cst} capture country-sector-time fixed effects, and d_{it} are the sanction treatment dummies. Our sanctions dummies d_{it} switch from 0 to 1 when firm i faces any of our three categories of targeted sanctions by either U.S. or

Table 3: Primary Regression Results on Sanctions Impact without Controls

	(1)	(2)	(3)	(4)
VARIABLES	d_Active	lOpRev	lAsset	lEmp
d_Sanc	-0.0295***	-0.3001***	-0.6996***	-0.4326***
	(0.003)	(0.061)	(0.052)	(0.030)
Observations	398,715	92,896	145,920	135,685
R-squared	0.665	0.897	0.884	0.855

*Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. d_Active and d_Sanc are dummies capturing when firms are active and sanctioned respectively. lOpRev stands for log Operating Revenue, Assets log Total Asset Holdings, and Emp log Total Number of Employees.*

EU authorities (or both).

5.2 Benchmark Results

5.2.1 Primary Regression

Columns 1 through 4 in Table 10 displays our primary results, which shows the coefficients from regressing our dummy indicating firm active status, log Operating Revenue, log Assets, and log Employee Count on the simplest sanctions dummy d_Sanc, which turns on in the time period when it faces any type of sanction from either the U.S. or the EU. Here, we do not impose any controls and the number of observations can vary across the various regressions due to missing or non-reported data for many companies.

Our headline results suggest that targeted sanctions have a statistically significant negative impact on firm-level financial health relative to non-sanctioned peer companies. Converting from logs back into levels, we find that a targeted firm on average faces a 3 percent increased likelihood of losing its active status relative to non-sanctioned peers (compared to an average firm exit rate of 0.8 percent per annum in the control group). Also, its operating revenue falls by about one-quarter, total assets by about one-half, and employee count by about one-third compared to non-sanctioned peers. These results are highly statistically

significant at the 1% confidence level for all of our financial metrics.[17]

We repeat that our results arise after controlling for both firm-specific fixed effects and country-sector-time fixed effects, which should eliminate oil price fluctuations and other factors that may apply to companies in particular combinations of sectors and countries. In particular, the sectors are determined by the 4-digit NACE Rev. 2 core codes, providing a high degree of granular control.

Although the magnitudes of the estimated losses are large, these results should be interpreted with some caution. First, these are the average effect but it does not necessarily apply uniformly to all targeted companies. The effect on each particular target may vary according to firm-specific characteristics and also the type of the sanction it faces. Many of the largest Russian companies tended to face only sectoral sanctions which are deliberately designed not to have a large immediate impact but affect their long-term health via their access to credit and technology. This is one reason why the concentrated impact at the firm level does not necessarily translate into a large macroeconomic impact, despite the target list containing some of the largest state-owned enterprises that comprise a large share of overall Russian national output.

On the other hand, the results capture the differential impact of sanctions on the performance of targeted or associated companies compared to non-targeted companies. They do not measure factors that might affect all firms equally in a sector or a country. For example, if targeted sanctions deter counter-parties from engaging in trade with any firm in a suspect sector (e.g. firms may "de-risk" and stop trade with all arms manufacturers) and not just the targeted ones, then this impact of sanctions would not be reflected in the performance differential exploited by the regression. This possibility would bias our esimates of the sanctions impact toward zero.

[17] A simple size-varying aggregation of the impact of sanctions on the operating revenue of sanctioned firms results in a macroeconomic impact of roughly 1.4 percent of Russia's GDP, which is consistent with the IMF's forecast and other macroeconomic studies.

5.2.2 Regression by Country

Table 2 shows the regression results once we split the sanctions treatment on the firm by the origin country of the sanction. We find the impact on the target's financial metrics, such as operating revenue, assets, and number of employees, appears to be largely driven by U.S. rather than EU sanctions. Only on the firms' survival status does EU sanctions have a signicant effect. Given the high degree of policy coordination and overlap in the U.S. and EU sanctions lists and the relative paucity of targets that are sanctioned only by the EU and *not* by the United States, this result may not be that meaningful.[18]

Table 4: Impact by Origin Country of Sanction

	(1)	(2)	(3)	(4)
VARIABLES	d_Active	lOpRev	lAsset	lEmp
d_US	-0.0080	-0.5305***	-0.8327***	-0.4646***
	(0.007)	(0.135)	(0.108)	(0.076)
d_EU	-0.0513***	0.4071	-0.0518	0.0794
	(0.014)	(0.274)	(0.179)	(0.128)
Observations	391,180	89,524	141,759	131,678
R-squared	0.650	0.881	0.870	0.824

*Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. d_US and d_EU are dummies capturing when firms were sanctioned by the U.S. or the EU respectively. lOpRev stands for log Operating Revenue, Assets log Total Asset Holdings, and Emp log Total Number of Employees.*

5.2.3 Regression by Type

Next, we split the sanctions treatment into its type: 1) Blocking or Restrictive sanctions on the entity itself; 2) Blocking or Restrictive sanctions on an Individual who is economically associated with the target firm; and 3) Sectoral sanctions that only limit certain transactions in certain sectors. Our results appear in Table .

[18] On the other hand, in private discussions with the authors, a number of large international banks reported a dichotomy of sanctions enforcement and magnitude of penalties between U.S. and EU regulators.

Table 5: Impact by Type of Sanction

	(1)	(2)	(3)	(4)
VARIABLES	d_Active	lOpRev	lAsset	lEmp
d_Rest	-0.0236**	0.1592	0.1128	0.0060
	(0.010)	(0.120)	(0.092)	(0.068)
d_Assoc	-0.0430***	-0.4319***	-0.8033***	-0.3869***
	(0.008)	(0.135)	(0.092)	(0.071)
d_Sect	-0.0209***	-0.3118***	-0.6573***	-0.4548***
	(0.004)	(0.065)	(0.057)	(0.031)
Observations	398,715	92,896	145,920	135,685
R-squared	0.665	0.897	0.884	0.855

*Notes: Robust standard errors in parenthese. *** p<0.01, ** p<0.05, * p<0.1. d_Rest, d_Assoc, and d_Sect are dummies capturing when a firm faces restrictive sanctions, sanctions via association with a sanctioned individual, or sectoral sanctions respectively. lOpRev stands for log Operating Revenue, Assets log Total Asset Holdings, and Emp log Total Number of Employees.*

The largest channel of the impact appears to be via association with sanctioned individuals. Sectoral sanctions are also negative and statistically signicant, but at a smaller impact than via association with sanctioned individuals. And interestingly, the effect via a sanction explicitly on a target firm itself, does not seem to be negative and statistically signicant except on the firm's Active Status.

The fact that individual and sectoral rather than firm-specific sanctions have a stronger impact may be, at first blush, puzzling. A firm associated to a sanctioned individual technically can mitigate that linkage by, e.g. forcing the individual to sell stake or remove from board or management. A firm that is explicitly sanctioned by name has no such recourse. It is possible that "de-risking" may be impacting all firms in that cohort of peers around the targeted firms, and not just targeted ones. In the case of Russia sanctions, we found the set of firms explicitly targeted via blocking/restrictive sanctions are clustered in the weapons manufacturing and finance subsectors. Meanwhile, the set of firms associated with sanctioned individuals appear to cover a much wider set of business sectors. This would bias

the coefficient on the restrictive sanction treatment toward zero.

Table 6: Impact by Type of Sanction using Primary Sector Groups

	(1)	(2)	(3)	(4)
VARIABLES	d_Active	lOpRev	lAsset	lEmp
d_Rest	-0.0353***	0.1822	-0.1742*	-0.0616
	(0.009)	(0.115)	(0.089)	(0.065)
d_Assoc	-0.0392***	-0.5078***	-0.8879***	-0.5073***
	(0.008)	(0.121)	(0.086)	(0.071)
d_Sect	-0.0210***	-0.5013***	-0.9773***	-0.6662***
	(0.003)	(0.056)	(0.048)	(0.028)
Observations	401,015	93,574	146,693	136,358
R-squared	0.667	0.898	0.884	0.855

*Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. d_Rest, d_Assoc, and d_Sect are dummies capturing when a firm faces restrictive sanctions, sanctions via association with a sanctioned individual, or sectoral sanctions respectively. lOpRev stands for log Operating Revenue, Assets log Total Asset Holdings, and Emp log Total Number of Employees.*

We can test for whether this "de-risking" may be occurring by considering coarser granularities on sectors. If we define our sector categorization using NACE's high-level aggregation of 12 groups instead of the 4-digit NACE Rev. 2 categorizations, Table 6 shows the sanctions treatment by type again but using broader sector group definitions. We find that the coefficient for assets becomes negative and marginally significant, suggest some "de-risking" away from sectors in which explicitly sanctioned entities operate. However, magnitudes still remain below that for associated and sectoral sanctions.

5.2.4 Regression on Targets and their Subsidiaries

Using BvD ownership data, we also split the impact of sanctions on explicitly named firms/individuals vs. on the subsidiaries of those targets that are implicitly sanctioned via the 50% Rule. Also, we consider the impact on any subsidiaries that are minority (less than 50 percent) owned by the sanctioned firm/individual and are therefore technically not

Table 7: Impact by Ownership Level

VARIABLES	(1) d_Active	(2) lOpRev	(3) lAsset	(4) lEmp
d_Sanc	-0.0295***	-0.3001***	-0.6996***	-0.4326***
	(0.003)	(0.061)	(0.052)	(0.030)
Observations	398,715	92,896	145,920	135,685
R-squared	0.665	0.897	0.884	0.855

*Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. d_Active and d_Sanc are dummies capturing when firms are active and sanctioned respectively. lOpRev stands for log Operating Revenue, Assets log Total Asset Holdings, and Emp log Total Number of Employees.*

sanctioned.

We find in Table 7 that the impact on implicitly sanctioned entities is also negative and statistically signicant, with magnitudes comparable to that of explicit sanctions. Also, the impact on minority-owned subsidiaries is also negative and statistically signicant, with magnitudes moderately less (and not statistically different) than that for explicitly and implicitly sanctioned targets. This may be evidence that counter-parties find it challenging to distinguish between those subsidiaries that are implicitly sanctioned vs. those that are not, and are "de-risking" against any subsidiary.

5.3 Strategic Firms and State Shielding

Columns 1 through 4 of Table 8 shows our primary regressions repeated after controlling for state shielding by having an interaction term between the sanctions treatment and whether the firm is strategic. We find that the direct sanctions impact remains negative and highly statistically significant, but that the interaction term is also positive and statistically significant.

We find that if a firm is strategic, the estimated negative impact on both the probability of bankruptcy and Operating Revenue is entirely negated. Meanwhile, the impact on As-

Table 8: Sanctions on Strategic and Non-Strategic Firms

	(1)	(2)	(3)	(4)
VARIABLES	d_Active	lOpRev	lAsset	lEmp
d_Sanc	-0.0303***	-0.3099***	-0.7080***	-0.4355***
	(0.003)	(0.062)	(0.053)	(0.030)
d_Sanc_Strat	0.0375***	0.2999**	0.3189***	0.2117*
	(0.014)	(0.144)	(0.121)	(0.120)
Observations	398,715	92,896	145,920	135,685
R-squared	0.665	0.897	0.884	0.855

*Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. d_Active and d_Sanc are dummies capturing when firms are active and sanctioned respectively. d_Sanc_Strat is an interaction term capturing when a firm is both sanctioned and strategic. lOpRev stands for log Operating Revenue, Assets log Total Asset Holdings, and Emp log Total Number of Employees.*

sets and on Employment is reduced by about one-half, although the mitigating impact on Employment is only statistically significant at the 10 percent level. This is consistent with the theoretical predictions of our model. Furthermore, the weaker impact on employment is consistent with our theoretical model above if employment can proxy for output. This is also consistent with the anecdotal evidence of government shielding of firms deemed sensitive for economic, political, or national security reasons.

This *sword/shield* effect has significant policy implications for the sanctioning government. On the one hand, shielding may mitigate the tactical benefict of imposing concentrated economic harm upon an entity or individual doing behavior undesirable to the sanctioning regime. On the other hand, by shielding the firm, the target government is transfering the economic harm away from and onto its own balance sheet, with strategic dividends if the ultimate policy goal of the sanctioning government is to modify the objective function of the target regime.[19] Indeed, from this perspective, shielding may be precisely the desired outcome of the sanctioning government and strategic firms are thus a target-rich environment

[19]We estimate it has cost the Government of Russia at least $13 billion to compensate strategic firms for its lost operating revenue.

for sanctions policy practionners seeking to incentivize a chance in state behavior.[20]

5.4 Robustness Checks

5.4.1 Parallel Trends and Matching Estimation

Our difference-in-differences methodology relies on the parallel trends assumption, i.e., that targeted firms would have experienced the same average change in performance as their non-targeted peers (same sector and country) had they not been targeted. This assumption could be violated if, for example, targeted companies tend to grow more slowly than non-targeted peers for reasons other than sanctions. It seems unlikely that there is an inherent bias for slow-growing firms in the sender government's choice of targets; however, it is something to explore.

We first examine whether targeted firms grew more slowly than non-targeted firms in the years prior to sanctions. For this purpose, we define $dlnX_{pre} = lnX_{2013} - lnX_{2012}$ for each $X = OpRev, Asset, Emp$ and regress it on a dummy variable $everSanc$ which is equal to 1 if the firm is sanctioned in any year and zero otherwise, controlling for country, sector and strategic status. The coefficient on $everSanc$ should be statistically insignificant if there is no pre-sanctions bias for slow-growing firms in target selection. The first row of Table 9 shows this to be the case.[21] By contrast, the second row shows the same regressions with dependent variables $dlnX_{post} = lnX_{2015} - lnX_{2013}$, which produce results in line with our headline fixed effects regressions in levels.

Targeted firms were significantly larger on average in 2013 than their non-targed peers

[20] Private discussions by the authors with ex-U.S. senior government officials closely involved in U.S. sanctions against Russia confirm the calculated targeting of firms that the Russian government both could and would shield.

[21] Despite using the historical Ruslana discs from 2010-2012, most of our firms did not report data in 2012. Thus, it is possible that small sample size accounts for the insignificance of the result. However, we continue to find a significant sanctions effect after 2014, even on this restricted sample. The remaining regressions in the table drop all firms that did not report data in 2012 or 2013.

Table 9: Placebo Test, DID and Matching Estimation

VARIABLES		(1) lOpRev	(2) lAsset	(3) lEmp
$dlnX_{pre}$	$everSanc$	0.048	-0.113	0.014
		(0.065)	(0.096)	(0.035)
	Observations	3,185	5,815	4,073
$dlnX_{post}$	$everSanc$	-0.314***	-1.41***	-0.697***
		(0.091)	(0.118)	(0.045)
	Observations	3,640	9,038	7,194
$dlnX_{2013}$	$everSanc$	3.26***	5.90***	2.25***
		(0.114)	(0.132)	(0.051)
	Observations	5,391	12,131	10,132
ATE	$everSanc$	-0.384***	-0.816***	-0.428***
		(0.123)	(0.104)	(0.097)
	Observations	7,699	13,593	13,040

*Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Estimates indicate the coefficient of ever_Sanc, controlling for sector, country and strategic status. ATE is the average treatment effect over sanction cohorts, using Mahalanobis nearest-neighbor matching on lagged lAsset, strategic status, a small employer dummy (2 employees or less in the previous year), country, and sector group. Sample is restricted to firms that report some data prior to 2014.*

on all three measures, as shown in the third row of Table 9. Hypothetically, if larger firms in 2013 had dimmer growth prospects than smaller firms, conditional on survival, then parallel trends assumption may be violated. To address this concern, we estimate the average treatment effect (ATE) of sanctions on $dlnX_t = lnX_t - lnX_{t-1}$ for each cohort of sanctioned firms t (defined by the first year of sanction) using Mahalanobis nearest-neighbor matching. Specifically, for each cohort t, we match each sanctioned firm with the non-sanctioned firm that is most similar in terms of industry, country and size, measured by lagged log of assets, strategic status and a small employer dummy (2 employees or less in the previous year). The resulting ATEs are averaged across cohorts to produce the ATE shown in last row of Table 9. The ATE indicates that impact of sanctions is to reduce the performance of targeted firms relative to their matched non-targeted peers. For all three performance measures, the ATEs are statistically significant at the 1 percent level and the magnitudes are in line with

Table 10: Sanctions on Strategic Firms vs. SOEs

	(1)	(2)	(3)	(4)
VARIABLES	d_Active	lOpRev	lAsset	lEmp
d_Sanc	-0.0302***	-0.3099***	-0.7080***	-0.4355***
	(0.003)	(0.062)	(0.053)	(0.030)
d_Sanc_Strat	0.0380***	0.3054**	0.3114**	0.2368*
	(0.015)	(0.148)	(0.125)	(0.126)
d_Sanc_SOE	-0.0165	-0.1228	0.1701	-0.2618
	(0.016)	(0.593)	(0.371)	(0.354)
Observations	398,715	92,896	145,920	135,685
R-squared	0.665	0.897	0.884	0.855

*Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. d_Active and d_Sanc are dummies capturing when firms are active and sanctioned respectively. d_Sanc_Strat is an interaction term capturing when a firm is both sanctioned and strategic. d_Sanc_Strat is an interaction term capturing when a firm is both sanctioned and a state-owned enterprise. lOpRev stands for log Operating Revenue, Assets log Total Asset Holdings, and Emp log Total Number of Employees.*

our headline results reported in Table 3.

5.4.2 State-Owned Enterprises

We also tested to see whether the differences in sanctions impact between strategic and non-strategic firms could be accounted for by the fact that many strategic firms are state-owned enterpises. Presumably, a target state would face different incentives to shield a firm if it was also the ultimate owner of the firm. Hence, using BvD ownership data, we constructed a dummy variable d_SOE which activates when the ultimate beneficial owner of a firm is an arm of the Russian government. Table 10 shows that the interaction of the sanctions treatment with the SOE dummy does not seem to have any significant extra explanatory power beyond the strategic dummy.

6 Conclusions

We estimate the impact of sanctions on the performance of sanctioned companies using detailed firm and individual-level data, using the case study of U.S.-EU sanctions against Russia since 2014 crisis as a natural experiment. We find very significant impacts on sanctioned firms relative to non-sanctioned peers. Thus, targeted sanctions do appear to be "smart", in the sense of hitting those targeted with relatively small collateral damage, despite some evidence of spilloever into non-sanctioned firms.

While assessing whether this concentrated economic damage is sufficient to change government behavior is beyond the scope of this paper, our findings suggest damaging the financial health of firms directly involved in undesirable actions (e.g. an arms manufacturer providing weapons to a conflict) may still have significant *tactical* benefits.

Furthermore, we documented both theoretically and empirically how the target state may systemically shield some targeted firms deemed to be strategic. However, this is not a free lunch but merely redirects the economic pain away from the target firm and onto the target regime instead while potentially imposing additional transactions costs. Therefore, from the perspective of the sanctioning country, shielding behavior transmutes the tactical benefit of concentrating harm upon a target entity into a strategic benefit by forcing the target government to ultimately absorb the losses. This inherent policy tradeoff should be recognized by policymakers when designing future sanctions regimes.

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Figure 1: Firm Outcomes in θandγspace

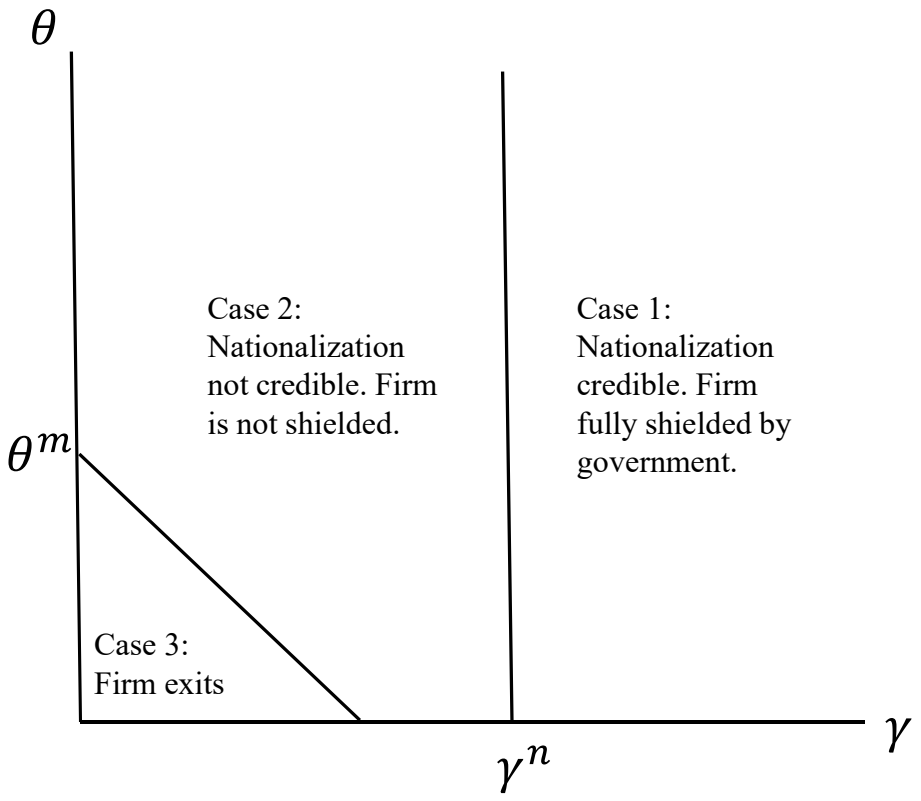
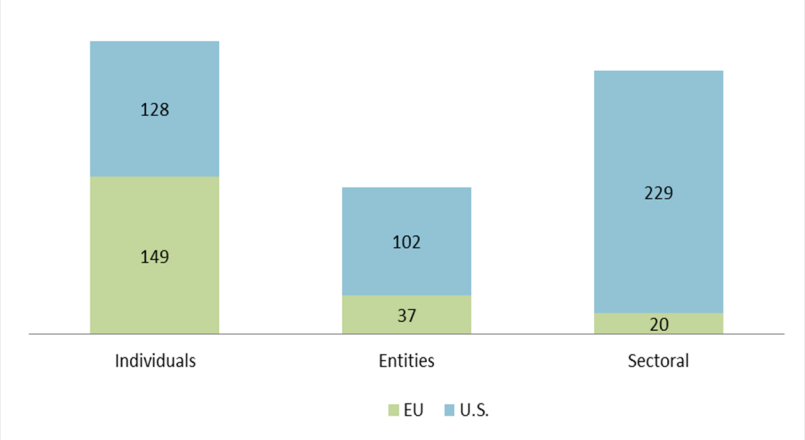


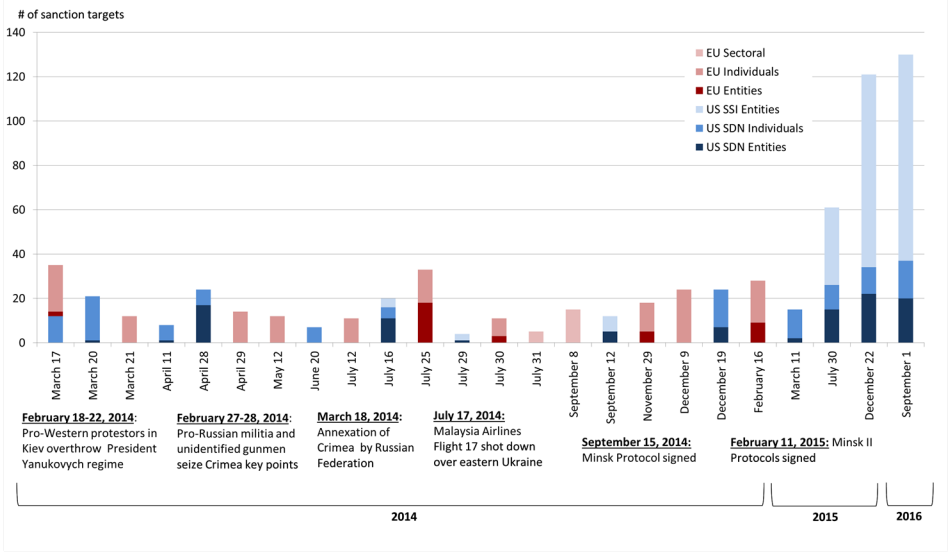
Figure 2: Overview of U.S. and EU Targets

As of December 1, 2016:



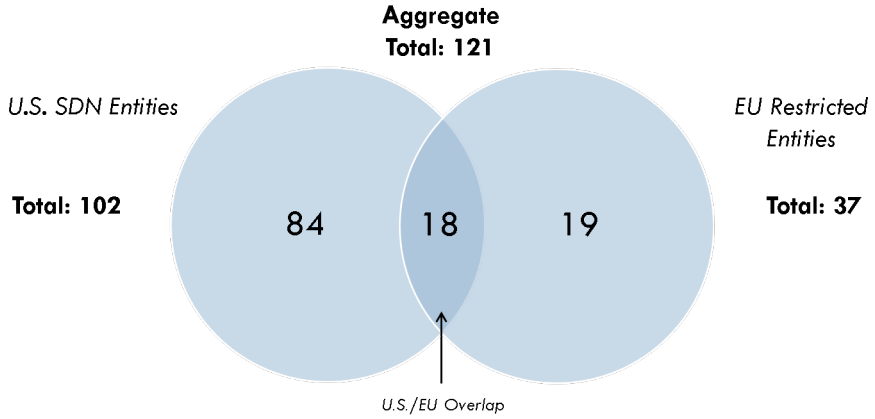
Source: U.S. Treasury OFAC, Council of the European Union

Figure 3: Targeting Timeline



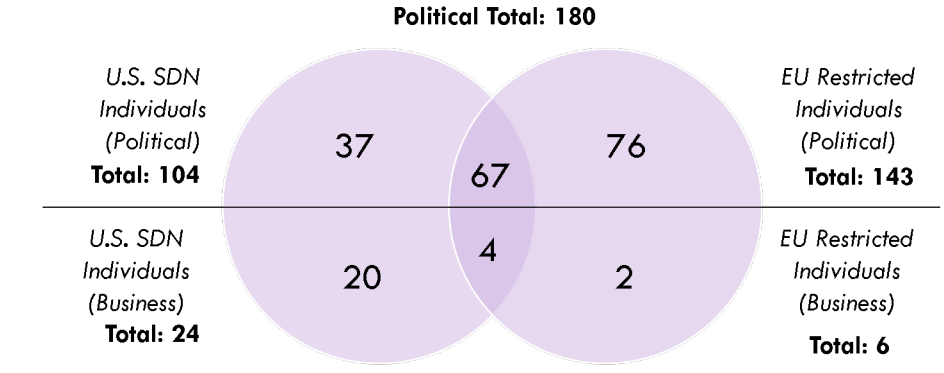
Source: U.S. Treasury OFAC, Council of the European Union, BBC

Figure 4: U.S. SDN and EU Restricted Entites



Source: U.S. Treasury OFAC, Council of the European Union

Figure 5: U.S. SDN and EU Restricted Individuals

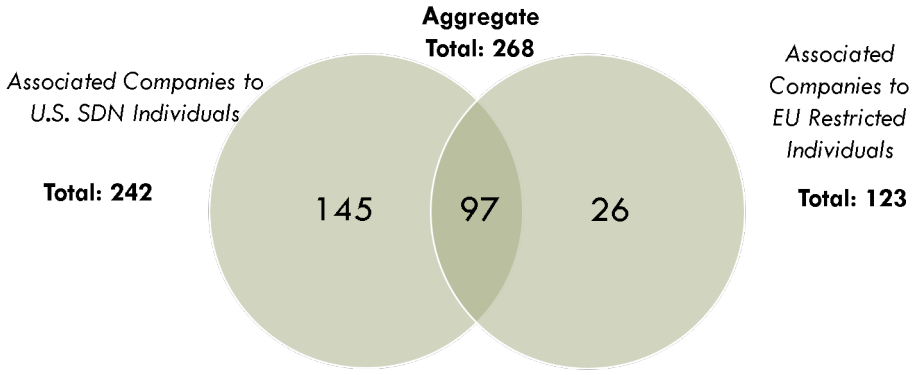


U.S. and EU Political + Business Total = 206

U.S. and EU sanctioned individuals were classified into political figures (e.g. politicians, government officials, etc.) and those with business interests, as recognized in the BvD Orbis database, (e.g. corporate officers, board members, shareholders).

Source: U.S. Treasury OFAC, Council of the European Union, Bureau van Dijk, Authors' Calculations

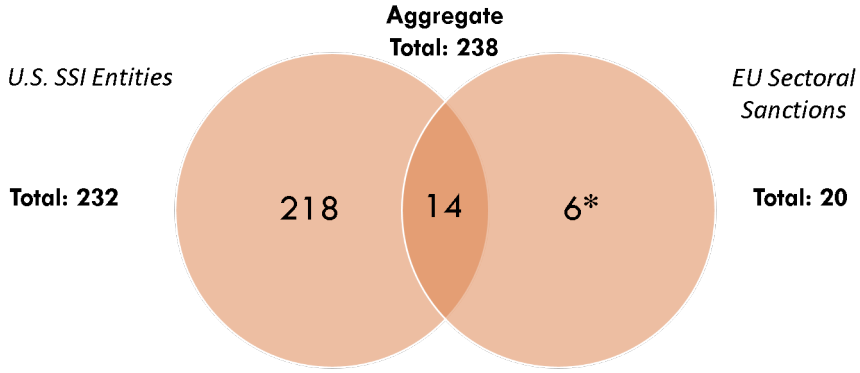
Figure 6: U.S. SDN and EU Associated Companies



Then, for those individuals classified as business figures, we collected all firms to which the individuals have or have had a business "association", e.g. a corporate officer, a director, a board member, shareholders, etc., according to the BvD Orbis database.

Source: U.S. Treasury OFAC, Council of the European Union, Bureau van Dijk, Authors' Calculations

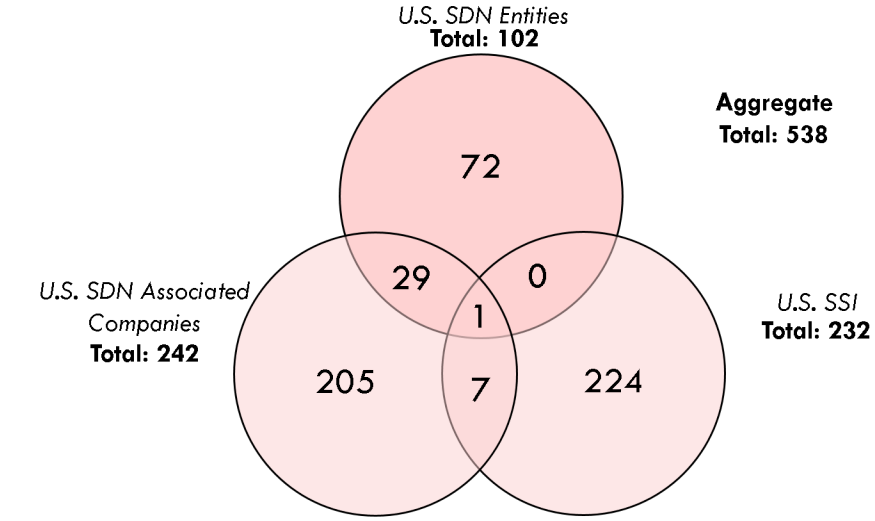
Figure 7: U.S. SSI and EU Sectoral Sanctioned Entities



This chart displays the overlap between those entities explicitly listed by the U.S. and EU governments as facing sectoral restrictions on certain transactions and technology transfers. However, both the U.S. and EU follow a 50% ownership rule whereby those subsidiaries 50% or more owned, directly or indirectly, by an explicitly sanctioned entity, also face the same sanctions.

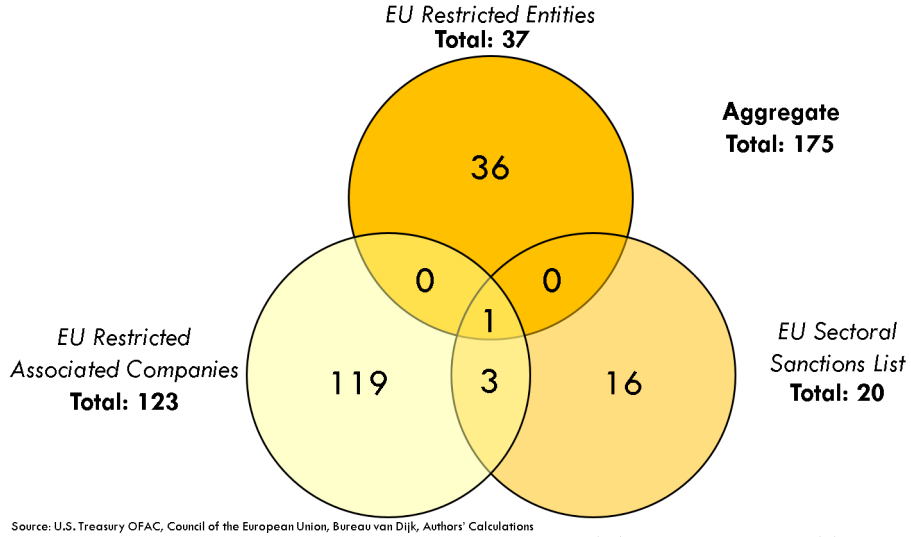
Source: U.S. Treasury OFAC, Council of the European Union, Bureau van Dijk, Authors' Calculations
*4 of 6 EU sectorally sanctioned entities are not in U.S. SSI List, but are in U.S. SDN List

Figure 8: U.S. Targeted Sanctions



Source: U.S. Treasury OFAC, Council of the European Union, Bureau van Dijk, Authors' Calculations
* This intersection includes a company Technopromexport that was designated on the U.S. SSI List (3/20/14) and the U.S. SDN List (12/19/14)

Figure 9: EU Targeted Sanctions



Source: U.S. Treasury OFAC, Council of the European Union, Bureau van Dijk, Authors' Calculations
*This intersection includes a company Almaz-Antey that was designated on the EU Restrictive Measures List (7/30/14), the EU Sectoral Sanctions List (9/8/14), and is associated with Sergei Chemezov who is a sanctioned individual.

Figure 10: Strategic Firms

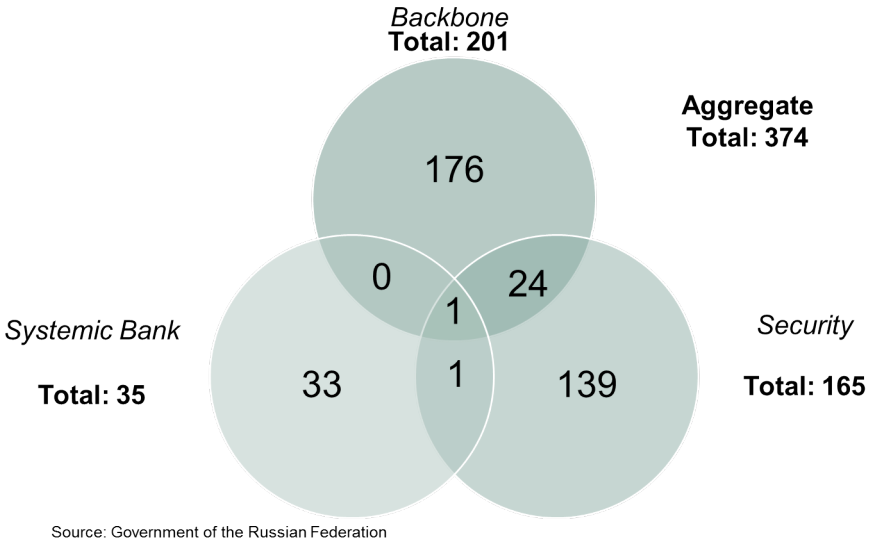


Figure 11: Sanctioned vs. Strategic Firms