Economic sanction games among the US, the EU and Russia: Payoffs and potential effects[☆]

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ABSTRACT

Economic sanctions of the US and EU on Russia because of Ukraine crisis in 2014 last for a long time and are still a hot policy topic. This paper uses a 16-country or region numerical general equilibrium model with trade cost and exogenous trade imbalance to explore this three-country economic sanction game payoffs, and simulate the effects of sanctions on individual countries. Our analysis find that all sanction involved countries will be hurt, but comparatively Russia will be hurt more, and the US and EU will be hurt less. Sanction measures of EU have larger impacts to Russia than the US measures, and meanwhile Russian counter-sanction measures will generate larger impacts on the EU than on the US. From the economic perspective, the optimal choice for US and EU is to give up sanction measures to Russia, and retaliation is Russia's optimal choice when faced with sanction measures. Countries out of the sanction game will gain because of trade diversion effects.

1. Introduction

The Russian military intervention in Ukraine, which began in late February 2014, prompted a number of governments to apply sanctions against individuals, businesses and officials from Russia. These sanctions were mainly from the European Union (EU) and the United States (US). Russia has responded with counter sanctions against them, including a total ban on food imports from the EU, the US, Norway, Canada and Australia. The sanction and retaliation measures of the US and EU to Russia lasted for several years up to now. Recently on June 14 2017, the US Senate passed a bill imposing sanctions on Russia in response to Russia's involvement in presidential election. Meanwhile, the EU reiterated their stance on sanctions against Russia on this year's G7 summit in May 2017. Therefore the economic sanction among the US, EU and Russia is a hot topic in policy side. Based on these backgrounds, this paper focuses on how these different sanction measures influence involved countries and non-involved countries, and what are the payoffs to the sanction game.

Existing literature on economic sanctions among US, EU and Russia are mainly analytical, few of them has ever used numerical methods to explore the sanction game payoffs and its influence to individual

countries. Galbert (2015) assesses the outcome and future of Russia sanctions from a European perspective. Dreyer and Popescu (2014) analyzes the effects and possible impacts of sanctions against Russian. Oxenstierna and Olsson (2015) comprehensively studies the impacts and prospects of the economic sanctions against Russia with analytical methodology. ICC (2015) studies the potential impact of the EU sanctions against Russia on international arbitration administered by EU-based institutions. Nelson (2015) generally analyzes economic implications of the US sanctions on Russia. Some literature analyze economic sanction from a theoretical perspective. Kaempfer and Lowenberg (1988) uses a public choice approach to study the theory of international economic sanction. This paper uses numerical general equilibrium modelling and simulation methodology to compute sanction game payoffs and then to explore the influences of economic sanctions. The methodology is new in sanction literature and the results are important for policy.

The US and EU sanctions against Russia and Russia's counter sanctions are cycle, incremental, step-by-step, and from soft sanctions to hard sanctions. From March 2014 to now, there are about three rounds of sanctions and counter sanctions among the US, the EU and Russia. The first round is the threat stage, the US and the EU use restrictive measures, mainly asset freezes and visa bans on selected individuals, to send a

strong message to the Russian government that there are consequences for their actions that violate the sovereignty and territorial integrity of Ukraine is prepared to take additional steps to impose further political and economic costs. The second round is that the US and EU use concrete measures to increase Russia's political isolation as well as the economic costs to Russia, especially in areas of importance to Russia economy, the measures include import bans on Russia's energy and defense sectors, embargo on the import and export of arms, exports bans on certain energy-related equipment and technology to Russia and financial sanctions. The third round began from July 2014 to now. In response to the escalating War in Donbass, on 17 July 2014 the US extended its transactions ban to two major Russian energy firms and two banks. After that a series of EU countries take more tighten sanctions to Russia. Even though in June 2015 the G7 collectively extended sanctions already in place for an additional six months (Wikipedia, 2015). Russia's counter actions include travel bans, import ban on food from western countries, and import bans on used cars, clothes and consumer products in the first two stages. The economic sanction and counter sanction game among the US, the EU and Russia is in developing and will last a long time. So it is valuable to explore the impacts of this sanction game numerically.

We set up a three-round sequential game to analogue this sanction process and explore its possible influence. We compute payoffs for all game tree points, and explore the game equilibriums and simulate the sanction game impacts. We assume the three-round game are separately soft sanction round, hard sanction round and forbidden sanction round. Each round sanction has seven choice of game points. Sanction and counter-sanction measures include tariff, non-tariff, and capital flow control. In this paper, we construct a 16-country or region global general equilibrium model including fixed trade imbalance, controlled capital flow and trade cost. Controlled capital flow assumption can help to explore the capital control effects, and trade cost structure is helpful to explore the effects of tariff and non-tariff barriers. Some sanction measures are hard to modelling in the general equilibrium structure, so our analysis focus on trade sanction measures.

We use the numerical general equilibrium model calibration and simulation methodology to compute payoffs for game tree points, and then to explore the sanction game influences to individual countries. Our numerical model has 16 countries or regions or regions, which are the US, the EU, Russia, China, Japan, Korea, Canada, Mexico, India, AN (Australia and New Zealand), CP (Chile and Peru), BMSV (Brunei, Malaysia, Singapore, and Vietnam), CILMPT (Cambodia, Indonesia, Laos, Myanmar, Philippine, and Thailand), ODDC (other developed countries, including Switzerland, Norway, Israel, and Iceland), ODC (other developing countries, including Brazil, Egypt, Argentina, and South Africa), and ROW (the rest of the world). Each country produces two goods which are tradable manufacturing goods and non-tradable non-manufacturing goods with two factors (labor and capital).

Our numerical analysis find that sanction and counter-sanction measures among the US, the EU and Russia will definitely hurt all sanction involved countries, but benefit all non-involved countries. For the US and EU, their optimal choices from the economic perspective are giving up sanction measures. The optimal choice for Russia is retaliating when faced with sanction measures. The impacts of sanctions to different countries are different. Negative impacts to the US and EU are comparatively small compared with their economic scale, so they are not afraid of Russia's counter sanction threat. But negative impacts of sanction to Russia is large compared with her economic scale, which means that Russia will be heavily hurt by economic sanction from the US and EU. The EU sanction measures will generate more effects to Russia than the US measures, meanwhile Russia's counter sanction measures will hurt the EU more than the US. Additionally, soft sanctions have less influence than hard sanctions, and hard sanctions have less impact than forbidden sanctions. The negative influences to involved countries under optimal

sanction are less than under arbitrary sanction.

2. A game of sequential economic sanction

We assume and build the sanction game according to the economic sanction facts among the US, the EU and Russia. In order to capture the full picture of the US and EU take sanction measures to Russia and Russia retaliate, and consider all possible policy choices by these three countries, we set up a three-round sanction-counter game, the sanctions are incrementally intensified. In this three-country economic sanction game, the senders are the US and EU, and the responder is Russia. The US and EU punish Russia, and Russia choose to retaliate.

The first round is the soft sanction game, the second round is the hard sanction game, and the third round is the forbidden sanction game. Each stage of the game is the same in theory, the difference is only in sanction degree/level (tariff level) and they are a sequential game. Each round of the games involves three players, the US, the EU and Russia. We assume that the US and EU are sanction initiation countries and they decide whether or not to take sanction measures to Russia, and Russia is the counter country and she decides whether or not to take counter retaliation measures. We also assume that Russia will take symmetric counter actions, which means Russia will retaliate the country who take sanction measures to her at the same sanction level but will not retaliate the countries without sanction measures to her. We further assume that this three-round sanction-counter game is a sequential game. Only at the situation that the US and EU take sanction measures simultaneously to Russia and meanwhile Russia retaliate, then the three players enter the second round sanction game, and the same assumption to the third round sanction game. In each round of the games, each player only has two action choices. For the US and EU, their two actions are Sanction (we denote it as S) and Non-Sanction (we denote it as NS). Russia's two action choices are Counter-Sanction (we denote it as CS) and Non-Counter-Sanction (we denote it as NCS).

Specifically, in the first round of the game, we assume a three-step action process. The first step is for the US to decide whether to sanction or not, the second step is for the EU to decide whether to sanction or not, the third stage is for Russia to decide whether to counter-sanction or not. Therefore, in each round of the game, there are 8 different decision choices (see Fig. 1). We define them as follows:

The First Round Game: Soft Sanction
O11 = (US: S; EU: S; Russia: CS); O12 = (US: S; EU: S; Russia: NCS);
O13 = (US: S; EU: NS; Russia: CS); O14 = (US: S; EU: NS; Russia: NCS);
O15 = (US: NS; EU: S; Russia: CS); O16 = (US: NS; EU: S; Russia: NCS);
O17 = (US: NS; EU: NS; Russia: NCS);

The Second Round Game: Hard Sanction
O21 = (US: S; EU: S; Russia: CS); O22 = (US: S; EU: S; Russia: NCS);
O23 = (US: S; EU: NS; Russia: CS); O24 = (US: S; EU: NS; Russia: NCS);
O25 = (US: NS; EU: S; Russia: CS); O26 = (US: NS; EU: S; Russia: NCS);
O27 = (US: NS; EU: NS; Russian: NCS);

The Third Round Game: Forbidden Sanction
O31 = (US: S; EU: S; Russia: CS); O32 = (US: S; EU: S; Russia: NCS);
O33 = (US: S; EU: NS; Russia: CS); O34 = (US: S; EU: NS; Russia: NCS);
O35 = (US: NS; EU: S; Russia: CS); O36 = (US: NS; EU: S; Russia: NCS);
O37 = (US: NS; EU: NS; Russia: NCS);