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**Macroeconomic effects of trade and financial
sanctions**

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Table of Contents

ABSTRACT	
1 INTRODUCTION	1
2 TRADE SANCTIONS	1
3 FINANCIAL SANCTIONS	5
4 SUMMARY	7
REFERENCES	8

Abstract*

The purpose of this paper is to examine the short-run effects of economic sanctions taking the form of restrictions on international trade in goods and services, as well as brakes on international financial flows. A Keynesian disequilibrium, demand driven macroeconomic paradigm is postulated. The target country is envisaged to be part of the global South, the sender country is viewed to be located in the global North, and the sanctions are general rather than targeted at specific firms and sectors. The trade sanctions can take two forms: a diminution of exports to the target country and a reduction in exports from the target nation. Both type of sanctions damage the target country's economy on impact: the first by lowering aggregate supply in the target country, the latter by worsening its terms of trade. From the viewpoint of the sender country, its economy may benefit from the demand generated by the rent from export restrictions to the targeted economy. Financial sanctions are more unequivocal in their damage to the target economy, they lower the supply of funds or capital in the target nation with adverse consequences for the supply of credit, investment finance, as well as reduced options on how to finance government expenditure.

Keywords

Sanctions, macroeconomic effects, trade policy.

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1 Introduction

International economic sanctions are akin to Clausewitz's (1832) definition of war: they fall into the category of politics by other means. The avowed aim of economic sanctions is to change the behaviour of targeted nations, or to make it more compliant with the sender country's (mainly the United States in the post-1945 era) or multilateral institution's (United Nations, European Union) objectives as to how the target country should behave. Therefore, the objective is political; the means employed are, however, economic. Economic sanctions take a variety of forms, including the institution of restrictions on international trade, as well as on international financial flows. A seminal work in this connection was by Hufbauer and Schott (1985), who also provided a data set on the deployment of economic sanctions. The literature on whether economic sanctions 'work' in coercing change in the target country's behaviour is a matter of some controversy; see van Bergeijk (2019a) on this inconclusive literature. Schneider and Weber (2019) argue that sanctions or 'economic coercion' met with some success during the period 1989 to 2016, which they characterize as the 'liberal' era. There is also some evidence that economic sanctions work better on impact and when they are of a short duration, compared to long-term sanctions; Dijazi and van Bergeijk (2013) for the obvious reason that the targeted nation can make alternative arrangements to bypass the sanction. However, van Marrewijk and van Bergeijk (1995) indicate that sanctions may work in the long-run if the target nation gradually learns about the credibility of sanctions, costs to its economy and the sender's determination. Furthermore, there is also a debate about whether unilateral (imposed solely by the United States, say) or multilateral sanctions (joint United States and the European Union sanctions on Iran, or African Union sanctions, for example) work better in changing behaviour (Bapat and Clifton, 2009), as well as the superiority of sanctions that target individual firms rather than the target's entire economy in general (Ahn and Ludema, 2019).

The purpose of this paper is not to look at the success or failure of the sanctions in inducing behavioural or policy change, or the degree thereof, but to analyze the macroeconomic effects of sanctions on the sender and target country's economies. We begin by examining trade sanctions, followed by financial flow restrictions. In the analysis presented below the target country is a developing country, and the sender a developed country, thus placing the analysis within the genre of macroeconomic models of North-South interaction, although financial sanctions will be analyzed in a single country context. The analysis of financial sanctions will be conducted in a single country context, focusing on the targeted country's economy.

2 Trade sanctions

There is considerable similarity between trade policies aimed at restricting or re-directing the quantum or pattern of international trade and economic sanctions, restricting international trade in goods and services, imposed by external powers. Forrer and Harrington (2019) indicate that the Trump administration, in particular, is increasingly using trade policy in the form of import tariffs as both trade policy and a sanction instruments. Also, van Bergeijk (2019b) indicates the growth of mercantilist, beggar my neighbor, tendencies in the global trade arena. This section will treat sanctions in the light of open economy macroeconomic models dealing with trade policy (Mundell, 1961; Ford

and Sen, 1985; Murshed 1992a and 1992b). The macroeconomic motivation for utilizing trade policy is to target output and employment, and not necessarily improvements in the terms of trade as in the neoclassical pure theory of international trade or enhance market share for domestic firms as with the economies of scale argument put forward by the new theories of international trade. In this case, trade restrictions are utilized to damage the target country's economy. The macroeconomic effects of sanctions are considered by Eyler (2007, chapter 5) in a context of a Ramsey type new open economy model, unlike the disequilibrium Keynesian models we consider below.

This section presents a simple two country theoretical macroeconomic model of trade sanctions to capture the *immediate impact* of trade sanctions. We describe the sanctions imposing country as the North (N) and the target country as the South (S). This is in line with the author's earlier work with structuralist macro-models: see Taylor (1983), for a seminal exposition of macro-models in this genre. The key to structuralist models is some asymmetry with standard models, at least some features which differentiate economies in the global South with those in the global North. In the case of this paper, the global South is dependent on an import of a particular good from the North, which enhances its aggregate supply. This is akin to the import multiplier effect on output in a repressed inflation or supply constrained regime (Malinvaud, 1977).

There are two types of sanctions under consideration imposed by the global North on the South. The first is to do with restricting the North's exports to the South. Even when it is a quantitative restriction, it will have a price or tax equivalent. The effect of this super-sanction is that it raises both the price of the North's good in the South, as well as diminishing aggregate supply or capacity utilization in the South. The second sanction is an import tariff, which increases the price of the South's goods (exports) in the North (its import). In what follows, both types of sanctions are analysed independently.

The equilibrium equation in the goods market for the North, the sanction imposing country is

$$P_N Y_N(P_N) = P_N A(Y_N + vX_N; P_S(1 + \tau)) + P_N X_N(Y_S; P_N(1 + v))[1 + v] - P_S X_S(Y_N + vX_N; P_S(1 + \tau))[1 + \tau] \quad (1)$$

On the left hand side we have aggregate supply, and on the right hand side we have components of aggregate demand: total absorption or expenditure, plus exports minus imports. Outside equilibrium excess demand cause prices to rise. Observe that the disposable income in the North is augmented by the export sanctions revenue, vX_N , and excess demand for output causes, the price of the good in the North, P_N to increase. The other rent composed of the import tariff revenue equivalent on the restrictions on imports from the South (τX_S) is dissipated and accrues to third countries outside the macroeconomic model.

Here:

P_N = price of the composite good in the North;

P_S = the price of the composite good in the South;

Y_N = aggregate output or income in the North;

Y_S = aggregate output or income in the South income;

X_N = exports of the North to the South, which is a positive function of the South's income, Y_S , but negatively related to P_N ;

X_S = imports of the North from the South, which is a positive function of Y_N but negatively related to price, P_S

A = absorption or expenditure (sum of private and public consumption and investment) in the North)

v = the ad-valorem tax equivalent of the restrictions on the North's exports to the South, which also has a negative impact on output in the South, the revenues from which are re-distributed back to households in a Meade like lump-sum fashion. In other words, they do not alter the distribution of income;

τ = the ad-valorem tax equivalent of the restrictions on the exports (imports) of the South (North) to the South

Note that in equation (1), $A_2 = \frac{\partial A}{\partial P_S} = X_S(1 - \varepsilon) > 0$, where ε is the elasticity of real absorption with respect to real income, this is the Laursen-Metzler (1950) effect; see Murshed (1997, pp 24-25) for a detailed derivation. A rise in the South's relative price or a deterioration in the North's terms of trade causes its real income to decline but real absorption falls less than proportionately, so there is an aggregate demand boost. The Laursen-Metzler effect played a key role in Mundell's (1961) analysis of the macroeconomic effects of trade policy, as well as in Ford and Sen (1985) and Murshed (1992a and 1992b).

Furthermore: $A_1 > 0, A_2 > 0, X_{N1} > 0, X_{N2} < 0, X_{S1} > 0, X_{S2} < 0, f_1 > 0$,

In the South the supply of output (Y_S) is negatively impacted on by the North's export sanction or super-sanction, v , otherwise excess demand, otherwise excess demand causes the price of the South's good to increase.

$$Y_S = g(P_S, v) \cdots g_1 > 0, g_2 < 0 \quad (2)$$

We substitute the above expression into (1) and the equation that follows. The equilibrium condition for macroeconomic balance in the South, utilizing equation (2) to describe aggregate supply emerges as:

$$P_S g(P_S, v) = P_S E(g(P_S, v)) + P_S X_S(Y_N + v X_N; P_S(1 + \tau)) - P_N X_N(Y_S; P_N(1 + v)) \quad (3)$$

On the left hand side we have aggregate supply, and on the right hand side we have components of aggregate demand: total absorption or expenditure, plus exports minus imports. Outside equilibrium excess demand cause prices to rise; E is the sum of private and public expenditure in the South, $E_1 > 0$.

In the analysis that follows we set initial values of $P_N, P_S = 1$, and initial v and $\tau = 0$, but the partial derivatives associated with these variables are *not* equal to zero or unity. Totally differentiating equations (1) and (3) after rewriting them in excess demand form, and arranging them in matrix format we have:

$$\begin{aligned}
& \begin{bmatrix} (A_1 - 1 - X_{S1})f_1 + X_{N2} & X_S(1 - \epsilon) + X_{N1}g_1 - X_{S2} \\ X_{S1}f_1 - X_{N2} & (E_1 - 1 - X_{N1})g_1 + X_{S2} - X_{N1}g_1 \end{bmatrix} \begin{bmatrix} dP_N \\ dP_S \end{bmatrix} \\
& = \begin{bmatrix} -A_1X_N - X_{N1}g_2 - X_{N2}P_N - X_N & -X_S(1 - \epsilon) + X_{S2}P_S + X_S \\ -(E_1 - 1 - X_{N1})g_2 - X_{S1}X_N + X_{N2}P_N & -X_{S2}P_S \end{bmatrix} \begin{bmatrix} dv \\ d\tau \end{bmatrix} \quad (4)
\end{aligned}$$

In (4) the trace of the Jacobian is negative and the determinant of the Jacobian is:

$$J = (A_1 - 1 - X_{S1})f_1g_1(E_1 - 1) - (A_1 - 1)f_1g_1X_{N1} - (A_1 - 1 - X_{S1})f_1g_1X_{N1} + (A_1 - 1)f_1X_{S2} + X_{N2}((E_1 - 1 - X_{N1})g_1 - (X_{S1}f_1 - X_{N2})X_S(1 - \epsilon)) \quad (5)$$

The above expression is positive and the model is stable if, for absolute values the following inequality holds:

$$(E_1 - 1 - X_{N1})g_1 > X_S(1 - \epsilon) \quad (6)$$

In what follows, we shall treat $J > 0$.

Utilizing Cramer's rule we can now proceed to look at the impact of super-sanctions as described.

$$\begin{aligned}
& \frac{dP_N}{dv} \\
& = \frac{-A_1X_N[E_1 - 1 - X_{N1} + X_{S2} - g_1X_{N1}] + g_2[X_{N1}X_{N1}g_1 + (1 - E_1)X_{S2}] - (X_{N2}P_N + X_N)(E_1 - 1 - X_{N1})g_1 - X_NX_{S2} + X_NX_{N1}g_1 + [(E_1 - 1 - X_{N1})g_2 + X_{S1}X_N - X_{N2}P_N][X_S(1 - \epsilon)] - X_NX_{S2}X_{S1} + X_{S1}X_NX_{N1}g_1}{J} \quad (7)
\end{aligned}$$

The above expression is positive only if $X_N > X_{N2}$ and if $(1 - E_1)X_{S2} > X_{N1}X_{N1}$. In other words, the demand for the North's good is price inelastic in the South; the marginal propensity to spend and import are low in the South; the price elasticity of the South's exports is high. There is excess demand in the North due to the sanctioned export rent being diverted towards domestic expenditure and this causes greater capacity utilization and output increases. Although we do not explicitly model a government sector, if the trade restriction rents accrue to a government with a higher propensity to spend then the expansionary effect could be greater for the North's economy.

Turning to the South:

$$\begin{aligned}
& \frac{dP_S}{dv} = \\
& \frac{(A_1 - 1 - X_{S1})f_1g_2(1 - E_1) + (A_1 - 1)X_{N1}f_1g_2 + X_{S1}X_NX_{S1}f_1 + X_{N2}P_NA_1f_1 - A_1X_NX_{N2} - X_NX_{N2} + X_{N2}(1 - E_1)g_2}{J} \quad (8)
\end{aligned}$$

The above expression will be positive if $(1 - E_1)g_2 > A_1f_1$ in absolute value. There is excess demand in the South due to falling aggregate supply or capacity utilization. There is inflation due to a supply shock, unless the inflation is suppressed as in a Malinvaud (1977) type fix-price model via rationing. Thus, clearly super-sanctions hurt the target country, although some of the adverse effect can be mitigated in the long-run via sourcing of lost imports from other countries.

We now turn to the impact of the ‘lighter’ trade sanction, in other words, a restriction on goods exported by the South.

$$\frac{dP_N}{d\tau} = \frac{[E_1 - 1 + X_{N1}] \epsilon g_1 X_S + X_{S2} P_S g_1 (E_1 - 1) + X_{S2} X_S - X_{N1} X_{S2} g_1 - \epsilon X_{N1} g_1 X_S}{J} \quad (9)$$

The sign is ambiguous. A necessary condition for the above expression to be positive is only if $X_{S2} > X_S$, in other words the price elasticity of demand for the South’s good is elastic. The elimination of the Laursen-Metzler effect on absorption in the North will also serve to enhance aggregate demand, as the effect works in a negative direction in this instance.

As far as the South is concerned:

$$\frac{dP_S}{d\tau} = \frac{(1 - A_1) f_1 X_{S2} - \epsilon X_S [X_{S1} f_1 - X_{N2}]}{J} < 0 \quad (10)$$

Trade sanctions are immiserizing for the South; both types of trade sanctions damage its economy. Restrictions on the exports of the South hurt the target country’s economy by deteriorating its terms of trade, and the restriction of exports to the target country, described here as the South, damage aggregate supply even if there is a tendency for the target nation’s terms of trade to improve as presented in the theoretical model of Eyler (2007, chapter5). Of course, in the longer run, if sanctions persist the target economy has greater scope to adjust and source goods from third countries. We have largely abstracted from trade diversion to third countries in order to gather the impact effects of unanticipated trade sanctions in target nations. The sanction sender nation can actually profit from sending the sanction, if the sanction export restriction rents accrue to its domestic economy or government, and also via improved terms of trade when it restricts the target country’s exports.

3 Financial sanctions

In this section we will focus on financial restrictions targeted to a developing country in the global South. We will focus solely on the economy of the South by introducing a monetary sector. Financial sanctions will be proxied by a reduction in the supply of money, as the target economy finds greater difficulty in accessing international sources of funds. We do not believe we should introduce international capital flows and equilibrium covered or uncovered interest parity relations as described in say, Dornbusch (1980), as such equilibrium concepts may not apply to developing countries, even the more emerging market economies there. After examining the effects of financial sanctions (money supply restrictions) in a simple analytical macro-model of the South, we will go on to look at the balance of payments consequences, in a residual equation, incorporating both trade and financial sanctions.

The goods market equilibrium condition for the South is a slightly modified version of equation (3) above:

$$P_S g(P_S, v) = P_S E(g(P_S, v); r) + P_S X_S(Y_N + v X_N; P_S(1 + \tau)) - P_N X_N(Y_S; P_N(1 + v)) \dots E_2 < 0 \quad (11)$$

Thus, the only change is that domestic expenditure is made a negative function of the (nominal) interest rate, r , indicating the negative interest elasticity of (investment) expenditure.

Turning to the money market we postulate a simple money demand equation, H_D , which is a positive function of income and negatively related to the interest rate. The supply of money, H , is not just a domestic monetary policy concern and can, however be negatively impacted by external financial sanctions, θ . Thus, in equilibrium, where excess demand for money causes interest rates to rise and vice versa:

$$H_D(g(P_S, v); r) = H(\theta) \dots H_1 < 0, H_{D1} > 0, H_{D2} < 0 \quad (12)$$

Totally differentiating (11) and (12) after writing them in excess demand (initial $P_N, P_S = 1$), we can arrange them in the following matrix format (ignoring the trade sanctions policies in this exercise):

$$\begin{bmatrix} (E_1 - 1 - X_{N1})g_1 + X_{S2} - X_{N1}g_1 & E_2 \\ H_{D1}g_1 & H_{D2} \end{bmatrix} \begin{bmatrix} dP_S \\ dr \end{bmatrix} = \begin{bmatrix} 0 \\ H_1 \end{bmatrix} d\theta \quad (13)$$

Here we may envisage $= -dK$, the financial sanction leads to an attenuation of international capital inflows, K .

The trace of the Jacobian matrix in (13) is negative and the determinant (J) can be demonstrated to be positive:

$$J = [(E_1 - 1 - X_{N1})g_1 + X_{S2} - X_{N1}g_1]H_{D2} - E_2 H_{D1}g_1 > 0 \quad (14)$$

Hence, the model is stable. Utilizing Cramer's rule:

$$\frac{dP_S}{d\theta} = \frac{-H_1 E_2}{J} < 0 \quad (15)$$

And

$$\frac{dr}{d\theta} = \frac{[(E_1 - 1 - X_{N1})g_1 + X_{S2} - X_{N1}g_1]H_1}{J} > 0 \quad (16)$$

Financial sanctions hit hard, there is a decline in aggregate supply causing output to decline, as can be seen by the tendency of prices to fall due to excess supply in (15). The prime cause is the rise in interest rates as can be discerned from equation (16), which is caused by the paucity of credit and sources of funding, and from there on leading to negative consequences for the real economy, particularly on investment.

Turning now to balance of payments considerations, a simple formulation can be the following:

$$P_S X_S(Y_N + v X_N; P_S(1 + \tau)) - P_N X_N(Y_S; P_N(1 + v)) - E(D + r^* D) + K = R \quad (17)$$

Here we have postulated fixed exchange rates, but this can be easily modified into a managed flexible exchange rate regime. The nominal exchange rate, E , will rise (depreciate) with balance of payments deficits and vice-versa. In (17) we have exports minus imports as the first two terms on the left-hand side; the third term is external debt servicing, where D represents inherited external debt, and r^*D stands for interest payments on the debt, which attracts a foreign interest rate, r^* and K represents current capital inflows from abroad. Balance of payments surpluses lead to an increase in foreign exchange reserves, R , and deficits have the opposite effect,

The joint impact of both trade and financial sanctions on the balance of payments in equation (17) will take the following form (again initial $P_N, P_S = 1$ and describing the combined trade and financial sanctions as S)

$$\frac{dr}{dS} = \frac{dX_S}{dv} - \frac{dX_N}{d\tau} - dE(D + r^*D) - d(D + r^*D)E + dK \quad (18)$$

In (18) above both imports and exports are likely to decline, the exchange rate is likely to depreciate (rise in absolute terms), debt servicing burdens rise as the exchange rate depreciates and capital flows will decline. Thus, the balance of payments will worsen, reserves of foreign currency will decline along with a simultaneous depreciation in the nominal exchange rate.

If the hypothetical sanctions target nation were to have a government sector, the manner in which government expenditure, G could be financed takes the following form:

$$\dot{H} + \dot{B} + \dot{E}D^* = (G - T) + rB + r^*ED \quad (19)$$

The government's spending is on the right hand side of (19) which is its spending G less revenues, T plus interest payments on the domestic bond, B and interest payments on external borrowing. The left hand side indicates the sources of funding for the government which can be money financed (from the central bank) or via a domestic bond or foreign borrowing. The dot over a variable denotes a rate of change over time. Financial sanctions will lower the availability of external borrowing, leading to a diminution of options for the state.

4 Summary

In conclusion, this paper has examined the short-run effects of economic sanctions taking the form of restrictions on international trade in goods and services, as well as brakes on international financial flows. A Keynesian disequilibrium, demand driven macroeconomic paradigm is postulated. The target country is envisaged to be part of the global South, the sender country is viewed to be located in the global North, and the sanctions are general rather than targeted at specific firms and sectors. The trade sanctions can take two forms: a diminution of exports to the target country and a reduction in exports from the target nation. Both type of sanctions damage the target country's economy on impact: the first by lowering aggregate supply in the target country, the latter by worsening its terms of trade. From the viewpoint of the sender country, its economy may benefit from the demand generated by the rent from export restrictions to the targeted economy. Financial sanctions are more unequivocal in their damage to the target economy, they lower the supply of funds or capital in the target nation with adverse consequences for the supply of credit, investment finance, as well as diminished options on how to finance government expenditure. In the longer run, however, there may be greater to scope

to adjust for the target economy, but this is not without cost. Similarly, the costs to the sender nation's economy will accumulate with the persistence of the sanction.

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