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THE EFFECT OF OIL CRISES ON ECONOMIES OF COMECON/ CMEA MEMBER COUNTRIES, A FIVE-COUNTRY STUDY: CSSR, GDR, HUNGARY, POLAND, AND USSR

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This thesis is dedicated to the memories of

Fernando José Cardim de Carvalho and Old Bolsheviks.

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ABSTRACT

Economic problems in COMECON/CMEA member countries started to grow in the second half of the 1970s, which lead to radical economic and political reforms in the second half of the 1980s and resulted in demise of the economic and political system in these countries. The main aim of this thesis is to investigate whether growing economic problems in East European planned economies, or in CMEA member countries, were initially triggered by oil crises, through international trade and level of indebtedness channels, or not. Countries examined in this thesis were the CSSR, the GDR, Hungary, Poland, and the USSR; the time covered in 1960 to 1989. Two time-series econometrics methods used in this thesis to check the causal relationship between imports of CMEA member countries from different country groups, their level of indebtedness, and their national income, which are the Toda-Yamamoto version of the Granger causality tests and the VECM estimations for each country. Econometric results from four out of five countries suggest that economies of CMEA member countries were negatively affected by the oil crises. These results showed that the economies of CMEA member countries were more vulnerable to the effects of external economic fluctuations than conventionally assumed.

Keywords: COMECON; CMEA; Oil Crises; International Trade; Debt; NMP; Causality
Jel Classifications: C32, F49, P24, P33

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INTRODUCTION

The worldwide economic and political order, which was gradually established around the Second World War, radically changed in 1980s. Capitalist economies, led by Reagan in US, and by Thatcher in UK, implemented neoliberal economic reforms in 1980s. Also, the demise of the Soviet Union and, Council for Mutual Economic Assistance, the two alternatively used abbreviations as COMECON and CMEA, member countries, occurred in the second half of 1980s; their economic systems were shifted from central planning to free market economy, based on neoliberal economic policies, and their political system were radically changed as well. The first, second, and third world countries started pursuing neoliberal economic reforms in 1980s, although the pace of reforms changed from one country to another. The majority of economists and political scientists have a consensus in the explanation that neoliberal reforms in capitalist economies were triggered by oil crises between 1973 and 1982. Oil crises indicated economically turbulent period for mainly developed capitalist economies. This turbulent period comprised several sequential events: a rapid increase in oil prices between 1973 and 1974 followed by a stagflation in developed capitalist economies; the further rise in oil prices between 1979 and 1980; the Federal Reserve System (Fed) steeply increased interest rates and decreased money supply in 1979 to fight high inflation (Volcker Shock), and yet accompanied by another stagflationary period in developed capitalist economies.

Most economists, political scientists, and even the Soviet leader Gorbachev confirmed that the political and economic transformation in CMEA member countries, in the second half of the 1980s, was a response to growing economic problems and economic stagnation that began in the second half of 1970s. Economists like Kotz and Weir (2007), Levine (1983), and Ofer (1987) asserted that economic decline in CMEA member countries, especially in the USSR, was initiated in the second half of 1970s, and they also claimed that this economic decline was a result of internal economic problems such as, the fall in investment rates, the level of industrialization and growing complexities in economies, the decline in research and development efforts and associated relaxation in technological progress, and peculiar problems in the functioning of central planning. They further argued that external economic fluctuations in the second half of 1970s and early 1980s in capitalist economies, namely the oil crises, did not have a major effect on CMEA member countries because these economies were relatively closed and isolated; they have several layers of insulation from external economic fluctuations and the CMEA as an economic block, and in particular the USSR, is a net oil exporter.

Notwithstanding, conventional wisdom holds that these internal economic problems in CMEA member countries would cause a gradual economic decline, but quantitative investigation, which is going to be discussed in the following chapters, implies that the economies of CMEA member countries were faced with severe economic “shock” between mid-1970s and early 1980s. The macroeconomic indicators of CMEA member countries, such as national income, or net material product (NMP), growth rate, import and export trends, and their level of indebtedness, abruptly changed in this period. This relatively rapid intensification of economic problems in CMEA member countries in this period arguably implies that they were faced with an economic “shock” at the time when capitalist economies were struggling with the effects oil crises; and hence both blocks, the first and second world, implemented similar neoliberal economic reforms in the 1980s.

Therefore, the timing of both historical events, the relatively rapid growth of economic problems in CMEA member countries and the oil crises, and also the similar responses of the diverse governments to these economic problems, suggest that the oil crises might have had a major impact on the economies of CMEA member countries. This hypothesis does not reveal a direct rejection of the internal economic problems hypothesis, which is claimed by the above authors, rather both hypotheses can be regarded as complementary, in that the effects of the oil crises on the economies of CMEA member countries amplified the internal economic problems. However, as it is suggested above, abrupt changes in macroeconomic indicators of CMEA member countries, between mid-1970s and early 1980s, cannot be solely explained by internal economic problems *per se* (Kotz and Weir 2007, 54; Venn 2002, 163–169).

The main hypothesis of this thesis is that economies of CMEA member countries were negatively affected by the oil crises, and that growing economic problems, caused by the oil crises, forced their governments to implement economic and political reforms in the late 1980s. The economies of CMEA member countries were heavily affected by the oil crises through two main channels; through international trade and through level of indebtedness. The chain of causality is asserted as this: due to the impact of the oil crises, CMEA member countries’ total imports increased and total exports declined. These initial changes caused a rise in their trade deficit which led to an increase in CMEA member countries level of indebtedness. The rise in the trade deficit and level of indebtedness forced economic planners to pursue policies towards decreasing trade deficits, mainly via cutting total imports; and in some CMEA member countries this policy was accommodated with rise in total exports. The fall of total imports in CMEA member countries caused a decline in their economic growth or in their national income.

The related literature suggests that the economies of CMEA member countries were import-fed, not export-led. Therefore the import side of the international trade channel in chiefly analyzed in the current thesis. The causal explanation is based on two main assumptions; that international trade and level of indebtedness indicators of CMEA member countries ‘abruptly’ changed with the onset of oil crises, and that these changes in international trade and level of indebtedness indicators led to a further change in economic growth, or in national income, of CMEA member countries. The causal relationships between the change in international trade and level of indebtedness indicators, together with the effects of the oil crises, can be checked by the timing of these ‘abrupt’ changes in these indicators through the descriptive statistical analysis which is done in the methodology chapter. If international trade and level of indebtedness indicators rapidly changed between 1973 and 1984, during the oil crises or within a few years after, it would indicate that such violent changes are caused by the oil crises.

However, the causal relationships between the changes in international trade and level of indebtedness indicators and the change in economic growth, or in national income, of CMEA member countries, can only be tested by econometric methods. Since the orthodox economic theories suggest that the decline in economic growth (recession) can cause a fall in the growth of total imports or in the level of imports of the country it can also can lead to a decrease in the growth of indebtedness or in the level of indebtedness of the same country. Therefore, econometric results which confirm the causality, more specifically a unidirectional causality, running from imports and/or level of indebtedness to national income, or NMP, in CMEA member countries, will support the main hypotheses of this thesis.

Five CMEA member countries, namely the Czechoslovak Socialist Republic (CSSR), the German Democratic Republic (GDR), Hungary, Poland, and the Union of Soviet Socialist

Republics (USSR) are analyzed in this thesis. Two European members of CMEA, Bulgaria, and Romania, are excluded from the analysis because both countries were outliers in CMEA. The Bulgarian economy was relatively more dependent on Intra-CMEA trade, especially on the USSR, than other CMEA member countries; and the Romanian economy was relatively more dependent on developed capitalist economies. Furthermore, Romania's political and institutional relationship with developed capitalist economies was relatively stronger than other CMEA member countries. CMEA member countries' political and economic systems were relatively homogeneous. Almost all of the CMEA member countries had faced significant economic troubles in the second half of the 1970s and in the early 1980s; and all of them implemented radical political and economic reforms in the late 1980s. Therefore, the results obtained from the examination of the effects of oil crises on the economies of several CMEA member countries would be valid for the countries having similar economic and political structure and close economic and political ties between each other. Thus, overall results obtained from these five CMEA member countries are less dependent on unique economic characteristics of one or two member countries, but more reliant on the countries showing similar structural characteristics.

The macroeconomic data of these five CMEA member countries cover the time frame between 1960 and 1989. The analysis period intentionally passes beyond the borders of the oil crises because the changes on macroeconomic data caused by the crises can only be detected if it covers the period before and after the occurrence of the crises. Additionally, empirical findings based on a limited number of observations could not be considered as technically reliable; they have to be based on at least twenty-five observations or more. Therefore, relatively long analysis periods are preferred for empirical analysis.

To our knowledge, the effects of oil crises on the economies of CMEA member countries, through international trade and level of indebtedness channels, are not thoroughly examined by quantitative methods, especially with econometric analysis, in the existing literature. Therefore, this thesis attempts to investigate the effects of oil crises on the economies of CMEA member countries, and also to analyze the various effects of CMEA member countries' international trade with different economic blocks, namely intra-CMEA trade and international trade with developed capitalist economies as well, especially for the 1960–1989 period, depending on empirical analysis. This thesis endeavors to fill the significant gap inherent in the related literature by doing so.

The plan of this thesis is as follows: The next chapter offers a brief description of the COMECON/CMEA and the oil crises. It also reviews the discussions associated with the policies of *Détente, Perestroika*, and *Glasnost*, which were deeply affected by international trade and the level of indebtedness of the CMEA member countries during that period. The second chapter summarizes the literature related to the international trade, structure of CMEA member countries, the effects of oil crises on their international trade and their level of indebtedness. It also examines the effects of changes in international trade and the level of indebtedness of CMEA member countries on their national economies. The third chapter, the methodology chapter, focuses first on the explaining the properties of the macroeconomic dataset used in this thesis and then concentrates on the descriptive statistical analysis of the dataset, and explains the econometric methods used for finding causal relationship between variables of interest, namely the Toda-Yamamoto version of the Granger causality test and the VECM estimation. The econometric findings obtained from sample countries' macroeconomic data are reported, and are then briefly interpreted in the fourth chapter. The conclusion contains a recapitulation of the results derived from the descriptive statistical and econometric analyses, and also a short discussion about the implications of the main results.

HISTORICAL BACKGROUND

The effects of the oil crises on the economies of CMEA member countries cannot be grasped without a brief description of COMECON/CMEA and the oil crises. The national economies of CMEA member countries, their international trade and indebtedness levels, were also affected by *Détente*, *Perestroika* and *Glasnos*t policies between 1960s and 1980s. Therefore, an examination of these policies is also crucial for understanding the economic changes that occurred in these countries during that period. For this reason, the first section of this chapter gives a description of COMECON/CMEA, the second covers the oil crises, the third *Détente* policy, and finally, the fourth, *Perestroika* and *Glasnos*t policies.

The Council for Mutual Economic Assistance-COMECON/CMEA

COMECON/CMEA is the abbreviation for the institution Council for Mutual Economic Assistance which was formed in January 1949 in Moscow. The founding member countries were Bulgaria, the CSSR, Hungary, Poland, Rumania and the USSR. The GDR joined the Council in the following year. Albania joined CMEA in 1949 but left it after the Sino-Soviet split in the early 1960s. Non-European countries like Vietnam, Mongolia and Cuba also joined CMEA in 1960s and 1970s, however, these countries are beyond the scope of the present thesis.

The establishment of CMEA was a result of the bipolar world order that emerged post-Second World War. After the Yalta Conference in 1945, the USSR's de facto control over other CMEA founder countries was recognized by the USA and the UK. The USSR established satellite states in these countries and pro-USSR governments carried out nationalization policies, without compensation, and inaugurated centrally planned economic systems. The USA was trying to increase its political and economic influence in Europe through the implementation of the Marshall Plan in 1947. The USSR condemned the USA's intention of controlling the European Continent, and together with satellite states in Eastern Europe started to boycott the meetings of international corporation institutions like the UN. In return, the USA, the UK, France, and other Western capitalist powers started banning economic relations with USSR, Bulgaria, CSSR, Hungary, Poland, Rumania, and GDR. The economic and political isolation of these countries lead them to the formation of an economic cooperation institution, the CMEA (Kaser 1967, 10–12). The CMEA was a relatively insignificant institution between 1949 and 1956. There was not any charter or legislation signed between member countries, apart from the founding agreement, and only ad hoc conferences held between government officials until 1956. The International Bank for Economic Cooperation, the International Investment Bank and twelve other economic commissions were established after 1956 to facilitate economic relations between CMEA member countries (Kaser 1967, 42–43; Schrenk 1991, 1).

The most important aim of the CMEA was to realize the economic integration and cooperation of the member countries. Socialist integration, socialist division of labor and economic specialization were the most referred objectives of CMEA. Security of input supply for industrial production was also an essential goal of the CMEA when CMEA member countries were faced with trade boycotts from developed capitalist economies. The industrial cooperation and joint industrial investments were imperative targets of the CMEA, together with horizontal specialization agreements signed between member countries for specific final products.

Nonetheless, the fundamental purpose of the existence of CMEA was organizing, coordinating and facilitating trade and related financial exchanges between member countries. The trade between CMEA member countries had to be planned on the basis of national five-year economic plans. The bilateral trade agreements, decisions about trade structures between CMEA member countries, and joint investment agreements between and among them, were resolved at CMEA meetings, which were held every year with participation by government officials from each member country (Schrenk 1991, 4–7).

The Gorbachev administration's reforms for liberalizing the economic and political system in the USSR, *Perestroika* and *Glasnos*t had a significant impact on the functioning of the CMEA. The 1987 and 1988 CMEA meeting sessions had passed resolutions which supported the transformation of the CMEA from plan coordination to a unified market framework. Despite these declarations of will for such fundamental change in the CMEA, no official change happened related to the functioning of the CMEA. Ultimately, *Perestroika* and *Glasnost* reforms led to the official dissolution of the USSR in 1991, and hence, the CMEA also disbanded in the same year (Schrenk 1991, 13).

Oil Crises

The term *oil crises* used in this thesis not only to the unprecedented increase in oil prices in international markets for 1973–1974 and 1979–1980, but also to the economically turbulent period for mainly developed capitalist economies between 1971 and 1982. This period contained several sequential events, such as, the collapse of the Bretton Woods system, a tremendous increase in oil prices between 1973 and 1974, stagflation in developed capitalist economies, further rise in oil prices between 1979 and 1980, Volcker Shock, another stagflationary period, and finally the beginning of the debt crisis in developing capitalist nations.

The economic boom in developed capitalist economies did not come to an end abruptly in 1973 after the rapid rise in oil prices. There were warning signs of problems as early as the late 1960s and early 1970s. The UK devalued Sterling around ten percent in 1967, and inflation rates in the

USA, the UK, and Japan rapidly increased between 1970 and 1973. The USA had its first trade deficit in 1971, and its fiscal deficit started to rise in the late 1960s and early 1970s, due to the cost of the Vietnam War and the Great Society program initiated by the Johnson administration. Nixon's administration devalued the US dollar ten percent against major currencies in 1971, and further devaluations took place in 1973 before the occurrence of rapid increase in oil prices. Additionally, US gold reserves could only cover the one fifth of the US liabilities in 1971. The frequent and substantial fluctuations in exchange rates between major currencies and consequent decline in the ratio of gold reserves to liabilities in the US were the initial signs of the collapse of the Bretton Woods system. The Bretton Woods system de facto collapsed in the summer 1973, several months before the rapid increase in oil prices, and the major capitalist countries had abandoned the fixed exchange rate system prevalent for their currencies, and thus started to shift to the floating exchange rate policy (DESA/UN 2017, 53–54; Venn 2002, 150–152).

One month before the break out of the Yom Kippur War in October, 1973, OPEC (Organization of Petroleum Exporting Countries) member countries declared that they wanted to increase oil prices in September 1973, which were mostly exchanged in the US dollar on international markets, because of the decline in real oil prices which had originated both from the rising inflation trend in the US and the devaluation of the US dollar (Venn 2002, 8). The Yom Kippur War finished without any significant gains for both sides. The USA had sent important military aid to Israel during the war, and in revenge, Arab countries desired to take a firm position against the countries who supported Israel. The Arab members of OPEC gradually decreased oil supplies between October and December in 1973, and ultimately completely ceased supplying oil to the countries who supported Israel, the USA, the UK, Netherlands, etc. Furthermore, OPEC also decided to increase oil prices in December 1973. This oil boycott lasted until the disengagement agreement reached at the end of the May 1973. Nevertheless, the oil prices in real terms were doubled in the last three months of 1973 (Hamilton 2011, 48; Venn 2002, 7–21).

This rapid increase in oil prices resulted in a rise in the cost of production for almost all sectors of the economy, and therefore, the price of most of the goods exchanged in international markets rapidly climbed because oil is used as input for these sectors (Venn 2002, 154). This caused a rapid increase in the inflation rate in developed capitalist economies, such as the USA, the UK, and Japan. Stock markets crashed at the end of 1973 and 1974. The growth rate in the

USA decreased from 5.6 percent to –0.2 percent, in the UK from 6.5 percent to –1.5 percent, and in Japan from 9.9 percent to –0.5 percent between 1973 and 1975. The developed capitalist economies, except West Germany and Japan, were faced with stagflation in this period, and their trade deficits increased. The increasing revenues of oil exporting countries, due to the rise in prices, could not be absorbed in their national economies; and therefore, these *petrodollars* flowed to international financial markets.

In the meantime, the developing capitalist economies were also facing with pronounced economic troubles in the same period. The demand for their exports from developed capitalist economies suddenly dropped due to the evolving recession in these countries and import costs tremendously increased owing to the rise in the prices of almost all goods in international markets; thus, they encountered huge foreign trade deficit problems. They attempted to cover their trade deficit by taking debts from international financial markets with relatively low interest rates, due to the flow of *petrodollars*, in the mid-1970s. The rise in the level of indebtedness of developing countries was the principal cause of the prolonged debt crisis occurred in 1980s (DESA/UN 2017, 54–59; Venn 2002, 154–161).

All of the developed capitalist economies had recovered from the 1974–1975 recession by 1976; however, the inflation rates in these countries were starting to increase between 1976 and 1978 despite the fact that oil prices in real terms stayed almost at the same level for that period (Venn 2002, 162). Then oil prices in real terms more than doubled between 1979 and 1980 due to the emergence of new crises in the Middle East (Hamilton 2011, 48). Strikes in the oil sector during the early phase of Iranian Revolution in late 1978 caused a decrease in the oil supply. The Iranian people toppled the Shah, supported by the USA, in January 1979. Iranian students occupied the USA Embassy in Tehran and they took USA officials hostage in November 1979. The US government stopped oil imports from Iran and froze all Iranian assets in the USA as retaliation in the same month. Furthermore, war between Iraq and Iran, two important oil exporters, broke out in 1980. These consecutive events happening in the Middle East between 1978 and 1980 caused further rapid increase in oil prices in the same decade that had already seen this happen earlier (Venn 2002, 22–30).

The rapid rise in oil prices between 1979 and 1980 led to a decline in growth rates in the developed capitalist economies for the same period; however, they did not face recession. The developed capitalist economies were more concerned about high inflation rates and they passed resolutions which recommended tight monetary and fiscal policies for reducing at the Tokyo G-7 Summit in June 1979. In accordance with this policy recommendation, the US Federal Reserve (Fed) increased interest rates steeply and decreased money supply in October 1979 when Paul Volcker became its chairman. This high interest rate and tight monetary policy was pursued by the Fed in the following years.

Furthermore, tight fiscal policy was adopted by the Thatcher administration in the UK in 1979 and by the Reagan administration in the USA in 1981. Both administrations not only decreased government spending but also deregulated markets and rigorously pursued privatization policies that could be considered as milestones of neoliberal reforms. Essentially, these policies were contractionary at their nature, and thus led to decline in inflation rates in these countries; however, both economies fell into recession in 1981 which lasted into 1982 and 1983. Additionally, the recession in developed capitalist economies negatively affected developing ones via decreased demand for imported goods in developed capitalist economies, which were provided by developing capitalist economies. Moreover, the trade deficits of developing countries increased and they could not find cheap credits from international financial markets due to the rise in interest rates and the decline in money supply. Consequently, developing capitalist economies started encountering debt servicing problems from the increase in interest rates and decrease in their export revenues. Mexico announced in August 1982 that it could not service its debt; this is considered the beginning of the debt crisis in developing capitalist economies (DESA/UN 2017, 54–59; Venn 2002, 163–169).

***Détente* Policy**

Détente policy identifies the era of increasing economic, military and diplomatic cooperation between the First World, especially the USA and Western European countries, and the Second World, especially the CMEA member countries, between 1969 and 1976. The diplomatic and economic relationships between the First and Second World gad been very low during the Cold War from the end of the Second World War to the late 1960s, period marked by political tensions and proxy wars in the Third World.

This situation gradually changed in the second half of the 1960s. Western European countries started improving their diplomatic and economic relations with CMEA member countries. This process created a fear in the USA's administration that their NATO allies were getting closer with the enemy bloc. Also, US companies did not want to be left behind by competitors in Europe, related to foreign trade with CMEA member countries. In the meantime, the nuclear arms race was going on between USA and USSR in mid-1960s; with, both of countries producing enough nuclear warheads to more than destroy their rival. Additionally, the US military causalities in Vietnam increased very rapidly between 1963 and 1969, causing a strong anti-war movement in USA during the same period with the US federal government coming to realize that their military intervention in Vietnam was leading to a dead end. This was the internal and external political atmosphere when Nixon took office in January 1969. He appointed Henry Kissinger as National Security Advisor and both politicians gradually started to change US international policy, despite the resistance from the federal bureaucracy, the Congress and the Senate (Schulzinger 2010, 373–376; Slantchev 2014, 1–4). The USSR was also suffering from the isolation policy of developed capitalist economies, and had been further hurt by seasonal fluctuations in grain production in 1960s leading it to seek to improve its economic relations with developed capitalist economies. Furthermore, the cost of the nuclear arms race was too high for USSR, and for the US, military spending associated both with sustaining the nuclear war threat and funding proxy wars conducted in the Third World, reached to unbearably high levels (Slantchev 2014, 3–4).

Both superpowers realized that the nuclear arms race and proxy wars were too costly and too risky, and they recognized that increasing economic relations between them was beneficial for both sides. Kissinger initiated personal and direct "back line" diplomatic relations with the USSR in 1969. The USA's main aim in this policy was to improve economic relations with the USSR, halt the nuclear arms race, diminish the risk of nuclear war, and create pressure on the USSR for decreasing their military support to proxy wars in Third World, especially in Vietnam. Kissinger and Nixon further attempted to normalize economic, military and diplomatic relations with China at the beginning of 1970s which increased pressure on the USSR since a type of Cold War was ongoing in the Second World between the USSR and China. Also, through improving the ties with China, the USA hoped to decrease Chinese support to North Vietnam (Schulzinger 2010, 376–378; Slantchev 2014, 2–5).

Nixon and Brezhnev signed the Interim Agreement on the Limitation of Strategic Arms (SALT I) and the Anti-Ballistic Missile Treaty (ABMT) in May 1972. These treaties put a cap on the number of nuclear warheads which both countries could have in their stockpiles and also restricted the number of anti-ballistic missiles which both countries could have. These treaties constituted the backbone of the *Détente* policy, which led to a halt in the nuclear arms race and diminished the possibility of nuclear war between the two superpowers. Improvement in military and diplomatic cooperation was only one side of the *Détente* policy, the USA and the USSR further reached agreement on several different pacts dealing with Second World War debts, shipping, taxes, and grain purchases between 1971 and 1974. The US lowered tariffs to the USSR; they jointly organized the Conference on Security and Cooperation in Europe (CSCE) in 1973 which led to the Helsinki Accords in 1975, which aimed to increase economic, military, and diplomatic relations between the USA, the CMEA member countries, and Western European countries (Schulzinger 2010, 379–390).

Nevertheless, there was little political support for the *Détente* policy from US voters, federal bureaucracy, Senate or Congress in USA. After the US sold 10 million tons of grain to the USSR in July of 1972, it was accused of causing a rise in grain and soybean prices, although that price increase was due primarily to oil crisis. Nevertheless, the US public hold the White House responsible and it became known as the Great Grain Robbery.

Although there was the Prevention of Nuclear War agreement in 1973, Nixon could not make any further steps toward implementing the *Détente* policy due to domestic opposition combined with the Watergate Scandal. Finally, he resigned in August 1974. Ford became president afterwards and Kissinger remained as the Secretary of State and National Security Advisor. Ford and Kissinger tried to partially maintain *Détente* policy after 1974. For example, Ford signed the Helsinki Accords in 1975 with the USSR. However, due to the negative effects of the oil crisis and the US military defeat in Vietnam in 1975, opposition to *Détente* soared. Carter defeated Ford in November 1976 and one of his main presidential campaign issues was to finalize the *Détente* policy. This was the end of *Détente* era (Schulzinger 2010, 385–392).

Perestroika and *Glasnos*t Policies

Mikhail Gorbachev became the Soviet leader in 1985. Gorbachev already knew that the USSR's economy was facing several problems. He stated that in the latter half of the seventies the country began to lose its momentum, economic growth rates fell down to the levels close to stagnation, contradictions in the society were consistently mounting, and USSR moved into a precrisis dimension in 1987. He called for urgent radical reforms in February 1986. The Gorbachev reforms era can be classified under three categories which were; economic reforms, democratization in civil society and the media, and democratization in the political system. The economic reforms in Gorbachev era were called *Perestroika*, a Russian term that means *restructuring*. The democratization in civil society and the media was called *Glasnost*, the Russian term used for *openness*.

In brief, Gorbachev claimed that the main problems in the USSR's economy were 'rigid central planning' and lack of work discipline. Gorbachev believed that democratization and decentralization of the economic institutions with the introduction of certain elements of a market economy, could solve the troubles of the USSR economy. However, his economic reforms were not targeted to completely restructure the socialist economy, only with adding a few elements of market economy into the system. These did not gradually establish a groundwork for the proper functioning of the capitalism and free market economy. He was strictly against private property ownership and was openly supporting public property until the mid-1990's (Kotz and Weir 2007, 53–56).

He started *Glasnost* reforms in 1986. He freed several political opposition leaders from jail, he called on the mass media to criticize Soviet bureaucracy, and totally lifted state control over civil society, media, public debate and individual expression. He initially started the *Glasnost* reforms because he was fearful about a backlash from the Soviet bureaucracy when he began to implement radical economic reforms, and he expected to receive open public support against the bureaucratic backlash. He further thought that public debates and intellectual contributions towards solving the problems in the USSR would be beneficial for sustaining the reform process. However, the majority of mass media and intellectuals started making liberal, pro free market propaganda through criticizing not only the current Soviet system but also socialist ideology, the October Revolution and even Lenin. This was the by-product of appointing extremely liberal intellectuals to the leadership roles in the mass media by some of the Central Committee members. Additionally, the society was extremely fed up with corrupt Soviet bureaucrats, with the effects of economic stagnation making society even more critical of the system. In fact, the biggest problem was that most of the high-rank Communist Party members were corrupt, and not sincere in supporting communist ideology. Others were secretly or semi openly advocating liberalism and free market economy, and had become party members to gain power within the system (Kotz and Weir 2007, 61–63).

The initial important *Perestroika* policies were based on two decrees adopted in June 1987 which were called "Basic Provisions for the Radical Restructuring of Economic Management" and "Law on State Enterprise". This became effective on January 1988. These reforms allowed small private property ownership and collective enterprise ownership by workers. Workers started to elect managers of the enterprise and, together with the managers to decide on their own wages. Enterprises were fully accountable for their profits and losses and they were financed through using state bank credits. States, local or regional governments, not central planning institutions, started setting some mandatory production targets together with non-mandatory or advisory ones for enterprises. These governments would buy the mandatory production targets and the rest of the production would be sold on the market through wholesale trade. The majority of the enterprises' production was sold through wholesale trade and it created market competition. The market prices were semi controlled by central planning institutions. Enterprises would decide their own investment plans based on workers and managers decisions (Kotz and Weir 2007, 54–76).

These reforms created chaos in the USSR economy after its implementation. The economy collapsed after 1987. There was no coordination in the economic activities. Horizontal integration in the economy disrupted and creating huge shortages in consumer markets because the output level was decided by the enterprise itself; however, prices were decided by central authority, and workers started to prefer consumption today over tomorrow, which means they increased their wages at the expense of decreasing investments. The shortages in consumer markets were caused by rapid increases in wages, coupled with stagnant production and prices.

State started encountering troubles in collecting taxes from enterprises, and budget deficits increased very rapidly (Kotz and Weir 2007, 54–76).

Furthermore, the Gorbachev administration passed a decree called "On the Foreign Trade Activity of State, Cooperative, and Other Enterprises" in December 1988. This decree abolished the state institutions' monopoly over international trade, and therefore enterprises started directly conducting international trade by themselves. Moreover, the USSR stopped interfering in national political decisions in CMEA member countries after 1987. After regime changes in Eastern European countries in 1989 and 1990, USSR became the only country left in the CMEA which was ruled by Communist Party. Consequently, Eastern European CMEA member countries' international trade with developed capitalist economies rapidly accelerated and their trade with USSR diminished. The USSR lost most of its important international trade partners after 1989 which in turn led to further deterioration in the USSR's economy. In response, Gorbachev submitted an economic plan, which passed parliament, called the "Presidential Plan" in October 1990. Its main aim was rapid privatization and liberalization of the economy which would lead to the formation of a free market and total dismantlement of the planned economy. Gorbachev formulated this plan because of the total chaos that appeared in the economy and the increasing tension coming from procapitalist forces in the political arena. The USSR's economy rapidly contracted in 1990 at 2.4 percent, and in 1991, 13 percent level. The Communist Party abandoned its constitutional right to rule the USSR in February 1990. The small states which were part of the USSR also left the country in 1990 and 1991. Russia started to be ruled by the capitalist parties in 1991 (Kotz and Weir 2007, 77–102).

LITERATURE REVIEW

To recapitulate, the main aim of this thesis is to investigate the effects of international economic fluctuations in the 1970s and early 1980s, namely the oil crises, on CMEA member countries' economies by using econometric analysis. The hypothesis is that the international economic fluctuations transmitted to CMEA member countries' economies primarily by international trade channels with their level of indebtedness a secondary transmission channel, which is effected by international financial conditions, because the level of effectiveness of this channel on national economies is mainly determined through changes in international trade. Thus, CMEA member countries' international trade is the main focus of the thesis. For this reason, the first section of the current chapter covers the literature which explains the international trade structure of CMEA member countries. Then, second section, has the studies describing how the oil crises affected the CMEA member countries' international trade and indebtedness reviewed. The last section is devoted to the discussions about how the changes in CMEA member countries' indebtedness level and international trade in 1970s and early 1980s affected CMEA member countries' national economies. At the end, the general trend in current literatures is briefly summarized, as well as how this thesis contributes to the existing literature. Finally, the anticipated results from the quantitative analysis are explained.

International Trade Structure of the CMEA Member Countries

The CMEA member countries' national economies were based on central planning between 1949 and 1989, with small variations in different countries and years. Therefore, their international trade structures were different from capitalist market economies. Their economies were based on five-year economic plans and their international trade was based on these five-year plans; they did not have flexible international trade structures and adjustment mechanisms to cope with external fluctuations (Bognar 1987, 406). CMEA member countries had bilateral trade between each other and they were aimed at having balanced trade with other CMEA countries as well as with developed and developing capitalist economies (Beckmann and Fidrmuc 2012, 41). There was a state monopoly over the international trade in CMEA member countries and enterprises had international trade through state institutions, therefore, there was a full state control over international trade. The main aim of the CMEA member countries' international trade was importing commodities based on five-year economic plans and exporting commodities to meet the cost of importing goods and related foreign currency needs; thus, CMEA member countries' export supplies were primarily determined by their import demands (Beckmann and Fidrmuc 2012, 32; Csaba 1980, 94).

CMEA member countries' imports from developed capitalist economies were mostly dominated by raw materials, high technology intermediate goods and high technology investment-capital goods between 1960 and 1989. These imported goods have low substitutability due to the widening technology gap between CMEA member countries and developed capitalist economies (Dobrinsky 1989, 325; Csaba 1980, 112; Portes 1977, 760). On the other hand, CMEA member countries' exports to developed capitalist economies mostly were dominated by raw materials and low technology manufactured goods between 1960 and 1989 (Brown and Tardos 1980, 261; Portes 1977, 773). The USSR was an exception to the CMEA member countries' general trend of exports to developed capitalist countries; in the sense that high technology manufactured goods and investment-capital goods were also important components of their exports to developed capitalist countries. However, due to the price changes in world markets, its importance started to diminish in mid-1970s (Treml 1980, 194–196). The USSR's oil exports were 15 percent of its total exports in 1970 but increased to 35 percent in 1977 due to the oil crises (Treml 1980, 190). The fuel and raw material imports in 1980 consisted of 27 percent of total imports in Hungary, 31 percent in Poland, 32 percent in the CSSR, and 37 percent in the GDR (Maximova 1987, 433). From 80 to 90 percent of the CMEA member countries' oil imports were supplied by the USSR in 1973, when the oil crises began (Beckmann and Fidrmuc 2012, 35). International trade among CMEA member countries, or intra CMEA trade, was dominated by small CMEA member countries' trade with the USSR (Beckmann and Fidrmuc 2012, 38). While the five CMEA member countries which are examined in this thesis had imports from CMEA member countries consisting of 52 to 72 percent of their total import volume, their imports from capitalist economies were limited to 28 to 48 percent. Similarly, although the exports of these five countries to all CMEA member countries ranged between 50 to 71 percent of their total exports; their exports to capitalist economies varied between 29 to 50 percent of their total exports in 1980 (Raczkowski 1987, 363).

The international trade monopoly, exchange rate or currency system, and international trade prices structure in CMEA member countries created layers of insulation from the effects of international trade and external fluctuations to their economies. CMEA member countries used three different currencies. First was their domestic currencies, ruble, zloty, etc., which were nonconvertible to foreign currencies and used for domestic transactions. Second was is foreign exchange currencies, Foreign Exchange Ruble, Foreign Exchange Zloty, etc., which were convertible to foreign currencies and used for international transactions with capitalist economies. The third one was the Transferable Ruble, which was used for transactions between CMEA member countries, intra CMEA trade. There was one-to-one exchange rate between Transferable Ruble and the Foreign Exchange Ruble. However, the Transferable Ruble was rarely used as a convertible currency before the 1970s, although, it was more frequently used as a convertible currency after then, due to the CMEA member countries' increasing trade deficit to developed capitalist economies. CMEA member countries' international trade institutions, generally the Ministry of Foreign Trade, made transactions, exports or imports, with other countries or foreign companies either in Transferable Ruble, or in foreign exchange currencies. However, these international trade institutions sold imported commodities to, or buy "going to be" exported commodities from, domestic enterprises in domestic non-convertible currencies. Therefore, the flow of domestic non-convertible currencies and foreign exchange currencies, and also Transferable Ruble, were strictly controlled by the state in CMEA member countries. Furthermore, the outflow of domestic nonconvertible currencies to other countries and inflow of foreign exchange currencies to the domestic economy were totally prevented. There were official, or accounting, fixed exchange rates between foreign exchange currencies of the CMEA member countries and foreign countries' currencies; however, there was no exchange rate between foreign exchange currencies and domestic nonconvertible currencies (Portes 1987, 410–417). Non-convertibility between foreign exchange currencies and domestic currencies made official fixed exchange rates between foreign exchange currencies and foreign countries' currencies "arbitrary" and economically nonfunctional (Portes 1987, 420; Treml 1980, 198–199).

Central planning, international trade monopolies and especially "multiple currency structure", in CMEA member countries laid the groundwork for another insulation mechanism, which was multiple price structure. There were three different price mechanisms that corresponded with the three different currencies in CMEA member countries. The first, domestic prices which were determined by each states' economic planning institutions and accounted, or exchanged, in domestic nonconvertible currencies. The domestic prices of consumption, intermediate, and investment, or capital, goods were centrally assigned by planning institutions. Second, world market prices which were used in international trade with capitalist economies and accounted, or exchanged, in foreign trade currencies, or convertible currencies. The domestic prices of imported goods, or prices of "going to be" exported goods, which was paid to exporting enterprises, were determined by planning institutions which were not directly linked with international trade prices, or world market prices. Additionally, there were taxes for imports and subsidies for exports in the domestic economy. Due to variations in domestic prices and world market prices, different currencies, and taxes, or subsidies, consumers and enterprises in the domestic economy face with inherently different prices than foreign trade institutions for example, the Ministry of Foreign Trade, for importing or exporting goods (Ofer 1987, 1794; Portes 1987; Treml 1980). Calculations about CMEA member countries' total gains or losses from international trade is very difficult because items on the earnings side, revenue from exports sold in international trade, taxes, revenue from imports sold in domestic economy etc., and on the costs side, cost of buying "going to be" exported goods from domestic enterprises, subsidies, cost of buying imported goods through international trade, etc., were accounted, or exchanged, in different currencies which were either nonconvertible to each other, domestic and foreign exchange currencies, or the exchange rate between them is arbitrary. Treml (1980), calculated the USSR's total gains, or losses, from international trade using input-output tables of the USSR and with several assumptions. The CMEA member countries' total gains, or losses, from international trade were absorbed by the state budget; therefore, it had an effect on national income and money supply, both in domestic currency and foreign trade currency (Portes 1987, 418–423; Treml 1980, 199).

The third price mechanism in CMEA member countries was between CMEA member countries, or intra CMEA, trade prices and accounted, or exchanged, in Transferable Ruble. The quantities and prices in intra CMEA trade were based on bilateral negotiations. The rules of bilateral negotiations were determined multilaterally by CMEA Executive Committee meetings. The bilateral trade agreements between CMEA member countries were done every five years (1960, 1965, 1970, etc.) based on their subsequent five-year economic plans (1961–1965 economic plan, 1966–1970 economic plan, etc.). The intra CMEA trade prices were fixed for the next five years (for example, the 1960 agreements fixed trade prices for 1961 and 1965) and the price calculation method was complex; however, it was essentially based on the previous five-year average of world market prices (for example, the price calculation for a specific commodity in the 1960 agreements was based on the five-year average world market prices between 1955 and 1959 of the same commodity). This intra CMEA trade price calculation method was used between 1958 and 1975. The lag of adjustment of intra CMEA trade prices to world market prices was longer than five years and because of that, short-term price fluctuations in intra CMEA trade were eliminated.

However, this mentioned intra CMEA trade price calculation method was changed in January 1975, and a new method became effective in 1976, at the CMEA Executive Committee meeting in Bucharest due to high price volatility in world markets after the beginning of the oil crises in 1973. The new intra CMEA trade price calculation method, called the Bucharest Principle, was similar to the previous one but the prices of traded commodities started to change every year based on the moving-average method. The intra CMEA trade price calculation of the specific commodity in 1976 was based on previous five-year average world market prices between 1971 and 1976 of the same commodity and in 1977 it was based on the five-year average world market prices between 1972 and 1977. Because of these varying intra CMEA trade price calculation methods, intra CMEA trade was gradually affected by changes in the world market prices (Beckmann and Fidrmuc 2012, 36; Hewett 1980, 324; Portes 1987, 411; Raczkowski 1987, 362). Also, according to several authors' calculations, the intra CMEA trade prices could not be solely explainable by these two "official" calculation methods because real intra CMEA trade prices were divergent from prices calculated by these methods. The general claim of the authors is that despite the disagreement on the reason, the USSR was "implicitly" subsidizing trade with other CMEA member countries by exporting commodities with prices lower than related prices based on the two "official" methods, and importing commodities with prices higher than associated prices based on them (Beckmann and Fidrmuc 2012, 36–37; Hewett 1980; Portes 1987, 411–412).

Conventional wisdom holds that CMEA member countries' economies, especially that of the USSR, were autarkic and closed (due to the established insulation mechanisms) to external economic fluctuations. This assumption is reinforced by the lack of published data, difficulties related to the calculation of economic openness, ratio or percentage of sum of exports and imports over national income, of CMEA member countries. Economic openness calculations were neither published nor done by official Soviet statistical institutions and, due to the multiple price and currency system, they are hard to calculate (Ofer 1987, 1794; Treml 1980, 184–186).

As a rule, relatively big economies, like that of the USSR, are more closed than smaller ones, like the other CMEA member countries (Ofer 1987, 1794). The USSR's economic openness percentage was between eight and fourteen percent, according to different calculations, in the second half of the 1960s. However, it became higher than twenty percent in the second half of the 1970s, which reached similar level that of the USA's or Brazil's; therefore, the USSR was neither closed, nor autarkic after mid-1970's (Ofer 1987, 1975; Trzeciakowski 1987, 475).

And, in fact, other CMEA member countries were more open than the USSR. According to Maximova (1987), in 1980, the share of export in national income was 29 percent in the CSSR, 30 percent in the GDR, 31 percent in Poland, and 54 percent in Hungary (Maximova 1987, 431). According to Brown and Tardos (1980), Hungary's openness percentage was around 105 in 1977 (Brown and Tardos 1980, 255). Trzeciakowski (1987) calculated the openness percentages of CMEA member countries between 1970 and 1981; the CSSR's openness percentage was increased from 17 to 37 percent, the GDR's openness percentage was increased from 35 to 63 percent, Hungary's openness percentage was over 100 between 1975 and 1980 and Poland's openness percentage was fluctuated between 44 percent (1970) and 68 percent (1975, 1980) (Trzeciakowski 1987, 475). As a corollary, the rates of growth of trade between CMEA member countries and developed capitalist economies in the 1970s were higher than the average growth rate of world trade, and aggregate exports of CMEA member countries to Western European countries reached the same level as exports from the USA (Maximova 1987, 431).

One of the possible important causes of the increase in openness of CMEA member countries and rise in international trade with capitalist economies in the late 1960s and 1970s was the external economic fluctuations (the oil crises) which is going to be discussed in the next section. Another important cause of these increases, especially the rise in international trade with capitalist economies, was the implementation of *Détente* or peaceful coexistence policies. The Agreement of Nuclear Non-Proliferation Treaty in 1968 had given a boost to diplomatic, economic and political cooperation between CMEA member countries and developed capitalist economies. The Communist parties of CMEA member countries made a collective call for foreign economic opening in 1969 (Csaba 1980, 94–96; Shmelev 1979, 315). The international trade systems of CMEA member countries were radically changed by the *Perestroika* policies of Gorbachev administration. The state monopoly over the international trade in the USSR was abolished in December of 1988. This was the beginning of the liberalization of international trade in CMEA member countries and the demise of the CMEA system as well (Kotz and Weir 2007, 89–90).

While *Détente* and *Perestroika* policies affected all CMEA member countries' international trade, there were economic reforms which occurred in specific member countries of CMEA between 1960 and 1989 that were not directly related to the effects of oil crises *per se* but mostly associated with the political changes in these countries. These reforms essentially affected the specific countries, international trade and indebtedness levels both in the short and long run.

The short lived economic reforms like the New Economic Model (NEM) in the CSSR between 1965 and 1968, New Economic System (NES) between 1963 and 1968; and Economic System of Socialism (ESS) between 1968 and 1970 in the GDR are beyond the scope of the thesis because their long-run effects were very limited.

Meanwhile, the workers riots in Poland caused a political change in 1970, and the Gierek administration took power. The Gierek administration tried to decrease workers' discontent by implementing several economic reforms. It started big investment projects in 1970 for increasing efficiency and productivity. These investment goods were mostly imported from developed capitalist economies and financed by loans obtained from the same economies in addition to domestic savings. Therefore, Poland's trade with developed capitalist economies and debt to those economies immediately increased in the early 1970s. The Gierek administration also made high real wage hikes through the 1970s to diminish workers' discontent. The most important economic reform of the Gierek administration was the adjustment of domestic prices to world market prices in early 1970s via adjusting the domestic prices of "going to be" exported goods and imported goods to the world market prices. They used newly introduced currency exchange coefficients, not official exchange rates, for making this price adjustment. Polish citizens were permitted to hold and acquire foreign currency by Gierek administration's reforms. These economic reforms were one of the causes of inflation, increasing trade deficit, and indebtedness levels in Poland after 1973 (Fallenbuchl 1980).

Similarly, the Kadar administration, which took power after the 1956 uprising in Hungary, also implemented economic reforms which were called the New Economic Mechanism (NEM) in 1968. The Kadar administration abolished the regulation of production through central planning, relaxed price controls, and also, adjusted domestic prices to the world market prices via the NEM reforms. These economic reforms were aimed at stimulating profit motivated enterprises conforming to the plan through general regulations and adaptation to changes in world markets. Attempts were made to equate producer prices to the average cost of production, and domestic consumer prices were going to be proportional to the average cost of production with a profit margin via NEM reforms. Prices of basic consumer goods and real wages were regulated by the state institutions and newly introduced commercial exchange rate, or foreign trade price coefficients, were determined by the average cost of exports through these reforms. A new exchange rate system was introduced for adjusting domestic prices of imported goods and "going to be" exported goods to world market prices. The introduction of this new exchange rate system could also be considered as a policy response to the oil crises because it became effective in 1976. The state would make investments on high technology sectors for increasing the competitiveness of Hungary in world markets and for increasing efficiency in production. The Kadar administration also tried to support import substitution and export oriented growth at the same time through these reforms.

In short, NEM reforms liberalized the Hungarian economy and it became more vulnerable to external shocks due to the abolition of insulation mechanisms; therefore, these economic changes were one of the causes of a large number of unfinished investment projects, a rapid increase in trade deficit, and the indebtedness level in Hungary after 1973 (Brown and Tardos 1980). Dobrinsky's (1989) econometric calculations for the period between 1962 and 1985 also verified that Poland and Hungary had different price structures than other CMEA countries. He showed that the lag of adjustment between domestic prices and world market prices was relatively long in the USSR; however, it was relatively short in Poland and Hungary (Dobrinsky 1989, 330).

Effects of Oil Crises on the CMEA Member Countries' International Trade and Level of Indebtedness

The world economy was in turbulence between 1973 and 1982. The Bretton Woods system gradually collapsed between 1971 and 1973; oil prices quadrupled in 1973 and doubled again in 1979, the developed capitalist economies were in recession between 1973 and 1975 and also between 1980 and 1982, commodity prices in world markets were increasing, worldwide high inflation occurred throughout the same period, and interest rates in world financial markets rose very rapidly between 1979 and 1981 due to Volcker Shock. Yet another important trend in the same period was the increasing supply of exports from developing countries. Developing capitalist economies accelerated the supply of relatively high quality, low-medium technology manufactured commodities to world markets with relatively low prices due to low labor cost, high energy utilization and high efficiency (Csaba 1980, 96; Shmelev 1979, 316).

Meanwhile, CMEA member countries were increasing their international trade with developed capitalist economies and started taking loans in 1969 from the same economies due to *Détente* policy and economic reforms in specific CMEA member countries. CMEA member countries were faced with important economic problems after 1973 due to superimposed effects of two new economic trends. These trends, increasing economic and financial relations with developed capitalist economies and turbulence in the world economy (oil crises) between 1973 and 1982, exogenously affected CMEA member countries' economies. CMEA member countries' economies were not completely insulated from the effects of the oil crises (Bognar 1987, 406; Portes 1987, 423). It affected CMEA member countries through several channels despite the existence of the "layers of insulation" which were discussed in the previous section. These channels were the acceleration in the general level of world commodity prices, or inflation, changes in relative prices of commodities exchanged in world markets, variations in exchange rates, changes in demand for exports and import supplies, and finally diversities in world financial markets, namely interest rates and credit availability (Brown and Tardos 1980, 255–256; Csaba 1980; Trzeciakowski 1987, 465).

The USSR's anticipated increase in foreign trade turnover was 35 percent for the years between 1971 and 1975, according to the five-year plan; however, foreign trade turnover increased 129 percent in reality (Treml 1980, 199). The stylized facts about all CMEA member countries between 1973 and 1978 are bearing out the proposition that CMEA member countries were affected by the oil crises; their openness percentages rapidly increased, their terms of trade, ratio of weighted prices of exported commodities over imported ones, changed, they started having substantial trade deficits, and they accumulated debt to developed capitalist economies very rapidly (Hewett 1980, 341–342; Portes 1987, 410; Raczkowski 1987, 363–364; Trzeciakowski 1987, 475). Both CMEA member countries' international trade with other CMEA member countries, intra CMEA trade, and CMEA member countries' international trade with developed capitalist economies were quickly increased between 1973 and 1978 (Beckmann and Fidrmuc 2012, 38; Maximova 1987, 430–431).

Notwithstanding, several researchers have varying opinions about whether CMEA member countries turned inward (percentage increase of intra CMEA trade in their total international trade) or outward (percentage increase of international trade with developed economies trade) in their total volume of international trade, as a result of the oil crises. Beckmann and Fidrmuc (2012), Portes (1977) and Trzeciakowski (1987) were arguing that CMEA member countries turned inward; however, based on related data, Zimmerman (1980) claimed that CMEA member countries turned outward between 1973 and 1978 (Beckmann and Fidrmuc 2012, 46; Trzeciakowski 1987, 472; Zimmerman 1980, 429). The de facto inconvertibility between Transferable Ruble and Foreign Trade Currency, and international trade price differences between intra CMEA prices and world market prices, are the main cause of this controversy.

CMEA member countries' increasing trade deficits to developed capitalist economies between 1973 and 1982 were not the direct result of the rise in oil prices because CMEA, as a trade block, was not a net oil importer but a net oil exporter (Portes 1977, 753). Nevertheless, there were structural problems in international trade between CMEA member countries and developed capitalist economies. CMEA member countries commodity composition in international trade with developed capitalist countries were explained in the previous section. Their import demand from developed capitalist countries was relatively inelastic and developed capitalist countries import demand from CMEA member countries was relatively low and elastic, despite the fact that their goods were relatively cheap, and only the exception would be the oil exports of the USSR. Therefore, CMEA member countries had a structural comparative disadvantage to developed capitalist countries due to relatively low technology usage in production and the low quality of commodities (Portes 1977, 762). Developing capitalist countries had started to dominate the world market for low technology manufactured goods in 1970s due to low labor costs and improvements in their production technologies and efficiency; therefore, CMEA member countries low technology manufactured goods exports to developed capitalist economies declined (Csaba 1980, 96; Shmelev 1979, 315). The recession in developed capitalist economies between 1973 and 1982 also caused a decrease in demand for imports from CMEA member countries (Csaba 1980, 98; Shmelev 1979, 316).

Another structural problem of CMEA member countries was the low efficiency of material and energy utilization in production despite high material and energy intensity in their production. In this respect, the world oil consumption increased 2 percent and OECD member countries oil consumption increased 1.8 percent; however, CMEA member countries oil consumption increased 30 percent between 1973 and 1978. This situation also originated from the intra CMEA trade price structure, where oil importing CMEA member countries, through intra CMEA trade, were faced with increase in oil prices fully only after 1978. CMEA member countries oil import from the USSR increased; however, developed capitalist economies oil import from the USSR decreased between 1973 and 1978 (Csaba 1980; 104). The USSR's oil exports consisted of 15 percent of its total exports in 1970 but it rose to 35 percent in 1977; however, the USSR's oil exports to capitalist economies consisted of 53 percent of its total exports in 1970 but that declined to 39 percent in 1977 for the same reason. According to Treml's (1980) calculations, the USSR's export to NMP ratio, in domestic currency and prices, did not increase much in 1970's.

Additionally, the USSR's terms of trade with capitalist economies deteriorated 3.5 percent between 1970 and 1977 (Rosefielde 1980, 155; Treml 1980, 190). This phenomenon was partly originated by international trade price differences between world market prices and intra CMEA trade prices; and also, from CMEA member countries' dependence to two different trade structures; the intra CMEA trade and the international trade with developed capitalist economies. This resulted in inefficiencies in international trade and production. Some oil importing CMEA member countries, for example Hungary and Poland, also started importing oil from capitalist economies after 1973 (Brown and Tardos 1980, 258; Fallenbuchl 1980, 300).

A deterioration of CMEA member countries' terms of trade with developed capitalist economies between 1973 and 1978 was caused by relative price changes in their export and import commodities. CMEA member countries were importing high-quality, high technology manufactured commodities, and intermediate and capital-investment goods, from developed capitalist economies; however, they were exporting low quality, low technology manufactured commodities to developed capitalist economies. High quality, high technology manufactured commodities have higher energy/labor ratio in their inputs (capital intensive) than low quality, low technology manufactured commodities' energy/labor ratio in their inputs (labor intensive). Therefore, an increase in energy, or oil, prices in world markets would lead to an increase in the relative price ratio of high quality, high technology manufactured commodities to low quality, low technology manufactured commodities (Brown and Tardos 1980, 260–261).

Furthermore, developed capitalist economies rapidly implemented energy and material saving techniques to their production processes in 1970s, due to the increase in oil prices; however, CMEA member countries either slowly implemented energy and material saving techniques to their production processes or efficiency of material and energy utilization in production was declined in 1970s, due to relatively long lag of adjustment of intra CMEA trade prices to world market prices, and a relatively low feedback effect of increase in production cost to changes in production technique (Csaba 1980, 104–106). CMEA member countries' volume, or quantity, of imports from developed capitalist economies was increased more rapidly than CMEA member countries' volume, or quantity, of exports to developed capitalist economies between 1973 and 1978 (Fallenbuchl 1980, 284–291; Rosefielde 1980, 152). These are the main causes of the CMEA member countries' increasing trade deficits, or imbalances, to developed capitalist economies during the oil crises, especially between 1973 and 1978.

It should be underlined that intra CMEA trade was mostly dominated by the trade between the USSR and other CMEA member countries. Intra CMEA trade grew rapidly between 1973 and 1980, due to the oil crises, and decreased slowly between 1980 and 1986, and then rapidly after 1987, because of *Perestroika* reforms (Beckmann and Fidrmuc 2012, 46). Beckmann and Fidrmuc (2012) showed that there was a structural break in intra CMEA trade in 1975. They found the structural break with econometric analysis by using intra CMEA trade data between 1958 and 1985 (Beckmann and Fidrmuc 2012, 42). The intra CMEA trade price calculation system changed in 1975; as a result, the lag of adjustment of intra CMEA trade prices to world market prices diminished and rapid increases in world market prices that occurred in 1973, due to oil crises, were fully conveyed to intra CMEA trade prices in 1978. The USSR's terms of trade with other CMEA member countries did not change between 1970 and 1974; however, it improved 13 percent between 1975 and 1976, and further improved 4.5 percent in 1977. The speed and magnitude of change was very high when we compare these with the previous two decades. (Brown and Tardos 1980, 257; Fallenbuchl 1980, 284; Hewett 1980, 340–341; Rosefielde 1980, 155).

However, if the new intra CMEA trade price calculation system was fully implemented, the USSR's terms of trade with other CMEA member countries would be improved by around 40 percent between 1974 and 1978, but it only improved around 20 percent. In a light of this fact, several authors argued that the USSR was implicitly subsidizing international trade with other CMEA member countries (Beckmann and Fidrmuc 2012, 36–37; Hewett 1980, 340). The volume, or quantity, of intra CMEA trade grew between 1973 and 1978; however, it declined between 1975 and 1976 and restarted increasing after 1977 (Beckmann and Fidrmuc 2012, 43, Hewett 1980, 341; Rosefielde 1980, 152).

The USSR's terms of trade with other CMEA member countries improved not only because of the increase in the oil prices, but also because of the relative price increase of USSR's manufactured commodities and capital-investment commodities exports to CMEA member countries, to the CMEA member countries manufactured commodities and capital-investment commodities exports to USSR between 1973 and 1978 (Hewett 1980, 328–330). This relative price change trend was similar to the change in relative prices in trade between CMEA member countries and developed capitalist economies in the same period. In addition to the relative price changes, the USSR's share of machinery imports from CMEA member countries in total machinery imports declined, and the share of machinery imports from developed capitalist economies increased in the same period (Treml 1980, 190).

The USSR's trade surplus from intra CMEA trade increased rapidly between 1974 and 1978; and as a mirror image, other CMEA member countries trade deficit from intra CMEA trade rapidly rose at the same period. Therefore, the USSR was accumulating a trade surplus from intra CMEA trade, but giving a trade deficit to developed capitalist economies; and when the effects of international trade with two trade blocks summed, the USSR trade deficit was increasing between 1973 and 1978. The total trade deficit of other CMEA member countries was also increasing between 1973 and 1978 (Hewett 1980, 334; Rosefielde 1980, 153–154). These results are indicating that intra CMEA trade was also affected by the oil crises. Hungary started using US dollars, along with Transferable Ruble, in intra CMEA trade transactions in 1970's to cover up its trade deficit with developed capitalist economies, due to the de facto inconvertibility between Transferable Ruble and Foreign Trade Currencies (Brown and Tardos 1980, 271).

Moreover, the level of indebtedness of CMEA members started to rise in mid-1970's. The level of indebtedness of Poland, Hungary, and the GDR became substantial in the early 1970s because these relatively small economies were more open and their international trade with developed capitalist economies were relatively high. In addition to that, Poland, and to a certain extent Hungary, started taking loans from developed capitalist economies for financing new investment projects and improving economic efficiency. However, all CMEA member countries' level of indebtedness increased very rapidly in the mid-1970's, due to the persistent balance of payments, or trade deficit, problems caused by the oil crises (Portes 1997, 754; Portes 1987, 410; Raczkowski 377).

CMEA member countries took most of their loans from financial institutions in European developed capitalist economies. CMEA member countries received further loans from non-European developed capitalist economies, like Japan and the US, but proportionally it was very low (Portes 1977, 759). CMEA member countries' loans from financial institutions in European developed capitalist economies were denominated in European currencies (Portes 1977, 758). 30 percent of CMEA member countries' debt was European government backed export credits which had relatively low interest rates with longer maturity; however, more than 30 percent of their debt was directly taken from financial institutions in European developed capitalist economies, which had relatively high interest rates- most of the time London Interbank Offer Rate (LIBOR) which is the global reference rate for unsecured short-term borrowing in the interbank market- with shorter maturity in 1975.

In general, CMEA member countries preferred direct Euromarket credits from financial institutions over export credits mostly because the former had lesser political constrains. In addition to that, the percentage of direct Euromarket credits in CMEA member countries' total debt had been increased after 1975 (Portes 1977, 756–759). CMEA member countries', except the USSR, debt to developed capitalist economies increased from $ 6 billion (US) to $ 21.2

billion (US) in 1975, and it further increased to $ 59.6 billion (US); a rise of roughly 10 times between 1970 and 1981. The USSR's debt to developed capitalist economies increased from $ 1 billion (US) to $ 7.8 billion (US) in 1975, and it further rose to $ 15.5 billion (US); manifesting a rise of almost 15 times between 1970 and 1981.

One should notice that there was huge turbulence in world financial markets between 1978–1982 due to the second climax in the oil crises and the Volcker Shock. Interest rates increased very quickly and financial institutions started credit rationing in the same period. This turbulence in world financial markets severely hit the CMEA member countries. They encountered more than 14 percent interest rates, with margin over LIBOR, around 1981 and 1982. The USSR, Hungary, Poland, and the GDR were included in the group of countries with a high degree of risk in 1981. Therefore, they could not rollover their debt with long or medium maturity, and they gradually started taking loans with higher interest rates and shorter maturities. CMEA member countries', except the USSR, liabilities increased 1,5 times between 1977 and 1981; however, their interest payments increased 3,3 times in the same period (Maximova 1987, 433–434; Raczkowski 1987, 378). Hungary, Poland, and the GDR faced debt servicing troubles in this period because their debt to yearly export to capitalist economies, this is the main factor for earning convertible currencies, ratio became 2,0, 2,7 and 2,3, respectively in 1976 (Portes 1977, 761). Poland was forced to make an agreement with the Paris Club, (an umbrella organization of creditor countries and financial institutions), for debt restructuring in 1981 and 1985 due to debt servicing problems (Rieffel 2003, 71). Hungary was an exceptional case. The USSR gave a 700 million rubles credit to Hungary between 1976 and 1980 to cover its debt (Beckmann and Fidrmuc 2012, 47).

Effect of Changes in CMEA Member Countries' Indebtedness Level and International Trade on Their National Economies

The CMEA member countries' economies were affected by the oil crises with varying levels of severity. This severity was dependent on; openness of economies, percentage of international trade with capitalist economies, or intra-CMEA trade, in total international trade of these countries, trade composition, efficiency and technology level in production of these countries, and degree of economic reform, or economic liberalization.

There is an apparent consensus in the associated literature. The more open economies, like Poland, GDR, and Hungary were more severely affected by the oil crises than the closer economies, like the USSR. The CMEA member countries', like USSR, Poland, and Hungary, economies had relatively higher percentages of international trade with capitalist economies, or relatively lower percentage of intra CMEA trade, in their total international trade were deeply affected by the oil crises, or vice versa, like the GDR and the CSSR. The countries which were exporting oil, whose high technology manufactured commodities and capital-investment goods made up a relatively large portion of their exports and production, performed with relatively higher efficiency. The countries such as the USSR, were less severely affected by the oil crises than countries which were importing oil, and whose low technology manufactured commodities constituted a relatively bigger portion of their exports and production done with relatively lower efficiency, like other CMEA members countries. The countries which had experienced relatively radical economic reforms towards liberalization of the economy, like Poland and Hungary, were more severely affected by oil crises than more "traditional" centrally planned economies like the USSR (Maximova 1987, 431; Portes 1987, 423; Raczkowski 1987, 467–468, 473; Trzeciakowski 1987, 361–363).

The increase in world market prices, originating from the oil crises, transmitted to domestic prices to different degrees on CMEA member countries (Shemelev 1979, 316). Traditionally state institutions in CMEA member countries controlled retail prices, input prices and wages. Also, direct earnings or loses from international trade, net exports, were absorbed by the state budget, and state institutions were giving subsidies to enterprises, especially export oriented ones, to decrease the cost of production and increase "profitability", competitiveness in international markets, and to stabilize domestic prices. States were also collecting retail taxes, duties and special taxes from imported goods. This system was based on international trade monopoly of the state, the inconvertibility of domestic and foreign trade currency, and the differences between domestic and international prices (Brown and Tardos 1980, 266–270; Fallenbuchl 1980, 286–292; Raczkowski 1987, 371–372; Treml 1980, 196).

This system promoted a relative domestic price stability in the medium run; however, domestic prices were adjusted to world prices with a delay; therefore, the main aim of the system was not efficiency but stability. The general trend of domestic prices in CMEA member countries was upward between 1975 and 1980, mainly caused by the oil crises. There were several domestic price changes in CMEA member countries to adjust domestic prices to world market prices between 1975 and 1982. Nevertheless, as a general rule, when one group of goods' domestic prices increased, another group of commodities prices decreased in order to smooth inflationary pressure (Raczkowski 1987, 371–372). This system's Achilles' heel was the short-term price fluctuations in world markets and rapid turbulence in the balance of payments. The absence of price signals in domestic markets, however, prevented rapid import substitution of enterprises which used imported raw materials, capital-investment goods, or intermediate goods, and export oriented enterprises, or whole economy, and could not direct resources to the production of export commodities which become relatively expensive. Also consumers in the retail market would not quickly adjust their consumption pattern based on the new world prices. There is a trade-off then, between the inflationary pressures and deficit pressures on state budgets and trade balances in this system (Brown and Tardos 1980, 266–270; Fallenbuchl 1980, 286; Raczkowski 1987, 371, 376).

In addition to that, when subsidies for price stability, or for supporting exports, exceed taxes imposed for the sake of price stability, they will cause a deficit pressure on the state budget. Although the CMEA member countries' economies were in full employment such budget deficits may have accelerate inflation, and so for preventing inflation, the state must cut other expenditures (Fallenbuchl 1980, 292). Treml (1980) also claimed that surplus caused by international trade, when taxes, subsidies, imports, and exports are taken into total consideration, will increase a surplus in state budget; and this surplus can result in an upheaval in state expenditures, credit expenditure of state banks, and increases in the money supply, which are inflationary as well. Treml further argued that the USSR would face an inflationary pressure due to its trade surplus and transmission of the increase in commodity prices in world markets to domestic prices (Treml 1980, 197). Domestic retail prices did not change in the USSR, the CSSR or the GDR between 1970 and 1975; however, it increased 13 percent in Poland and 16 percent in Hungary in the same period; and while between 1975 and 1980 domestic retail prices in the USSR and the GDR stayed the same, they increased 10 percent in the CSSR; and in Poland and Hungary the increase was more than 40 percent in the same period (Raczkowski 1987, 375). Poland and Hungary had adjusted most of their domestic prices to world market prices, with control over prices of essential goods, via a new exchange rate system, in the early 1970s and 1976, respectively. Therefore, relatively high inflation in Poland and Hungary was not surprising because, the new price system was prioritizing trade balance and efficiency over price stability. There was a cost push inflation in Poland in 1970s. The main cause of inflation was the rise in oil and energy input prices; however, real wages also increased very rapidly, in response to workers' discontent, between 1973 and 1982 (Fallenbuchl 1980, 286–299; Raczkowski 1987, 373–375). Nevertheless, Hungarian workers' wages stayed stable in 1970's (Brown and Tardos 1980, 264–265).

The deficit caused by the difference between price equalization taxes and subsidies, which was absorbed in the state budget, in turn, rapidly increased between 1973 and 1982 in Poland and Hungary; therefore, they gradually increased domestic prices, directed subsidies to export oriented enterprises, and revaluated exchanges rates to decrease the cost of burden of price equalization on the state budget, increase exports, and make import substitution (Brown and Tardos 1980, 267–270; Fallenbuchl 1980; 286–293; Raczkowski 1987, 376–377). These evaluations, from several different authors, indicate that the rise in commodity prices in the world market, due to the oil crises, affected domestic commodity prices in CMEA member countries to varying degrees.

The effects of the oil crises between 1973 and 1982 on CMEA member countries' economies, apart from inflation, were; rising trade deficits, increasing indebtedness levels, and increasing interest payments, due to turbulence in the world financial markets between 1978 and 1972. The only solution to these problems was simultaneous implementation of two economic policies. First, decrease imports, or import substitution, and increase in exports; second, boost domestic savings so that they exceed investments, or in other words, growth in consumption and investment must be smaller than that of total economic growth (Brown and Tardos 1980, 265; Csaba 1980, 101; Portes 1977, 760; Portes 1987, 419).

In theory, CMEA member countries could make the proper investments for decreasing imports, by investing in import substituting sectors, and increasing exports, through investment in export oriented enterprises, financed by efficiently using already taken credits or increasing domestic savings (Portes 1977, 760). However, the structure of the domestic economies and international trade of CMEA member countries was not flexible enough for the efficient implementation of both policies at the same time. CMEA member countries' economies were not export-led but import-fed. The economic planners saw exports as a necessary evil to pay for the required imports (Portes 1987, 418). They were inward looking economies and their economic structure did not support an increase in exports but only substituting imports (Balassa and Tyson 1987, 439–440). The CMEA member countries tried to direct some of the domestic resources to export oriented enterprises, and also increased subsidies to these enterprises: However, such efforts did not cause a very rapid export growth due to the recession in the developed capitalist economies originating from the oil crises, and the decrease in import demand in these countries (Fallenbuchl 1980, 289–291). There were also structural reasons, which prevented rapid export growth, such as the export composition of CMEA member countries, the price system and so on, which were discussed in the previous section. Also, Hungary appreciated its own foreign trade currency against other currencies after 1973 (Balassa and Tyson 1987, 457).

Furthermore, there were also problems related to investment which are discussed below. In the case of import substitution, or decrease in imports, the economic policy was more problematic than the policy concerning the increase in exports in CMEA member countries. CMEA member countries' imports mostly consisted of "productive" imports such as raw materials, high technology commodities, capital-investment commodities, and high technology intermediate goods (Dobrinsky 1989, 325; Portes 1977, 760; Portes 1987, 419). Therefore, the income elasticity of imports was relatively low, i.e., inelastic (Csaba 1980, 101; Fallenbuchl 1980, 289–291; Portes 1977, 760). Hungary in 1973 and 1975, and Poland in 1975 and 1977, could made small import substitution, which are indicated by decreases in the income elasticity of substitutions in these countries (Balassa and Tyson 1987, 454; Brown and Tardos 1980, 270–271; Fallenbuchl 1980; 289–291). However, the cost of import substitution, the cost of investment on import substituting sectors, in CMEA member countries in the short run and medium run was too high; therefore, the level of import substitution was very low in these countries (Portes 1977, 760). The investment for import substitution and the increase in exports, through increasing competitiveness, requires high technology investment and CMEA member countries were importing high technology capital-investment goods from developed capitalist countries; therefore, trade balance could not be achieved by new investments in the short-run. Additionally, there was a high correlation between imports and investment in CMEA member countries until 1974 (Brown and Tardos 1980, 273–274).

Another policy for increasing investment was financing the investments through the rise in domestic savings, or fall in consumption; however, this was also politically impossible for most of the CMEA member countries (Fallenbuchl 1980; 301). Eventually, planners in CMEA member countries chose, or were forced to choose, the worst policy, which is the restrictive one. The planned decline in imports, followed by a fall in investment rates, or increase in unfinished investment plans ultimately lead to a fall in the growth rates of national incomes. These restrictive policies occurred in most of the CMEA member countries to decrease the trade deficits and increasing resources which were directed to the financing of debt and interest payments between 1974 and 1982. This way especially true in Poland, Hungary and CSSR (Balassa and Tyson 1987; 457–458; Brown and Tardos 1980, 273–274; Csaba 1980, 101; Fallenbuchl 1980; 289–291; Portes 1987, 418). Some researchers claimed that the direct aim of these restrictive policies, the decrease in imports and in investment, was the slowing down of the economic growth because of the low-income elasticity of imports; i.e., inelasticity (Csaba 1980, 101).

However, according to orthodox economic approaches, a decrease in imports will positively affect the national income, or economic growth, because imports are considered as leakages which are equivalent to the marginal propensity to save (Holzman 1974, 126). Nonetheless, if the decrease in "productive" imports, like raw materials, intermediate goods, and capital-investment goods, occurred due to exogenous factors, like balance of payment pressures, such a decrease will eventually cause a decline in national income greater than the initial decline in imports. This is called the "bottleneck effect", or "bottleneck multiplier" if it refers to the ratio of the decrease in national income to the initial decrease in imports (Holzman 1974, 127). Portes (1987) and Fallenbuchl (1980) explained the simultaneous process of decreasing imports, decreasing investment rates, and the decrease in growth in national income for several CMEA member countries between 1974 and 1982 through the "bottleneck effect-multiplier" (Fallenbuchl 1980, 290–291; Portes 1987, 415). This economic policy caused shortages, a decrease in capacity utilization and also disrupted production in export oriented enterprises (Csaba 1980, 101; Portes 1987, 415). This recessionary process which CMEA member countries faced after 1973 due to the oil crises was not completely different from the recessionary process that inward looking developing capitalist economies like Brazil, Mexico and Turkey confronted at the same period (Balassa and Tyson, 1987).

The research of Dobrinsky (1989) was the only one which partially examines the effect of international trade on CMEA member countries' economies by econometric methods. Dobrinsky's research was based on a larger research project which created dynamic world scale macro model for projections. Different economies were dynamically interrelated in this project with their imports and exports. Each countries' exports were dependent on total world imports and each countries' imports were dependent on their own GDP, or national income. Dobrinsky examined the USSR, the GDR, the CSSR, Poland, and Hungary with data between 1960 and 1985. His economic model was based on the supply driven Cobb-Douglas production function. In his model, the dependent variable were gross output and independent variables are total factor productivity (TFP), employment, capital and import, consisting only of raw material and intermediate goods imports (Dobrinsky 1989, 314–321). He found that there was a relatively high import growth in CMEA member countries during the 1960s. The contribution of import growth to the growth in gross output was between a low of 23 percent in GDR, and a high of 39 percent in Hungary, in all CMEA member countries in 1960s, except the USSR. The contribution of import growth to the growth in gross output was only 7 percent in USSR, due to the relative size and closeness of the economy. The import growth decreased in CMEA countries during 1970's, therefore, the contribution of import growth to the growth in gross output also declined. The contribution of import growth to the growth in gross output was between a low of 13 percent, in GDR, and a high of 30 percent in Poland, in all CMEA member countries except the USSR in 1970's. The contribution of import growth to the growth in gross output was again limited to 7 percent in the USSR.

Dobrinsky also found that there is a correlation with the increase in total factor productivity and import growth, or vice versa, especially for countries with a high contribution of import growth to the growth in gross output, such as Poland, Hungary, and the CSSR, but not in the USSR or the GDR. He explained it by the import composition of these countries which consisted of investment-capital goods, intermediate goods and high technology goods. Therefore, the decrease in import growth in Poland, Hungary, and the CSSR between 1971 and 1985, was due to the balance of payment problems accompanied by a decrease in total factor productivity and a decline in growth rates of the gross output. He showed that the growth rate of imports was procyclical in CMEA member countries (Dobrinsky 1989, 323–325).

Additionally, Dobrinsky also found that consumption was highly stable and investment was procyclical in CMEA member countries between 1960 and 1985. He further indicated that the import demand of these countries depended to a larger extent on domestic absorption, consumption plus investment, rather than export revenue or intended increase in export capacity. Furthermore, he found low price elasticity of imports for CMEA member countries (Dobrinsky 1989, 328–329). In the light of these findings, the chain of causality can be formed as imports had a huge effect on investment, and/or total factor productivity, and all these factors, import, investment and total factor productivity, were determining the growth rate of gross output, and the effect of employment was negligible due to full employment in CMEA member countries. This also reinforced the "bottleneck effect-multiplier" explanation for the relationship between growth in national income and imports in CMEA member countries.

According to the related literature, the oil crises between 1973 and 1982, and financial turbulence between 1979 and 1982, affected CMEA member countries' international trade and level of indebtedness. Moreover, many researchers claim that the balance of payment problems of the CMEA member countries and increasing level of indebtedness in those countries, reinforced with the rise in interest rates in the world financial markets and credit rationing, affected CMEA member countries' economies through the decrease in imports, in investment rates, in growth rates of national incomes and in the unprecedented rise in inflation. However, this relationship, the effect of changes in CMEA member countries' indebtedness level and international trade on their national economies, is not thoroughly examined by quantitative methods, especially with econometric analysis, in the existing related literature with the probable exception of Dobrinsky (1989). The main aim of Dobrinsky's research however, was not to examine this relationship, and he did not check the effects of CMEA member countries' indebtedness level or debt-interest payment obligations on their national economies. This thesis attempts to investigate this relationship and also to analyze the various effects of CMEA member countries' international trade with different economic blocks; intra CMEA trade, international trade with developed capitalist economies and international trade with developing capitalist economies on their nation economies as well, for the relatively longer timespan covering the 1960–1989 period depending on econometric analysis. In this way, this thesis endeavors to fill the significant gap inherent in the related literature. The anticipated results from quantitative analysis in this thesis are that the external economic fluctuations in capitalist economies between 1973 and 1982, due to the oil crises, negatively affected CMEA member countries national economies, through changes in CMEA member countries' international trade, indebtedness level, and debt repayment conditions, for example, changes in interest rate on their debt.

METHODOLOGY

The related literature suggested that the economies of CMEA member countries were import-fed. The trade deficits of CMEA member countries increased between 1973 and 1982 due to the effects of the oil crises in these period. CMEA member countries took credits from developed capitalist economies during this period for covering up their deficit. However, the increasing indebtedness level of CMEA countries in this period, and turbulence in international financial market between 1979 and 1982, through a rise in interest rates and decline in credit supply, caused a debt servicing problem for CMEA member countries to varying degrees. Therefore, economic planners in these countries implemented policies to diminish imports to deal with this debt servicing problems. CMEA member countries' imports mostly consisted of "productive" imports; therefore, the decrease in imports caused a bottleneck effect and NMP growth rates decreased in CMEA member countries. This chain of causality, or causal hypothesis, explained above, suggests that the economies of CMEA member countries were negatively affected by the oil crises through changes in their imports, variations in their indebtedness levels, and relatedly changes in interest rates in international financial markets.

Five CMEA member countries, namely the CSSR, the GDR, Hungary, Poland, and the USSR, are examined in this thesis for the time frame between 1960 and 1989. This time frame covers preoil crises, oil crises, and postoil crises periods. Because the change in trends of variables of interest and causality between them cannot be found by only checking the period of oil crises; therefore, time frame of quantitative analysis is extended to preoil and postoil crises period. The hypothesis is tested by two methods, detecting the change in trends of variables, namely NMP, import, export and level of indebtedness, by plotting variables with respect to time, and by checking the causal relationship between these variables by econometrics.

Data

The variables of interest for the five CMEA member countries, the CSSR, the GDR, Hungary, Poland, and the USSR, for the time frame between 1960 and 1989 are summarized in the table below.

Table 1. Summary of Variables of Interest for Five CMEA Member Countries, 1960–1989

<table>
<tr><th>Variables</th><th>Abbreviation of Variables in Econometric Analysis</th><th>Unit of Account</th></tr>
<tr><td>Net Material Product (NMP)</td><td>nmp</td><td rowspan="8">In Real Terms, In Domestic Currency
CSSR: Constant 1977 Prices in Domestic KCS, Koruna Ceskoslovenska
GDR: Constant 1980 Prices in Domestic Mark
Hungary: Constant 1976 Prices in Domestic Forint
Poland: Constant 1982 Prices in Domestic Zloty
USSR: Constant 1973 Prices in Domestic Ruble</td></tr>
<tr><td>Total Exports</td><td>extot</td></tr>
<tr><td>Total Imports</td><td>imtot</td></tr>
<tr><td>Imports from Socialist Economies</td><td>imsoc</td></tr>
<tr><td>Imports from Developed Capitalist Economies</td><td>imind</td></tr>
<tr><td>Imports from Developing Capitalist Economies</td><td>imdev</td></tr>
<tr><td>Level of Indebtedness, External Debt</td><td>debtdomes</td></tr>
<tr><td>Debt Repayment</td><td>intdomes</td></tr>
</table>

One of the biggest challenges in this thesis is obtaining the dataset. Plus, none of the data series are digitalized. The associated data series were obtained from hardcopy sources, manually digitalized and combined. All the data series have been converted to the same unit of account, the domestic currency of CMEA member countries in real terms, for internally consistent and comparable results, and also for removing the effect of price changes. Several data sources are used in this thesis, Dobrinsky (1986), Marer (1972), Vienna Institute for Comparative Economic Studies (WIIW) (1979–1990), FRED (2018), United Nations (1974–1975), Glowny Urzad Statystyczny (1973–1974), Federalni Statisticky Urad (1972–1975), Központi Statisztikai Hivatal (1973–1975), and Ministersvto Vneshney Torgovli (1972–1976). However, the data series are heavily based on two principal sources; Dobrinsky (1986) and Vienna Institute for Comparative Economic Studies (WIIW) (1979–1990). Dobrinsky (1986) is used as a data series between 1960 and 1982, and the Vienna Institute for Comparative Economic Studies (WIIW) (1979–1990) is used for data series between 1983 and 1989. Two series are combined in order to get one set of data for the analysis period 1960 and 1989. All the series have one observation per year. Two data series are extrapolated; the level of indebtedness between 1960 and 1971, and conversion rates between foreign exchange currencies, or valuta, and domestic currencies for the period between 1983 and 1989. It should be mentioned that the quality of the economic data from CMEA member countries is questionable and the dataset produced for this thesis is based on the data sources referred above. Ex-CMEA member countries' statistical institutions could republish and digitalize the economic data for the period between 1945 and 1990 to diminish doubts about the quality of the data.

NMP is the national income calculation method of CMEA member countries. NMP is the equivalent of the GDP; however, NMP is only calculated for sectors which produce tangible commodities; therefore, most of the service sectors are not included in the NMP because most of the services in CMEA member countries are not commodified and do not have any exchange values. Another difference between NMP and GDP calculation is that depreciation of fixed assets is subtracted in NMP calculation, but in standard GDP calculation it is not. NMP calculations are done in domestic currencies and with domestic price indices; henceforth, they are converted from nominal to real terms.

The total exports and imports are aggregate variables which cover CMEA member countries' international trade with all other countries in the World. They are published in foreign exchange currencies, or valuta, in nominal terms. While total export variables in foreign exchange currencies are converted to domestic currencies with export conversion rates between foreign exchange currencies and domestic currencies, total import variables are converted with import conversion rates. Furthermore, total export and import variables are converted from nominal to real terms with export and import price indices. Imports from socialist economies, from developed capitalist economies, and from developing capitalist economies variables were the subset variables of total imports and when we add up all three variables we reach the total import variable. The conversion method employed for the total import variable is also used for these three subset variables. The imports from the socialist economies variable does not solely cover imports from other CMEA member countries but also from other socialist economies as well (China, Yugoslavia, Albania, etc.). The total import variable is divided in three subsets for detecting possible distinct effects of imports from different country groups on the economies of CMEA member countries.

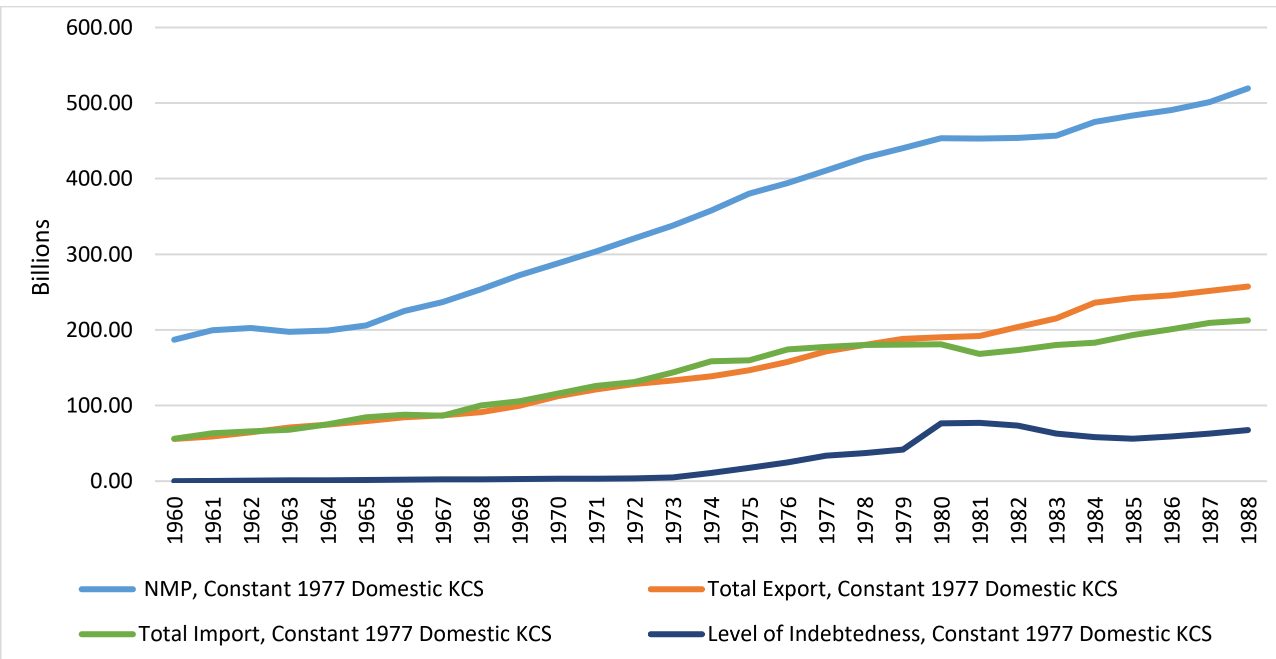
The level of indebtedness variable is based on the net debt data of CMEA member countries to developed capitalist economies, therefore, it is a close proxy for the total level of indebtedness of CMEA member countries. The level of indebtedness variable indicates the level of external debt of CMEA member countries. In the case of CMEA member countries there was no distinction between public and private external debt since there was not any private sector at all. The level of indebtedness data is published in US dollars; therefore, first it is converted to foreign exchange currencies by using foreign exchange rates. Then the level of indebtedness in foreign exchange currencies is converted to domestic currencies via import conversion rates. Ultimately, the level of indebtedness is converted from nominal into real terms through the domestic price indices.

The debt repayment variable indicates yearly debt payments, both principal and interest payments, of CMEA member countries to creditors. Comprehensive data for maturity dates and the level of interest rates for CMEA member countries' debts do not exist; therefore, the level of indebtedness variable in domestic currencies and in real terms, multiplied by the Fed's effective federal funds rate, (FRED 2018), for the last month of every year, is used in order to create a proxy for the debt repayment variable.

After describing the multi-level construction process of the data set, principal macroeconomic indicators of the CSSR, the GDR, Hungary, Poland, and the USSR; which are real NMP, total exports, total imports, level of indebtedness, openness ratio, real NMP growth rate, debt to NMP ratio, and trade balance covering total exports minus total imports as a ratio to NMP are plotted (in the graphs below), against the analysis period 1960 to 1989. (A negative trade balance to NMP ratios means a trade deficit to NMP ratio, and a positive trade balance to NMP ratios means a trade surplus to NMP ratio.) The main trends in the indicators encompassing the changes are thoroughly examined for each country after drawing the graphs. Additionally, probable causal relationships between the variables, together with the reasons for the change in the main trends, are briefly discussed for each country. In the final stage, possible answers to the question of why these countries were affected by the oil crises to this individual levels, are evaluated.

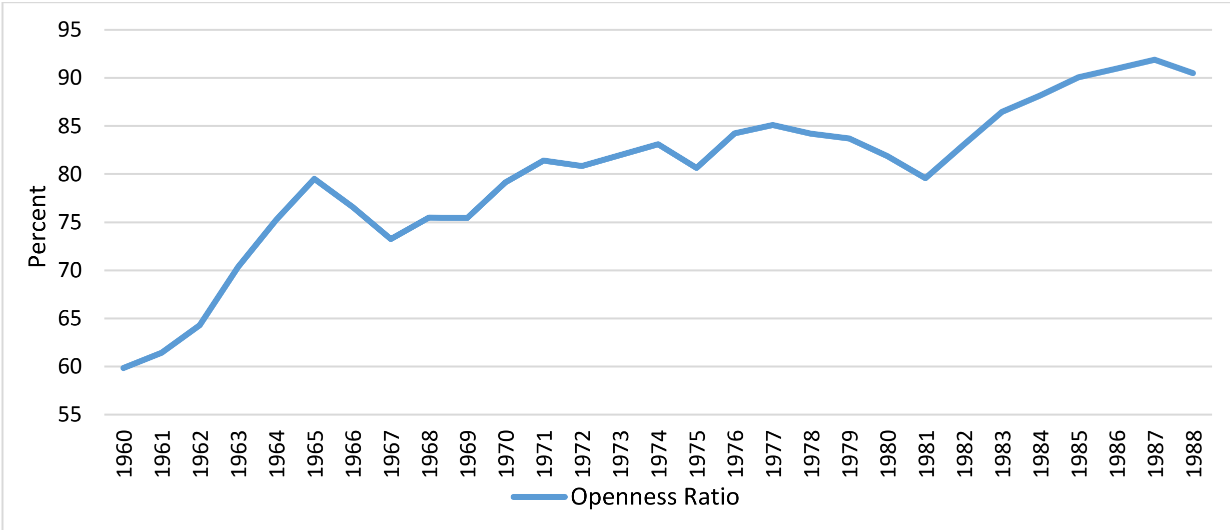
CSSR

Figure 1. CSSR's Real NMP, Real Export, Real Import, and Real Level of Indebtedness, 1960–1988



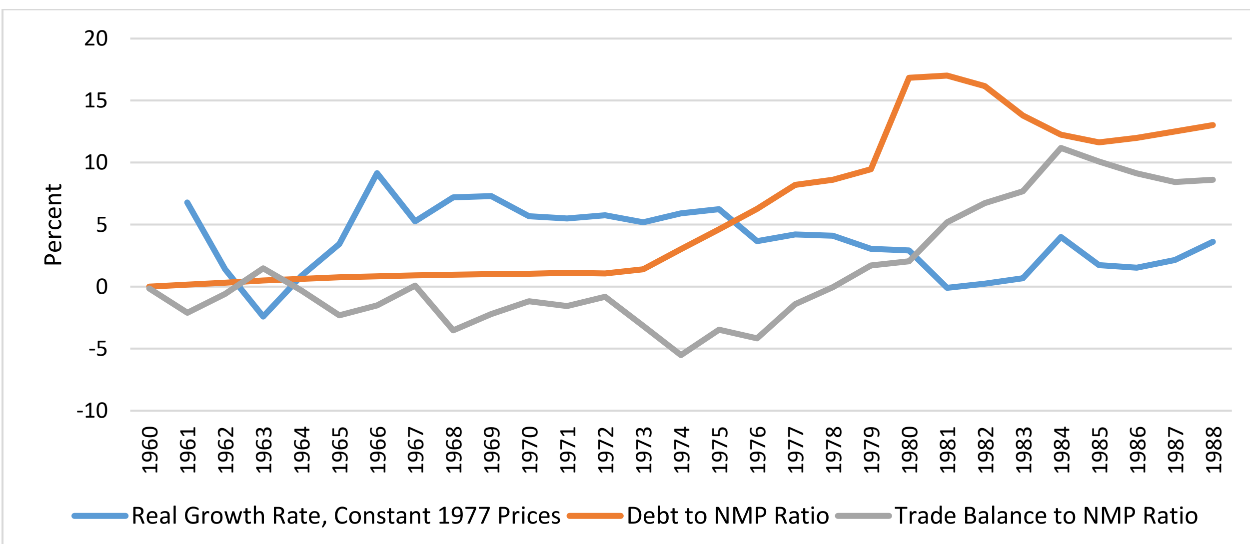
Source: Own calculation based on data sources mentioned in the methodology chapter.

Figure 2. CSSR's Openness Ratio, 1960–1988



Source: Own calculation based on data sources mentioned in the methodology chapter.

Figure 3. CSSR's Real NMP Growth Rate, Debt to NMP Ratio, and Trade Balance to NMP Ratio, 1960–1988



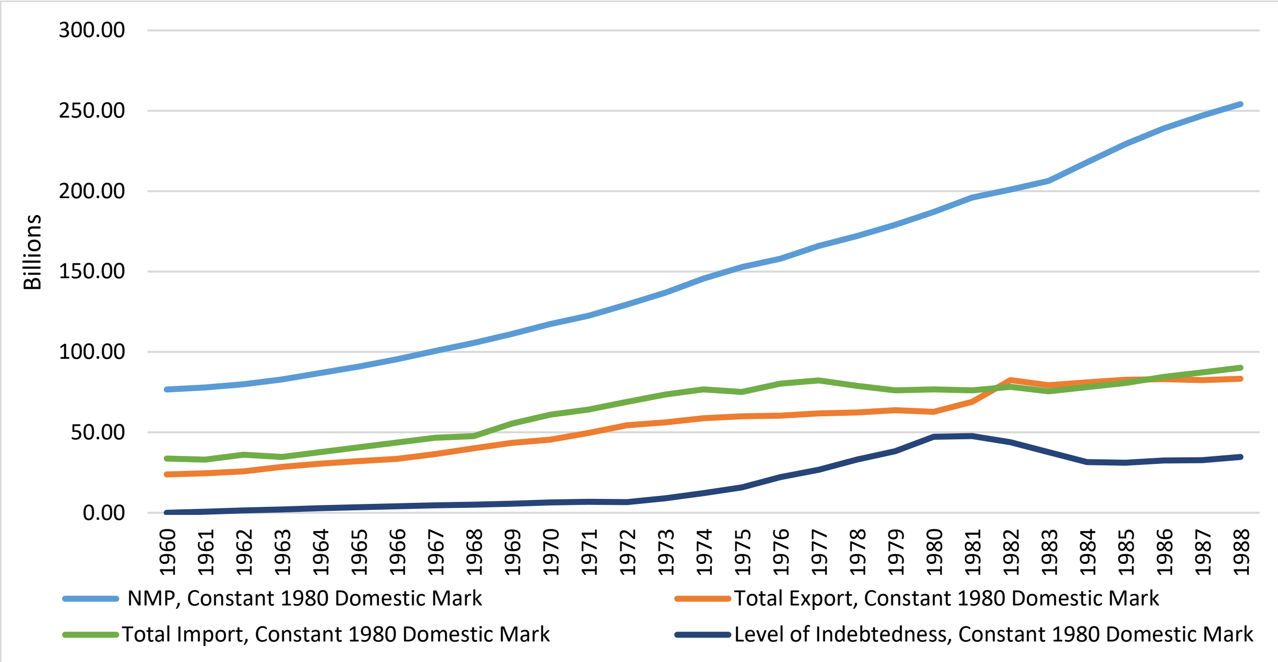
Source: Own calculation based on data sources mentioned in the methodology chapter.

The real NMP growth rate of the CSSR was relatively stable between 1967 and 1975, then decreased in the second half of the 1970's. After that, the CSSR's real NMP stayed stagnant from 1980 to 1983, and at the end of the analysis period, it started to grow. The total imports growth trend in the CSSR was relatively stable between 1960 and 1973. It increased rapidly between 1973 and 1976, then, remained stagnant until the end of the 1970s. It decreased in 1980 followed by a very slow growth trend between 1981 and 1984, and the trend accelerated afterwards. The total exports growth trend in the CSSR was relatively stable between 1960 and 1979, then it became stagnant between 1979 and 1981. It started to grow between 1981 and 1984, and until at the end of the analysis period its growth trend diminished. The level of indebtedness of the CSSR was almost negligible from 1960 to 1973, however, it grew very rapidly between 1973 and 1979, with a spike in 1980. The CSSR's level of indebtedness increased around 10 times between 1973 and 1979, from 4.6 billion domestic koruna ceskoslovenska (KCS) to 41.6 billion KCS. It increased around 85 percent in 1979. The CSSR's level of indebtedness slowly declined between 1981 and 1984, and then stayed stagnant until the end of the 1980s. The average real NMP growth rate of the CSSR in the 1960s was 4.6 percent, in 1970s it was 4.4 percent, and in 1980s it dropped to 1.6 percent. On the other hand, the average openness ratio of CSSR in the 1960s was 71 percent, in 1970s it was 82 percent, and in the 1980s it attained to level of 87 percent. A similar historical trend is observed for the average debt to NMP ratio in the CSSR. In the 1960s, it was limited with 0.6 percent; in 1970s, it reached to the level of 4.5 percent, and in the 1980s, it was 16.2 percent. The average trade balance to NMP ratio of the CSSR in 1960s was –1.1 percent, in the 1970s it was –2 percent, and finally, in the 1980s it was 7.9 percent.

The trade deficit of the CSSR grew rapidly between 1973 and 1978, mostly due to the effects of the oil crises, which caused a rapid rise in total imports between 1973 and 1976. The rise in the trade deficit, however, resulted in a rapid increase in the level of indebtedness in the CSSR between 1973 and 1980. The acceleration in the level of indebtedness in turn forced the CSSR's planners to implement policies for closing the trade deficit through cutting imports. Hence, imports became very stagnant between 1976 and 1984, and decreased in 1980. The stagnation in imports, however, caused a decline in the real growth rate of the CSSR between 1976 and 1980, and after that, imports decreased in 1980 following a relatively slow growth period during 1981 and 1983, leading to stagnation in the CSSR's NMP for the same period.

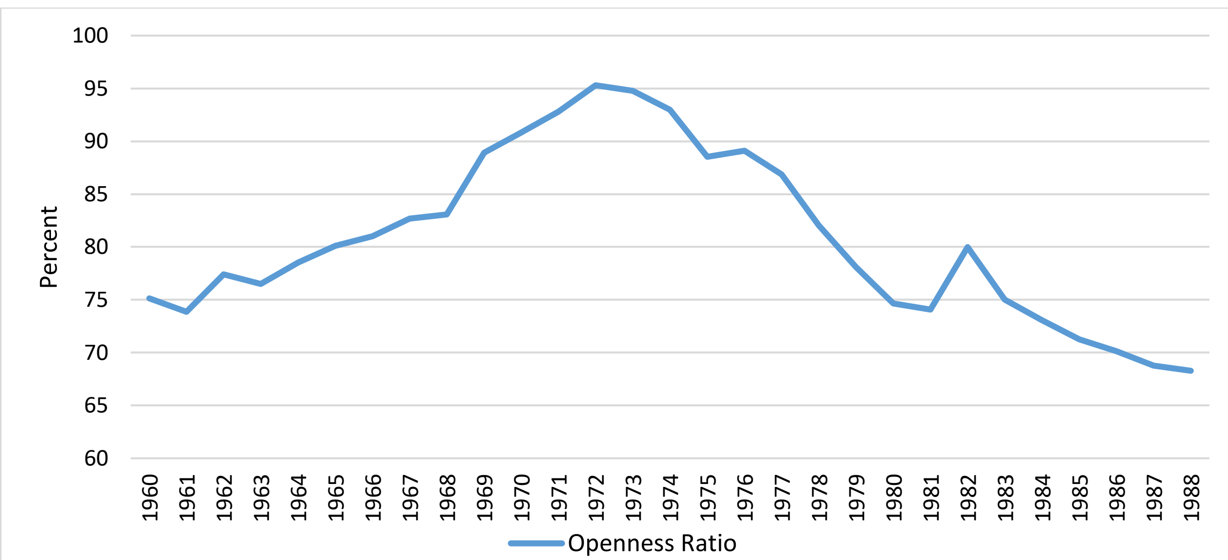
GDR

Figure 4. GDR's Real NMP, Real Export, Real Import, and Real Level of Indebtedness, 1960–1988



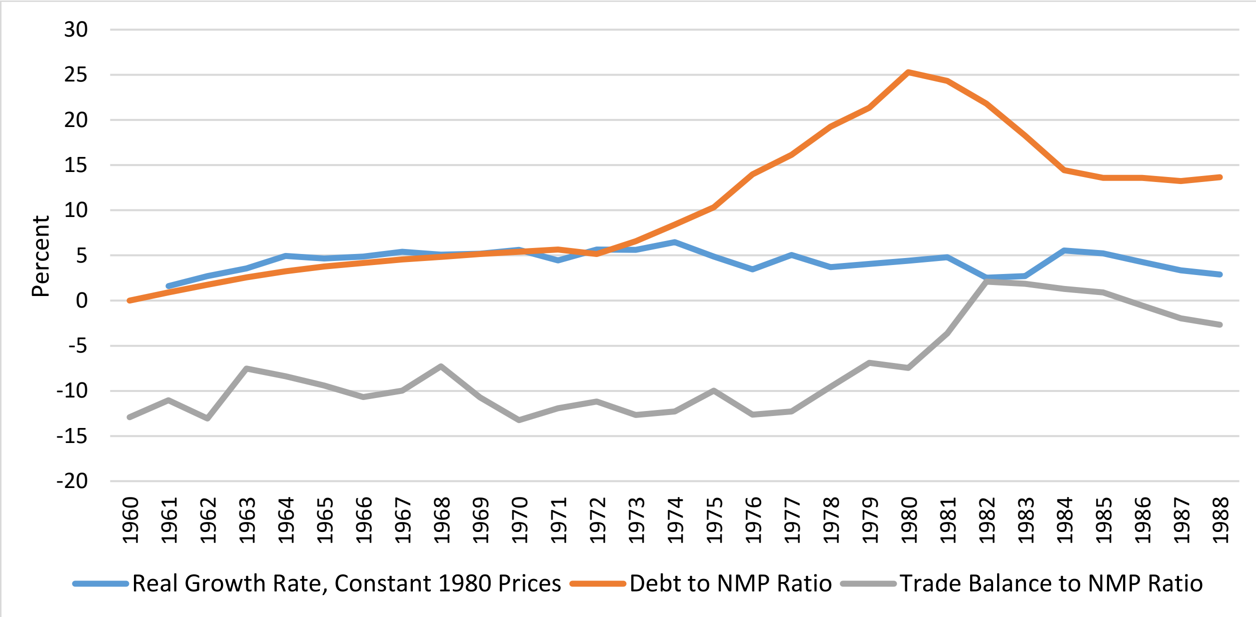
Source: Own calculation based on data sources mentioned in the methodology chapter.

Figure 5. GDR's Openness Ratio, 1960–1988



Source: Own calculation based on data sources mentioned in the methodology chapter.

Figure 6. GDR's Real NMP Growth Rate, Debt to NMP Ratio, and Trade Balance to NMP Ratio, 1960–1988



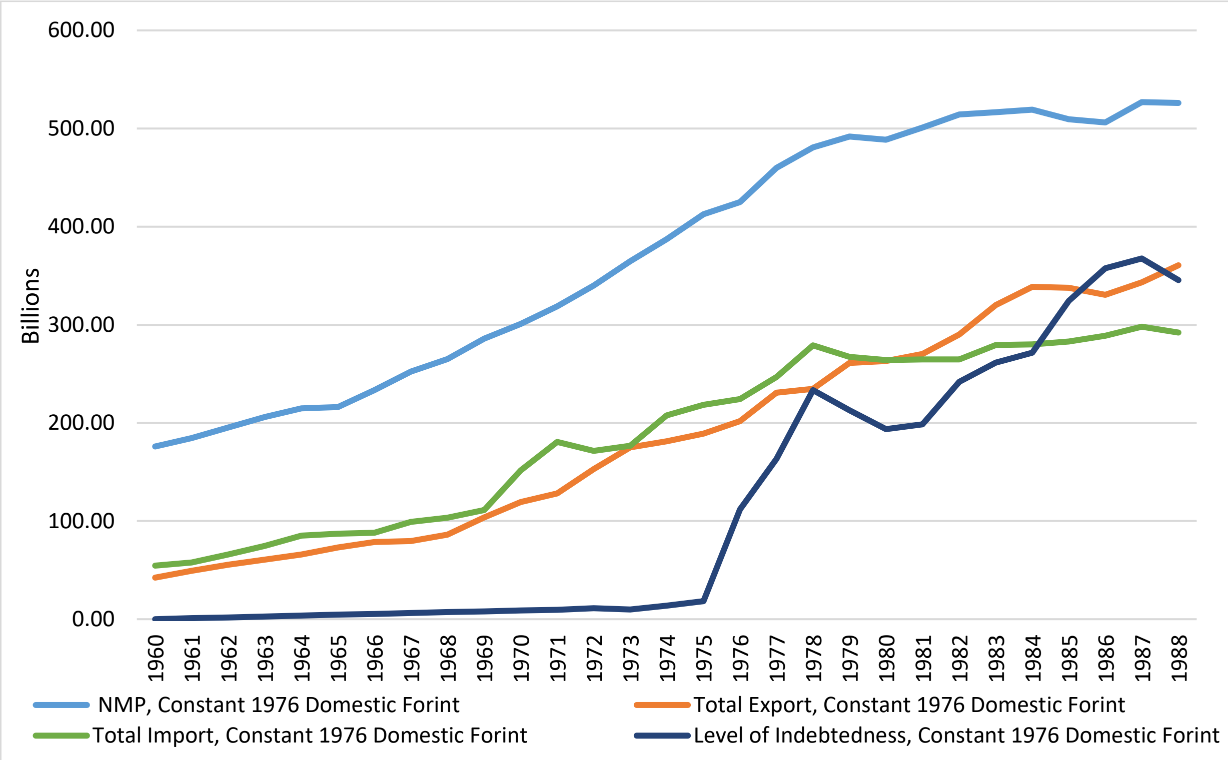
Source: Own calculation based on data sources mentioned in the methodology chapter.

The real NMP growth rate of the GDR was relatively stable between 1964 and 1981. It decreased between 1981 and 1983 followed a rise between 1983 and 1985. The total import growth trend of the GDR was relatively stable between 1960 and 1968. It increased between 1968 and 1974. Total imports of the GDR became relatively stagnant between 1974 and 1977, and then, declined between 1977 and 1980. Total imports of the GDR stayed stagnant between 1980 and 1985, and then after, increased between 1985 and 1988. As for the total export growth trend of the GDR, it was relatively stable between 1960 and 1972. Total exports became relatively stagnant between 1972 and 1980, then rapidly increased between 1980 and 1982. From 1982 until 1988 it again turned to the state of stagnancy. The level of indebtedness of the GDR was relatively low between 1960 and 1972, however, it grew rapidly between 1972 and 1980. The level of indebtedness of the GDR increased around 7 times between 1972 and 1980, from 6.6 billion domestic marks to 47 billion domestic marks. The indebtedness level of the GDR drastically declined between 1981 and 1984, and then stayed relatively stagnant between 1984 and 1988. The average real NMP growth rate of the GDR in the 1960s was 4.3 percent; in the 1970s it was 4.7 percent; and in the 1980s it was 3.7 percent. The average openness ratio of the GDR in the 1960s was 79 percent, in the 1970s it was 89 percent, and in the 1980s, it was 72 percent. The average debt to NMP ratio of the GDR in 1960s was 3.1 percent, in 1970s it was 11.2 percent, and in 1980s it was 20 percent. The average trade balance to NMP ratio of the GDR in 1960s was –10 percent, in 1970s it was –11.2 percent, and in 1980s it declined to the relatively acceptable levels of –1.9 percent.

The total imports of GDR increased quickly between 1968 and 1974, due to the combined effects of *Détente* policies and the oil crises. The increase in total imports of the GDR caused a relatively rapid rise of its trade deficit between 1968 and 1980. The rise in the trade deficit of the GDR, arguably caused a rapid increase in the level of indebtedness of the GDR between 1972 and 1980. The rise in the level of indebtedness obligated the GDR's planners to pursue policies for diminishing the trade deficit through cutting imports and rising exports. The total imports of the GDR decreased between 1977 and 1980, and total exports of the GDR rapidly rose between 1980 and 1982. The lagged effect of decline in total imports between 1977 and 1980, and increase in exports between 1980 and 1982, arguably resulted in a decrease in real growth rate of the GDR's NMP between 1981 and 1983.

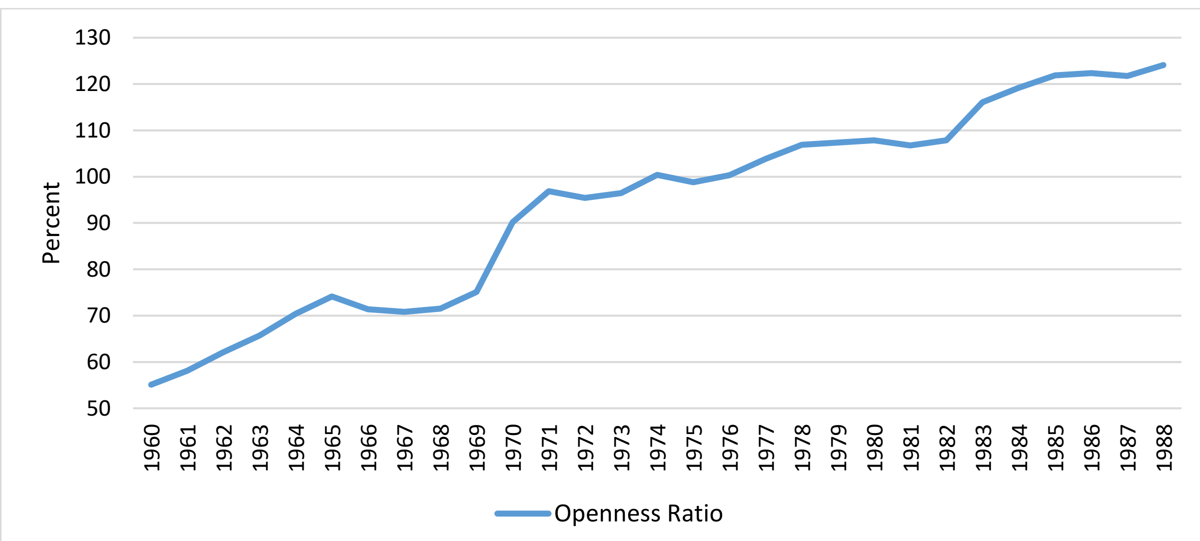
Hungary

Figure 7. Hungary's Real NMP, Real Export, Real Import, and Real Level of Indebtedness, 1960–1988



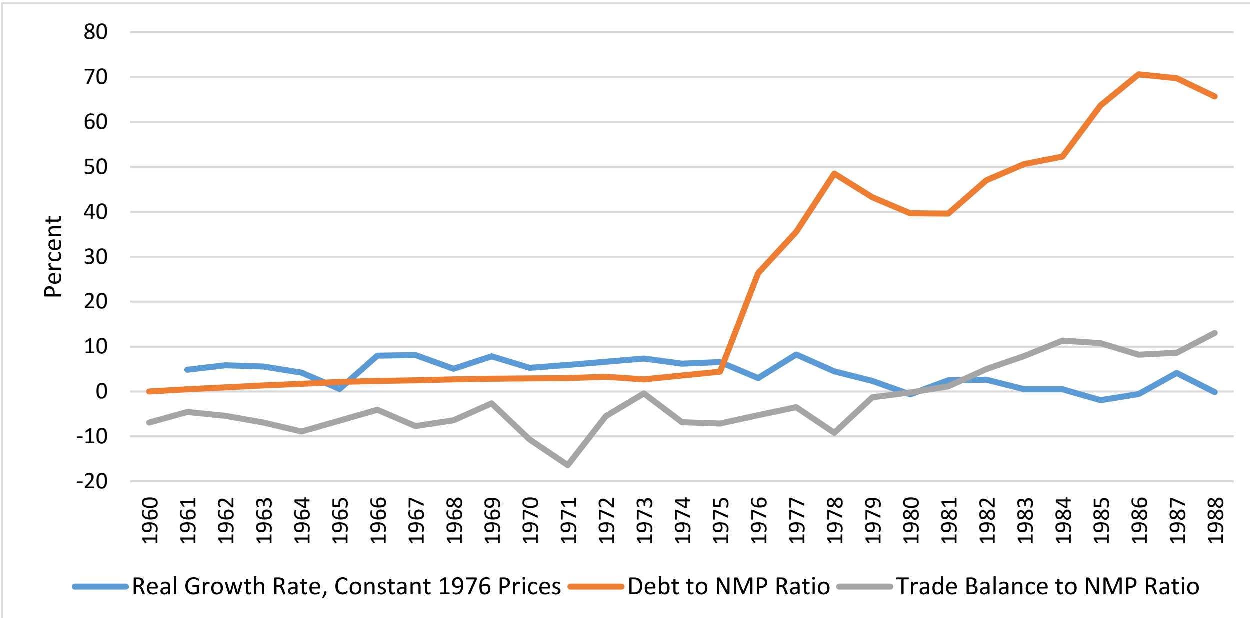
Source: Own calculation based on data sources mentioned in the methodology chapter.

Figure 8. Hungary's Openness Ratio, 1960–1988



Source: Own calculation based on data sources mentioned in the methodology chapter.

Figure 9. Hungary's Real NMP Growth Rate, Debt to NMP Ratio, and Trade Balance to NMP Ratio, 1960–1988



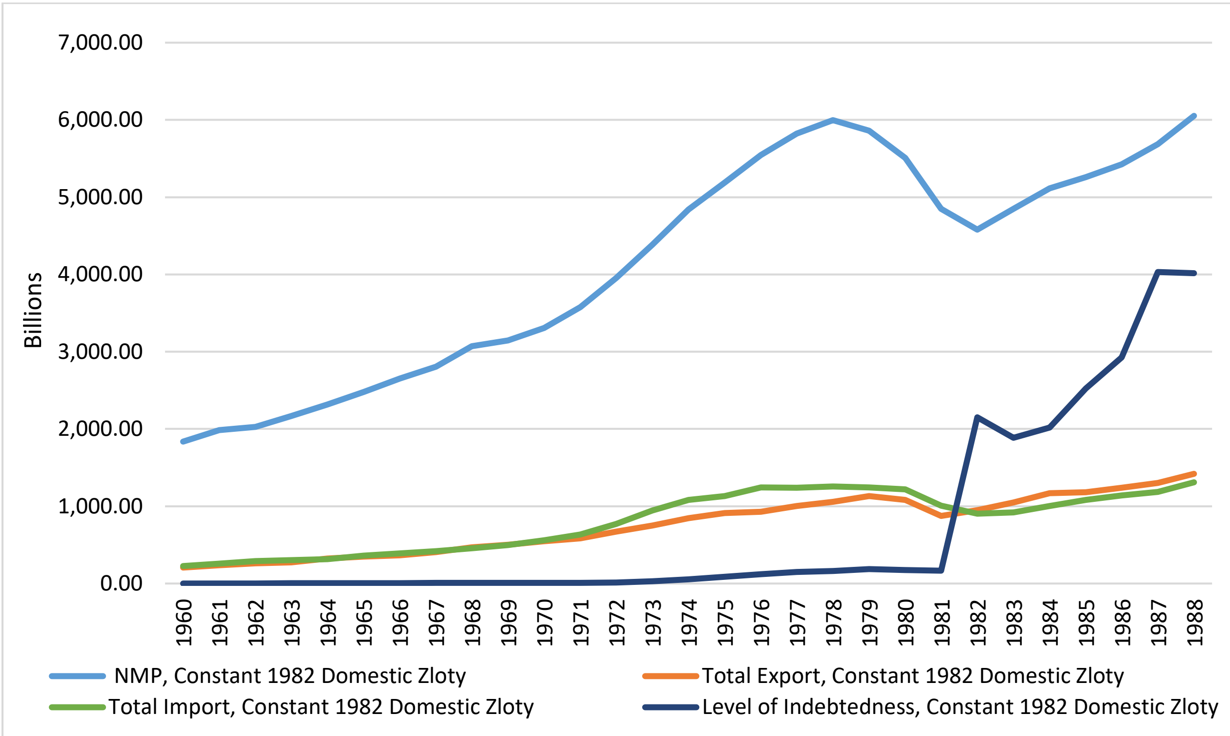
Source: Own calculation based on data sources mentioned in the methodology chapter.

While the real NMP growth rate of Hungary was relatively stable between 1965 and 1975, it decreased between 1975 and 1976; then increased between 1976 and 1977. Hungary's real NMP growth rate once more declined between 1977 and 1980, but then increased between 1980 and 1982, becoming relatively stagnant thereafter. The total import growth trend of Hungary was relatively stable between 1960 and 1969; it grew rapidly between 1969 and 1971, then became relatively stagnant between 1971 and 1973. Total imports accelerated very rapidly between 1973 and 1974, and also between 1976 and 1978, however they declined between 1978 and 1979, and afterwards stayed relatively stagnant until the end of the analysis period. As for the total export growth trend of Hungary, it was relatively stable between 1960 and 1968; then increased between 1968 and 1973, but then decreased between 1973 and 1979. The total exports of Hungary became stagnant between 1979 and 1981, grew between 1981 and 1984, becoming stagnant again between 1984 and 1986, and at the end, grew between 1986 and 1988. The level of indebtedness of Hungary was very low between 1960 and 1973, however, it grew very fast between 1973 and 1978. The skyrocketing trend in the level of indebtedness between 1975 and 1978, was mainly caused by the very rapid devaluation of the forint in this period. Hungary's level of indebtedness increased more than 7 times between 1973 and 1979 in constant US dollar, from 0.9 billion to 7 billion. However, the level of indebtedness decreased between 1978 and 1981 in constant domestic forints, and stayed relatively stagnant in that period in constant US dollars as well. The level of indebtedness of Hungary grew again between 1981 and 1987 both in constant US dollars and in constant domestic forints. The average real NMP growth rate of Hungary in the 1960s was 5.5 percent, in the 1970s it was 4.6 percent, and in the 1980s it was 1.1 percent. The average openness ratio of Hungary in the 1960s was 69 percent, in the 1970s it rose to 101 percent, and in the 1980s it attained its highest level of 117 percent. The average debt to NMP ratio of Hungary in the 1960s was only 1.7 percent, in the 1970s it steeply rose to 17.4 percent, and in the 1980s it attained 57.5 percent. The average trade balance to NMP ratio of Hungary in the 1960s was –6 percent, in the 1970s it was –6.7 percent, and in the 1980s it recovered to 7.8 percent.

Hungary's trade deficit grew between 1969 and 1972, and also between 1973 and 1979. The growth in the latter period was due mostly to the impact of the oil crises which caused a rapid increase in total imports between 1973 and 1974, and also between 1976 and 1978. This rise in the trade deficit between 1973 and 1979 caused a rapid increase in the level of indebtedness of Hungary between 1973 and 1979. In turn, the rise in the level of indebtedness forced Hungarian planners to implement policies for closing the trade deficit through curbing imports. Total imports declined between 1978 and 1979, and stayed relatively stagnant between 1979 and 1988. The decline in imports between 1978 and 1979, and its following stagnation caused a decrease in Hungary's real NMP growth rate between 1978 and 1980, and relative stagnation in Hungary's real NMP between 1980 and 1986, except the relatively small growth in NMP between 1980 and 1982.

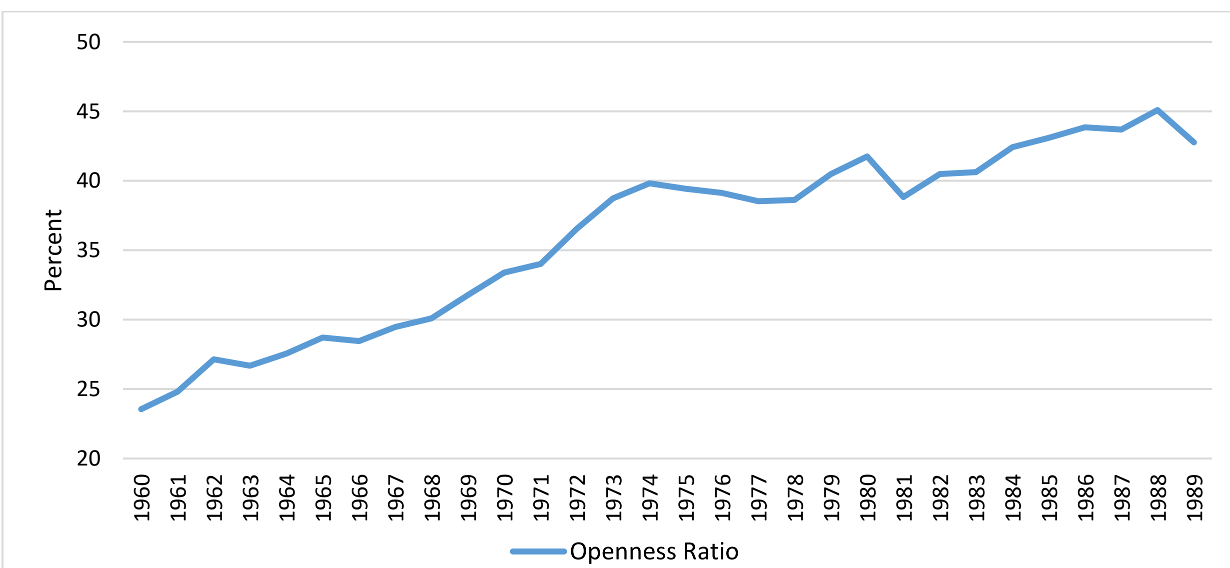
Poland

Figure 10. Poland's Real NMP, Real Export, Real Import, and Real Level of Indebtedness, 1960–1989



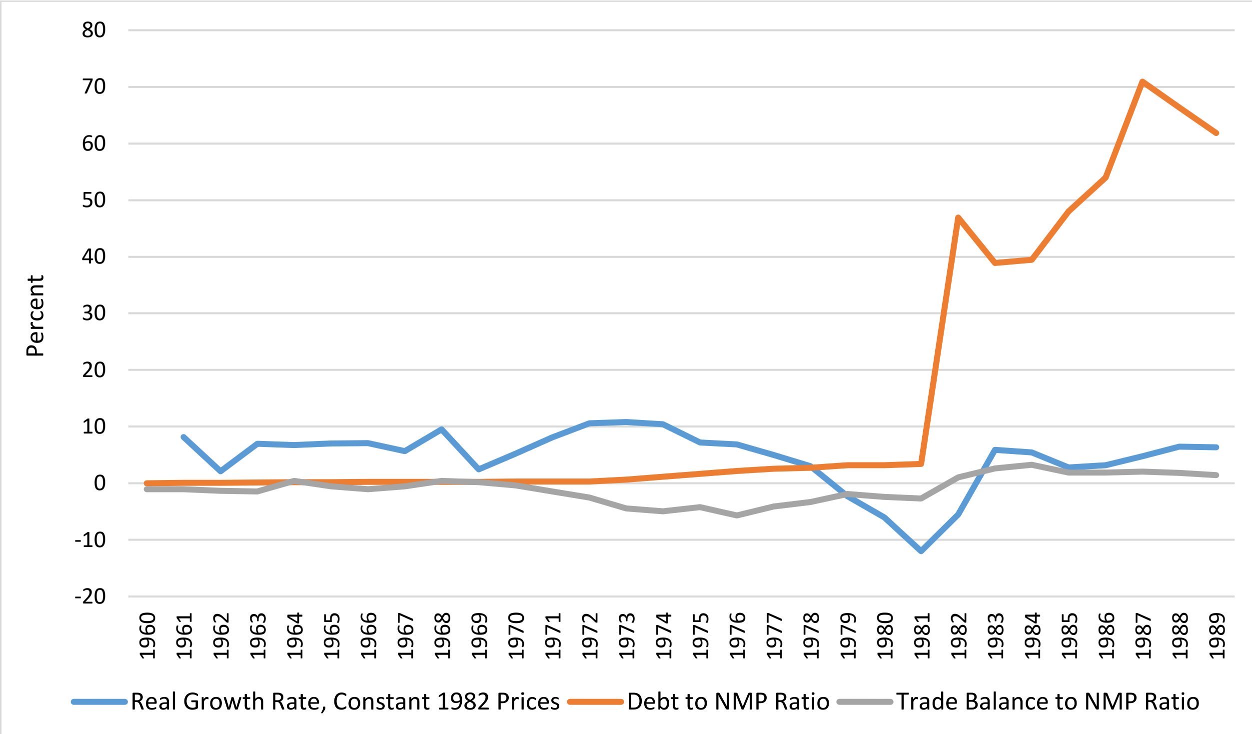
Source: Own calculation based on data sources mentioned in the methodology chapter.

Figure 11. Poland's Openness Ratio, 1960–1989



Source: Own calculation based on data sources mentioned in the methodology chapter.

Figure 12. Poland's Real NMP Growth Rate, Debt to NMP Ratio, and Trade Balance to NMP Ratio, 1960–1989



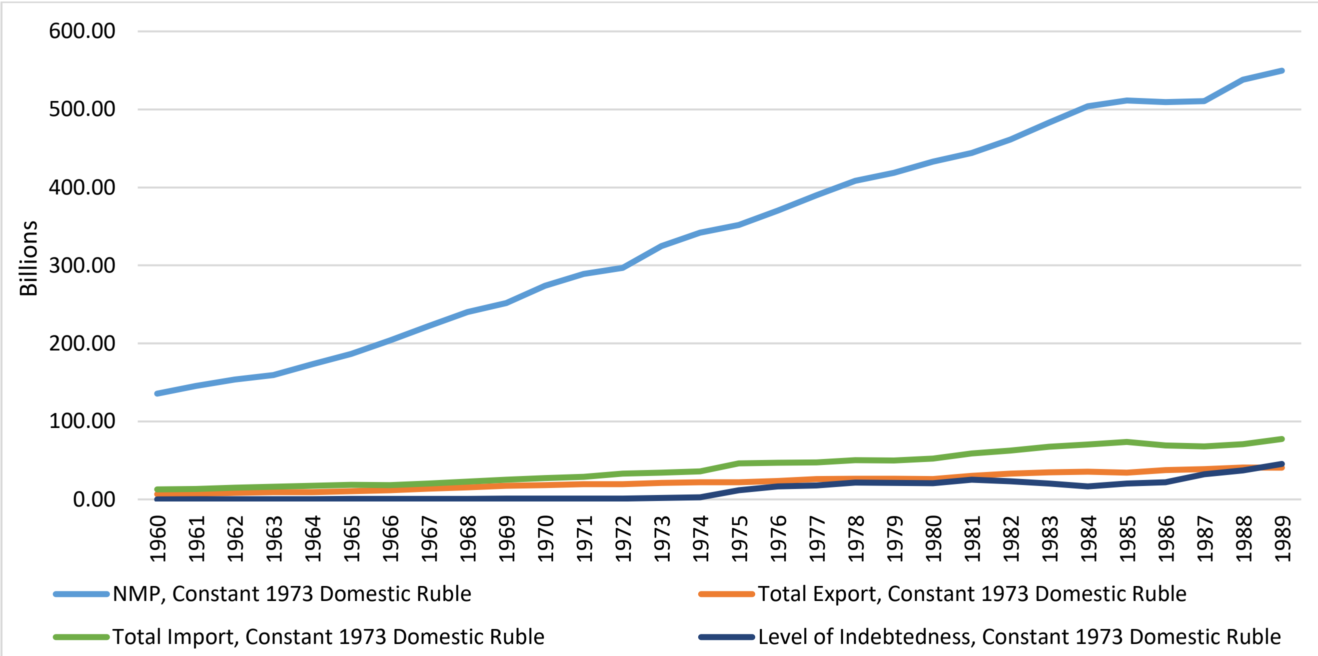
Source: Own calculation based on data sources mentioned in the methodology chapter.

The real NMP growth rate of Poland was relatively stable in the 1960s. However, it increased in the late 1960s and early 1970s, becoming relatively stable again between 1972 and 1976. Then Poland's real NMP growth rate declined between 1976 and 1979, and it contracted rapidly between 1979 and 1982, before growing again until the end of the analysis period. The total import growth trend of Poland was relatively stable between 1960 and 1970; the trend increased from 1970 until 1976. Poland's total imports became stagnant between 1976 and 1980, and then declined between 1980 and 1982. Its total imports grew at a relatively slow rate between 1983 and 1988. On the other side of the foreign trade activities, the country's total export growth rate was relatively stable between 1960 and 1979; however, it decreased between 1979 and 1982. Afterwards, Poland's exports grew between 1982 and 1989. As for the level of indebtedness, it was negligible between 1960 and 1972, grew very fast between 1972 and 1979. It rose tremendously, roughly 26 times between 1972 and 1979 in constant US dollars, from 0.86 billion to 22.6 billion, and it increased around 15 times in the same period in constant domestic zlotys, from 12 to 186 billion. The level of indebtedness of Poland became relatively stable between 1979 and 1981 both in constant US dollar and in constant domestic zloty terms. However, it spiked between 1981 and 1982, mostly because of the very rapid devaluation of the zloty. The level of indebtedness of Poland decreased between 1982 and 1984 both in constant US dollars and in constant domestic zlotys terms. Afterwards, it grew between 1984 and 1987 yet again both in constant US dollars and in constant domestic zloty terms. Poland's the average real NMP growth rate in the 1960s was 6 percent, in the 1970s it was 5.3 percent, and in the 1980s it was restricted with 1.9 percent. The average openness ratio of the country in the 1960s was 28 percent, in the 1970s it was 38 percent, and in the 1980s it reached 42 percent. The average debt to NMP ratio of Poland in the 1960s was only 0.2 percent, in the 1970s it was 1.5 percent, but in the 1980s it reached to 43.5 percent. The average trade balance to NMP ratio of the country in the 1960s was –0.6 percent, in the 1970s it was –3.3 percent, and in the 1980's, it was 1.1 percent.

The relatively fast growth in total imports of Poland between 1970 and 1976, more or less corresponds to the rapid growth in its NMP between 1969 and 1977. The increase in the rate of growth of Polish imports in the early 1970's was arguably caused by *Détente* policy. The trade deficit of the country grew between 1972 and 1979, mostly from the effects of the oil crises. The rise in the trade deficit of Poland between 1972 and 1979 resulted in a rapid increase in its level of indebtedness in the same period. This rapid increase in the level of indebtedness forced Polish policy makers to pursue policies for diminishing trade deficits via lowering imports. The total imports of Poland became stagnant between 1976 and 1980, and then declined between 1980 and 1982. The stagnation and then decline in imports caused a decrease in the real NMP growth rate of Poland from 1976 to 1979, and then contraction in the Polish NMP between 1979 and 1982.

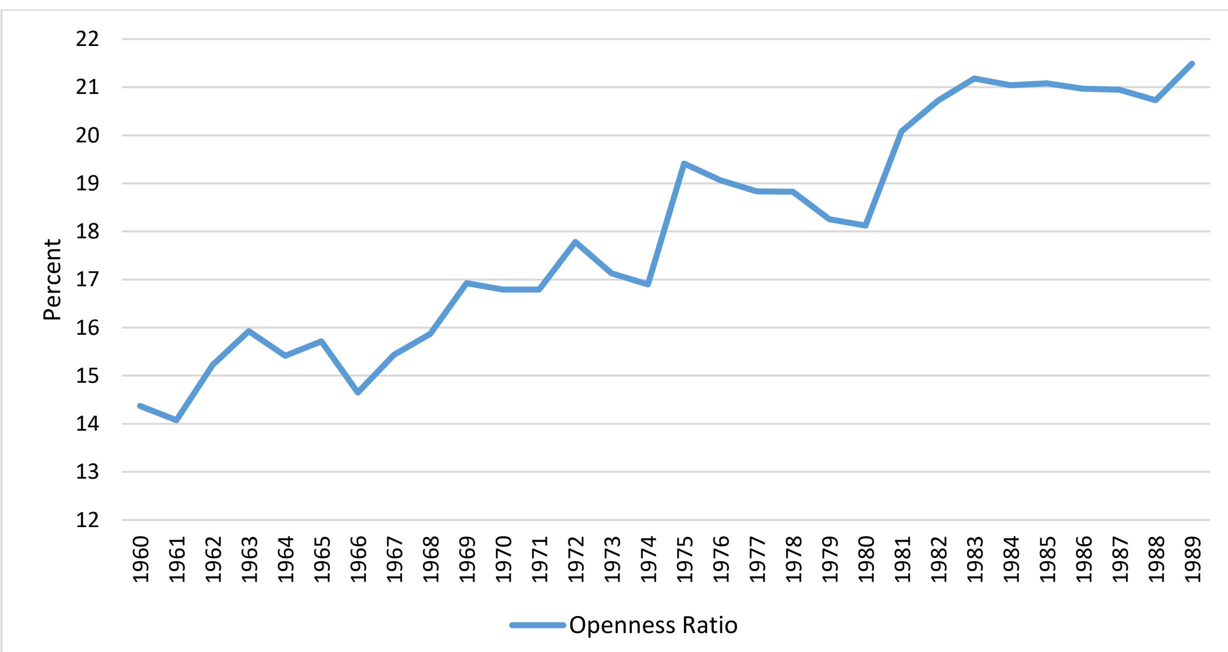
USSR

Figure 13. USSR's Real NMP, Real Export, Real Import, and Real Level of Indebtedness, 1960–1989



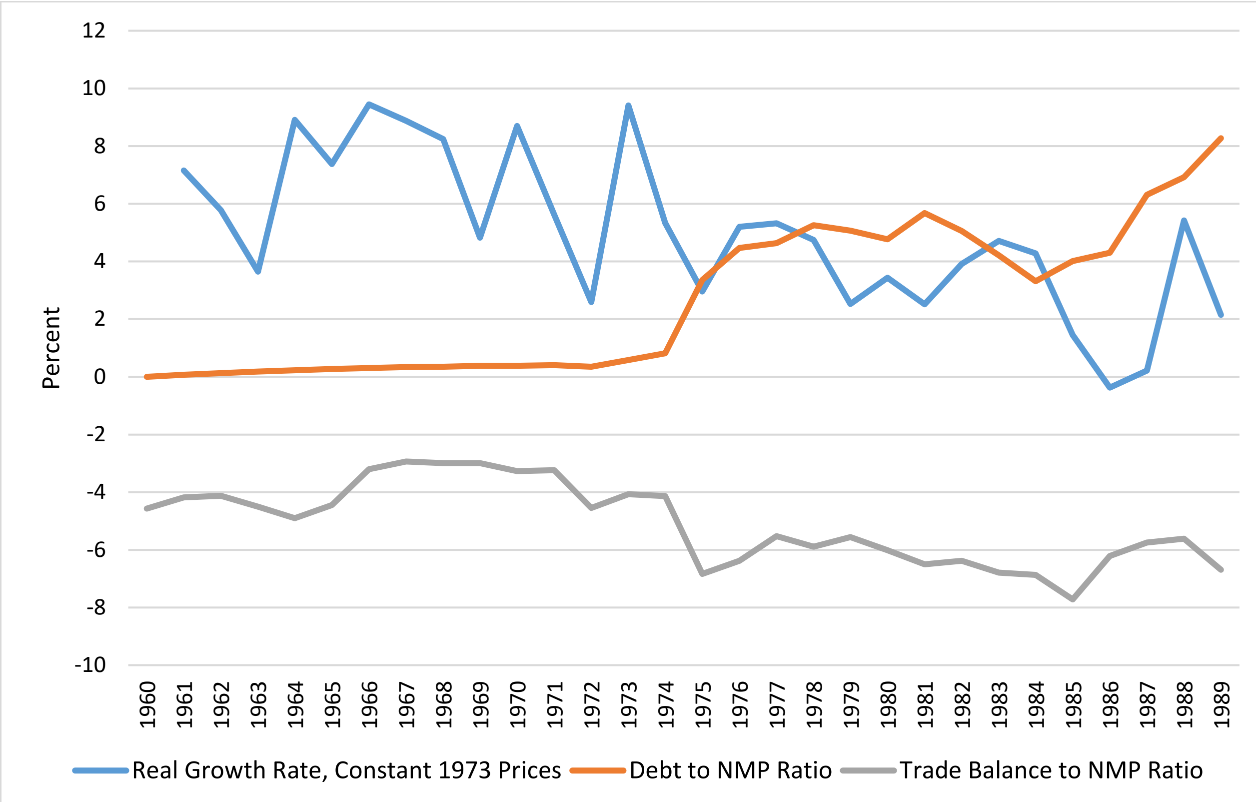
Source: Own calculation based on data sources mentioned in the methodology chapter.

Figure 14. USSR's Openness Ratio, 1960–1989



Source: Own calculation based on data sources mentioned in the methodology chapter.

Figure 15. USSR's Real NMP Growth Rate, Debt to NMP Ratio, and Trade Balance to NMP Ratio, 1960–1989



Source: Own calculation based on data sources mentioned in the methodology chapter.

The real NMP growth rate of the USSR exhibited a cyclical trend, fluctuating between 4 and 9 percent, between 1960 and 1973. It decreased from 1973 to 1984. The real NMP growth rate of the USSR further decreased between 1984 and 1986 but at a higher proportion, and it became relatively stagnant between 1986 and 1987. It then started to grow between 1987 and 1989. The total import growth trend of the USSR was relatively stable between 1960 and 1974. It grew rapidly between 1974 and 1975, then after, total imports for the USSR became relatively stagnant between 1975 and 1980. Total imports of the USSR grew rapidly one more time, between 1980 and 1981, and then after, its growth trend increased between 1981 and 1985, when it is compared with the growth trend observed between 1975 and 1980. The USSR's imports declined between 1985 and 1987, but started to grow again between 1987 and 1989. The total export growth trend of the country was relatively stable during the whole analysis period. As for the level of indebtedness of USSR, it was negligible from 1960 to 1974. However, it increased very rapidly between 1974 and 1978. It rose around 7 times in this period, from 2.7 billion domestic rubles to 21.4 billion domestic rubles. The level of indebtedness of the USSR became stagnant between 1978 and 1980, and then grew rapidly between 1980 and 1981, before declining between 1981 and 1984. The level of indebtedness of the USSR started to grow yet again in the latter part of the analysis period. The average real NMP growth rate of the USSR in the 1960s was considerably high attaining 7.3 percent, in the 1970s it was 4.7 percent, and in the 1980s it was 2.7 percent. The average openness ratio of the country in the 1960s was 15.3 percent, in the 1970s it rose to 17.9 percent, and in the 1980s, it achieved 20.6 percent. The average debt to NMP ratio of the USSR in 1960s was only 0.2 percent, in the 1970s it was 2.5 percent, and in the 1980s it arrived at 5.3 percent. The average trade balance to NMP ratio of the USSR in 1960s was –3.9 percent, in the 1970s it was –5 percent, and in the 1980s it was –6.5 percent.

The USSR's trade deficit grew quickly between 1974 and 1985, due to the rapid increase in total imports between 1974 and 1975, and also between 1980 and 1981, which were mostly caused by the effects of the oil crises. The rapid increase in the USSR's trade deficit between 1974 and 1978 resulted in a rapid increase in its level of indebtedness between those years. This rapid increase obliged USSR' planners to implement policies for closing the trade deficit through restricting imports. The total imports of the USSR became relatively stagnant between 1975 and 1980, which arguably caused a relatively low real NMP growth rate between 1975 and 1980, when it is compared with the NMP growth trend of the country for the 1960–1974 period. The decrease in total imports of the USSR between 1985 and 1987 coincides with the stagnation of the country's NMP at the same time.

As the above descriptive statistical analysis shows the CSSR, the GDR, Hungary, Poland, and the USSR were affected by the oil crises at different levels of severity. The level of severity in this context, indicated mainly by the downward trend in real NMP growth rate, stagnation in national income, or NMP, or recession, and to a lesser degree by the rise in level of indebtedness. The severity was dependent on; openness ratio of economies, percentage of international trade with capitalist economies in total international trade of these countries, trade composition, efficiency and technology level in production of these countries, and last but not least, on the degree of economic reform, or economic liberalization. Conventional wisdom holds that the main determinants of the level of severity were the openness ratio and the percentage of international trade with capitalist economies in their total international trade, because the oil crises started in the developed capitalist economies and the speed of transmission of the effects of the oil crises to CMEA member countries, together with its intensity, was dependent on the sample countries' openness ratio and percentage of international trade with capitalist economies in their total international trade. This interpretation can explain why the USSR was less severely affected by the oil crises, as its openness ratio was relatively low and its international trade more concentrated on intra CMEA trade. On similar grounds, we may suggest that Hungary was more severely affected by the oil crisis, since its openness ratio was relatively high and its international trade more focused on developed capitalist economies.

This explanation partly describes the whole picture. Poland had a relatively low openness ratio but was severely affected by the crises. On the other extreme, the GDR had a relatively high openness ratio and its international trade was more concentrated on developed capitalist economies, and so the country was less severely affected by the oil crises. Such variations in the level of severity can be explained by the differences in trade composition, efficiency and technology levels in the production of these countries, plus the degree of economic reform, or economic liberalization. For example, the USSR was a net oil exporter and because of it, the country was less severely affected by the oil crises. And, as noted, the differences in trade composition and in efficiency and technology level of production between these five countries were significant determinants of the level of severity as well.

As discussed in the literature review chapter, the price gap between low technology manufactured goods, raw materials (except oil) agricultural products, and high technology manufactured goods widened during and after the oil crises. Therefore, it can be suggested that countries with a relatively higher percentage of high technology manufactured goods, high technology intermediate goods, and capital-investment goods in their total import bundle, and with a relatively high percentage of low technology manufactured goods, raw materials (except oil) and agricultural products in their total exports, such as Hungary and Poland, are more severely affected by the oil crises then countries with a relatively higher percentage of high technology manufactured goods, high technology intermediate goods, and capital-investment goods in their total export bundle, and with a relatively high percentage of low technology manufactured goods, raw materials (except oil) and agricultural products in their total imports, like the USSR and the GDR.

It can thus be claimed that, the severity, or intensity, of the effects of the oil crises on different countries was dependent on that countries' position within the international labor division. For example, the GDR managed to decrease its trade deficit and level of indebtedness by increasing its exports in the early 1980s, which was a unique situation when it is compared with the other four CMEA member countries. Another determinant of the difference in the level of severity among these countries was the variation in the degree of economic reform, or economic liberalization. Poland and Hungary were more severely affected by the oil crises, arguably because their economies were relatively more liberalized than the others. Poland, in the early 1970s, and Hungary, in the mid-1970s, implemented reforms for a relative liberalization of their economies, such as, decreasing price controls, relaxing centralization, and allowing autonomy for the enterprises. Additionally, Poland and Hungary's domestic currencies became convertible against other foreign currencies, and prices in domestic consumer markets gradually converged to prices in the international markets. These reforms were broadly discussed in the literature review chapter.

After evaluating the main findings of the descriptive statistical analysis, the emphasis of the thesis is now shifting to more advance quantitative techniques, namely econometric analysis in the next section.

Econometric Methodology

The main hypothesis in this thesis is that the economies of CMEA member countries were negatively affected by the oil crises through changes in their international trade, and/or in their level of indebtedness, and associated changes in interest rates in international financial markets. Related literature suggests that the economies of CMEA member countries were not export-led but import-fed economies, therefore, this econometric analysis focuses only on the import side of their international trade.

The econometric analysis is based on three variable groups which are; national income variable, *nmp*, import variables, *imtot, imsoc, imind,* and *imdev,* and level of indebtedness variables, *debtdomes*, and *intdomes*. The main hypothesis can be restated in a more formal way as the decrease in import and/or increase in the level of indebtedness, or increase in yearly debt repayments, will cause a decrease in the national income of CMEA member countries. However, conventional wisdom holds that changes in national income can also cause changes in imports, and changes in the level of indebtedness; hence, also changes in yearly debt repayments. Therefore, the causal relationship, especially the direction of causality, between these variables should be checked by econometric methods to test the main hypothesis.

Initially, the balanced panel data method was used in the econometric analysis based on the assumption that the economies of CMEA member countries had similar structural characteristics. However, it is found, as can be also observed from the above graphs, that the various variables of the different countries had structural breaks in variant years. Also, tests showed that there was a cross-country or cross-section dependence. Due to these problems, econometric results based on balanced panel data method are inconclusive. Thus, the times series method is used in subsequent econometric analyses instead of the balanced panel data method. Causal relationships between variables of each country are examined separately; therefore, five groups of results are obtained from the econometric analysis. Initial econometric results also show that the variable of imports from developing capitalist economies, *imdev*, is not statistically significant for most of the empirical analyses, possibly due to the fact that the share of imports from developing capitalist economies in the total imports of CMEA member countries is very small; therefore, that variable of imports from developing capitalist economies, *imdev*, is not employed in subsequent econometric analyses.

Six similar econometric models were specified in the time series analysis for testing the causal relationships between variables for each country. Econometric models are presented in the table below.

Table 2. Econometric Models Used in the Time Series Analysis

Model 1	$nmp = \beta_0 + \beta_1 imtot + \beta_2 debtdomes + u$
Model 2	$nmp = \beta_0 + \beta_1 imtot + \beta_2 intdomes + u$
Model 3	$nmp = \beta_0 + \beta_1 imsoc + \beta_2 debtdomes + u$
Model 4	$nmp = \beta_0 + \beta_1 imsoc + \beta_2 intdomes + u$
Model 5	$nmp = \beta_0 + \beta_1 imind + \beta_2 debtdomes + u$
Model 6	$nmp = \beta_0 + \beta_1 imind + \beta_2 intdomes + u$

The national income variable, *nmp*, is the response variable in all the specified models. However, one of the three different import variables, *imtot, imsoc*, and *imind,* and one of the two different level of indebtedness variables, *debtdomes*, and *intdomes,* are used as explanatory variables in diverse models. The rationale in using one of the three different import variables as an explanatory variable in distinct models is to capture possible different effects of imports from various country groups on the national incomes of CMEA member countries. On the other hand, one of the two different level of indebtedness variables is used as an explanatory variable in different models because a first level of indebtedness variable, *debtdomes*, only represents the level of indebtedness of CMEA member countries in each year; however, a second level of indebtedness variable, *intdomes*, is a proxy variable for a yearly debt repayment of CMEA member countries which is determined by both CMEA member countries' level of indebtedness and interest rates in international financial markets. Therefore, two different level of indebtedness variables can have different effects on the national incomes of CMEA member countries, and these possible distinct effects can be captured by different models.

The main hypothesis of this thesis, based on causal relationship between variables, is tested using two different econometric methods; therefore, results are crosschecked. The first method is the Toda-Yamamoto (1995) version of the Granger causality test, for testing the general causality. The second method is the estimation of vector error correction model (VECM), for testing both long-run and short-run causality. If the results from the two methods confirm almost the same unidirectional causal relationship between variables, the hypothesis is supported by econometric methods.

The first step of econometric analysis is the application of a unit root test to each variable of interest, *nmp*, *imtot*, *imsoc*, *imind*, *debtdomes*, and *intdomes* in six models for each country, for finding the order of integration of each variable. The augmented Dickey-Fuller test is applied to each variable of interest, with intercept and appropriate lag length based on the Schwarz information criterion (SIC), to find the order of integration of each variable. However, the augmented Dickey-Fuller test can give spuriously high orders of integration results when there is a structural break in the time series of the variable. Therefore, the breakpoint augmented Dickey-Fuller test is applied to each variable of interest, with intercept and appropriate lag length based on the SIC. The breakpoint augmented Dickey-Fuller test automatically finds one non-specified breakpoint in the series and adds two different dummy variables to the model, which are dummy variable for only the break date, and dummy variable for all the dates after the break date. The order of integration results from these two tests are compared for each variable of interest, and the minimum order of integration result from these tests is accepted as the order of integration of the tested variable of interest.

The second step of econometric analysis is the specification of the vector autoregressive models (VAR) for each country, based on six econometric models, for the Toda-Yamamoto (1995) version of the Granger causality test. The minimum lag length of variables in the VAR must be equal to or higher than the maximum order of integration of variables in the model. However, the ultimate decision about the lag length of variables in the VAR, is based on the results of the Akaike information criterion (AIC), the SIC, the Hannan-Quinn information criterion (HQ) and also the VAR residual autocorrelation Lagrange multiplier (LM) tests, when the minimum lag length is also taken into account. Thus, there is no autocorrelation problem in each VAR. Afterwards, extra exogenous lags are added to the VAR, and the length of extra exogenous lags must be equal to the maximum order of integration of the variables in the model. Furthermore, the block exogeneity Wald test is applied to the final specification of VAR for the Toda-Yamamoto (1995) version of the Granger causality test. The results from the block exogeneity Wald tests are going to be the first empirical findings concerning the causal relationship between variables.

The third step of econometric analysis is the specification of the VAR for each country, based on six econometric models, for the Johansen cointegration test. The Johansen cointegration test can only be applicable if all variables in the VAR have the same order of integration. However, results from two unit root tests showed that some variables of interest are I(1), and some variables of interest are I(2), for each country, when the minimum order of integration result from these tests is accepted as the order of integration of the tested variable of interest. Therefore, the first difference of I(2) variables are taken to transform I(2) variables to I(1). (*d* prefix used for abbreviation of first differenced variables in econometric analysis, for example, *dnmp, dimtot, dintdomes,* etc.) The economic interpretation of the first differenced variables from I(2) to I(1) will be based on yearly change of these variables, not real levels of them. The lag length decisions about each VAR, with first differenced and level variables, based on results of AIC, SIC, HQ, and also VAR residual autocorrelation LM tests. Therefore, there isn't any autocorrelation problem in each VAR. Afterwards, the Johansen cointegration test is applied to each VAR for obtaining the cointegration relation between variables in each VAR. Three different versions of Johansen cointegration test are applied to each VAR, which are; variables having deterministic linear trends but the cointegrating equation have only intercept, variables having deterministic linear trends and cointegrating equation having intercept and non-deterministic linear trend, and variables having quadratic trends and cointegrating equation having intercept and non-deterministic linear trend. Both maximum eigenvalue and trace results of cointegration rank test, based on Johansen cointegration test, are checked for determining the cointegration relation between variables in each VAR, for each country.

The fourth step of econometric analysis is the specification of VECM, for each country, based on cointegration results from three different versions of the Johansen cointegration test for six econometric models. Each VECM has the same lag length with corresponding VAR having already specified in the previous step. The cointegrating vectors, $\boldsymbol{\beta}$, of each VECM have been normalized to *nmp*. The negative and statistically significant adjustment coefficients, $\boldsymbol{\alpha}$, are indicating the long-run causal relationship between variables. Statistically significant lag coefficients of explanatory variables are indicating the short-run causal relationship between explanatory and response variables.

In the end, results from the Toda-Yamamoto version of the Granger causality tests and results obtained from estimations of VECMs, for the same econometric models, are compared. If both results are supporting each other by confirming almost the same unidirectional causal relationship from explanatory variables to response variables, the main hypothesis of this thesis is supported by econometric methods.

The results from the Toda-Yamamoto version of the Granger causality tests, the Johansen cointegration tests, and VECM estimations were based on the implicit assumption that there are not any structural breaks in the time-series variables. The existence of possible structural breaks in the series wasn't taken into account in these tests and estimations because conventional solutions to the structural break problem, adding time dummy variables or dividing the time series into several sub-time series, cannot be applicable in this econometric analysis due to the relatively small number of observations, 30. The breakpoint augmented Dickey-Fuller test results show that different time series variables of five CMEA member countries have at least one break in different dates and there is a possibility of the existence of more breaks in these series, due to the instability caused by the oil crises. These results indicate that conventional solutions to the structural break problem cannot be applicable in this econometric analysis. Therefore, econometric results should be interpreted cautiously.

RESULTS

The quantitative results obtained from econometric analysis, which is explained step by step in the last part of the methodology chapter, are briefly presented in this chapter. Econometric results are reported with the same sequential order of the econometric analysis and presented country by country. At the end of each country subchapter, after all the econometric results are reported, they were briefly evaluated as well. Tables of full raw econometric results from each test and estimation are located in the appendix chapter and there are references to the corresponding tables in each brief report about the results of the econometric analysis in this chapter.

CSSR

The results from the augmented Dickey-Fuller and breakpoint augmented Dickey-Fuller tests show that the *debtdomes,* and *intdomes* time series variables are I(1), and *nmp, imtot, imsoc,* and *imind* time series variables are I(2), at 5 percent significance level for the CSSR between 1960 and 1989. Therefore, the first difference of time series variables *nmp, imtot, imsoc,* and *imind* are going to be taken for the Johansen cointegration tests and VECM specifications. The abbreviations of first differenced variables in econometric analysis will become *dnmp, dimtot, dimsoc,* and *dimind* (See Table A3 and A4)

The results from the Toda-Yamamoto version of the Granger causality test for the CSSR's first model indicate that variables *imtot* and *debtdomes* jointly, and individually, and unidirectionally Granger causes *nmp*, at 5 percent significance level, between 1960 and 1989. The results from the CSSR's second model show that variables, *imtot* and *intdomes* jointly, and also *imtot* individually, and unidirectionally Granger causes *nmp*, at 5 percent significance level, between 1960 and 1989. However, unidirectional causality can be questionable because, *nmp* and *imtot* jointly, and also *imtot* individually, Granger cause *intdomes,* at 5 percent significance level. Nonetheless, this finding is in line with the hypotheses of the thesis, which is that a change in imports will cause a change in level of indebtedness and debt repayment, and the results from the second model of the CSSR showed that *imtot* unidirectionally Granger cause *intdomes;* therefore, the direction of causality supports the thesis hypotheses.

The results from the Toda-Yamamoto version of the Granger causality test for the CSSR's third model does not indicate a statistically significant causal relationship between variables of interest at 5 percent significance level. The results from the CSSR's fourth model only suggest that *imsoc* unidirectionally Granger cause *intdomes,* at 5 percent significance level, which is in line with the thesis hypotheses. The results from the Toda-Yamamoto version of the Granger causality test for the CSSR's fifth model show that variables *imind* and *debtdomes* jointly, and also *debtdomes* individually, and unidirectionally Granger cause *nmp,* at 5 percent significance level, between 1960 and 1989. The results from the CSSR's sixth model confirms that, *imind* and *intdomes* jointly, and also both of them individually, and unidirectionally Granger causes *nmp*, at 5 percent significance level (See Table A5 and A6)

The results from the third version of Johansen cointegration test for the CSSR's first model showed that there is one cointegrating relation in the model, according to the results obtained from both trace rank and maximum eigenvalue rank tests, at a 5 percent significance level, during the analysis period. The results from the second and third versions of the Johansen cointegration test for CSSR's second model indicate that there is one cointegrating relation in the model, according to the result from the trace rank test at 5 percent significance level; however, the result from the maximum eigenvalue rank test of the third version of the Johansen cointegration test is also giving statistically significant results for one cointegrating relation for the CSSR's second model, at 5.4 percent significance level. Furthermore, the results from the third version of Johansen cointegration test for the CSSR's third model show that there is one cointegrating relation in the model, according to the results from trace rank test, at 5 percent significance level; however, the result from the maximum eigenvalue rank test is also giving statistically significant results for one cointegrating relation for the CSSR's third model, at 5.6 percent significance level. The Johansen cointegration test result for the CSSR's fourth and sixth models indicate that there is no cointegrating relation in the fourth and sixth models of the CSSR at 5 percent significance level. The findings from the first version of the Johansen cointegration test for the CSSR's fifth model suggest that there is one cointegrating relation in the model, according to the result from trace rank test at 5 percent significance level; however, the second version of the test indicates that there is one cointegrating relation in the model, according to results from both the trace rank and maximum eigenvalue rank tests, at 5 percent significance level. However, the third version of the test show that the CSSR's fifth model have two, or may be one, cointegrating relation(s), according to the results obtained from both the trace rank and maximum eigenvalue rank tests, at 5 percent significance level (See Table A7 and A8).

Moreover, the findings obtained from the CSSR's first VECM, with quadratic trend, indicate that variables *dimtot (*change in *imtot)* and *debtdomes* jointly and unidirectionally Granger cause *dnmp* (change in *nmp)* in the long run, at a 5 percent significance level, between 1960 and 1989. The results from the CSSR's second VECM, from both linear trend and quadratic trend versions, only indicate that variable *dimtot* (change in imtot) unidirectionally Granger cause *intdomes* both in the long-run and in the short run, at 5 percent significance level, which supports the thesis hypotheses. The results from the CSSR's third VECM, with quadratic trend, confirm that variables *dimsoc* (change in *imsoc*) and *debtdomes* jointly and unidirectionally Granger cause *dnmp* (change in *nmp)* in the long run, at 5 percent significance level. The results from the CSSR's fifth VECM, without linear or quadratic trend, indicate that, variables *dimind* (change in *imind*) and *debtdomes*, jointly and unidirectionally Granger cause *dnmp* (change in *nmp)* in the long run, and also variable *debtdomes* unidirectionally Granger cause *dnmp* (change in *nmp)* in the short run, at 5 percent significance level. The findings from the CSSR's fifth VECM, from both with linear trend and with quadratic trend versions, indicate that, variables *dimind* (change in *imind*) and *debtdomes*, jointly and unidirectionally Granger cause *dnmp* (change in *nmp)* in the long run, at 5 percent significance level (See Table A9 and A10).

The results from the Toda-Yamamoto version of the Granger causality tests and VECM estimations of the CSSR's time series data between 1960 and 1989, are jointly indicating that variables *imtot* and *debtdomes* are jointly and unidirectionally Granger cause *nmp,* and also, variables *imind* and *debtdomes* are jointly and unidirectionally Granger cause *nmp,* at 5 percent significance level. At the same time, results do not support the unidirectional causality from *imsoc* to *nmp,* at 5 percent significance level; therefore, it can be argued that the unidirectional causality from *imtot* to *nmp,* are mainly caused by *imind* component of *imtot.* Therefore, econometric results show that the CSSR's imports from developed capitalist economies and its level of indebtedness Granger cause the CSSR's national income, or NMP. The effects of the oil crises on CSSR's total imports and level of indebtedness can be observable from the graph in the previous chapter. The CSSR's total imports decreased and its level of indebtedness increased due to the oil crises. Therefore, empirical findings obtained from the CSSR's time-series data strongly support the main hypothesis of this thesis which is that the oil crises negatively affected the economies of CMEA member countries through international trade and level of indebtedness channels.

GDR

The results from the augmented Dickey-Fuller and breakpoint augmented Dickey-Fuller tests show that the *nmp*, *imsoc, imind,* and *intdomes* time series variables are I(1), and *imtot,* and *debtdomes* time series variables are I(2), at 5 percent significance level for the GDR during the analysis period. Therefore, the first difference of time series variables *imtot,* and *debtdomes* is going to be taken for the Johansen cointegration tests and VECM specifications. The abbreviation of the first differenced variables in econometric analysis will became *dimtot,* and *ddebtdomes* (See Table A11 and A12).

The results from the Toda-Yamamoto version of the Granger causality test for GDR's first model indicate that the variables *imtot* and *debtdomes* jointly, and also *debtdomes* individually, and unidirectionally Granger causes *nmp*, at 5 percent significance level, between 1960 and 1989. The results from the GDR's second, third, fourth, and fifth models indicate bidirectional, or multidirectional, causal relationship between variables of interest, at 5 percent significance level; therefore, the results from the Toda-Yamamoto version of the Granger causality test for the GDR's second, third, fourth, and fifth models neither support nor reject the main hypothesis of this thesis. However, the results from the GDR's sixth model indicates that variables *imind* and *intdomes* jointly, and also both of the variables individually, and unidirectionally Granger causes *nmp*, at 5 percent significance level (See Table A13 and A14).

The results from the second and third versions of the Johansen cointegration test for the GDR's first model show that there is one cointegrating relation in the model, according to the results from both trace rank and maximum eigenvalue rank tests, at 5 percent significance level, between 1960 and 1989. The results from the first and third versions of the Johansen cointegration test for the GDR's second model indicate that there is one cointegrating relation in the model, according to results from the maximum eigenvalue rank test, at 5 percent significance level; however, results from the second version of Johansen cointegration test for the GDR's second model indicate that there is one cointegrating relation in the model according to results from both the trace rank and maximum eigenvalue rank tests, at 5 percent significance level. The findings from the first, second, and third versions of Johansen cointegration test for the GDR's third model suggest that there is one cointegrating relation in the model, according to the results from both the trace rank and the maximum eigenvalue rank tests, at 5 percent significance level. First and second versions of Johansen cointegration test results for the GDR's fourth model indicate that there is one cointegrating relation in the model, according to the results from both the trace rank and maximum eigenvalue rank tests, at 5 percent significance level. The findings from the first, second and third versions of the Johansen cointegration test for the GDR's fifth model show that there is one cointegrating relation in the model, according to the results from the trace rank and maximum eigenvalue rank tests, at 5 percent significance level. The results from both the first and second versions of the Johansen cointegration test for the GDR's sixth model indicate that there is one cointegrating relation in the model, according to the result from the maximum eigenvalue rank test, at 5 percent significance level (See Table A15 and A16).

The findings from the GDR's first VECM, both with linear trend and with quadratic trend versions, indicate that variables *dimtot (*change in *imtot)* and *ddebtdomes* (change in *debtdomes*) jointly and unidirectionally Granger cause *nmp* in the long run, at 5 percent significance level during the analysis period. The results from the GDR's first VECM with linear trend, estimation also indicate that variable *ddebtdomes* (change in *debtdomes*) unidirectionally Granger cause *nmp* in the short run, and results from first VECM with quadratic trend estimation show that both variables *dimtot (*change in *imtot)* and *ddebtdomes* (change in *debtdomes*) individually and unidirectionally Granger cause *nmp,* also in the short run, at 5 percent significance level. The results from the GDR's second VECM estimations indicate bidirectional, or multidirectional, causal relationships between variables of interest, at 5 percent significance level; therefore, the findings from the GDR's second VECM estimations neither support nor reject the main hypothesis of this thesis. The results from the GDR's third VECM, both with linear trend and with quadratic trend versions, indicate that variables *imsoc* and *ddebtdomes* (change in *debtdomes*) jointly and unidirectionally Granger cause *nmp* in the long run, and also both variables individually in the short run, at 5 percent significance level. The results from GDR's fourth VECM, with linear trend, estimation only indicate that variables *nmp* and imsoc jointly and unidirectionally Granger cause *intdomes*, in the long run, at 5 percent significance level. This finding is against the main hypothesis of this thesis; however, it can be an outlier, because, it is not supported by other results. The results from the GDR's fifth VECM, both with linear trend and with quadratic trend versions, showed that variables *imind* and *ddebtdomes* (change in *debtdomes*) jointly and unidirectionally Granger cause *nmp* in the long run, and also *ddebtdomes* individually in the short run, at 5 percent significance level. The results from the GDR's sixth VECM, with linear trend, indicate bidirectional, or multidirectional, causal relationship between variables of interest, at 5 percent significance level; therefore, the results from the GDR's sixth VECM estimation neither support nor reject the main hypothesis of this thesis (See Table A17, A18, and A19).

The results from the Toda-Yamamoto version of the Granger causality tests and VECM estimations of the GDR's time series data between 1960 and 1989, are jointly indicating that variables *imtot* and *debtdomes* jointly and unidirectionally Granger cause *nmp*, both in the long run and in the short run, at 5 percent significance level. Therefore, econometric findings confirm that GDR's total imports and its level of indebtedness Granger, cause GDR's national income, or NMP. The effects of the oil crises on GDR's total imports and the level of indebtedness can be observed from the graph presented in the previous chapter. The GDR's total imports decreased and its level of indebtedness increased due to the oil crises. Therefore, the econometric findings from the GDR's time series data strongly support the main hypothesis of this thesis.

Hungary

The results from the augmented Dickey-Fuller and the breakpoint augmented Dickey-Fuller tests showed that all times series variables, *nmp, imtot, imsoc, imind, debtdomes* and *intdomes,* are I(1), at 5 percent significance level for Hungary between 1960 and 1989 (See Table A20 and A21).

The results from the Toda-Yamamoto version of the Granger causality test for Hungary's first, second, third, and fourth models do not indicate statistically significant causal relationships between the variables of interest, at 5 percent significance level, during the analysis period. However, the results from the Toda-Yamamoto version of the Granger causality test for Hungary's fifth model show that variables *imind* and *debtdomes* jointly, and also *imind* individually, and unidirectionally Granger cause *nmp*, at 5 percent significance level. The results from the Hungary's sixth model indicate that variables *imind* and *intdomes* jointly, and also *imind* individually, and unidirectionally Granger cause *nmp*, at 5 percent significance level (See Table A22 and A23).

The results from the Johansen cointegration test for Hungary's first and third models suggest that there is no cointegrating relation in these models, at 5 percent significance level. However, the results from first version of the Johansen cointegration test for Hungary's second model show that there is one cointegrating relation in the model, as to the result from the trace rank test, at 5 percent significance level, between 1960 and 1989. The first version of Johansen cointegration test results for Hungary's fourth model indicate that there is one cointegrating relation in the model, according to results from both the trace rank and maximum eigenvalue rank tests, at 5 percent significance level. The results from the first version of Johansen cointegration test for Hungary's fifth model further show that there is one cointegrating relation in the model, according to results from both the trace rank and maximum eigenvalue rank tests, at 5 percent significance level. The first, second and the third versions of the Johansen cointegration test results for Hungary's sixth model indicate that there is one cointegrating relation in the model, according to the results from both in trace rank and maximum eigenvalue rank tests, at 5 percent significance level during the analysis period (See Table A24).

The results from Hungary's second and fourth VECM estimations do not indicate a causal relationship between variables of interest, at 5 percent significance level. The results from Hungary's fifth VECM, without linear or quadratic trend, show that variables *imind* and *debtdomes* jointly, and unidirectionally Granger cause *nmp* in the long run, at 5 percent significance level, between 1960 and 1989. The results from Hungary's sixth VECM, from all three versions, without linear or quadratic trend, with linear trend, and with quadratic trend, indicate that variables *imind* and *intdomes* jointly and unidirectionally Granger cause *nmp* in the long run, at 5 percent significance level (See Table A25 and A26).

The findings obtained from the Toda-Yamamoto version of the Granger causality tests and VECM estimations of Hungary's time series data between 1960 and 1989, are jointly indicating that variables *imind* and *debtdomes* are jointly and unidirectionally Granger cause *nmp*, and also, variables *imind* and *intdomes* are jointly and unidirectionally Granger cause *nmp*, at 5 percent significance level.

Therefore, empirical findings confirm that Hungary's imports from developed capitalist economies, its level of indebtedness, and yearly debt repayments Granger cause Hungary's national income or NMP. The effects of the oil crises on Hungary's total imports and level of indebtedness can be observable from the graph in the previous chapter. Hungary's total imports decreased, its level of indebtedness, and therefore, its yearly debt repayments, also caused by an increase in interest rates in international financial markets, increased due to the oil crises. Therefore, the econometric findings from Hungary's time series data strongly support the main hypothesis of this thesis which is oil crises negatively affected the economies of CMEA member countries through international trade and level of indebtedness channels.

Poland

The results from the augmented Dickey-Fuller and the breakpoint augmented Dickey-Fuller tests show that *imsoc, debtdomes,* and *intdomes* time series variables are I(1), and *nmp, imtot,* and *imind* time series variables are I(2), at 5 percent significance level, for Poland during the analysis period. Therefore, the first difference of time series variables *nmp, imtot*, and *imind* are going to be taken for the Johansen cointegration tests and VECM specifications. The abbreviation of the first differenced variables in econometric analysis will become *dnmp, dimtot* and *dimind* (See Table A27 and A28).

The results from the Toda-Yamamoto version of the Granger causality test for Poland's first model show that variables *debtdomes* and *nmp* jointly, and also both variables individually, and unidirectionally Granger cause *imtot,* at 5 percent significance level between 1960 and 1989. The results from the Toda-Yamamoto version of the Granger causality test for Poland's second model indicate that variables *intdomes* and *nmp* jointly, and also *nmp* individually, and unidirectionally Granger cause *imtot*, at 5 percent significance level. The results from the Toda-Yamamoto version of the Granger causality test for Poland's third model show that variables *debtdomes* and *nmp* jointly, and also both variables individually, and unidirectionally Granger cause *imsoc*, at 5 percent significance level. The results the from Toda-Yamamoto version of the Granger causality test for Poland's fourth model indicate that variables *imsoc* and *nmp* jointly and unidirectionally Granger cause *intdomes*, at 5 percent significance level. The results from the Toda-Yamamoto version of the Granger causality test for Poland's fifth and sixth models does not indicate a statistically significant causal relationship between variables of interest, at 5 percent significance level during the analysis period. The results from the Toda-Yamamoto version of the Granger causality test for Poland's first, second, third, and fourth models do not support the main hypothesis of this thesis; moreover, these findings don't support the main hypothesis, and none of the results from the Toda-Yamamoto version of the Granger causality test for Poland are supporting the main hypothesis. Possible explanations are going to be discussed in the following paragraphs (See Table A29 and A30).

The results from Poland's six VECM estimations, based on the Johansen cointegration test results of the models, are in line with the results from the Toda-Yamamoto version of the

Granger causality test which are indicated above. Therefore, only the summary of the results from Poland's six VECM estimations are stated. The results from Poland's first VECM, without linear or quadratic trend, indicate bidirectional, or multidirectional, causal relationship between variables of interest, at 5 percent significance level; therefore, the results from Poland's first VECM, without linear or quadratic trend, neither support nor reject the main hypothesis of this thesis, at 5 percent significance level. The results from Poland's first VECM, with linear trend, indicate that variables *dnmp* (change in *nmp*) and *dimtot* (change in *imtot*) jointly and unidirectionally Granger cause *debtdomes* in the long run, at 5 percent significance level during the analysis period. The results from Poland's second VECM, from both without linear or quadratic trend and with linear trend versions, show that variables *dnmp* (change in *nmp*) and *dimtot* (change in *imtot*) jointly and unidirectionally Granger cause *intdomes* in the long run, at 5 percent significance level. The results from Poland's second VECM, with quadratic trend, indicate bidirectional, or multidirectional, causal relationship between variables of interest, at 5 percent significance level; therefore, the results from Poland's second VECM, with quadratic trend, neither support nor reject the main hypothesis of this thesis, at 5 percent significance level. The results from Poland's third VECM, without linear or quadratic trend, show that variables *dnmp* (change in *nmp*) and *imsoc*, jointly and unidirectionally Granger cause *debtdomes* in the long run, at 5 percent significance level. The results from Poland's third VECM, both with linear trend and with quadratic trend versions, do not indicate causal relationship between variables of interest, at 5 percent significance level. The results from Poland's fourth, fifth and sixth VECMs indicate bidirectional, or multidirectional, causal relationship between variables of interest, at 5 percent significance level; therefore, the results from Poland's fourth, fifth, and sixth VECM neither support nor reject the main hypothesis of this thesis, at 5 percent significance level. The VECM results for Poland's first, second, and fourth models do not support the main hypothesis of this thesis; moreover, the majority of the estimated results from these models don't support the main hypothesis, and none of the estimated results from VECMs for Poland support the main hypothesis.

None of the results from the Toda-Yamamoto version of the Granger causality tests and VECM estimations of Poland's time series data during the analysis period, support the econometric hypothesis that import variables and/or level of indebtedness variables unidirectionally Granger cause national income variable, *nmp*; moreover, some of these results don't support the hypothesis by indicating causality between variables of interest in opposite direction, at 5 percent significance level. There are two possible explanations for these unexpected results from empirical analysis of the Polish data. The first explanation is the poor quality of the data which creates doubts about the reliability of econometric results; however, econometric results from other CMEA member countries' data are quite consistent; therefore, this explanation is not very plausible.

The second explanation concerns the structural difference of the Polish economy. The related literature, which was examined in the literature review chapter, the graphs of Polish macroeconomic indicators, in the methodology chapter, and several historical facts (debt restructuring negotiations between Poland and Paris Club in 1981 and 1985, rapid devaluation of the zloty, and very high inflation in 1980s) suggest that Polish economy is effected the most severely by the oil crises among the five CMEA member countries which are analyzed in this thesis. The econometric methods used in this thesis failed to capture the relationship between time series variables of Poland because these methods are designed for capturing one particular relationship between variables in the whole-time period, in this case 30 years. However, due to the severe effects of the oil crises on the Polish economy, trends in the time series variables changed several times, in other words, several break points exist in time series variables, these changes happened in very short time period and trends moved to opposite direction.

Therefore, the econometric methods used in this thesis poorly indicate the relationship between variables of interest of Poland for the analysis period. Furthermore, due to the relatively small number of observations (30) and the existence of several breaks in the different time series variables at different dates, the application of the econometric methods such time dummy variables, or dividing the time series into several sub-time series, cannot solve the existing empirical problem. The increase in the number of observations and the application of regime-switching models, such as the Markov-switching one, could be a possible solutions for this problem.

USSR

The results from the augmented Dickey-Fuller and the breakpoint augmented Dickey-Fuller tests show that the *nmp*, *imtot*, *imsoc*, *imind* and *intdomes* time series variables are I(1), and *debtdomes* time series variable is I(2), at 5 percent significance level, for the USSR in the analysis period. Therefore, the first difference of the time series variable *debtdomes* is going to be taken for the Johansen cointegration tests and VECM specifications. The abbreviation of first differenced variable in econometric analysis will become *ddebtdomes* (See Table A31 and A32).

The results from the Toda-Yamamoto version of the Granger causality test for the USSR's first model show that variables *imtot* and *debtdomes* jointly, and also both variables individually, and unidirectionally Granger cause *nmp*, at 5 percent significance level, between 1960 and 1989. The results from the USSR's second, third, fourth, fifth, and sixth models do not indicate a statistically significant causal relationship between variables of interest, at 5 percent significance level during the analysis period (See Table A33 and A34).

The first version of the Johansen cointegration test results for the USSR's first model indicate that there is one cointegrating relation in the model, according to the result from the trace rank test, at 5 percent significance level, between 1960 and 1989; however, results from the maximum eigenvalue rank test of the first version of the Johansen cointegration test also gives statistically significant results for one cointegrating relation for the USSR's first model at 5 percent significance level. The results from second version of Johansen cointegration test for USSR's first model also show that there is at least one cointegrating relation in the model, for the results from both the trace rank and maximum eigenvalue rank tests, at 5 percent significance level. The results from the first version of Johansen cointegration test for the USSR's second model indicate that there is one cointegrating relation in the model, according to the results from both the trace rank and maximum eigenvalue rank tests, at 5 percent significance level. The results from the second and third versions of the Johansen cointegration test for the USSR's third model show that there is one cointegrating relation in the model, according to the results from both the trace rank and maximum eigenvalue rank tests, at 5 percent significance level. The results from the Johansen cointegration test for USSR's the fourth model indicate that there is no cointegrating relation in this model, at 5 percent significance level. However, the third version of Johansen cointegration test results for the USSR's fifth model show that there is one cointegrating relation in the model, according to the results from both the trace rank and maximum eigenvalue rank tests, at 5 percent significance level. The third version of the Johansen cointegration test results for the USSR's sixth model suggest that there is one cointegrating relation in the model, according to the results from the trace rank test, at 5 percent significance level for the analysis period (See Table A35).

The finding from the USSR's first VECM, without linear or quadratic trend, does not indicate a causal relationship between variables of interest, at 5 percent significance level. However, the result from the USSR's first VECM, with linear trend, show that variables *imtot* and *ddebtdomes* (change in *debtdomes*) jointly and unidirectionally Granger cause *nmp* in the long run, at 5 percent significance level; also, both variables *imtot* and *ddebtdomes* (change in *debtdomes*) are individually and unidirectionally Granger cause *nmp* in the short run, at 5 percent significance level, between 1960 and 1989. The result from the USSR's second VECM, without linear or quadratic trend, does not indicate a causal relationship between variables of interest, at 5 percent significance level. The results from the USSR's third VECM, from both with linear trend and with quadratic trend versions, show that variables *imsoc* and *ddebtdomes* (change in *debtdomes*) jointly and unidirectionally Granger cause *nmp* in the long run, at 5 percent significance level; also, both variables *imsoc* and *ddebtdomes* (change in *debtdomes*) are individually and unidirectionally Granger cause *nmp* in the short run, at 5 percent significance level. The results from the USSR's fifth VECM, with quadratic trend, indicate bidirectional, or multidirectional, causal relationship between variables of interest, at 5 percent significance level; therefore, the results from the USSR's fifth VECM estimation neither support nor reject the main hypothesis of this thesis. The result from the USSR's sixth VECM, without quadratic trend, does not indicate causal relationship between variables of interest, at 5 percent significance level (See Table A36, A37, and A38).

The results from the Toda-Yamamoto version of the Granger causality tests and VECM estimations of USSR's time series data between 1960 and 1989, jointly indicate that variables *imtot* and *debtdomes* are jointly and unidirectionally Granger cause *nmp*, both in the short run and in the long run, at 5 percent significance level. Therefore, empirical findings confirm that the USSR's total imports and its level of indebtedness Granger cause the USSR's national income or NMP during the analysis period. The effects of the oil crises on the USSR's total imports and level of indebtedness can be observable from the graph in the previous chapter. The USSR's total imports became stagnant between 1975 and 1980, and its level of indebtedness increased, in the same period, due to the oil crises. Therefore, the econometric results from the

USSR’s time series data strongly support the main hypothesis of this thesis which is oil crises negatively affected the economies of CMEA member countries through international trade and level of indebtedness channels.

CONCLUSION

Descriptive statistical analysis, in the methodology chapter, suggests that five CMEA member countries analyzed in this thesis, which are the CSSR, the GDR, Hungary, Poland, and the USSR were affected from the oil crises with variant levels of severity. The level of severity was dependent on; the openness ratio of economies, percentage of international trade with capitalist economies in total international trade of these countries, trade composition, the efficiency and technology level in the production of these countries, and the degree of economic reform, or economic liberalization. As discussed in the methodology chapter as well, the USSR and the GDR were less severely affected by the oil crises than the CSSR, Hungary and Poland, due to several reasons stated above and their position in the international division of labor.

Descriptive statistical analysis also indicates that trends in macroeconomic indicators of the five CMEA member countries, such as total imports, total exports, level of indebtedness, and national income or NMP, were abruptly changed between 1973 and 1984. These violent changes imply that the economies of CMEA member countries encountered economic shocks simultaneously; also the timing of these abrupt changes together with their effects on the international trade indicators of these countries suggest that the common cause of these alterations is the effects of the oil crises.

The econometric findings, given in the results chapter, about the causal relationship between the variables of interest, based on yearly macroeconomic data between 1960 and 1989, from the five CMEA member countries examined in this thesis, confirm that unidirectional causality runs from import variables and level of indebtedness variables to national income variable, at 5 percent significance level, for four out of the five sample countries, all except Poland. The possible explanations, about why similar causal relationship between variables of interest are not indicated by the econometric results of Poland, are briefly discussed in the results chapter.

The findings from the econometric analysis also suggest that in three out of four countries, total imports Granger cause national income or NMP; in two out of four countries, imports from developed capitalist economies Granger cause national income or NMP; in all countries, the level of indebtedness Granger cause national income or NMP; in one out of four countries, yearly debt repayment Granger cause national income or NMP; and imports from socialist countries that are not Granger cause national income or NMP, in any country, at 5 percent significance level. These econometric results suggest that imports from developed capitalist economies have a stronger impact on the national income of the CMEA member countries than imports from socialist economies; and level of indebtedness also has a stronger effect on the national income of CMEA member countries, than the yearly debt repayments of these countries, implicitly suggesting that fluctuations in interest rates in international financial markets have a relatively weaker effect on national income of CMEA member countries.

In general, descriptive statistical analysis and the majority of the results obtained from econometric analysis support the main hypothesis of this thesis, which is that the oil crises negatively affected the economies of CMEA member countries through international trade and level of indebtedness channels. Better econometric results can be retrieved through applying more elaborate econometric models such as regime-switching, Markov-switching models, with higher quality datasets and a larger number of observations.

Nonetheless, econometric results in this thesis and related literature also suggest that, the economies of CMEA member countries were not closed, autarkic, isolated from worldwide economic relationships, or immune to external economic fluctuations during the analysis period 1960–1989. The CMEA member countries’ positions in the international division of labor were a significant determinant of their national economic performances. The effects of oil crises were one of the most crucial causes of economic decline for CMEA member countries in the second half of the 1970s. The governments’ of CMEA member countries in late 1980s openly stated that their radical economic and political reforms were a response to growing economic problems since the second half of the 1970s. Therefore, it can be firmly suggested that the oil crises were one of the major causes of the demise of the Soviet Union and CMEA *per se*.

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APPENDIX

Table A3. Unit Root Test Results of Variables of Interest, ADF Test, CSSR

Variable and Specification	t-Statistic (p-value)	Lag Length	Break Date
Augmented Dickey-Fuller Test			
***nmp* with intercept**	-0.1588 (0.9333)	0	N/A
D(*nmp*,1) with intercept	-2.7303 (0.0816)	0	N/A
D(*nmp*,2) with intercept	-5.9513 (0.0000)	0	N/A
***imtot* with intercept**	1.2789 (0.9979)	0	N/A
D(*imtot*,1) with intercept	-1.3800 (0.5775)	0	N/A
D(*imtot*,2) with intercept	-2.8704 (0.0621)	0	N/A
D(*imtot*,3) with intercept	-4.3146 (0.0024)	0	N/A
***imsoc* with intercept**	1.4667 (0.9988)	0	N/A
D(*imsoc*,1) with intercept	-2.6483 (0.0957)	0	N/A
D(*imsoc*,2) with intercept	-3.9709 (0.0052)	0	N/A
***imind* with intercept**	0.5297 (0.9849)	0	N/A
D(*imind*,1) with intercept	-0.6091 (0.8532)	0	N/A
D(*imind*,2) with intercept	-2.7059 (0.0861)	0	N/A
D(*imind*,3) with intercept	-4.4520 (0.0017)	0	N/A
***debtdomes* with intercept**	1.2926 (0.9980)	0	N/A
D(*debtdomes*,1) with intercept	-0.8620 (0.7851)	0	N/A
D(*debtdomes*,2) with intercept	-2.4493 (0.1386)	0	N/A
D(*debtdomes*,3) with intercept	-4.6479 (0.0011)	0	N/A
***intdomes* with intercept**	-0.4650 (0.8844)	0	N/A
D(*intdomes*,1) with intercept	-3.4107 (0.0191)	0	N/A

Note: D (variable, 1) means first difference of the variable, D (variable, 2) means second difference of the variable, etc.

Table A4. Unit Root Test Results of Variables of Interest, Breakpoint ADF Test, CSSR

Variable and Specification	t-Statistic (p-value)	Lag Length	Break Date
Augmented Dickey-Fuller with Break Test			
***nmp* with intercept**	-2.9939 (0.6895)	0	1965
D(*nmp*,1) with intercept	-3.6144 (0.3234)	0	1965
D(*nmp*,2) with intercept	-6.2549 (< 0.01)	0	1966
***imtot* with intercept**	-3.2751 (0.5195)	7	1983
D(*imtot*,1) with intercept	-4.3549 (0.0644)	0	1988
D(*imtot*,2) with intercept	-6.4356 (< 0.01)	1	1988
***imsoc* with intercept**	-3.1792 (0.5781)	7	1982
D(*imsoc*,1) with intercept	-4.2419 (0.0872)	0	1988
D(*imsoc*,2) with intercept	-6.9854 (< 0.01)	0	1988
***imind* with intercept**	-1.5051 (> 0.99)	0	1988
D(*imind*,1) with intercept	-4.1022 (0.1248)	0	1988
D(*imind*,2) with intercept	-8.3233 (< 0.01)	0	1988
***debtdomes* with intercept**	-3.7222 (0.2711)	4	1984
D(*debtdomes*,1) with intercept	-12.6681 (< 0.01)	7	1979
***intdomes* with intercept**	-3.7462 (0.2597)	6	1982
D(*intdomes*,1) with intercept	-10.9908 (< 0.01)	7	1980

Note: D (variable, 1) means first difference of the variable, D (variable, 2) means second difference of the variable, etc.

Table A5. Toda-Yamamoto Version of the Granger Causality Test Results, Models 1–3, CSSR

Variable	Chi-Square Statistic	Degrees of Freedom	p-value
Block Exogeneity Wald Test, based on VAR			
Model 1 with two endogenous lags and extra two exogenous lags			
Dependent variable: *nmp*			
Excluded variable: *imtot*	7.6949	2	0.0213
Excluded variable: *debtdomes*	6.8626	2	0.0323
Both variables excluded	29.4899	4	0.0000
Dependent variable: *imtot*			
Excluded variable: *nmp*	1.0405	2	0.5944
Excluded variable: *debtdomes*	0.0920	2	0.9550
Both variables excluded	1.1037	4	0.8937
Dependent variable: *debtdomes*			
Excluded variable: *nmp*	0.4213	2	0.8100
Excluded variable: *imtot*	0.0995	2	0.9515
Both variables excluded	0.6096	4	0.9620
Model 2 with two endogenous lags and extra two exogenous lags			
Dependent variable: *nmp*			
Excluded variable: *imtot*	6.4927	2	0.0389
Excluded variable: *intdomes*	4.2172	2	0.1214
Both variables excluded	25.6349	4	0.0000
Dependent variable: *imtot*			
Excluded variable: *nmp*	1.7264	2	0.4218
Excluded variable: *intdomes*	1.6242	2	0.4439
Both variables excluded	2.7088	4	0.6077
Dependent variable: *intdomes*			
Excluded variable: *nmp*	2.3275	2	0.3123
Excluded variable: *imtot*	9.0074	2	0.0111
Both variables excluded	9.8235	4	0.0435
Model 3 with two endogenous lags and extra two exogenous lags			
Dependent variable: *nmp*			
Excluded variable: *imsoc*	1.3536	2	0.5082
Excluded variable: *debtdomes*	2.1123	2	0.3478
Both variables excluded	11.5568	4	0.210
Dependent variable: *imsoc*			
Excluded variable: *nmp*	0.6071	2	0.7382
Excluded variable: *debtdomes*	1.3125	2	0.5188
Both variables excluded	1.6167	4	0.8058
Dependent variable: *debtdomes*			
Excluded variable: *nmp*	0.3153	2	0.8542
Excluded variable: *imsoc*	2.2623	2	0.3227
Both variables excluded	2.7784	4	0.5956

Table A6. Toda-Yamamoto Version of the Granger Causality Test Results, Models 4–6, CSSR

Variable	Chi-Square Statistic	Degrees of Freedom	p-value
Block Exogeneity Wald Test, based on VAR			
Model 4 with two endogenous lags and extra two exogenous lags			
Dependent variable: *nmp*			
Excluded variable: *imsoc*	0.8738	2	0.6460
Excluded variable: *intdomes*	1.9021	2	0.3863
Both variables excluded	8.4780	4	0.0756
Dependent variable: *imsoc*			
Excluded variable: *nmp*	1.0906	2	0.5797
Excluded variable: *intdomes*	3.8229	2	0.1479
Both variables excluded	4.4059	4	0.3538
Dependent variable: *intdomes*			
Excluded variable: *nmp*	0.6232	2	0.7323
Excluded variable: *imsoc*	9.4403	2	0.0089
Both variables excluded	9.9730	4	0.0409
Model 5 with two endogenous lags and extra two exogenous lags			
Dependent variable: *nmp*			
Excluded variable: *imind*	2.9236	2	0.2318
Excluded variable: *debtdomes*	10.8095	2	0.0045
Both variables excluded	13.8081	4	0.0079
Dependent variable: *imind*			
Excluded variable: *nmp*	1.2086	2	0.5465
Excluded variable: *debtdomes*	0.0533	2	0.9737
Both variables excluded	1.5645	4	0.8152
Dependent variable: *debtdomes*			
Excluded variable: *nmp*	0.6606	2	0.7187
Excluded variable: *imind*	0.1975	2	0.9060
Both variables excluded	1.0947	4	0.8951
Model 6 with two endogenous lags and extra two exogenous lags			
Dependent variable: *nmp*			
Excluded variable: *imind*	6.6856	2	0.0353
Excluded variable: *intdomes*	10.7114	2	0.0047
Both variables excluded	18.2666	4	0.0011
Dependent variable: *imind*			
Excluded variable: *nmp*	0.3284	2	0.8486
Excluded variable: *intdomes*	0.1838	2	0.9122
Both variables excluded	0.8901	4	0.9260
Dependent variable: *intdomes*			
Excluded variable: *nmp*	0.2241	2	0.8940
Excluded variable: *imind*	0.2027	2	0.9036
Both variables excluded	0.4084	4	0.9818

Table A7. Johansen Cointegration Test Results, Models 1–4, CSSR

Number of Cointegrating Equations	Trace Statistic (p-value)	Result from Trace Rank Test	Maximum Eigenvalue Statistic (p-value)	Result from Maximum Eigenvalue Rank Test
VAR1: *dnmp dimtot debtdomes,* all endogenous variables, lag length=1				
Test Version 3: Variables have quadratic trends and cointegrating equation have intercept and non-deterministic linear trend				
None	36.0802 (0.0383)	1 Cointegrating Equation in the Model at 5 percent significance level	25.1944 (0.0374)	1 Cointegrating Equation in the Model at 5 percent significance level
At most 1	10.8857 (0.3991)		9.4112 (0.4538)	
At most 2	1.4745 (0.2246)		1.4745 (0.2246)	
VAR2: *dnmp dimtot intdomes,* all endogenous variables, lag length=2				
Test Version 2: Variables have deterministic linear trends and cointegrating equation have intercept and non-deterministic linear trend				
None	44.1117 (0.0378)	1 Cointegrating Equation in the Model at 5 percent significance level	24.0117 (0.0851)	No Cointegrating Equation in the Model at 5 percent significance level
At most 1	20.1000 (0.2209)		16.7837 (0.1148)	
At most 2	3.3163 (0.8370)		3.3163 (0.8370)	
Test Version 3: Variables have quadratic trends and cointegrating equation have intercept and non-deterministic linear trend				
None	38.2183 (0.0219)	1 Cointegrating Equation in the Model at 5 percent significance level	23.9999 (0.0540)	No Cointegrating Equation in the Model at 5 percent significance level (But 1 at 5.4 percent significance level)
At most 1	14.2184 (0.1744)		13.7547 (0.1459)	
At most 2	0.4637 (0.4959)		0.4637 (0.4959)	
VAR3: *dnmp dimsoc debtdomes,* all endogenous variables, lag length=1				
Test Version 3: Variables have quadratic trends and cointegrating equation have intercept and non-deterministic linear trend				
None	35.8950 (0.0401)	1 Cointegrating Equation in the Model at 5 percent significance level	23.8632 (0.0562)	No Cointegrating Equation in the Model at 5 percent significance level (But 1 at 5.6 percent significance level)
At most 1	12.0318 (0.3067)		8.6803 (0.5292)	
At most 2	3.3516 (0.0671)		3.3516 (0.0671)	
VAR4: *dnmp dimsoc intdomes,* all endogenous variables, lag length=1 No Cointegrating Equation in the Model at 5 percent significance level				

Table A8. Johansen Cointegration Test Results, Models 5–6, CSSR

Number of Cointegrating Equations	Trace Statistic (p-value)	Result from Trace Rank Test	Maximum Eigenvalue Statistic (p-value)	Result from Maximum Eigenvalue Rank Test
VAR5: *dnmp dimind debtdomes,* all endogenous variables, lag length=2				
Test Version 1: Variables have deterministic linear trends but the cointegrating equation have only intercept				
None	31.2369 (0.0339)	1 Cointegrating Equation in the Model at 5 percent significance level	19.2032 (0.0911)	No Cointegrating Equation in the Model at 5 percent significance level
At most 1	12.0337 (0.1553)		10.6517 (0.1725)	
At most 2	1.3820 (0.2398)		1.3820 (0.2398)	
Test Version 2: Variables have deterministic linear trends and cointegrating equation have intercept and non-deterministic linear trend				
None	49.5873 (0.0094)	1 Cointegrating Equation in the Model at 5 percent significance level	27.5257 (0.0296)	1 Cointegrating Equation in the Model at 5 percent significance level
At most 1	22.0617 (0.1387)		18.2528 (0.0725)	
At most 2	3.8088 (0.7696)		3.8088 (0.7696)	
Test Version 3: Variables have quadratic trends and cointegrating equation have intercept and non-deterministic linear trend				
None	45.9831 (0.0024)	2 Cointegrating Equations in the Model at 5 percent significance level	27.5191 (0.0178)	2 Cointegrating Equations in the Model at 5 percent significance level
At most 1	18.4640 (0.0489)		17.9401 (0.0383)	
At most 2	0.5239 (0.4692)		0.5239 (0.4692)	
VAR6: *dnmp dimind intdomes,* all endogenous variables, lag length=1 No Cointegrating Equation in the Model at 5 percent significance level				

Table A9. VECM Estimation Results, Models 1 and 2, CSSR

C(1), or α, (p-value)	C(2), (p-value)	C(3), (p-value)	C(4), (p-value)	C(5), (p-value)	C(6), (p-value)	C(7), (p-value)	C(8), (p-value)	C(9), (p-value)
VECM1: *dnmp dimtot debtdomes*, all endogenous, lag length=1, cointegrating vector, $\boldsymbol{\beta}$, normalized to *nmp* Variables have quadratic trends and cointegrating equation have intercept and non-deterministic linear trend								
D(dnmp,1)=C(1)(dnmp(-1) -0.0490*dimtot(-1)+0.4111*debtdomes(-1)-1440912213*t -500688117) +C(2)*D(dnmp(-1),1)+C(3)*D(dimtot(-1),1)+C(4)*D(debtdomes(-1),1)+C(5)+C(6)*t* ($\boldsymbol{R^2 = 0.55}$, $\boldsymbol{R^2_{adj} = 0.45}$)								
-0.8518 (0.0065)	0.0761 (0.6832)	0.1132 (0.4311)	-0.0552 (0.7599)	2.40e+09 (0.3041)	-1.39e+08 (0.2979)			
D(dimtot,1)=C(1)(dnmp(-1) -0.0490*dimtot(-1)+0.4111*debtdomes(-1)-1440912213*t -500688117) +C(2)*D(dnmp(-1),1)+C(3)*D(dimtot(-1),1)+C(4)*D(debtdomes(-1),1)+C(5)+C(6)*t* ($\boldsymbol{R^2 = 0.18}$, $\boldsymbol{R^2_{adj} = 0.00}$)								
0.1061 (0.9435)	0.4523 (0.6440)	-0.9618 (0.2077)	-0.4059 (0.6685)	-1.08e+10 (0.3784)	1.04e+09 (0.1438)			
D(debtdomes,1)=C(1)(dnmp(-1) -0.0490*dimtot(-1)+0.4111*debtdomes(-1)-1440912213*t -500688117) +C(2)*D(dnmp(-1),1)+C(3)*D(dimtot(-1),1)+C(4)*D(debtdomes(-1),1)+C(5)+C(6)*t* ($\boldsymbol{R^2 = 0.17}$, $\boldsymbol{R^2_{adj} = 0.00}$)								
-0.1318 (0.9240)	0.6025 (0.5064)	-0.4497 (0.5177)	0.3588 (0.6819)	-9.62e+09 (0.3938)	9.78e+08 (0.1362)			
VECM2: *dnmp dimtot intdomes*, all endogenous, lag length=2, cointegrating vector, $\boldsymbol{\beta}$, normalized to *nmp* Variables have deterministic linear trends and cointegrating equation have intercept and non-deterministic linear trend								
D(dnmp,1)=C(1)(dnmp(-1) -5.8326*dimtot(-1)+14.4058*intdomes(-1)-4304222887*t -16564641600) +C(2)*D(dnmp(-1),1)+C(3)*D(dnmp(-2),1)+C(4)*D(dimtot(-1),1)+C(5)*D(dimtot(-2),1)+C(6)*D(intdomes(-1),1)+C7*D(intdomes(-2),1)+C(8)* ($\boldsymbol{R^2 = 0.59}$, $\boldsymbol{R^2_{adj} = 0.43}$)								
-0.1356 (0.1553)	-0.3796 (0.0769)	-0.0317 (0.8505)	1.0450 (0.0325)	0.7047 (0.0073)	0.2379 (0.8206)	0.5832 (0.5387)	3.34e+08 (0.7674)	
D(dimtot,1)=C(1)(dnmp(-1) -5.8326*dimtot(-1)+14.4058*intdomes(-1)-4304222887*t -16564641600) +C(2)*D(dnmp(-1),1)+C(3)*D(dnmp(-2),1)+C(4)*D(dimtot(-1),1)+C(5)*D(dimtot(-2),1)+C(6)*D(intdomes(-1),1)+C7*D(intdomes(-2),1)+C(8)* ($\boldsymbol{R^2 = 0.24}$, $\boldsymbol{R^2_{adj} = 0.00}$)								
-0.7185 (0.1637)	1.3308 (0.2396)	0.4129 (0.6506)	1.6049 (0.5191)	0.2188 (0.8642)	6.4922 (0.2609)	4.0812 (0.4281)	2.26e+09 (0.7113)	
D(intdomes,1)=C(1)(dnmp(-1) -5.8326*dimtot(-1)+14.4058*intdomes(-1)-4304222887*t -16564641600) +C(2)*D(dnmp(-1),1)+C(3)*D(dnmp(-2),1)+C(4)*D(dimtot(-1),1)+C(5)*D(dimtot(-2),1)+C(6)*D(intdomes(-1),1)+C7*D(intdomes(-2),1)+C(8)* ($\boldsymbol{R^2 = 0.51}$, $\boldsymbol{R^2_{adj} = 0.32}$)								
-0.1672 (0.0009)	0.1772 (0.0745)	0.0528 (0.4998)	0.6193 (0.0083)	0.1856 (0.1025)	1.7236 (0.0020)	0.8948 (0.0523)	-48883292 (0.9245)	
Variables have quadratic trends and cointegrating equation have intercept and non-deterministic linear trend								
D(dnmp,1)=C(1)(dnmp(-1) -5.5859*dimtot(-1)+13.8650*intdomes(-1)-3901986046 *t -20214482345) +C(2)*D(dnmp(-1),1)+C(3)*D(dnmp(-2),1)+C(4)*D(dimtot(-1),1)+C(5)*D(dimtot(-2),1)+C(6)*D(intdomes(-1),1)+C7*D(intdomes(-2),1)+C(8)+C(9)*t* ($\boldsymbol{R^2 = 0.66}$, $\boldsymbol{R^2_{adj} = 0.50}$)								
-0.1486 (0.1100)	-0.4002 (0.0492)	-0.0368 (0.8144)	1.0427 (0.0228)	0.7160 (0.0041)	0.3302 (0.7355)	0.5208 (0.5553)	3.83e+09 (0.1331)	-2.12e+08 (0.1200)
D(dimtot,1)=C(1)(dnmp(-1) -5.5859*dimtot(-1)+13.8650*intdomes(-1)-3901986046 *t -20214482345) +C(2)*D(dnmp(-1),1)+C(3)*D(dnmp(-2),1)+C(4)*D(dimtot(-1),1)+C(5)*D(dimtot(-2),1)+C(6)*D(intdomes(-1),1)+C7*D(intdomes(-2),1)+C(8)+C(9)*t* ($\boldsymbol{R^2 = 0.32}$, $\boldsymbol{R^2_{adj} = 0.01}$)								
-0.7207 (0.1653)	1.4479 (0.1918)	0.4495 (0.6118)	1.6130 (0.5017)	0.1642 (0.8942)	6.1981 (0.2689)	4.4158 (0.3784)	-1.83e+10 (0.2004)	1.24e+09 (0.1077)
D(intdomes,1)=C(1)(dnmp(-1) -5.5859*dimtot(-1)+13.8650*intdomes(-1)-3901986046 *t -20214482345) +C(2)*D(dnmp(-1),1)+C(3)*D(dnmp(-2),1)+C(4)*D(dimtot(-1),1)+C(5)*D(dimtot(-2),1)+C(6)*D(intdomes(-1),1)+C7*D(intdomes(-2),1)+C(8)+C(9)*t* ($\boldsymbol{R^2 = 0.55}$, $\boldsymbol{R^2_{adj} = 0.33}$)								
-0.1706 (0.0011)	0.1871 (0.0607)	0.0566 (0.4670)	0.6120 (0.0084)	0.1781 (0.1123)	1.6935 (0.0024)	0.9127 (0.0473)	-2.01e+09 (0.1113)	1.19e+08 (0.0798)

Note: D (variable, 1) means first difference of the variable, D (variable, 2) means second difference of the variable, etc. C (1) means coefficient 1, C (2) means coefficient 2, etc., (-1) means first lag of variable, (-2) means second lag of variable, etc., and t means time trend.

Table A10. VECM Estimation Results, Models 3 and 5, CSSR

C(1), or α, (p-value)	C(2), (p-value)	C(3), (p-value)	C(4), (p-value)	C(5), (p-value)	C(6), (p-value)	C(7), (p-value)	C(8), (p-value)	C(9), (p-value)
VECM3: *dnmp dimsoc debtdomes*, all endogenous, lag length=1, cointegrating vector, $\boldsymbol{\beta}$, normalized to *nmp* Variables have quadratic trends and cointegrating equation have intercept and non-deterministic linear trend								
D(dnmp,1)=C(1)(dnmp(-1) -1.8072*dimsoc(-1)+0.4432*debtdomes(-1)-1537730490*t +8005904168) +C(2)*D(dnmp(-1),1)+C(3)*D(dimsoc(-1),1)+C(4)*D(debtdomes(-1),1)+C(5)+C(6)*t* ($\boldsymbol{R^2} = \mathbf{0.44}$, $\boldsymbol{R^2_{adj}} = \mathbf{0.31}$)								
-0.4114 (0.0290)	-0.1535 (0.3887)	-0.2010 (0.4877)	-0.1305 (0.5133)	2.39e+09 (0.3590)	-1.26e+08 (0.3965)			
D(dimsoc,1)=C(1)(dnmp(-1) -1.8072*dimsoc(-1)+0.4432*debtdomes(-1)-1537730490*t +8005904168) +C(2)*D(dnmp(-1),1)+C(3)*D(dimsoc(-1),1)+C(4)*D(debtdomes(-1),1)+C(5)+C(6)*t* ($\boldsymbol{R^2} = \mathbf{0.30}$, $\boldsymbol{R^2_{adj}} = \mathbf{0.14}$)								
0.6352 (0.0596)	0.0228 (0.9434)	-0.0583 (0.9113)	-0.4953 (0.1792)	-3.94e+09 (0.4036)	4.34e+08 (0.1150)			
D(debtdomes,1)=C(1)(dnmp(-1) -1.8072*dimsoc(-1)+0.4432*debtdomes(-1)-1537730490*t +8005904168) +C(2)*D(dnmp(-1),1)+C(3)*D(dimsoc(-1),1)+C(4)*D(debtdomes(-1),1)+C(5)+C(6)*t* ($\boldsymbol{R^2} = \mathbf{0.21}$, $\boldsymbol{R^2_{adj}} = \mathbf{0.02}$)								
0.3861 (0.6087)	0.4180 (0.5770)	-0.7645 (0.5324)	0.0066 (0.9937)	-9.02e+09 (0.4119)	9.96e+08 (0.1206)			
VECM5: *dnmp dimind debtdomes*, all endogenous, lag length=2, cointegrating vector, $\boldsymbol{\beta}$, normalized to *nmp* Variables have deterministic linear trends but the cointegrating equation have only intercept								
D(dnmp,1)=C(1)(dnmp(-1) -0.1881*dimind(-1)+0.0833*debtdomes(-1) -14507953952) +C(2)*D(dnmp(-1),1)+C(3)*D(dnmp(-2),1)+C(4)*D(dimind(-1),1)+C(5)*D(dimind(-2),1)+C(6)*D(debtdomes(-1),1)+C(7)*D(debtdomes(-2),1)+C(8)* ($\boldsymbol{R^2} = \mathbf{0.63}$, $\boldsymbol{R^2_{adj}} = \mathbf{0.49}$)								
-0.4954 (0.0238)	-0.1999 (0.3752)	-0.0311 (0.8650)	0.3667 (0.2725)	0.4795 (0.1136)	-0.3336 (0.0419)	0.0339 (0.8575)	1.15e+09 (0.3375)	
D(dimind,1)=C(1)(dnmp(-1) -0.1881*dimind(-1)+0.0833*debtdomes(-1) -14507953952) +C(2)*D(dnmp(-1),1)+C(3)*D(dnmp(-2),1)+C(4)*D(dimind(-1),1)+C(5)*D(dimind(-2),1)+C(6)*D(debtdomes(-1),1)+C(7)*D(debtdomes(-2),1)+C(8)* ($\boldsymbol{R^2} = \mathbf{0.16}$, $\boldsymbol{R^2_{adj}} = \mathbf{0.00}$)								
0.2336 (0.7056)	0.4833 (0.4780)	0.2622 (0.6374)	-0.8349 (0.4067)	-0.6182 (0.4888)	-0.1798 (0.7018)	0.1040 (0.8562)	2.79e+09 (0.4409)	
D(debtdomes,1)=C(1)(dnmp(-1) -0.1881*dimind(-1)+0.0833*debtdomes(-1) -14507953952) +C(2)*D(dnmp(-1),1)+C(3)*D(dnmp(-2),1)+C(4)*D(dimind(-1),1)+C(5)*D(dimind(-2),1)+C(6)*D(debtdomes(-1),1)+C(7)*D(debtdomes(-2),1)+C(8)* ($\boldsymbol{R^2} = \mathbf{0.14}$, $\boldsymbol{R^2_{adj}} = \mathbf{0.00}$)								
0.8736 (0.4443)	0.6975 (0.5757)	0.4675 (0.6469)	0.8329 (0.6497)	0.1786 (0.9126)	0.1971 (0.8188)	0.6780 (0.5217)	4.72e+09 (0.4766)	
Variables have deterministic linear trends and cointegrating equation have intercept and non-deterministic linear trend								
D(dnmp,1)=C(1)(dnmp(-1) -0.4468*dimind(-1)+0.4048*debtdomes(-1) -1209757950*t-4952701913) +C(2)*D(dnmp(-1),1)+C(3)*D(dnmp(-2),1)+C(4)*D(dimind(-1),1)+C(5)*D(dimind(-2),1)+C(6)*D(debtdomes(-1),1)+C(7)*D(debtdomes(-2),1)+C(8)* ($\boldsymbol{R^2} = \mathbf{0.67}$, $\boldsymbol{R^2_{adj}} = \mathbf{0.54}$)								

-0.9667 (0.0078)	0.0965 (0.7177)	0.0758 (0.6851)	0.6269 (0.0568)	0.4959 (0.0848)	-0.0345 (0.8668)	0.2044 (0.2905)	-2.38e+08 (0.8535)	
D(dimind,1)=C(1)(dnmp(-1) -0.4468*dimind(-1)+0.4048*debtdomes(-1) -1209757950*t-4952701913) +C(2)*D(dnmp(-1),1)+C(3)*D(dnmp(-2),1)+C(4)*D(dimind(-1),1)+C(5)*D(dimind(-2),1)+C(6)*D(debtdomes(-1),1)+C(7)*D(debtdomes(-2),1)+C(8)* ($\boldsymbol{R^2 = 0.15}$, $\boldsymbol{R^2_{adj} = 0.00}$)								
-0.1035 (0.9219)	0.6798 (0.4321)	0.4018 (0.5066)	-0.8678 (0.3933)	-0.6554 (0.4640)	-0.0488 (0.9413)	0.1368 (0.8235)	2.27e+09 (0.5849)	
D(debtdomes,1)=C(1)(dnmp(-1) -0.4468*dimind(-1)+0.4048*debtdomes(-1) -1209757950*t-4952701913) +C(2)*D(dnmp(-1),1)+C(3)*D(dnmp(-2),1)+C(4)*D(dimind(-1),1)+C(5)*D(dimind(-2),1)+C(6)*D(debtdomes(-1),1)+C(7)*D(debtdomes(-2),1)+C(8)* ($\boldsymbol{R^2 = 0.11}$, $\boldsymbol{R^2_{adj} = 0.00}$)								
0.3450 (0.8603)	0.9924 (0.5356)	0.7409 (0.5095)	0.5925 (0.7515)	0.0782 (0.9622)	0.3310 (0.7881)	0.6528 (0.5681)	4.32e+09 (0.5760)	
Variables have quadratic trends and cointegrating equation have intercept and non-deterministic linear trend								
D(dnmp,1)=C(1)(dnmp(-1) -0.2340*dimind(-1)+0.3828*debtdomes(-1) -1298811521*t-2590060909) +C(2)*D(dnmp(-1),1)+C(3)*D(dnmp(-2),1)+C(4)*D(dimind(-1),1)+C(5)*D(dimind(-2),1)+C(6)*D(debtdomes(-1),1)+C(7)*D(debtdomes(-2),1)+C(8)+C(9)*t* ($\boldsymbol{R^2 = 0.69}$, $\boldsymbol{R^2_{adj} = 0.54}$)								
-0.8495 (0.0208)	0.0197 (0.9415)	0.0342 (0.8556)	0.5085 (0.1162)	0.4757 (0.1067)	-0.1087 (0.5903)	0.1861 (0.3333)	4.17e+09 (0.0874)	-2.49e+08 (0.0631)
D(dimind,1)=C(1)(dnmp(-1) -0.2340*dimind(-1)+0.3828*debtdomes(-1) -1298811521*t-2590060909) +C(2)*D(dnmp(-1),1)+C(3)*D(dnmp(-2),1)+C(4)*D(dimind(-1),1)+C(5)*D(dimind(-2),1)+C(6)*D(debtdomes(-1),1)+C(7)*D(debtdomes(-2),1)+C(8)+C(9)*t* ($\boldsymbol{R^2 = 0.29}$, $\boldsymbol{R^2_{adj} = 0.00}$)								
-0.7149 (0.4861)	1.0202 (0.2178)	0.5823 (0.3108)	-1.0434 (0.2753)	-0.9058 (0.2967)	0.1828 (0.7631)	0.1346 (0.8138)	-8.40e+09 (0.2418)	6.02e+08 (0.1291)
D(debtdomes,1)=C(1)(dnmp(-1) -0.2340*dimind(-1)+0.3828*debtdomes(-1) -1298811521*t-2590060909) +C(2)*D(dnmp(-1),1)+C(3)*D(dnmp(-2),1)+C(4)*D(dimind(-1),1)+C(5)*D(dimind(-2),1)+C(6)*D(debtdomes(-1),1)+C(7)*D(debtdomes(-2),1)+C(8)+C(9)*t* ($\boldsymbol{R^2 = 0.22}$, $\boldsymbol{R^2_{adj} = 0.00}$)								
-0.7428 (0.7021)	1.6069 (0.3039)	1.0689 (0.3273)	0.3855 (0.8292)	-0.3060 (0.8506)	0.7654 (0.5090)	0.6754 (0.5365)	-1.43e+10 (0.2926)	1.04e+09 (0.1653)

Note: D (variable, 1) means first difference of the variable, D (variable, 2) means second difference of the variable, etc. C (1) means coefficient 1, C (2) means coefficient 2, etc., (-1) means first lag of variable, (-2) means second lag of variable, etc., and t means time trend.

Table A11. Unit Root Test Results of Variables of Interest, ADF Test, GDR

Variable and Specification	t-Statistic (p-value)	Lag Length	Break Date
Augmented Dickey-Fuller Test			
***nmp* with intercept**	4.5453 (1.0000)	0	N/A
D(*nmp*,1) with intercept	-2.7626 (0.0766)	0	N/A
D(*nmp*,2) with intercept	-1.7141 (0.4101)	6	N/A
D(*nmp*,3) with intercept	-6.1544 (0.0001)	5	N/A
***imtot* with intercept**	1.1174 (0.9967)	0	N/A
D(*imtot*,1) with intercept	-0.6429 (0.8452)	0	N/A
D(*imtot*,2) with intercept	-2.2200 (0.2042)	0	N/A
D(*imtot*,3) with intercept	-3.6520 (0.0115)	0	N/A
***imsoc* with intercept**	-0.5801 (0.8603)	0	N/A
D(*imsoc*,1) with intercept	-4.8188 (0.0006)	0	N/A
***imind* with intercept**	0.9369 (0.9946)	0	N/A
D(*imind*,1) with intercept	-0.6401 (0.8459)	0	N/A
D(*imind*,2) with intercept	-1.9523 (0.3048)	0	N/A
D(*imind*,3) with intercept	-3.9433 (0.0058)	0	N/A
***debtdomes* with intercept**	3.5350 (1.0000)	7	N/A
D(*debtdomes*,1) with intercept	-0.1287 (0.9367)	0	N/A
D(*debtdomes*,2) with intercept	-0.2046 (0.9266)	0	N/A
D(*debtdomes*,3) with intercept	3.5643 (1.0000)	6	N/A
D(*debtdomes*,4) with intercept	2.7491 (1.0000)	6	N/A
D(*debtdomes*,5) with intercept	-9.5998 (0.0000)	5	N/A
***intdomes* with intercept**	-0.5935 (0.8573)	0	N/A
D(*intdomes*,1) with intercept	-2.4865 (0.1293)	0	N/A
D(*intdomes*,2) with intercept	-5.1088 (0.0003)	0	N/A

Note: D (variable, 1) means first difference of the variable, D (variable, 2) means second difference of the variable, etc.

Table A12. Unit Root Test Results of Variables of Interest, Breakpoint ADF Test, GDR

Variable and Specification	t-Statistic (p-value)	Lag Length	Break Date
Augmented Dickey-Fuller with Break Test			
***nmp* with intercept**	-2.5265 (0.8954)	7	1983
D(*nmp*,1) with intercept	-4.5474 (0.0381)	6	1982
***imtot* with intercept**	-1.0782 (> 0.99)	0	1988
D(*imtot*,1) with intercept	-3.9559 (0.1707)	0	1988
D(*imtot*,2) with intercept	-5.6463 (< 0.01)	1	1988
***imsoc* with intercept**	-1.5777 (> 0.99)	0	1984
D(*imsoc*,1) with intercept	-5.0974 (< 0.01)	0	1977
***imind* with intercept**	-1.1583 (> 0.99)	0	1988
D(*imind*,1) with intercept	-5.4656 (< 0.01)	0	1988
***debtdomes* with intercept**	-3.0532 (0.6547)	3	1984
D(*debtdomes*,1) with intercept	-2.0269 (0.9810)	0	1988
D(*debtdomes*,2) with intercept	-4.5435 (0.0384)	0	1988
***intdomes* with intercept**	-3.1153 (0.6177)	1	1977
D(*intdomes*,1) with intercept	-8.4058 (< 0.01)	7	1980

Note: D (variable, 1) means first difference of the variable, D (variable, 2) means second difference of the variable, etc.

Table A13. Toda-Yamamoto Version of the Granger Causality Test Results, Models 1–3, GDR

Variable	Chi-Square Statistic	Degrees of Freedom	p-value
Block Exogeneity Wald Test, based on VAR			
Model 1 with two endogenous lags and extra two exogenous lags			
Dependent variable: *nmp*			
Excluded variable: *imtot*	1.1435	2	0.5645
Excluded variable: *debtdomes*	9.1625	2	0.0102
Both variables excluded	13.8144	4	0.0079
Dependent variable: *imtot*			
Excluded variable: *nmp*	1.3501	2	0.5091
Excluded variable: *debtdomes*	0.1770	2	0.9153
Both variables excluded	2.2618	4	0.6877
Dependent variable: *debtdomes*			
Excluded variable: *nmp*	2.6145	2	0.2706
Excluded variable: *imtot*	0.0034	2	0.9983
Both variables excluded	3.2335	4	0.5195
Model 2 with two endogenous lags and extra two exogenous lags			
Dependent variable: *nmp*			
Excluded variable: *imtot*	4.3522	2	0.1135
Excluded variable: *intdomes*	11.1231	2	0.0038
Both variables excluded	19.4135	4	0.0007
Dependent variable: *imtot*			
Excluded variable: *nmp*	5.9430	2	0.0512
Excluded variable: *intdomes*	0.7874	2	0.6746
Both variables excluded	6.2047	4	0.1844
Dependent variable: *intdomes*			
Excluded variable: *nmp*	10.6295	2	0.0049
Excluded variable: *imtot*	0.7673	2	0.6814
Both variables excluded	15.3327	4	0.0041
Model 3 with three endogenous lags and extra two exogenous lags			
Dependent variable: *nmp*			
Excluded variable: *imsoc*	13.1368	3	0.0043
Excluded variable: *debtdomes*	27.3750	3	0.0000
Both variables excluded	60.2264	6	0.0000
Dependent variable: *imsoc*			
Excluded variable: *nmp*	6.0512	3	0.1091
Excluded variable: *debtdomes*	4.4796	3	0.2141
Both variables excluded	20.3205	6	0.0024
Dependent variable: *debtdomes*			
Excluded variable: *nmp*	6.2056	3	0.1020
Excluded variable: *imsoc*	13.4464	3	0.0038
Both variables excluded	26.0761	6	0.0002

Table A14. Toda-Yamamoto Version of the Granger Causality Test Results, Models 4–6, GDR

Variable	Chi-Square Statistic	Degrees of Freedom	p-value
Block Exogeneity Wald Test, based on VAR			
Model 4 with two endogenous lags and extra one exogenous lag			
Dependent variable: *nmp*			
Excluded variable: *imsoc*	4.7408	2	0.0934
Excluded variable: *intdomes*	10.9530	2	0.0042
Both variables excluded	16.4588	4	0.0025
Dependent variable: *imsoc*			
Excluded variable: *nmp*	1.6414	2	0.4401
Excluded variable: *intdomes*	0.6393	2	0.7264
Both variables excluded	3.4269	4	0.4891
Dependent variable: *intdomes*			
Excluded variable: *nmp*	7.5763	2	0.0226
Excluded variable: *imsoc*	0.5825	2	0.7473
Both variables excluded	11.0930	4	0.0255
Model 5 with three endogenous lags and extra two exogenous lags			
Dependent variable: *nmp*			
Excluded variable: *imind*	5.8608	3	0.1186
Excluded variable: *debtdomes*	12.5695	3	0.0057
Both variables excluded	34.1296	6	0.0000
Dependent variable: *imind*			
Excluded variable: *nmp*	4.6902	3	0.1959
Excluded variable: *debtdomes*	11.5500	3	0.0091
Both variables excluded	22.6090	6	0.0009
Dependent variable: *debtdomes*			
Excluded variable: *nmp*	8.8197	3	0.0318
Excluded variable: *imind*	3.5911	3	0.3091
Both variables excluded	13.9952	6	0.0297
Model 6 with two endogenous lags and extra one exogenous lag			
Dependent variable: *nmp*			
Excluded variable: *imind*	6.0440	2	0.0487
Excluded variable: *intdomes*	13.8716	2	0.0010
Both variables excluded	21.0375	4	0.0003
Dependent variable: *imind*			
Excluded variable: *nmp*	6.4804	2	0.0392
Excluded variable: *intdomes*	0.6857	2	0.7097
Both variables excluded	6.6362	4	0.1564
Dependent variable: *intdomes*			
Excluded variable: *nmp*	4.7158	2	0.0946
Excluded variable: *imind*	0.2706	2	0.8735
Both variables excluded	7.7048	4	0.1030

Table A15. Johansen Cointegration Test Results, Models 1–3, GDR

Number of Cointegrating Equations	Trace Statistic (p-value)	Result from Trace Rank Test	Maximum Eigenvalue Statistic (p-value)	Result from Maximum Eigenvalue Rank Test
VAR1: *nmp dimtot ddebtdomes,* all endogenous variables, lag length=2				
Test Version 2: Variables have deterministic linear trends and cointegrating equation have intercept and non-deterministic linear trend				
None	50.5449 (0.0073)	1 Cointegrating Equation in the Model at 5 percent significance level	34.9308 (0.0024)	1 Cointegrating Equation in the Model at 5 percent significance level
At most 1	15.6141 (0.5238)		10.2150 (0.5958)	
At most 2	5.3991 (0.5401)		5.3991 (0.5401)	
Test Version 3: Variables have quadratic trends and cointegrating equation have intercept and non-deterministic linear trend				
None	36.1273 (0.0378)	1 Cointegrating Equation in the Model at 5 percent significance level	28.6942 (0.0121)	1 Cointegrating Equation in the Model at 5 percent significance level
At most 1	7.4330 (0.7400)		6.5251 (0.7637)	
At most 2	0.9079 (0.3407)		0.9079 (0.3407)	
VAR2: *nmp dimtot intdomes,* all endogenous variables, lag length=1				
Test Version 1: Variables have deterministic linear trends but the cointegrating equation have only intercept				
None	27.2595 (0.0954)	No Cointegrating Equation in the Model at 5 percent significance level	21.1840 (0.0492)	1 Cointegrating Equation in the Model at 5 percent significance level
At most 1	6.0755 (0.6866)		5.2493 (0.7101)	
At most 2	0.8262 (0.3634)		0.8262 (0.3634)	
Test Version 2: Variables have deterministic linear trends and cointegrating equation have intercept and non-deterministic linear trend				
None	45.9371 (0.0242)	1 Cointegrating Equation in the Model at 5 percent significance level	32.9459 (0.0048)	1 Cointegrating Equation in the Model at 5 percent significance level
At most 1	12.9912 (0.7389)		8.7386 (0.7510)	
At most 2	4.2526 (0.7053)		4.2526 (0.7053)	
Test Version 3: Variables have quadratic trends and cointegrating equation have intercept and non-deterministic linear trend				
None	33.7048 (0.686)	No Cointegrating Equation in the Model at 5 percent significance level	27.2244 (0.0196)	1 Cointegrating Equation in the Model at 5 percent significance level
At most 1	6.4804 (0.8292)		6.4752 (0.7689)	
At most 2	0.0053 (0.9413)		0.0053 (0.9413)	
VAR3: *nmp imsoc ddebtdomes,* all endogenous variables, lag length=3				
Test Version 1: Variables have deterministic linear trends but the cointegrating equation have only intercept				
None	38.7390 (0.0036)	1 Cointegrating Equation in the Model at 5 percent significance level	31.4249 (0.0013)	1 Cointegrating Equation in the Model at 5 percent significance level
At most 1	7.3141 (0.5414)		4.5138 (0.8015)	
At most 2	2.8003 (0.0942)		2.8003 (0.0942)	
Test Version 2: Variables have deterministic linear trends and cointegrating equation have intercept and non-deterministic linear trend				
None	52.0493 (0.0048)	1 Cointegrating Equation in the Model at 5 percent significance level	33.9368 (0.0034)	1 Cointegrating Equation in the Model at 5 percent significance level
At most 1	18.1125 (0.3364)		15.1855 (0.1838)	
At most 2	2.9270 (0.8851)		2.9270 (0.8851)	
Test Version 3: Variables have quadratic trends and cointegrating equation have intercept and non-deterministic linear trend				
None	37.1219 (0.0293)	1 Cointegrating Equation in the Model at 5 percent significance level	25.6198 (0.0328)	1 Cointegrating Equation in the Model at 5 percent significance level
At most 1	11.5021 (0.3474)		9.2799 (0.4669)	
At most 2	2.2222 (0.1360)		2.2222 (0.1360)	

Table A16. Johansen Cointegration Test Results, Models 4–6, GDR

Number of Cointegrating Equations	Trace Statistic (p-value)	Result from Trace Rank Test	Maximum Eigenvalue Statistic (p-value)	Result from Maximum Eigenvalue Rank Test
VAR4: ***nmp imsoc intdomes,*** **all endogenous variables, lag length=2**				
Test Version 1: Variables have deterministic linear trends but the cointegrating equation have only intercept				
None	38.6177 (0.0038)	1 Cointegrating Equation in the Model at 5 percent significance level	30.8286 (0.0016)	1 Cointegrating Equation in the Model at 5 percent significance level
At most 1	7.7891 (0.4882)		7.7724 (0.4023)	
At most 2	0.0167 (0.8970)		0.0167 (0.8970)	
Test Version 2: Variables have deterministic linear trends and cointegrating equation have intercept and non-deterministic linear trend				
None	60.3844 (0.0004)	1 Cointegrating Equation in the Model at 5 percent significance level	38.1039 (0.0008)	1 Cointegrating Equation in the Model at 5 percent significance level
At most 1	22.2806 (0.1313)		14.8990 (0.1992)	
At most 2	7.3816 (0.3064)		7.3816 (0.3064)	
VAR5: ***nmp imind ddebtdomes,*** **all endogenous variables, lag length=2**				
Test Version 1: Variables have deterministic linear trends but the cointegrating equation have only intercept				
None	58.0375 (0.0000)	1 Cointegrating Equation in the Model at 5 percent significance level	49.1296 (0.0000)	1 Cointegrating Equation in the Model at 5 percent significance level
At most 1	8.9079 (0.3740)		8.9070 (0.2940)	
At most 2	0.0009 (0.9777)		0.0009 (0.9777)	
Test Version 2: Variables have deterministic linear trends and cointegrating equation have intercept and non-deterministic linear trend				
None	80.6955 (0.0000)	1 Cointegrating Equation in the Model at 5 percent significance level	60.6251 (0.0000)	1 Cointegrating Equation in the Model at 5 percent significance level
At most 1	20.0704 (0.2224)		11.2739 (0.4855)	
At most 2	8.7965 (0.1932)		8.7965 (0.1932)	
Test Version 3: Variables have quadratic trends and cointegrating equation have intercept and non-deterministic linear trend				
None	52.5476 (0.0003)	1 Cointegrating Equation in the Model at 5 percent significance level	41.0250 (0.0001)	1 Cointegrating Equation in the Model at 5 percent significance level
At most 1	11.5226 (0.3458)		10.8216 (0.3259)	
At most 2	0.7010 (0.4024)		0.7010 (0.4024)	
VAR6: ***nmp imind intdomes,*** **all endogenous variables, lag length=2**				
Test Version 1: Variables have deterministic linear trends but the cointegrating equation have only intercept				
None	27.9622 (0.0802)	No Cointegrating Equation in the Model at 5 percent significance level	22.5510 (0.0314)	1 Cointegrating Equation in the Model at 5 percent significance level
At most 1	5.4112 (0.7637)		4.2206 (0.8354)	
At most 2	1.1905 (0.2752)		1.1905 (0.2752)	
Test Version 2: Variables have deterministic linear trends and cointegrating equation have intercept and non-deterministic linear trend				
None	38.9157 (0.1187)	No Cointegrating Equation in the Model at 5 percent significance level	28.8606 (0.0193)	1 Cointegrating Equation in the Model at 5 percent significance level
At most 1	10.0551 (0.9226)		6.1918 (0.9473)	
At most 2	3.8633 (0.7618)		3.8633 (0.7618)	

Table A17. VECM Estimation Results, Models 1 and 2, GDR

C(1), or α, (p-value)	C(2), (p-value)	C(3), (p-value)	C(4), (p-value)	C(5), (p-value)	C(6), (p-value)	C(7), (p-value)	C(8), (p-value)	C(9), (p-value)
VECM1: *nmp dimtot ddebtdomes,* all endogenous, lag length=2 Variables have deterministic linear trends and cointegrating equation have intercept and non-deterministic linear trend								
D(nmp,1)=C(1)*(nmp(-1) +0.1234*dimtot(-1)+1.6170*ddebtdomes(-1)-8793661388*t -16167864991) +C(2)*D(nmp(-1),1)+C(3)*D(nmp(-2),1)+C(4)*D(dimtot(-1),1)+C(5)*D(dimtot(-2),1)+C(6)*D(ddebtdomes(-1),1)+C(7)*D(ddebtdomes(-2),1)+C(8) ($\boldsymbol{R^2 = 0.81}$, $\boldsymbol{R^2_{adj} = 0.74}$)								
-0.1494 (0.0002)	0.0617 (0.7698)	-0.5253 (0.0015)	0.0074 (0.9240)	-0.0262 (0.7220)	0.4720 (0.0002)	0.1445 (0.2735)	9.78e+09 (0.0000)	
D(dimtot,1)=C(1)*(nmp(-1) +0.1234*dimtot(-1)+1.6170*ddebtdomes(-1)-8793661388*t -16167864991) +C(2)*D(nmp(-1),1)+C(3)*D(nmp(-2),1)+C(4)*D(dimtot(-1),1)+C(5)*D(dimtot(-2),1)+C(6)*D(ddebtdomes(-1),1)+C(7)*D(ddebtdomes(-2),1)+C(8) ($\boldsymbol{R^2 = 0.13}$, $\boldsymbol{R^2_{adj} = 0.00}$)								
-0.4238 (0.2873)	-2.1772 (0.4067)	-0.4788 (0.7859)	-0.6128 (0.5232)	-0.3678 (0.6858)	1.3291 (0.2990)	0.8913 (0.5796)	2.01e+10 (0.3431)	
D(ddebtdomes,1)=C(1)*(nmp(-1) +0.1234*dimtot(-1)+1.6170*ddebtdomes(-1)-8793661388*t -16167864991) +C(2)*D(nmp(-1),1)+C(3)*D(nmp(-2),1)+C(4)*D(dimtot(-1),1)+C(5)*D(dimtot(-2),1)+C(6)*D(ddebtdomes(-1),1)+C(7)*D(ddebtdomes(-2),1)+C(8) ($\boldsymbol{R^2 = 0.11}$, $\boldsymbol{R^2_{adj} = 0.00}$)								
-0.5041 (0.3081)	-1.9307 (0.5522)	-0.8814 (0.6880)	-0.2945 (0.8042)	-0.3289 (0.7708)	1.7102 (0.2830)	0.9217 (0.6446)	2.15e+10 (0.4132)	
Variables have quadratic trends and cointegrating equation have intercept and non-deterministic linear trend, cointegrating vector, $\boldsymbol{\beta}$, normalized to *nmp*								
D(nmp,1)=C(1)*(nmp(-1) +0.7449*dimtot(-1)+1.5725*ddebtdomes(-1)-6836896668*t -49688687781) +C(2)*D(nmp(-1),1)+C(3)*D(nmp(-2),1)+C(4)*D(dimtot(-1),1)+C(5)*D(dimtot(-2),1)+C(6)*D(ddebtdomes(-1),1)+C(7)*D(ddebtdomes(-2),1)+C(8)+C(9)*t ($\boldsymbol{R^2 = 0.89}$, $\boldsymbol{R^2_{adj} = 0.84}$)								
-0.2654 (0.0000)	-0.0993 (0.5618)	-0.3418 (0.0120)	0.1460 (0.0409)	0.0415 (0.4884)	0.5974 (0.0000)	0.3228 (0.0101)	5.34e+09 (0.0000)	2.61e+08 (0.0000)
D(dimtot,1)=C(1)*(nmp(-1) +0.7449*dimtot(-1)+1.5725*ddebtdomes(-1)-6836896668*t -49688687781) +C(2)*D(nmp(-1),1)+C(3)*D(nmp(-2),1)+C(4)*D(dimtot(-1),1)+C(5)*D(dimtot(-2),1)+C(6)*D(ddebtdomes(-1),1)+C(7)*D(ddebtdomes(-2),1)+C(8)+C(9)*t ($\boldsymbol{R^2 = 0.42}$, $\boldsymbol{R^2_{adj} = 0.14}$)								
0.9412 (0.1127)	-0.6067 (0.7898)	-2.5479 (0.1349)	-1.3102 (0.1551)	-0.6961 (0.3855)	0.0186 (0.9873)	-1.0098 (0.5069)	3.30e+09 (0.7295)	1.20e+09 (0.0800)
D(ddebtdomes,1)=C(1)*(nmp(-1) +0.7449*dimtot(-1)+1.5725*ddebtdomes(-1)-6836896668*t -49688687781) +C(2)*D(nmp(-1),1)+C(3)*D(nmp(-2),1)+C(4)*D(dimtot(-1),1)+C(5)*D(dimtot(-2),1)+C(6)*D(ddebtdomes(-1),1)+C(7)*D(ddebtdomes(-2),1)+C(8)+C(9)*t ($\boldsymbol{R^2 = 0.40}$, $\boldsymbol{R^2_{adj} = 0.12}$)								
1.2691 (0.0883)	0.3321 (0.9068)	-3.3628 (0.1150)	-1.2350 (0.2756)	-0.7859 (0.4313)	-0.0515 (0.9717)	-1.6472 (0.3877)	3.98e+08 (0.9733)	1.34e+09 (0.1129)
VECM2: *nmp dimtot intdomes*, all endogenous, lag length=1, cointegrating vector, $\boldsymbol{\beta}$, normalized to *nmp*, Variables have deterministic linear trends but the cointegrating equation have only intercept								
D(nmp,1)=C(1)*(nmp(-1) -6.8247*dimtot(-1)-18.9314*intdomes(-1) -105276628017) +C(2)*D(nmp(-1),1)+C(3)*D(dimtot(-1),1)+C(4)*D(intdomes(-1),1)+C(5) ($\boldsymbol{R^2 = 0.50}$, $\boldsymbol{R^2_{adj} = 0.41}$)								
0.0113 (0.2669)	0.5069 (0.0064)	0.0820 (0.4457)	0.5017 (0.0977)	3.27e+09 (0.0088)				

D(dimtot,1)=C(1)(nmp(-1) -6.8247*dimtot(-1)-18.9314*intdomes(-1) -105276628017) +C(2)*D(nmp(-1),1)+C(3)*D(dimtot(-1),1)+C(4)*D(intdomes(-1),1)+C(5)* ($R^2 = 0.23$, $R^2_{adj} = 0.09$)								
0.1577 (0.0262)	-1.2130 (0.2910)	0.1684 (0.8128)	2.3655 (0.2335)	9.76e+09 (0.2113)				
D(intdomes,1)=C(1)(nmp(-1) -6.8247*dimtot(-1)-18.9314*intdomes(-1) -105276628017) +C(2)*D(nmp(-1),1)+C(3)*D(dimtot(-1),1)+C(4)*D(intdomes(-1),1)+C(5)* ($R^2 = 0.43$, $R^2_{adj} = 0.33$)								
0.0306 (0.0010)	-0.3002 (0.0396)	0.0763 (0.3848)	0.5729 (0.0240)	2.23e+09 (0.0253)				
Variables have deterministic linear trends and cointegrating equation have intercept and non-deterministic linear trend								
D(nmp,1)=C(1)(nmp(-1) +3.5428*dimtot(-1)+8.0853*intdomes(-1) -9374732526*t-29014962819) +C(2)*D(nmp(-1),1)+C(3)*D(dimtot(-1),1)+C(4)*D(intdomes(-1),1)+C(5)* ($R^2 = 0.60$, $R^2_{adj} = 0.53$)								
-0.0671 (0.0128)	0.3804 (0.0200)	0.1943 (0.0764)	0.5736 (0.0352)	4.07e+09 (0.0006)				
D(dimtot,1)=C(1)(nmp(-1) +3.5428*dimtot(-1)+8.0853*intdomes(-1) -9374732526*t-29014962819) +C(2)*D(nmp(-1),1)+C(3)*D(dimtot(-1),1)+C(4)*D(intdomes(-1),1)+C(5)* ($R^2 = 0.09$, $R^2_{adj} = 0.00$)								
-0.2210 (0.2860)	-0.5043 (0.6877)	0.0138 (0.9872)	1.6413 (0.4399)	5.23e+09 (0.5375)				
D(intdomes,1)=C(1)(nmp(-1) +3.5428*dimtot(-1)+8.0853*intdomes(-1) -9374732526*t-29014962819) +C(2)*D(nmp(-1),1)+C(3)*D(dimtot(-1),1)+C(4)*D(intdomes(-1),1)+C(5)* ($R^2 = 0.33$, $R^2_{adj} = 0.21$)								
-0.0724 (0.0076)	-0.2648 (0.0931)	0.1174 (0.2709)	0.5038 (0.0602)	2.00e+09 (0.0626)				
Variables have quadratic trends and cointegrating equation have intercept and non-deterministic linear trend								
D(nmp,1)=C(1)(nmp(-1) +3.4028*dimtot(-1)+7.5745*intdomes(-1) -7945653593*t-50604782203) +C(2)*D(nmp(-1),1)+C(3)*D(dimtot(-1),1)+C(4)*D(intdomes(-1),1)+C(5)+C(6)*t* ($R^2 = 0.61$, $R^2_{adj} = 0.52$)								
-0.0695 (0.0408)	0.3556 (0.0798)	0.1947 (0.0949)	0.5642 (0.0413)	2.64e+09 (0.0069)	99933187 (0.0907)			
D(dimtot,1)=C(1)(nmp(-1) +3.4028*dimtot(-1)+7.5745*intdomes(-1) -7945653593*t-50604782203) +C(2)*D(nmp(-1),1)+C(3)*D(dimtot(-1),1)+C(4)*D(intdomes(-1),1)+C(5)+C(6)*t* ($R^2 = 0.22$, $R^2_{adj} = 0.04$)								
0.0407 (0.8681)	-2.1936 (0.1494)	-0.4852 (0.5720)	0.9999 (0.6205)	1.19e+09 (0.8609)	9.51e+08 (0.0374)			
D(intdomes,1)=C(1)(nmp(-1) +3.4028*dimtot(-1)+7.5745*intdomes(-1) -7945653593*t-50604782203) +C(2)*D(nmp(-1),1)+C(3)*D(dimtot(-1),1)+C(4)*D(intdomes(-1),1)+C(5)+C(6)*t* ($R^2 = 0.32$, $R^2_{adj} = 0.16$)								
-0.0678 (0.0472)	-0.3058 (0.1311)	0.1030 (0.3689)	0.4776 (0.0850)	4.58e+08 (0.6118)	1.13e+08 (0.0594)			

Note: D (variable, 1) means first difference of the variable, D (variable, 2) means second difference of the variable, etc. C (1) means coefficient 1, C (2) means coefficient 2, etc., (-1) means first lag of variable, (-2) means second lag of variable, etc., and t means time trend.

Table A18. VECM Estimation Results, Models 3 and 4, GDR

C(1), or α, (p-value)	C(2), (p-value)	C(3), (p-value)	C(4), (p-value)	C(5), (p-value)	C(6), (p-value)	C(7), (p-value)	C(8), (p-value)	C(9), (p-value)
VECM3: *nmp imsoc ddebtdomes*, all endogenous, lag length=3, cointegrating vector, $\boldsymbol{\beta}$, normalized to *nmp*, Variables have deterministic linear trends but the cointegrating equation have only intercept								
D(nmp,1)=C(1)(nmp(-1) +33.8945*imsoc(-1)-24.5685*ddebtdomes(-1)-1.7224e+12) +C(2)*D(nmp(-1),1)+C(3)*D(nmp(-2),1)+C(4)*D(nmp(-3),1)+C(5)*D(imsoc(-1),1)+C(6)*D(imsoc(-2),1)+C(7)*D(imsoc(-3),1)+C(8)*D(ddebtdomes(-1),1)+C(9)*D(ddebtdomes(-2),1)+C(10)*D(ddebtdomes(-3),1)+C(11)* ($\boldsymbol{R^2=0.81}$, $\boldsymbol{R^2_{adj}=0.67}$)								
0.0004 (0.8864)	0.4650 (0.2349)	-0.1934 (0.4865)	0.3147 (0.2804)	-0.1258 (0.3027)	-0.0219 (0.8744)	-0.0397 (0.7622)	0.2714 (0.0295)	-0.2431 (0.1822)
C(10), (p-value)	**C(11), (p-value)**	**C(12), (p-value)**						
-0.2977 (0.0362)	3.22e+09 (0.4337)							
D(imsoc,1)=C(1)(nmp(-1) +33.8945*imsoc(-1)-24.5685*ddebtdomes(-1)-1.7224e+12) +C(2)*D(nmp(-1),1)+C(3)*D(nmp(-2),1)+C(4)*D(nmp(-3),1)+C(5)*D(imsoc(-1),1)+C(6)*D(imsoc(-2),1)+C(7)*D(imsoc(-3),1)+C(8)*D(ddebtdomes(-1),1)+C(9)*D(ddebtdomes(-2),1)+C(10)*D(ddebtdomes(-3),1)+C(11)* ($\boldsymbol{R^2=0.65}$, $\boldsymbol{R^2_{adj}=0.39}$)								
-0.0098 (0.0419)	0.8969 (0.1648)	-0.4773 (0.2982)	1.4260 (0.0076)	0.3568 (0.0844)	0.0998 (0.6601)	-0.3146 (0.1565)	0.2463 (0.1996)	-0.1945 (0.5030)
C(10), (p-value)	**C(11), (p-value)**	**C(12), (p-value)**						
-0.3095 (0.1625)	-1.09e+10 (0.1162)							
D(ddebtdomes,1)=C(1)(nmp(-1) +33.8945*imsoc(-1)-24.5685*ddebtdomes(-1)-1.7224e+12) +C(2)*D(nmp(-1),1)+C(3)*D(nmp(-2),1)+C(4)*D(nmp(-3),1)+C(5)*D(imsoc(-1),1)+C(6)*D(imsoc(-2),1)+C(7)*D(imsoc(-3),1)+C(8)*D(ddebtdomes(-1),1)+C(9)*D(ddebtdomes(-2),1)+C(10)*D(ddebtdomes(-3),1)+C(11)* ($\boldsymbol{R^2=0.34}$, $\boldsymbol{R^2_{adj}=0.00}$)								
0.0545 (0.1585)	-3.9404 (0.4522)	-3.2334 (0.3943)	-1.9443 (0.6180)	0.0143 (0.9930)	-0.3031 (0.8722)	0.2153 (0.9038)	1.9900 (0.2152)	1.7345 (0.4738)
C(10), (p-value)	**C(11), (p-value)**	**C(12), (p-value)**						
0.6626 (0.7103)	6.41e+10 (0.2579)							
Variables have deterministic linear trends and cointegrating equation have intercept and non-deterministic linear trend								
D(nmp,1)=C(1)(nmp(-1) +0.2992*imsoc(-1)+1.7049*ddebtdomes(-1)-7974473857*t-42693862661) +C(2)*D(nmp(-1),1)+C(3)*D(nmp(-2),1)+C(4)*D(nmp(-3),1)+C(5)*D(imsoc(-1),1)+C(6)*D(imsoc(-2),1)+C(7)*D(imsoc(-3),1)+C(8)*D(ddebtdomes(-1),1)+C(9)*D(ddebtdomes(-2),1)+C(10)*D(ddebtdomes(-3),1)+C(11)* ($\boldsymbol{R^2=0.90}$, $\boldsymbol{R^2_{adj}=0.82}$)								
-0.2955 (0.0039)	-0.0027 (0.9904)	-0.4339 (0.0581)	0.1560 (0.2707)	-0.2291 (0.0247)	-0.1162 (0.2295)	-0.1484 (0.1475)	0.6447 (0.0003)	0.3518 (0.0887)
C(10), (p-value)	**C(11), (p-value)**	**C(12), (p-value)**						
0.1992 (0.2652)	9.44e+09 (0.0005)							
D(imsoc,1)=C(1)(nmp(-1) +0.2992*imsoc(-1)+1.7049*ddebtdomes(-1)-7974473857*t-42693862661) +C(2)*D(nmp(-1),1)+C(3)*D(nmp(-2),1)+C(4)*D(nmp(-3),1)+C(5)*D(imsoc(-1),1)+C(6)*D(imsoc(-2),1)+C(7)*D(imsoc(-3),1)+C(8)*D(ddebtdomes(-1),1)+C(9)*D(ddebtdomes(-2),1)+C(10)*D(ddebtdomes(-3),1)+C(11)* ($\boldsymbol{R^2=0.57}$, $\boldsymbol{R^2_{adj}=0.27}$)								
-0.2738 (0.2113)	-0.6877 (0.2196)	-0.8027 (0.1403)	0.4313 (0.2154)	0.2048 (0.3727)	-0.2383 (0.3091)	-0.5493 (0.0357)	0.7724 (0.0322)	0.8988 (0.0763)
C(10), (p-value)	**C(11), (p-value)**	**C(12), (p-value)**						
0.1105 (0.7959)	9.44e+09 (0.0884)							
D(ddebtdomes,1)=C(1)(nmp(-1) +0.2992*imsoc(-1)+1.7049*ddebtdomes(-1)-7974473857*t-42693862661) +C(2)*D(nmp(-1),1)+C(3)*D(nmp(-2),1)+C(4)*D(nmp(-3),1)+C(5)*D(imsoc(-1),1)+C(6)*D(imsoc(-2),1)+C(7)*D(imsoc(-3),1)+C(8)*D(ddebtdomes(-1),1)+C(9)*D(ddebtdomes(-2),1)+C(10)*D(ddebtdomes(-3),1)+C(11)* ($\boldsymbol{R^2=0.44}$, $\boldsymbol{R^2_{adj}=0.04}$)								
3.3395 (0.0372)	7.9969 (0.0493)	0.0773 (0.9830)	4.7463 (0.0588)	1.5064 (0.3458)	2.2112 (0.1802)	2.2175 (0.1980)	-3.2708 (0.1690)	-8.1214 (0.0259)
C(10), (p-value)	**C(11), (p-value)**	**C(12), (p-value)**						
-4.7200	-9.06e+10							

(0.1270)	(0.0240)							
Variables have quadratic trends and cointegrating equation have intercept and non-deterministic linear trend								
D(nmp,1)=C(1)(nmp(-1) +0.0577*imsoc(-1)+1.9318*ddebtdomes(-1)-7028980779*t-47717009090) +C(2)*D(nmp(-1),1)+C(3)*D(nmp(-2),1)+C(4)*D(nmp(-3),1)+C(5)*D(imsoc(-1),1)+C(6)*D(imsoc(-2),1)+C(7)*D(imsoc(-3),1)+C(8)*D(ddebtdomes(-1),1)+C(9)*D(ddebtdomes(-2),1)+C(10)*D(ddebtdomes(-3),1)+C(11)+C(12)*t* ($\boldsymbol{R^2 = 0.91}$, $\boldsymbol{R^2_{adj} = 0.84}$)								
-0.3358 (0.0022)	-0.3320 (0.3440)	-0.4960 (0.0342)	-0.0494 (0.8385)	-0.2682 (0.0115)	-0.1942 (0.0641)	-0.2022 (0.0577)	0.7486 (0.0002)	0.5678 (0.0457)
C(10), (p-value)	**C(11), (p-value)**	**C(12), (p-value)**						
0.2725 (0.1415)	8.11e+09 (0.0010)	3.26e+08 (0.0298)						
D(imsoc,1)=C(1)(nmp(-1) +0.0577*imsoc(-1)+1.9318*ddebtdomes(-1)-7028980779*t-47717009090) +C(2)*D(nmp(-1),1)+C(3)*D(nmp(-2),1)+C(4)*D(nmp(-3),1)+C(5)*D(imsoc(-1),1)+C(6)*D(imsoc(-2),1)+C(7)*D(imsoc(-3),1)+C(8)*D(ddebtdomes(-1),1)+C(9)*D(ddebtdomes(-2),1)+C(10)*D(ddebtdomes(-3),1)+C(11)+C(12)*t* ($\boldsymbol{R^2 = 0.57}$, $\boldsymbol{R^2_{adj} = 0.21}$)								
-0.1325 (0.5825)	-0.1604 (0.8610)	-0.6384 (0.2723)	0.8287 (0.2120)	0.1892 (0.4486)	-0.2256 (0.3924)	-0.5383 (0.0572)	0.5921 (0.1558)	0.4741 (0.4996)
C(10), (p-value)	**C(11), (p-value)**	**C(12), (p-value)**						
-0.1144 (0.8084)	3.47e+09 (0.5090)	-7666103 (0.8323)						
D(ddebtdomes,1)=C(1)(nmp(-1) +0.0577*imsoc(-1)+1.9318*ddebtdomes(-1)-7028980779*t-47717009090) +C(2)*D(nmp(-1),1)+C(3)*D(nmp(-2),1)+C(4)*D(nmp(-3),1)+C(5)*D(imsoc(-1),1)+C(6)*D(imsoc(-2),1)+C(7)*D(imsoc(-3),1)+C(8)*D(ddebtdomes(-1),1)+C(9)*D(ddebtdomes(-2),1)+C(10)*D(ddebtdomes(-3),1)+C(11)+C(12)*t* ($\boldsymbol{R^2 = 0.51}$, $\boldsymbol{R^2_{adj} = 0.09}$)								
2.3449 (0.1481)	3.1774 (0.5949)	-1.2943 (0.7260)	0.5514 (0.8950)	2.0416 (0.2167)	2.4582 (0.1615)	2.4631 (0.1651)	-2.1132 (0.4224)	-4.6451 (0.3136)
C(10), (p-value)	**C(11), (p-value)**	**C(12), (p-value)**						
-3.2160 (0.3035)	-2.85e+10 (0.4049)	3.41e+08 (0.8844)						
VECM4: *nmp imsoc intdomes*, all endogenous, lag length=2, cointegrating vector, $\boldsymbol{\beta}$, normalized to *nmp*, Variables have deterministic linear trends but the cointegrating equation have only intercept								
D(nmp,1)=C(1)(nmp(-1) +5.4200*imsoc(-1)-28.4605*intdomes(-1)-348437424453) +C(2)*D(nmp(-1),1)+C(3)*D(nmp(-2),1)+C(4)*D(imsoc(-1),1)+C(5)*D(imsoc(-2),1)+C(6)*D(intdomes(-1),1)+C(7)*D(intdomes(-2),1)+C(8)* ($\boldsymbol{R^2 = 0.74}$, $\boldsymbol{R^2_{adj} = 0.65}$)								
0.0002 (0.9813)	0.8142 (0.0026)	-0.1350 (0.4327)	-0.3407 (0.0087)	-0.0264 (0.8681)	0.3103 (0.2143)	-0.8260 (0.0076)	2.7e+09 (0.1186)	
D(imsoc,1)=C(1)(nmp(-1) +5.4200*imsoc(-1)-28.4605*intdomes(-1)-348437424453) +C(2)*D(nmp(-1),1)+C(3)*D(nmp(-2),1)+C(4)*D(imsoc(-1),1)+C(5)*D(imsoc(-2),1)+C(6)*D(intdomes(-1),1)+C(7)*D(intdomes(-2),1)+C(8)* ($\boldsymbol{R^2 = 0.09}$, $\boldsymbol{R^2_{adj} = 0.00}$)								
-0.0038 (0.7818)	0.4352 (0.3881)	-0.1435 (0.6889)	0.0585 (0.8131)	0.0721 (0.8288)	-0.2116 (0.6806)	0.0888 (0.8798)	-7e+08 (0.8280)	
D(intdomes,1)=C(1)(nmp(-1) +5.4200*imsoc(-1)-28.4605*intdomes(-1)-348437424453) +C(2)*D(nmp(-1),1)+C(3)*D(nmp(-2),1)+C(4)*D(imsoc(-1),1)+C(5)*D(imsoc(-2),1)+C(6)*D(intdomes(-1),1)+C(7)*D(intdomes(-2),1)+C(8)* ($\boldsymbol{R^2 = 0.61}$, $\boldsymbol{R^2_{adj} = 0.47}$)								
0.0260 (0.0004)	-0.4655 (0.0492)	-0.2502 (0.1316)	-0.1736 (0.1301)	-0.0541 (0.7185)	0.3456 (0.1454)	0.5245 (0.0587)	5.1e+09 (0.0037)	
Variables have deterministic linear trends and cointegrating equation have intercept and non-deterministic linear trend, cointegrating vector, $\boldsymbol{\beta}$, is not normalized to *nmp*								
D(nmp,1)=C(1)(nmp(-1) +1.2600*imsoc(-1)-7.7115*intdomes(-1)-11516791840*t-43945591713) +C(2)*D(nmp(-1),1)+C(3)*D(nmp(-2),1)+C(4)*D(imsoc(-1),1)+C(5)*D(imsoc(-2),1)+C(6)*D(intdomes(-1),1)+C(7)*D(intdomes(-2),1)+C(8)* ($\boldsymbol{R^2 = 0.77}$, $\boldsymbol{R^2_{adj} = 0.68}$)								
-0.0472 (0.1990)	0.5470 (0.0558)	-0.1784 (0.2719)	-0.3064 (0.0117)	-0.1196 (0.4054)	0.4041 (0.1086)	-0.4941 (0.1635)	4.7e+09 (0.0141)	
D(imsoc,1)=C(1)(nmp(-1) +1.2600*imsoc(-1)-7.7115*intdomes(-1)-11516791840*t-43945591713) +C(2)*D(nmp(-1),1)+C(3)*D(nmp(-2),1)+C(4)*D(imsoc(-1),1)+C(5)*D(imsoc(-2),1)+C(6)*D(intdomes(-1),1)+C(7)*D(intdomes(-2),1)+C(8)* ($\boldsymbol{R^2 = 0.17}$, $\boldsymbol{R^2_{adj} = 0.00}$)								
-0.1045 (0.1747)	-0.2503 (0.6605)	-0.2711 (0.4204)	0.1136 (0.6262)	-0.1937 (0.5171)	-0.0213 (0.9665)	0.9116 (0.2158)	4.7e+09 (0.2179)	
D(intdomes,1)=C(1)(nmp(-1) +1.2600*imsoc(-1)-7.7115*intdomes(-1)-11516791840*t-43945591713) +C(2)*D(nmp(-1),1)+C(3)*D(nmp(-2),1)+C(4)*D(imsoc(-1),1)+C(5)*D(imsoc(-2),1)+C(6)*D(intdomes(-1),1)+C(7)*D(intdomes(-2),1)+C(8)* ($\boldsymbol{R^2 = 0.44}$, $\boldsymbol{R^2_{adj} = 0.23}$)								
-0.1086 (0.0185)	-0.4959 (0.1362)	-0.1536 (0.4216)	0.0338 (0.7980)	0.1016 (0.5495)	0.6682 (0.0300)	0.7422 (0.0823)	4.2e+09 (0.0576)	

Note: D (variable, 1) means first difference of the variable, D (variable, 2) means second difference of the variable, etc. C (1) means coefficient 1, C (2) means coefficient 2, etc., (-1) means first lag of variable, (-2) means second lag of variable, etc., and t means time trend.

Table A19. VECM Estimation Results, Models 5 and 6, GDR

C(1), or α, (p-value)	C(2), (p-value)	C(3), (p-value)	C(4), (p-value)	C(5), (p-value)	C(6), (p-value)	C(7), (p-value)	C(8), (p-value)	C(9), (p-value)
VECM5: *nmp imind ddebtdomes*, all endogenous, lag length=2, cointegrating vector, $\boldsymbol{\beta}$, normalized to *nmp*, Variables have deterministic linear trends but the cointegrating equation have only intercept								
D(nmp,1)=C(1)(nmp(-1) +17.0657*imind(-1)-17.0892*ddebtdomes(-1)-461569251780) +C(2)*D(nmp(-1),1)+C(3)*D(nmp(-2),1)+C(4)*D(imind(-1),1)+C(5)*D(imind(-2),1)+C(6)*D(ddebtdomes(-1),1)+C(7)*D(ddebtdomes(-2),1)+C(8)* ($\boldsymbol{R^2=0.72}$, $\boldsymbol{R^2_{adj}=0.62}$)								
0.0098 (0.0183)	0.3719 (0.1477)	-0.4639 (0.0244)	0.0128 (0.9302)	-0.1526 (0.2758)	0.3281 (0.0136)	-0.0828 (0.5398)	7.39e+09 (0.0028)	
D(imind,1)=C(1)(nmp(-1) +17.0657*imind(-1)-17.0892*ddebtdomes(-1)-461569251780) +C(2)*D(nmp(-1),1)+C(3)*D(nmp(-2),1)+C(4)*D(imind(-1),1)+C(5)*D(imind(-2),1)+C(6)*D(ddebtdomes(-1),1)+C(7)*D(ddebtdomes(-2),1)+C(8)* ($\boldsymbol{R^2=0.19}$, $\boldsymbol{R^2_{adj}=0.00}$)								
0.0563 (0.1139)	-3.2830 (0.1524)	-0.5861 (0.7324)	-0.3998 (0.7598)	0.5577 (0.6512)	1.3455 (0.2256)	0.6705 (0.5780)	2.85e+10 (0.1522)	
D(ddebtdomes,1)=C(1)(nmp(-1) +17.0657*imind(-1)-17.0892*ddebtdomes(-1)-461569251780) +C(2)*D(nmp(-1),1)+C(3)*D(nmp(-2),1)+C(4)*D(imind(-1),1)+C(5)*D(imind(-2),1)+C(6)*D(ddebtdomes(-1),1)+C(7)*D(ddebtdomes(-2),1)+C(8)* ($\boldsymbol{R^2=0.23}$, $\boldsymbol{R^2_{adj}=0.00}$)								
0.0906 (0.0575)	-3.9939 (0.1847)	-1.9056 (0.4028)	-0.5231 (0.7615)	0.4553 (0.7791)	2.0326 (0.1676)	1.3440 (0.4002)	4.20e+10 (0.1120)	
Variables have deterministic linear trends and cointegrating equation have intercept and non-deterministic linear trend								
D(nmp,1)=C(1)(nmp(-1) -1.5582*imind(-1)+3.0531*ddebtdomes(-1)-9250601402*t+19418668539) +C(2)*D(nmp(-1),1)+C(3)*D(nmp(-2),1)+C(4)*D(imind(-1),1)+C(5)*D(imind(-2),1)+C(6)*D(ddebtdomes(-1),1)+C(7)*D(ddebtdomes(-2),1)+C(8)* ($\boldsymbol{R^2=0.79}$, $\boldsymbol{R^2_{adj}=0.71}$)								
-0.0734 (0.0013)	0.1798 (0.4347)	-0.5294 (0.0044)	0.0041 (0.9738)	-0.1127 (0.3578)	0.4165 (0.0014)	0.0534 (0.6832)	9.09e+09 (0.0002)	
D(imind,1)=C(1)(nmp(-1) -1.5582*imind(-1)+3.0531*ddebtdomes(-1)-9250601402*t+19418668539) +C(2)*D(nmp(-1),1)+C(3)*D(nmp(-2),1)+C(4)*D(imind(-1),1)+C(5)*D(imind(-2),1)+C(6)*D(ddebtdomes(-1),1)+C(7)*D(ddebtdomes(-2),1)+C(8)* ($\boldsymbol{R^2=0.14}$, $\boldsymbol{R^2_{adj}=0.00}$)								
-0.2581 (0.2197)	-2.9436 (0.2334)	-0.2054 (0.9061)	-0.1250 (0.9243)	0.6105 (0.6337)	1.2955 (0.2824)	0.6747 (0.6253)	2.35e+10 (0.2628)	
D(ddebtdomes,1)=C(1)(nmp(-1) -1.5582*imind(-1)+3.0531*ddebtdomes(-1)-9250601402*t+19418668539) +C(2)*D(nmp(-1),1)+C(3)*D(nmp(-2),1)+C(4)*D(imind(-1),1)+C(5)*D(imind(-2),1)+C(6)*D(ddebtdomes(-1),1)+C(7)*D(ddebtdomes(-2),1)+C(8)* ($\boldsymbol{R^2=0.15}$, $\boldsymbol{R^2_{adj}=0.00}$)								
-0.4028 (0.1562)	-3.3357 (0.3112)	-1.2341 (0.5985)	-0.0555 (0.9749)	0.5265 (0.7588)	1.9088 (0.2391)	1.2903 (0.4876)	3.28e+10 (0.2445)	
Variables have quadratic trends and cointegrating equation have intercept and non-deterministic linear trend								
D(nmp,1)=C(1)(nmp(-1) -1.4890*imind(-1)+2.9163*ddebtdomes(-1)-5822271945*t-38289042935) +C(2)*D(nmp(-1),1)+C(3)*D(nmp(-2),1)+C(4)*D(imind(-1),1)+C(5)*D(imind(-2),1)+C(6)*D(ddebtdomes(-1),1)+C(7)*D(ddebtdomes(-2),1)+C(8)+C(9)*t* ($\boldsymbol{R^2=0.82}$, $\boldsymbol{R^2_{adj}=0.74}$)								
-0.1164 (0.0013)	0.1525 (0.4873)	-0.4618 (0.0101)	-0.0739 (0.5624)	-0.1823 (0.1485)	0.4823 (0.0005)	0.1244 (0.3466)	5.20e+09 (0.0001)	2.26e+08 (0.0032)
D(imind,1)=C(1)(nmp(-1) -1.4890*imind(-1)+2.9163*ddebtdomes(-1)-5822271945*t-38289042935) +C(2)*D(nmp(-1),1)+C(3)*D(nmp(-2),1)+C(4)*D(imind(-1),1)+C(5)*D(imind(-2),1)+C(6)*D(ddebtdomes(-1),1)+C(7)*D(ddebtdomes(-2),1)+C(8)+C(9)*t* ($\boldsymbol{R^2=0.37}$, $\boldsymbol{R^2_{adj}=0.07}$)								
0.3121 (0.3080)	-2.5570 (0.2425)	-1.1955 (0.4569)	1.0071 (0.4244)	1.6176 (0.1900)	0.3451 (0.7572)	-0.3401 (0.7911)	3.99e+09 (0.6921)	1.33e+09 (0.0567)
D(ddebtdomes,1)=C(1)(nmp(-1) -1.4890*imind(-1)+2.9163*ddebtdomes(-1)-5822271945*t-38289042935) +C(2)*D(nmp(-*								

*1),1)+C(3)*D(nmp(-2),1)+C(4)*D(imind(-1),1)+C(5)*D(imind(-2),1)+C(6)*D(ddebtdomes(-1),1)+C(7)*D(ddebtdomes(-2),1)+C(8)+C(9)*t* ($R^2 = 0.34$, $R^2_{adj} = 0.04$)								
0.3080 (0.4605)	-2.8422 (0.3408)	-2.4665 (0.2686)	1.3619 (0.4314)	1.7837 (0.2884)	0.7170 (0.6406)	0.0170 (0.9923)	3.78e+09 (0.7846)	1.93e+09 (0.0445)
VECM6: *nmp imind intdomes*, all endogenous, lag length=2, cointegrating vector, $\boldsymbol{\beta}$, normalized to *nmp*, Variables have deterministic linear trends but the cointegrating equation have only intercept								
D(nmp,1)=C(1)(nmp(-1) +2.0974*imind(-1)-13.0373*intdomes(-1)-169909418216) +C(2)*D(nmp(-1),1)+C(3)*D(nmp(-2),1)+C(4)*D(imind(-1),1)+C(5)*D(imind(-2),1)+C(6)*D(intdomes(-1),1)+C(7)*D(intdomes(-2),1)+C(8)* ($R^2 = 0.70$, $R^2_{adj} = 0.59$)								
-0.0038 (0.7372)	0.9662 (0.0005)	-0.1828 (0.3525)	0.1677 (0.2367)	-0.2584 (0.0994)	0.5635 (0.0314)	-0.8264 (0.0133)	1.54e+09 (0.3724)	
D(imind,1)=C(1)(nmp(-1) +2.0974*imind(-1)-13.0373*intdomes(-1)-169909418216) +C(2)*D(nmp(-1),1)+C(3)*D(nmp(-2),1)+C(4)*D(imind(-1),1)+C(5)*D(imind(-2),1)+C(6)*D(intdomes(-1),1)+C(7)*D(intdomes(-2),1)+C(8)* ($R^2 = 0.42$, $R^2_{adj} = 0.20$)								
0.2632 (0.0027)	-3.9431 (0.0220)	-1.1410 (0.3926)	0.1381 (0.8839)	1.1847 (0.2570)	1.4970 (0.3752)	3.4986 (0.1056)	3.44e+10 (0.0074)	
D(intdomes,1)=C(1)(nmp(-1) +2.0974*imind(-1)-13.0373*intdomes(-1)-169909418216) +C(2)*D(nmp(-1),1)+C(3)*D(nmp(-2),1)+C(4)*D(imind(-1),1)+C(5)*D(imind(-2),1)+C(6)*D(intdomes(-1),1)+C(7)*D(intdomes(-2),1)+C(8)* ($R^2 = 0.51$, $R^2_{adj} = 0.33$)								
0.0416 (0.0012)	-0.5123 (0.0361)	-0.2843 (0.1457)	0.0281 (0.8362)	-0.0350 (0.8128)	0.4391 (0.0794)	0.4675 (0.1306)	5.39e+09 (0.0040)	
Variables have deterministic linear trends and cointegrating equation have intercept and non-deterministic linear trend, cointegrating vector, $\boldsymbol{\beta}$, is not normalized to *nmp*,								
D(nmp,1)=C(1)(nmp(-1) +0.2729*imind(-1)+6.8190*intdomes(-1)-11309646748*t+6808488966) +C(2)*D(nmp(-1),1)+C(3)*D(nmp(-2),1)+C(4)*D(imind(-1),1)+C(5)*D(imind(-2),1)+C(6)*D(intdomes(-1),1)+C(7)*D(intdomes(-2),1)+C(8)* ($R^2 = 0.71$, $R^2_{adj} = 0.60$)								
-0.0211 (0.3835)	0.7836 (0.0041)	-0.3022 (0.1289)	0.1569 (0.1289)	-0.2014 (0.1916)	0.5809 (0.0248)	-0.5994 (0.0720)	3.44e+09 (0.0686)	
D(imind,1)=C(1)(nmp(-1) +0.2729*imind(-1)+6.8190*intdomes(-1)-11309646748*t+6808488966) +C(2)*D(nmp(-1),1)+C(3)*D(nmp(-2),1)+C(4)*D(imind(-1),1)+C(5)*D(imind(-2),1)+C(6)*D(intdomes(-1),1)+C(7)*D(intdomes(-2),1)+C(8)* ($R^2 = 0.30$, $R^2_{adj} = 0.04$)								
-0.4647 (0.0180)	-3.7677 (0.0526)	-0.8195 (0.5767)	0.2581 (0.8030)	1.1562 (0.3179)	1.4331 (0.4373)	3.3948 (0.1708)	3.12e+10 (0.0324)	
D(intdomes,1)=C(1)(nmp(-1) +0.2729*imind(-1)+6.8190*intdomes(-1)-11309646748*t+6808488966) +C(2)*D(nmp(-1),1)+C(3)*D(nmp(-2),1)+C(4)*D(imind(-1),1)+C(5)*D(imind(-2),1)+C(6)*D(intdomes(-1),1)+C(7)*D(intdomes(-2),1)+C(8)* ($R^2 = 0.43$, $R^2_{adj} = 0.21$)								
-0.0780 (0.0066)	-0.5136 (0.0624)	-0.2520 (0.2348)	0.0456 (0.7568)	-0.0304 (0.8519)	0.4317 (0.1095)	0.4875 (0.1672)	5.18e+09 (0.0143)	

Note: D (variable, 1) means first difference of the variable, D (variable, 2) means second difference of the variable, etc. C (1) means coefficient 1, C (2) means coefficient 2, etc., (-1) means first lag of variable, (-2) means second lag of variable, etc., and t means time trend.

Table A20. Unit Root Test Results of Variables of Interest, ADF Test, Hungary

Variable and Specification	t-Statistic (p-value)	Lag Length	Break Date
Augmented Dickey-Fuller Test			
***nmp* with intercept**	-1.1129 (0.6969)	0	N/A
D(*nmp*,1) with intercept	-3.5352 (0.0144)	0	N/A
***imtot* with intercept**	-1.2494 (0.6388)	0	N/A
D(*imtot*,1) with intercept	-4.7264 (0.0008)	1	N/A
***imsoc* with intercept**	-1.7443 (0.3994)	0	N/A
D(*imsoc*,1) with intercept	-4.9370 (0.0004)	0	N/A
***imind* with intercept**	0.0208 (0.9531)	0	N/A
D(*imind*,1) with intercept	-7.0062 (0.0000)	0	N/A
***debtdomes* with intercept**	1.1529 (0.9970)	0	N/A
D(*debtdomes*,1) with intercept	-3.7073 (0.0096)	0	N/A
***intdomes* with intercept**	-0.1025 (0.9401)	0	N/A
D(*intdomes*,1) with intercept	-3.9464 (0.0054)	0	N/A

Note: D (variable, 1) means first difference of the variable, D (variable, 2) means second difference of the variable, etc.

Table A21. Unit Root Test Results of Variables of Interest, Breakpoint ADF Test, Hungary

Variable and Specification	t-Statistic (p-value)	Lag Length	Break Date
Augmented Dickey-Fuller with Break Test			
***nmp* with intercept**	-2.9002 (0.7389)	0	1968
D(*nmp*,1) with intercept	-4.4653 (0.0474)	0	1977
***imtot* with intercept**	-3.8891 (0.1977)	0	1969
D(*imtot*,1) with intercept	-5.7344 (< 0.01)	0	1978
***imsoc* with intercept**	-3.6141 (0.3235)	0	1969
D(*imsoc*,1) with intercept	-6.0333 (< 0.01)	0	1975
***imind* with intercept**	-1.2344 (> 0.99)	1	1969
D(*imind*,1) with intercept	-7.5285 (< 0.01)	0	1974
***debtdomes* with intercept**	-1.5845 (> 0.99)	0	1974
D(*debtdomes*,1) with intercept	-6.4036 (< 0.01)	5	1975
***intdomes* with intercept**	7.5506 (> 0.99)	7	1984
D(*intdomes*,1) with intercept	-6.3276 (< 0.01)	6	1983

Note: D (variable, 1) means first difference of the variable, D (variable, 2) means second difference of the variable, etc.

Table A22. Toda-Yamamoto Version of the Granger Causality Test Results, Models 1–3, Hungary

Variable	Chi-Square Statistic	Degrees of Freedom	p-value
Block Exogeneity Wald Test, based on VAR			
Model 1 with one endogenous lag and extra one exogenous lag			
Dependent variable: *nmp*			
Excluded variable: *imtot*	0.4452	1	0.5046
Excluded variable: *debtdomes*	0.1553	1	0.6936
Both variables excluded	0.7314	2	0.6937
Dependent variable: *imtot*			
Excluded variable: *nmp*	5.0148	1	0.0251
Excluded variable: *debtdomes*	0.6925	1	0.4053
Both variables excluded	5.4962	2	0.0640
Dependent variable: *debtdomes*			
Excluded variable: *nmp*	0.0170	1	0.8962
Excluded variable: *imtot*	0.9031	1	0.3420
Both variables excluded	1.0086	2	0.6039
Model 2 with one endogenous lag and extra one exogenous lag			
Dependent variable: *nmp*			
Excluded variable: *imtot*	0.0753	1	0.7838
Excluded variable: *intdomes*	0.7671	1	0.3811
Both variables excluded	0.8009	2	0.6700
Dependent variable: *imtot*			
Excluded variable: *nmp*	3.6219	1	0.0570
Excluded variable: *intdomes*	0.9628	1	0.3265
Both variables excluded	5.5561	2	0.0577
Dependent variable: *intdomes*			
Excluded variable: *nmp*	3.5875	1	0.0582
Excluded variable: *imtot*	0.1739	1	0.6767
Both variables excluded	3.6535	2	0.1609
Model 3 with one endogenous lag and extra one exogenous lag			
Dependent variable: *nmp*			
Excluded variable: *imsoc*	0.7006	1	0.4026
Excluded variable: *debtdomes*	0.0939	1	0.7593
Both variables excluded	0.8403	2	0.6569
Dependent variable: *imsoc*			
Excluded variable: *nmp*	0.2615	1	0.6091
Excluded variable: *debtdomes*	0.7484	1	0.3870
Both variables excluded	1.0104	2	0.6034
Dependent variable: *debtdomes*			
Excluded variable: *nmp*	0.0412	1	0.8391
Excluded variable: *imsoc*	0.0007	1	0.9791
Both variables excluded	0.0492	2	0.9757

Table A23. Toda-Yamamoto Version of the Granger Causality Test Results, Models 4-6, Hungary

Variable	Chi-Square Statistic	Degrees of Freedom	p-value
Block Exogeneity Wald Test, based on VAR			
Model 4 with one endogenous lag and extra one exogenous lag			
Dependent variable: *nmp*			
Excluded variable: *imsoc*	1.2211	1	0.2692
Excluded variable: *intdomes*	0.6531	1	0.4190
Both variables excluded	1.4915	2	0.4744
Dependent variable: *imsoc*			
Excluded variable: *nmp*	0.1746	1	0.6761
Excluded variable: *intdomes*	2.2050	1	0.1376
Both variables excluded	2.8538	2	0.2401
Dependent variable: *intdomes*			
Excluded variable: *nmp*	4.5874	1	0.0322
Excluded variable: *imsoc*	0.4537	1	0.5006
Both variables excluded	4.7009	2	0.0953
Model 5 with one endogenous lag and extra one exogenous lag			
Dependent variable: *nmp*			
Excluded variable: *imind*	5.6963	1	0.0170
Excluded variable: *debtdomes*	0.0024	1	0.9610
Both variables excluded	6.0139	2	0.0494
Dependent variable: *imind*			
Excluded variable: *nmp*	2.4740	1	0.1157
Excluded variable: *debtdomes*	0.0611	1	0.8048
Both variables excluded	2.5981	2	0.2728
Dependent variable: *debtdomes*			
Excluded variable: *nmp*	0.0913	1	0.7626
Excluded variable: *imind*	1.5789	1	0.2089
Both variables excluded	2.0880	2	0.3520
Model 6 with one endogenous lag and extra one exogenous lag			
Dependent variable: *nmp*			
Excluded variable: *imind*	5.1500	1	0.0232
Excluded variable: *intdomes*	3.3840	1	0.0658
Both variables excluded	6.2379	2	0.0442
Dependent variable: *imind*			
Excluded variable: *nmp*	0.0140	1	0.9059
Excluded variable: *intdomes*	0.0304	1	0.8617
Both variables excluded	0.0787	2	0.9614
Dependent variable: *intdomes*			
Excluded variable: *nmp*	1.4152	1	0.2342
Excluded variable: *imind*	0.0546	1	0.8153
Both variables excluded	1.7388	2	0.4192

Table A24. Johansen Cointegration Test Results, Models 1–6, Hungary

Number of Cointegrating Equations	Trace Statistic (p-value)	Result from Trace Rank Test	Maximum Eigenvalue Statistic (p-value)	Result from Maximum Eigenvalue Rank Test
VAR1: *nmp imtot debtdomes,* all endogenous variables, lag length=1 No Cointegrating Equation in the Model at 5 percent significance level				
VAR2: *nmp imtot intdomes,* all endogenous variables, lag length=1				
Test Version 1: Variables have deterministic linear trends but the cointegrating equation have only intercept				
None	34.0067 (0.0154)	1 Cointegrating Equation in the Model at 5 percent significance level	19.9068 (0.0735)	No Cointegrating Equation in the Model at 5 percent significance level
At most 1	14.0999 (0.0802)		11.1801 (0.1454)	
At most 2	2.9198 (0.0875)		2.9198 (0.0875)	
VAR3: *nmp imsoc debtdomes,* all endogenous variables, lag length=1 No Cointegrating Equation in the Model at 5 percent significance level				
VAR4: *nmp imsoc intdomes,* all endogenous variables, lag length=1				
Test Version 1: Variables have deterministic linear trends but the cointegrating equation have only intercept				
None	30.9399 (0.0368)	1 Cointegrating Equation in the Model at 5 percent significance level	22.4912 (0.0320)	1 Cointegrating Equation in the Model at 5 percent significance level
At most 1	8.4487 (0.4187)		5.4319 (0.6866)	
At most 2	3.0168 (0.0824)		3.0168 (0.0824)	
VAR5: *nmp imind debtdomes,* all endogenous variables, lag length=1				
Test Version 1: Variables have deterministic linear trends but the cointegrating equation have only intercept				
None	31.1189 (0.0350)	1 Cointegrating Equation in the Model at 5 percent significance level	22.6939 (0.0299)	1 Cointegrating Equation in the Model at 5 percent significance level
At most 1	8.4250 (0.4211)		6.3300 (0.5712)	
At most 2	2.0951 (0.1478)		2.0951 (0.1478)	
VAR6: *nmp imind intdomes,* all endogenous variables, lag length=1				
Test Version 1: Variables have deterministic linear trends but the cointegrating equation have only intercept				
None	37.4364 (0.0054)	1 Cointegrating Equation in the Model at 5 percent significance level	28.8514 (0.0034)	1 Cointegrating Equation in the Model at 5 percent significance level
At most 1	8.5850 (0.4051)		6.3938 (0.5632)	
At most 2	2.1912 (0.1388)		2.1912 (0.1388)	
Test Version 2: Variables have deterministic linear trends and cointegrating equation have intercept and non-deterministic linear trend				
None	43.9682 (0.0391)	1 Cointegrating Equation in the Model at 5 percent significance level	31.8286 (0.0071)	1 Cointegrating Equation in the Model at 5 percent significance level
At most 1	12.1396 (0.8023)		8.5393 (0.7708)	
At most 2	3.6003 (0.7988)		3.6003 (0.7988)	
Test Version 3: Variables have quadratic trends and cointegrating equation have intercept and non-deterministic linear trend				
None	41.4929 (0.0089)	1 Cointegrating Equation in the Model at 5 percent significance level	31.5235 (0.0046)	1 Cointegrating Equation in the Model at 5 percent significance level
At most 1	9.9693 (0.4835)		8.4176 (0.5573)	
At most 2	1.5518 (0.2129)		1.5518 (0.2129)	

Table A25. VECM Estimation Results, Models 2 and 4, Hungary

C(1), or α, (p-value)	C(2), (p-value)	C(3), (p-value)	C(4), (p-value)	C(5), (p-value)	C(6), (p-value)
VECM2: *nmp imtot intdomes*, all endogenous, lag length=1, cointegrating vector, $\boldsymbol{\beta}$, normalized to *nmp*, Variables have deterministic linear trends but the cointegrating equation have only intercept					
D(nmp,1)=C(1)(nmp(-1) -1.3871*imtot(-1)-0.9753*intdomes(-1) -101182824470) +C(2)*D(nmp(-1),1)+C(3)*D(imtot(-1),1)+C(4)*D(intdomes(-1),1)+C(5)* ($\boldsymbol{R^2 = 0.11}$, $\boldsymbol{R^2_{adj} = 0.00}$)					
-0.0283 (0.8754)	0.3242 (0.2070)	0.0424 (0.8400)	0.0312 (0.9538)	8.60e+09 (0.0159)	
D(imtot,1)=C(1)(nmp(-1) -1.3871*imtot(-1)-0.9753*intdomes(-1) -101182824470) +C(2)*D(nmp(-1),1)+C(3)*D(imtot(-1),1)+C(4)*D(intdomes(-1),1)+C(5)* ($\boldsymbol{R^2 = 0.52}$, $\boldsymbol{R^2_{adj} = 0.44}$)					
0.6713 (0.0003)	-0.0079 (0.9719)	0.4007 (0.0413)	0.4070 (0.4015)	4.48e+09 (0.1423)	
D(intdomes,1)=C(1)(nmp(-1) -1.3871*imtot(-1)-0.9753*intdomes(-1) -101182824470) +C(2)*D(nmp(-1),1)+C(3)*D(imtot(-1),1)+C(4)*D(intdomes(-1),1)+C(5)* ($\boldsymbol{R^2 = 0.31}$, $\boldsymbol{R^2_{adj} = 0.19}$)					
-0.0243 (0.7093)	0.2430 (0.0130)	-0.0577 (0.4497)	0.2425 (0.2208)	-1.55e+09 (0.2059)	
VECM4: *nmp imsoc intdomes*, all endogenous, lag length=1, cointegrating vector, $\boldsymbol{\beta}$, normalized to *nmp*, Variables have deterministic linear trends but the cointegrating equation have only intercept					
D(nmp,1)=C(1)(nmp(-1) -2.2404*imsoc(-1)-3.9114*intdomes(-1) -90194797371) +C(2)*D(nmp(-1),1)+C(3)*D(imsoc(-1),1)+C(4)*D(intdomes(-1),1)+C(5)* ($\boldsymbol{R^2 = 0.19}$, $\boldsymbol{R^2_{adj} = 0.05}$)					
0.0495 (0.6739)	0.3442 (0.2029)	-0.2422 (0.2029)	0.0792 (0.8762)	9.56e+09 (0.0110)	
D(imsoc,1)=C(1)(nmp(-1) -2.2404*imsoc(-1)-3.9114*intdomes(-1) -90194797371) +C(2)*D(nmp(-1),1)+C(3)*D(imsoc(-1),1)+C(4)*D(intdomes(-1),1)+C(5)* ($\boldsymbol{R^2 = 0.32}$, $\boldsymbol{R^2_{adj} = 0.20}$)					
0.3402 (0.0062)	-0.2867 (0.2726)	0.2437 (0.2857)	0.2377 (0.6311)	5.54e+09 (0.1126)	
D(intdomes,1)=C(1)(nmp(-1) -2.2404*imsoc(-1)-3.9114*intdomes(-1) -90194797371) +C(2)*D(nmp(-1),1)+C(3)*D(imsoc(-1),1)+C(4)*D(intdomes(-1),1)+C(5)* ($\boldsymbol{R^2 = 0.32}$, $\boldsymbol{R^2_{adj} = 0.20}$)					
0.0389 (0.3823)	0.1532 (0.1346)	0.0185 (0.8323)	0.3061 (0.1193)	-1.06e+09 (0.4242)	

Note: D (variable, 1) means first difference of the variable, D (variable, 2) means second difference of the variable, etc. C (1) means coefficient 1, C (2) means coefficient 2, etc., (-1) means first lag of variable, (-2) means second lag of variable, etc., and t means time trend.

Table A26. VECM Estimation Results, Models 5 and 6, Hungary

C(1), or α, (p-value)	C(2), (p-value)	C(3), (p-value)	C(4), (p-value)	C(5), (p-value)	C(6), (p-value)
VECM5: *nmp imind debtdomes*, all endogenous, lag length=1, cointegrating vector, $\boldsymbol{\beta}$, normalized to *nmp*, Variables have deterministic linear trends but the cointegrating equation have only intercept					
D(nmp,1)=C(1)(nmp(-1) -5.0587*imind(-1)+0.7012*debtdomes(-1) -120115972980) +C(2)*D(nmp(-1),1)+C(3)*D(imind(-1),1)+C(4)*D(debtdomes(-1),1)+C(5)* ($\boldsymbol{R^2=0.41}$, $\boldsymbol{R^2_{adj}=0.31}$)					
-0.1424 (0.0071)	-0.0027 (0.9889)	-0.0961 (0.6993)	0.1033 (0.2004)	1.22e+10 (0.0006)	
D(imind,1)=C(1)(nmp(-1) -5.0587*imind(-1)+0.7012*debtdomes(-1) -120115972980) +C(2)*D(nmp(-1),1)+C(3)*D(imind(-1),1)+C(4)*D(debtdomes(-1),1)+C(5)* ($\boldsymbol{R^2=0.23}$, $\boldsymbol{R^2_{adj}=0.10}$)					
0.0804 (0.1258)	0.3115 (0.1404)	-0.1610 (0.5390)	-0.0138 (0.8682)	1.49e+09 (0.6473)	
D(debtdomes,1)=C(1)(nmp(-1) -5.0587*imind(-1)+0.7012*debtdomes(-1) -120115972980) +C(2)*D(nmp(-1),1)+C(3)*D(imind(-1),1)+C(4)*D(debtdomes(-1),1)+C(5)* ($\boldsymbol{R^2=0.17}$, $\boldsymbol{R^2_{adj}=0.3}$)					
-0.0772 (0.6341)	-0.1554 (0.8116)	-1.3904 (0.1019)	0.4630 (0.0885)	1.67e+10 (0.1127)	
VECM6: *nmp imind intdomes*, all endogenous, lag length=1, cointegrating vector, $\boldsymbol{\beta}$, normalized to *nmp*, Variables have deterministic linear trends but the cointegrating equation have only intercept					
D(nmp,1)=C(1)(nmp(-1) -6.0195*imind(-1)+9.5921*intdomes(-1) -76568017066) +C(2)*D(nmp(-1),1)+C(3)*D(imind(-1),1)+C(4)*D(intdomes(-1),1)+C(5)* ($\boldsymbol{R^2=0.40}$, $\boldsymbol{R^2_{adj}=0.30}$)					
-0.1253 (0.0098)	-0.0769 (0.7271)	-0.1566 (0.5562)	0.1239 (0.7771)	1.45e+10 (0.0005)	
D(imind,1)=C(1)(nmp(-1) -6.0195*imind(-1)+9.5921*intdomes(-1) -76568017066) +C(2)*D(nmp(-1),1)+C(3)*D(imind(-1),1)+C(4)*D(intdomes(-1),1)+C(5)* ($\boldsymbol{R^2=0.19}$, $\boldsymbol{R^2_{adj}=0.05}$)					
-0.0366 (0.4477)	0.0409 (0.8587)	-0.5655 (0.0547)	0.5715 (0.2276)	5.72e+09 (0.1452)	
D(intdomes,1)=C(1)(nmp(-1) -6.0195*imind(-1)+9.5921*intdomes(-1) -76568017066) +C(2)*D(nmp(-1),1)+C(3)*D(imind(-1),1)+C(4)*D(intdomes(-1),1)+C(5)* ($\boldsymbol{R^2=0.36}$, $\boldsymbol{R^2_{adj}=0.25}$)					
-0.0282 (0.1481)	0.1222 (0.1895)	-0.1458 (0.2022)	0.3361 (0.0797)	-43729119 (0.9771)	
Variables have deterministic linear trends and cointegrating equation have intercept and non-deterministic linear trend, cointegrating vector, $\boldsymbol{\beta}$, is not normalized to *nmp*,					
D(nmp,1)=C(1)(nmp(-1) -7.0721*imind(-1)+10.2337*intdomes(-1) -4193106611*t-76911389358) +C(2)*D(nmp(-1),1)+C(3)*D(imind(-1),1)+C(4)*D(intdomes(-1),1)+C(5)* ($\boldsymbol{R^2=0.40}$, $\boldsymbol{R^2_{adj}=0.29}$)					
-0.1162 (0.0108)	-0.1020 (0.6486)	-0.1715 (0.5289)	0.0504 (0.9076)	1.50e+10 (0.0005)	
D(imind,1)=C(1)(nmp(-1) -7.0721*imind(-1)+10.2337*intdomes(-1) -4193106611*t-76911389358) +C(2)*D(nmp(-1),1)+C(3)*D(imind(-1),1)+C(4)*D(intdomes(-1),1)+C(5)* ($\boldsymbol{R^2=0.17}$, $\boldsymbol{R^2_{adj}=0.03}$)					
-0.0131 (0.7738)	0.1064 (0.6577)	-0.4765 (0.1115)	0.5129 (0.2770)	4.60e+09 (0.2580)	
D(intdomes,1)=C(1)(nmp(-1) -7.0721*imind(-1)+10.2337*intdomes(-1) -4193106611*t-76911389358) +C(2)*D(nmp(-1),1)+C(3)*D(imind(-1),1)+C(4)*D(intdomes(-1),1)+C(5)* ($\boldsymbol{R^2=0.35}$, $\boldsymbol{R^2_{adj}=0.24}$)					
-0.0238 (0.1952)	0.1248 (0.1978)	-0.1386 (0.2374)	0.3153 (0.0980)	-82888736 (0.9585)	
Variables have quadratic trends and cointegrating equation have intercept and non-deterministic linear trend					
D(nmp,1)=C(1)(nmp(-1) -7.0504*imind(-1)+10.2310*intdomes(-1) +3024747199*t-60253163937) +C(2)*D(nmp(-1),1)+C(3)*D(imind(-1),1)+C(4)*D(intdomes(-1),1)+C(5)+C(6)*t* ($\boldsymbol{R^2=0.43}$, $\boldsymbol{R^2_{adj}=0.29}$)					
-0.1161 (0.0110)	-0.1519 (0.5075)	-0.1598 (0.5568)	0.1004 (0.8180)	2.09e+10 (0.0013)	-3.49e+08 (0.1273)
D(imind,1)=C(1)(nmp(-1) -7.0504*imind(-1)+10.2310*intdomes(-1) +3024747199*t-60253163937) +C(2)*D(nmp(-1),1)+C(3)*D(imind(-1),1)+C(4)*D(intdomes(-1),1)+C(5)+C(6)*t* ($\boldsymbol{R^2=0.20}$, $\boldsymbol{R^2_{adj}=0.02}$)					
-0.0140 (0.7611)	0.1493 (0.5467)	-0.4894 (0.1051)	0.4712 (0.3228)	1.27e+09 (0.8386)	1.87e+08 (0.4413)
D(intdomes,1)=C(1)(nmp(-1) -7.0504*imind(-1)+10.2310*intdomes(-1) +3024747199*t-60253163937) +C(2)*D(nmp(-1),1)+C(3)*D(imind(-1),1)+C(4)*D(intdomes(-1),1)+C(5)+C(6)*t* ($\boldsymbol{R^2=0.44}$, $\boldsymbol{R^2_{adj}=0.31}$)					
-0.0241 (0.1695)	0.1606 (0.0933)	-0.1473 (0.1893)	0.2813 (0.1220)	-2.57e+09 (0.2769)	1.36e+08 (0.1414)

Note: D (variable, 1) means first difference of the variable, D (variable, 2) means second difference of the variable, etc. C (1) means coefficient 1, C (2) means coefficient 2, etc., (-1) means first lag of variable, (-2) means second lag of variable, etc., and t means time trend.

Table A27. Unit Root Test Results of Variables of Interest, ADF Test, Poland

Variable and Specification	t-Statistic (p-value)	Lag Length	Break Date
Augmented Dickey-Fuller Test			
***nmp* with intercept**	-1.0866 (0.7061)	2	N/A
D(*nmp*,1) with intercept	-2.9085 (0.0575)	1	N/A
D(*nmp*,2) with intercept	-3.7742 (0.0084)	0	N/A
***imtot* with intercept**	-1.3199 (0.6060)	1	N/A
D(*imtot*,1) with intercept	-2.5015 (0.1258)	0	N/A
D(*imtot*,2) with intercept	-5.5175 (0.0001)	0	N/A
***imsoc* with intercept**	-1.7691 (0.3873)	1	N/A
D(*imsoc*,1) with intercept	-2.7496 (0.0786)	0	N/A
D(*imsoc*,2) with intercept	-6.7206 (0.0000)	0	N/A
***imind* with intercept**	-1.1666 (0.6743)	1	N/A
D(*imind*,1) with intercept	-2.1865 (0.2152)	0	N/A
D(*imind*,2) with intercept	-6.4043 (0.0000)	0	N/A
***debtdomes* with intercept**	8.6366 (1.0000)	7	N/A
D(*debtdomes*,1) with intercept	5.4969 (1.0000)	7	N/A
D(*debtdomes*,2) with intercept	-5.9516 (0.0001)	3	N/A
***intdomes* with intercept**	4.3014 (1.0000)	7	N/A
D(*intdomes*,1) with intercept	-5.7979 (0.0000)	0	N/A

Note: D (variable, 1) means first difference of the variable, D (variable, 2) means second difference of the variable, etc.

Table A28. Unit Root Test Results of Variables of Interest, Breakpoint ADF Test, Poland

Variable and Specification	t-Statistic (p-value)	Lag Length	Break Date
Augmented Dickey-Fuller with Break Test			
***nmp* with intercept**	-2.4617 (0.9122)	3	1982
D(*nmp*,1) with intercept	-3.8254 (0.2248)	1	1981
D(*nmp*,2) with intercept	-5.8555 (< 0.01)	1	1981
***imtot* with intercept**	-3.2482 (0.5365)	1	1971
D(*imtot*,1) with intercept	-3.8995 (0.1937)	0	1981
D(*imtot*,2) with intercept	-7.0375 (< 0.01)	0	1981
***imsoc* with intercept**	-2.8786 (0.7488)	0	1969
D(*imsoc*,1) with intercept	-5.1633 (< 0.01)	3	1980
***imind* with intercept**	-3.6254 (0.3182)	2	1971
D(*imind*,1) with intercept	-3.0583 (0.6517)	0	1981
D(*imind*,2) with intercept	-7.4591 (< 0.01)	0	1975
***debtdomes* with intercept**	-2.2924 (0.9479)	0	1980
D(*debtdomes*,1) with intercept	-26.3330 (< 0.01)	5	1981
***intdomes* with intercept**	-1.4350 (> 0.99)	0	1979
D(*intdomes*,1) with intercept	-19.0668 (< 0.01)	4	1981

Note: D (variable, 1) means first difference of the variable, D (variable, 2) means second difference of the variable, etc.

Table A29. Toda-Yamamoto Version of the Granger Causality Test Results, Models 1–3, Poland

Variable	Chi-Square Statistic	Degrees of Freedom	p-value
Block Exogeneity Wald Test, based on VAR			
Model 1 with two endogenous lags and extra two exogenous lags			
Dependent variable: *nmp*			
Excluded variable: *imtot*	1.2599	2	0.5326
Excluded variable: *debtdomes*	2.8893	2	0.2358
Both variables excluded	3.5290	4	0.4735
Dependent variable: *imtot*			
Excluded variable: *nmp*	13.0915	2	0.0014
Excluded variable: *debtdomes*	7.0114	2	0.0300
Both variables excluded	20.8662	4	0.0003
Dependent variable: *debtdomes*			
Excluded variable: *nmp*	0.6686	2	0.7158
Excluded variable: *imtot*	5.8879	2	0.0527
Both variables excluded	6.9774	4	0.1371
Model 2 with two endogenous lags and extra two exogenous lags			
Dependent variable: *nmp*			
Excluded variable: *imtot*	1.3580	2	0.5046
Excluded variable: *intdomes*	3.2222	2	0.1997
Both variables excluded	3.9337	4	0.4151
Dependent variable: *imtot*			
Excluded variable: *nmp*	14.9038	2	0.0006
Excluded variable: *intdomes*	5.8594	2	0.0534
Both variables excluded	17.5209	4	0.0015
Dependent variable: *intdomes*			
Excluded variable: *nmp*	0.5429	2	0.7623
Excluded variable: *imtot*	4.5263	2	0.1040
Both variables excluded	8.1748	4	0.0854
Model 3 with two endogenous lags and extra two exogenous lags			
Dependent variable: *nmp*			
Excluded variable: *imsoc*	0.3224	2	0.8511
Excluded variable: *debtdomes*	3.4407	2	0.1790
Both variables excluded	4.4534	4	0.3481
Dependent variable: *imsoc*			
Excluded variable: *nmp*	8.6900	2	0.0130
Excluded variable: *debtdomes*	7.9767	2	0.0185
Both variables excluded	16.6582	4	0.0023
Dependent variable: *debtdomes*			
Excluded variable: *nmp*	3.1748	2	0.2045
Excluded variable: *imsoc*	2.8322	2	0.2427
Both variables excluded	3.7602	4	0.4394

Table A30. Toda-Yamamoto Version of the Granger Causality Test Results, Models 4–6, Poland

Variable	Chi-Square Statistic	Degrees of Freedom	p-value
Block Exogeneity Wald Test, based on VAR			
Model 4 with four endogenous lags and extra two exogenous lags			
Dependent variable: *nmp*			
Excluded variable: *imsoc*	2.5650	4	0.6330
Excluded variable: *intdomes*	4.0576	4	0.3983
Both variables excluded	11.9888	8	0.1517
Dependent variable: *imsoc*			
Excluded variable: *nmp*	2.9871	4	0.5600
Excluded variable: *intdomes*	3.5430	4	0.4714
Both variables excluded	7.2946	8	0.5052
Dependent variable: *intdomes*			
Excluded variable: *nmp*	7.5648	4	0.1089
Excluded variable: *imsoc*	2.9849	4	0.5603
Both variables excluded	24.4637	8	0.0019
Model 5 with two endogenous lags and extra two exogenous lags			
Dependent variable: *nmp*			
Excluded variable: *imind*	1.0219	2	0.5999
Excluded variable: *debtdomes*	4.3529	2	0.1134
Both variables excluded	4.407	4	0.3472
Dependent variable: *imind*			
Excluded variable: *nmp*	2.4394	2	0.2953
Excluded variable: *debtdomes*	0.2004	2	0.9046
Both variables excluded	2.5236	4	0.6404
Dependent variable: *debtdomes*			
Excluded variable: *nmp*	0.1492	2	0.9281
Excluded variable: *imind*	2.9176	2	0.2325
Both variables excluded	4.5874	4	0.3323
Model 6 with two endogenous lags and extra two exogenous lags			
Dependent variable: *nmp*			
Excluded variable: *imind*	0.9568	2	0.6198
Excluded variable: *intdomes*	6.1434	2	0.0463
Both variables excluded	6.2766	4	0.1794
Dependent variable: *imind*			
Excluded variable: *nmp*	3.4429	2	0.1788
Excluded variable: *intdomes*	0.9319	2	0.6275
Both variables excluded	3.8261	4	0.4300
Dependent variable: *intdomes*			
Excluded variable: *nmp*	2.4258	2	0.2973
Excluded variable: *imind*	0.9965	2	0.6076
Both variables excluded	2.9634	4	0.5640

Table A31. Unit Root Test Results of Variables of Interest, ADF Test, USSR

Variable and Specification	t-Statistic (p-value)	Lag Length	Break Date
Augmented Dickey-Fuller Test			
***nmp* with intercept**	-0.1485 (0.9346)	0	N/A
D(*nmp*,1) with intercept	-4.6024 (0.0011)	0	N/A
***imtot* with intercept**	0.4167 (0.9802)	0	N/A
D(*imtot*,1) with intercept	-4.5292 (0.0013)	0	N/A
***imsoc* with intercept**	4.0355 (1.0000)	6	N/A
D(*imsoc*,1) with intercept	-4.0400 (0.0043)	0	N/A
***imind* with intercept**	-0.7125 (0.8271)	2	N/A
D(*imind*,1) with intercept	-3.8635 (0.0068)	1	N/A
***debtdomes* with intercept**	0.8726 (0.9935)	1	N/A
D(*debtdomes*,1) with intercept	-1.6792 (0.4300)	1	N/A
D(*debtdomes*,2) with intercept	-8.3528 (0.0000)	0	N/A
***intdomes* with intercept**	-0.9726 (0.7489)	1	N/A
D(*intdomes*,1) with intercept	-4.0243 (0.0054)	5	N/A

Note: D (variable, 1) means first difference of the variable, D (variable, 2) means second difference of the variable, etc.

Table A32. Unit Root Test Results of Variables of Interest, Breakpoint ADF Test, USSR

Variable and Specification	t-Statistic (p-value)	Lag Length	Break Date
Augmented Dickey-Fuller with Break Test			
***nmp* with intercept**	-1.4925 (> 0.99)	0	1965
D(*nmp*,1) with intercept	-5.3742 (< 0.01)	1	1984
***imtot* with intercept**	-1.2572 (> 0.99)	0	1974
D(*imtot*,1) with intercept	-5.0991 (< 0.01)	4	1975
***imsoc* with intercept**	0.1242 (> 0.99)	0	1966
D(*imsoc*,1) with intercept	-6.0037 (< 0.01)	5	1981
***imind* with intercept**	-2.7370 (0.8159)	2	1971
D(*imind*,1) with intercept	-5.4547 (< 0.01)	1	1975
***debtdomes* with intercept**	-0.5739 (> 0.99)	0	1986
D(*debtdomes*,1) with intercept	-3.2702 (0.5528)	1	1986
D(*debtdomes*,2) with intercept	-9.1123 (< 0.01)	0	1984
***intdomes* with intercept**	-3.4666 (0.4054)	7	1985
D(*intdomes*,1) with intercept	-4.6170 (0.0313)	5	1978

Note: D (variable, 1) means first difference of the variable, D (variable, 2) means second difference of the variable, etc.

Table A33. Toda-Yamamoto Version of the Granger Causality Test Results, Models 1–3, USSR

Variable	Chi-Square Statistic	Degrees of Freedom	p-value
Block Exogeneity Wald Test, based on VAR			
Model 1 with four endogenous lags and extra two exogenous lags			
Dependent variable: *nmp*			
Excluded variable: *imtot*	27.8855	4	0.0000
Excluded variable: *debtdomes*	19.0712	4	0.0008
Both variables excluded	38.6014	8	0.0000
Dependent variable: *imtot*			
Excluded variable: *nmp*	5.5122	4	0.2387
Excluded variable: *debtdomes*	1.7398	4	0.7835
Both variables excluded	12.8006	8	0.1189
Dependent variable: *debtdomes*			
Excluded variable: *nmp*	3.5475	4	0.4707
Excluded variable: *imtot*	5.0100	4	0.2863
Both variables excluded	10.1159	8	0.2570
Model 2 with two endogenous lags and extra one exogenous lag			
Dependent variable: *nmp*			
Excluded variable: *imtot*	2.1748	2	0.3371
Excluded variable: *intdomes*	2.2220	2	0.3292
Both variables excluded	3.7276	4	0.4441
Dependent variable: *imtot*			
Excluded variable: *nmp*	6.8923	2	0.0319
Excluded variable: *intdomes*	0.8663	2	0.6485
Both variables excluded	6.9783	4	0.1370
Dependent variable: *intdomes*			
Excluded variable: *nmp*	0.0420	2	0.9792
Excluded variable: *imtot*	2.8375	2	0.2420
Both variables excluded	2.9153	4	0.5721
Model 3 with three endogenous lags and extra two exogenous lags			
Dependent variable: *nmp*			
Excluded variable: *imsoc*	1.0647	3	0.7856
Excluded variable: *debtdomes*	6.4342	3	0.0923
Both variables excluded	8.8125	6	0.1844
Dependent variable: *imsoc*			
Excluded variable: *nmp*	5.9545	3	0.1138
Excluded variable: *debtdomes*	2.1308	3	0.5457
Both variables excluded	8.2188	6	0.2225
Dependent variable: *debtdomes*			
Excluded variable: *nmp*	0.7645	3	0.8579
Excluded variable: *imsoc*	5.1315	3	0.1624
Both variables excluded	6.6553	6	0.3539

Table A34. Toda-Yamamoto Version of the Granger Causality Test Results, Models 4–6, USSR

Variable	Chi-Square Statistic	Degrees of Freedom	p-value
Block Exogeneity Wald Test, based on VAR			
Model 4 with three endogenous lags and extra one exogenous lag			
Dependent variable: *nmp*			
Excluded variable: *imsoc*	1.7178	3	0.6330
Excluded variable: *intdomes*	1.3623	3	0.7144
Both variables excluded	3.1713	6	0.7871
Dependent variable: *imsoc*			
Excluded variable: *nmp*	2.2549	3	0.5212
Excluded variable: *intdomes*	8.5897	3	0.0353
Both variables excluded	10.4811	6	0.1058
Dependent variable: *intdomes*			
Excluded variable: *nmp*	3.2450	3	0.3554
Excluded variable: *imsoc*	6.4927	3	0.0900
Both variables excluded	8.7661	6	0.1872
Model 5 with two endogenous lags and extra two exogenous lags			
Dependent variable: *nmp*			
Excluded variable: *imind*	1.6960	2	0.4283
Excluded variable: *debtdomes*	0.2935	2	0.8635
Both variables excluded	1.8565	4	0.7621
Dependent variable: *imind*			
Excluded variable: *nmp*	4.9685	2	0.0834
Excluded variable: *debtdomes*	1.3835	2	0.5007
Both variables excluded	8.2949	4	0.0814
Dependent variable: *debtdomes*			
Excluded variable: *nmp*	0.3550	2	0.8374
Excluded variable: *imind*	1.3194	2	0.5170
Both variables excluded	2.0608	4	0.7246
Model 6 with two endogenous lags and extra one exogenous lag			
Dependent variable: *nmp*			
Excluded variable: *imind*	1.3737	2	0.5031
Excluded variable: *intdomes*	0.6592	2	0.7192
Both variables excluded	1.6121	4	0.8066
Dependent variable: *imind*			
Excluded variable: *nmp*	4.7628	2	0.0924
Excluded variable: *intdomes*	3.1859	2	0.2033
Both variables excluded	6.8652	4	0.1432
Dependent variable: *intdomes*			
Excluded variable: *nmp*	1.3334	2	0.5134
Excluded variable: *imind*	1.3584	2	0.5070
Both variables excluded	3.6827	4	0.4506

Table A35. Johansen Cointegration Test Results, Models 1–6, USSR

Number of Cointegrating Equations	Trace Statistic (p-value)	Result from Trace Rank Test	Maximum Eigenvalue Statistic (p-value)	Result from Maximum Eigenvalue Rank Test
VAR1: *nmp imtot ddebtdomes,* all endogenous variables, lag length=3				
Test Version 1: Variables have deterministic linear trends but the cointegrating equation have only intercept				
None	35.7243 (0.0092)	1 Cointegrating Equation in the Model at 5 percent significance level	20.7679 (0.0561)	No Cointegrating Equation in the Model at 5 percent significance level (But 1 at 5.6 percent significance level)
At most 1	14.9573 (0.0601)		10.6304 (0.1737)	
At most 2	4.3269 (0.0375)		4.3269 (0.0375)	
Test Version 2: Variables have deterministic linear trends and cointegrating equation have intercept and non-deterministic linear trend				
None	57.1881 (0.0011)	2 Cointegrating Equations in the Model at 5 percent significance level	29.0558 (0.0181)	1 Cointegrating Equation in the Model at 5 percent significance level
At most 1	28.1323 (0.0257)		18.3870 (0.0766)	
At most 2	10.0531 (0.1248)		10.0531 (0.1248)	
VAR2: *nmp imtot intdomes,* all endogenous variables, lag length=2				
Test Version 1: Variables have deterministic linear trends but the cointegrating equation have only intercept				
None	32.1985 (0.0260)	1 Cointegrating Equation in the Model at 5 percent significance level	22.1916 (0.0354)	1 Cointegrating Equation in the Model at 5 percent significance level
At most 1	10.0070 (0.2820)		6.7745 (0.5162)	
At most 2	3.2325 (0.0722)		3.2325 (0.0722)	
VAR3: *nmp imsoc ddebtdomes,* all endogenous variables, lag length=2				
Test Version 2: Variables have deterministic linear trends and cointegrating equation have intercept and non-deterministic linear trend				
None	48.5349 (0.0124)	1 Cointegrating Equation in the Model at 5 percent significance level	35.9431 (0.0017)	1 Cointegrating Equation in the Model at 5 percent significance level
At most 1	12.5918 (0.7694)		7.7770 (0.8410)	
At most 2	4.8147 (0.6231)		4.8147 (0.6231)	
Test Version 3: Variables have quadratic trends and cointegrating equation have intercept and non-deterministic linear trend				
None	43.7869 (0.0046)	1 Cointegrating Equation in the Model at 5 percent significance level	34.1332 (0.0018)	1 Cointegrating Equation in the Model at 5 percent significance level
At most 1	9.6537 (0.5143)		4.8554 (0.9129)	
At most 2	4.7983 (0.0285)		4.7983 (0.0285)	
VAR4: *nmp imsoc intdomes,* all endogenous variables, lag length=2 No Cointegrating Equation in the Model at 5 percent significance level				
VAR5: *nmp imind ddebtdomes,* all endogenous variables, lag length=4				
Test Version 3: Variables have quadratic trends and cointegrating equation have intercept and non-deterministic linear trend				
None	39.8276 (0.0142)	1 Cointegrating Equation in the Model at 5 percent significance level	25.2470 (0.0368)	1 Cointegrating Equation in the Model at 5 percent significance level
At most 1	14.5806 (0.1578)		8.5038 (0.5480)	
At most 2	6.0768 (0.0137)		6.0768 (0.0137)	
VAR6: *nmp imind intdomes,* all endogenous variables, lag length=2				
Test Version 3: Variables have quadratic trends and cointegrating equation have intercept and non-deterministic linear trend				
None	37.0311 (0.0300)	1 Cointegrating Equation in the Model at 5 percent significance level	19.8791 (0.1707)	No Cointegrating Equation in the Model at 5 percent significance level
At most 1	17.1520 (0.0740)		11.5347 (0.2717)	
At most 2	5.6173 (0.0178)		5.6173 (0.0178)	

Table A36. VECM Estimation Results, Models 1 and 2, USSR

C(1), or α, (p-value)	C(2), (p-value)	C(3), (p-value)	C(4), (p-value)	C(5), (p-value)	C(6), (p-value)	C(7), (p-value)	C(8), (p-value)	C(9), (p-value)	C(10), (p-value)	C(11), (p-value)
VECM1: *nmp imtot ddebtdomes*, all endogenous, lag length=3, cointegrating vector, $\boldsymbol{\beta}$, normalized to *nmp*, Variables have deterministic linear trends but the cointegrating equation have only intercept										
D(nmp,1)=C(1)(nmp(-1) -5.9646*imtot(-1)-1.0452*ddebtdomes(-1)-97413091978) +C(2)*D(nmp(-1),1)+C(3)*D(nmp(-2),1)+C(4)*D(nmp(-3),1)+C(5)*D(imtot(-1),1)+C(6)*D(imtot(-2),1)+C(7)*D(imtot(-3),1)+C(8)*D(ddebtdomes(-1),1)+C(9)*D(ddebtdomes(-2),1)+C(10)*D(ddebtdomes(-3),1)+C(11)* ($\boldsymbol{R^2=0.51}$, $\boldsymbol{R^2_{adj}=0.16}$)										
0.0492 (0.6736)	-0.3372 (0.2920)	-0.1973 (0.5428)	-0.1385 (0.6537)	1.0008 (0.2023)	1.0611 (0.2566)	-1.7239 (0.1436)	-0.6524 (0.2853)	-1.0688 (0.1480)	1.6771 (0.0467)	2.49e+10 (0.0077)
D(imtot,1)=C(1)(nmp(-1) -5.9646*imtot(-1)-1.0452*ddebtdomes(-1)-97413091978) +C(2)*D(nmp(-1),1)+C(3)*D(nmp(-2),1)+C(4)*D(nmp(-3),1)+C(5)*D(imtot(-1),1)+C(6)*D(imtot(-2),1)+C(7)*D(imtot(-3),1)+C(8)*D(ddebtdomes(-1),1)+C(9)*D(ddebtdomes(-2),1)+C(10)*D(ddebtdomes(-3),1)+C(11)* ($\boldsymbol{R^2=0.73}$, $\boldsymbol{R^2_{adj}=0.53}$)										
0.1317 (0.0018)	-0.1053 (0.2730)	-0.0204 (0.8326)	-0.2550 (0.0137)	0.6765 (0.0092)	0.0257 (0.9253)	0.2422 (0.4795)	-0.1411 (0.4361)	0.1055 (0.6219)	-0.0216 (0.9265)	5.90e+09 (0.0274)
D(ddebtdomes,1)=C(1)(nmp(-1) -5.9646*imtot(-1)-1.0452*ddebtdomes(-1)-97413091978) +C(2)*D(nmp(-1),1)+C(3)*D(nmp(-2),1)+C(4)*D(nmp(-3),1)+C(5)*D(imtot(-1),1)+C(6)*D(imtot(-2),1)+C(7)*D(imtot(-3),1)+C(8)*D(ddebtdomes(-1),1)+C(9)*D(ddebtdomes(-2),1)+C(10)*D(ddebtdomes(-3),1)+C(11)* ($\boldsymbol{R^2=0.61}$, $\boldsymbol{R^2_{adj}=0.34}$)										
0.0325 (0.5637)	0.0654 (0.6653)	-0.0142 (0.9270)	0.0748 (0.6146)	-0.1414 (0.7001)	-0.8997 (0.0558)	1.3110 (0.0280)	-0.3876 (0.1914)	0.5365 (0.1322)	-0.7623 (0.0583)	-2.3e+09 (0.5486)
Variables have deterministic linear trends and cointegrating equation have intercept and non-deterministic linear trend										
D(nmp,1)=C(1)(nmp(-1) -0.2791*imtot(-1)-1.5364*ddebtdomes(-1)-14678901317*t -101265203294) +C(2)*D(nmp(-1),1)+C(3)*D(nmp(-2),1)+C(4)*D(nmp(-3),1)+C(5)*D(imtot(-1),1)+C(6)*D(imtot(-2),1)+C(7)*D(imtot(-3),1)+C(8)*D(ddebtdomes(-1),1)+C(9)*D(ddebtdomes(-2),1)+C(10)*D(ddebtdomes(-3),1)+C(11)* ($\boldsymbol{R^2=0.66}$, $\boldsymbol{R^2_{adj}=0.42}$)										
-0.9345 (0.0224)	0.1177 (0.6831)	0.0910 (0.7314)	0.1770 (0.5049)	0.9413 (0.1100)	1.5763 (0.0488)	-0.2390 (0.8300)	-1.9386 (0.0115)	-2.3735 (0.0083)	0.0683 (0.9408)	5.86e+09 (0.5380)
D(imtot,1)=C(1)(nmp(-1) -0.2791*imtot(-1)-1.5364*ddebtdomes(-1)-14678901317*t -101265203294) +C(2)*D(nmp(-1),1)+C(3)*D(nmp(-2),1)+C(4)*D(nmp(-3),1)+C(5)*D(imtot(-1),1)+C(6)*D(imtot(-2),1)+C(7)*D(imtot(-3),1)+C(8)*D(ddebtdomes(-1),1)+C(9)*D(ddebtdomes(-2),1)+C(10)*D(ddebtdomes(-3),1)+C(11)* ($\boldsymbol{R^2=0.59}$, $\boldsymbol{R^2_{adj}=0.29}$)										
0.3617 (0.0423)	-0.1207 (0.3525)	0.0266 (0.8214)	-0.2420 (0.0539)	0.2427 (0.3390)	-0.6489 (0.0655)	-0.6690 (0.1901)	0.1443 (0.6340)	0.6310 (0.0875)	0.7914 (0.0690)	9.39e+09 (0.0390)
D(ddebtdomes,1)=C(1)(nmp(-1) -0.2791*imtot(-1)-1.5364*ddebtdomes(-1)-14678901317*t -101265203294) +C(2)*D(nmp(-1),1)+C(3)*D(nmp(-2),1)+C(4)*D(nmp(-3),1)+C(5)*D(imtot(-1),1)+C(6)*D(imtot(-2),1)+C(7)*D(imtot(-3),1)+C(8)*D(ddebtdomes(-1),1)+C(9)*D(ddebtdomes(-2),1)+C(10)*D(ddebtdomes(-3),1)+C(11)* ($\boldsymbol{R^2=0.64}$, $\boldsymbol{R^2_{adj}=0.38}$)										
0.2436 (0.2508)	-0.0049 (0.9757)	-0.0417 (0.7780)	0.0332 (0.8215)	-0.2632 (0.4072)	-1.1768 (0.0120)	0.8228 (0.1990)	-0.1161 (0.7597)	0.8828 (0.0600)	-0.2857 (0.5804)	1.43e+09 (0.7868)
VECM2: *nmp imtot intdomes*, all endogenous, lag length=2, cointegrating vector, $\boldsymbol{\beta}$, normalized to *nmp*, Variables have deterministic linear trends but the cointegrating equation have only intercept										
D(nmp,1)=C(1)(nmp(-1) -7.7021*imtot(-1)+26.7206*intdomes(-1)-51701291020) +C(2)*D(nmp(-1),1)+C(3)*D(nmp(-2),1)+C(4)*D(imtot(-1),1)+C(5)*D(imtot(-2),1)+C(6)*D(intdomes(-1),1)+C(7)*D(intdomes(-2),1)+C(8)* ($\boldsymbol{R^2=0.28}$, $\boldsymbol{R^2_{adj}=0.01}$)										
0.1254 (0.1014)	-0.1051 (0.6701)	-0.4121 (0.0816)	0.9517 (0.1199)	0.2537 (0.7276)	-1.7015 (0.6574)	-6.9066 (0.1621)	2.01e+10 (0.0002)			
D(imtot,1)=C(1)(nmp(-1) -7.7021*imtot(-1)+26.7206*intdomes(-1)-51701291020) +C(2)*D(nmp(-1),1)+C(3)*D(nmp(-2),1)+C(4)*D(imtot(-1),1)+C(5)*D(imtot(-2),1)+C(6)*D(intdomes(-1),1)+C(7)*D(intdomes(-2),1)+C(8)* ($\boldsymbol{R^2=0.44}$, $\boldsymbol{R^2_{adj}=0.23}$)										
0.0512 (0.0548)	0.1073 (0.2139)	0.0097 (0.9015)	0.0462 (0.8204)	-0.2412 (0.3402)	-1.9884 (0.1419)	-0.4198 (0.7997)	1.29e+09 (0.4012)			
D(intdomest,1)=C(1)(nmp(-1) -7.7021*imtot(-1)+26.7206*intdomes(-1)-51701291020) +C(2)*D(nmp(-1),1)+C(3)*D(nmp(-2),1)+C(4)*D(imtot(-1),1)+C(5)*D(imtot(-2),1)+C(6)*D(intdomes(-1),1)+C(7)*D(intdomes(-2),1)+C(8)* ($\boldsymbol{R^2=0.55}$, $\boldsymbol{R^2_{adj}=0.38}$)										
0.0085 (0.0484)	0.0090 (0.5095)	0.0112 (0.3753)	-0.1042 (0.0044)	-0.0140 (0.7274)	0.5231 (0.0212)	0.2497 (0.3520)	22987063 (0.9251)			

Note: D (variable, 1) means first difference of the variable, D (variable, 2) means second difference of the variable, etc. C (1) means coefficient 1, C (2) means coefficient 2, etc., (-1) means first lag of variable, (-2) means second lag of variable, etc., and t means time t

Table A37. VECM Estimation Results, Model 3, USSR

C(1), or α, (p-value)	C(2), (p-value)	C(3), (p-value)	C(4), (p-value)	C(5), (p-value)	C(6), (p-value)	C(7), (p-value)	C(8), (p-value)	C(9), (p-value)
VECM3: *nmp imsoc ddebtdomes*, all endogenous, lag length=2 Variables have deterministic linear trends and cointegrating equation have intercept and non-deterministic linear trend								
D(nmp,1)=C(1)(nmp(-1) +3.1300*imsoc(-1)-0.8791*ddebtdomes(-1)-19669394465*t-113880771292) +C(2)*D(nmp(-1),1)+C(3)*D(nmp(-2),1)+C(4)*D(imsoc(-1),1)+C(5)*D(imsoc(-2),1)+C(6)*D(ddebtdomes(-1),1)+C(7)*D(ddebtdomes(-2),1)+C(8)* ($\boldsymbol{R^2 = 0.77}$, $\boldsymbol{R^2_{adj} = 0.67}$)								
-0.7956 (0.0000)	0.0777 (0.5563)	-0.2405 (0.0927)	2.0596 (0.0033)	2.3263 (0.0034)	-0.9167 (0.0073)	-1.3581 (0.0003)	1.17e+10 (0.0018)	
D(imsoc,1)=C(1)(nmp(-1) +3.1300*imsoc(-1)-0.8791*ddebtdomes(-1)-19669394465*t-113880771292) +C(2)*D(nmp(-1),1)+C(3)*D(nmp(-2),1)+C(4)*D(imsoc(-1),1)+C(5)*D(imsoc(-2),1)+C(6)*D(ddebtdomes(-1),1)+C(7)*D(ddebtdomes(-2),1)+C(8)* ($\boldsymbol{R^2 = 0.22}$, $\boldsymbol{R^2_{adj} = 0.00}$)								
0.0174 (0.7463)	0.0359 (0.5398)	0.0310 (0.6116)	0.2895 (0.2971)	-0.2869 (0.3608)	-0.0933 (0.4960)	0.0569 (0.6750)	4.39e+08 (0.7596)	
D(ddebtdomes,1)=C(1)(nmp(-1) +3.1300*imsoc(-1)-0.8791*ddebtdomes(-1)-19669394465*t-113880771292) +C(2)*D(nmp(-1),1)+C(3)*D(nmp(-2),1)+C(4)*D(imsoc(-1),1)+C(5)*D(imsoc(-2),1)+C(6)*D(ddebtdomes(-1),1)+C(7)*D(ddebtdomes(-2),1)+C(8)* ($\boldsymbol{R^2 = 0.59}$, $\boldsymbol{R^2_{adj} = 0.43}$)								
0.2903 (0.0032)	-0.1311 (0.1742)	0.0772 (0.4355)	-0.8936 (0.0547)	-1.4520 (0.0087)	-0.3645 (0.1097)	0.2891 (0.1959)	4.50e+09 (0.0640)	
Variables have quadratic trends and cointegrating equation have intercept and non-deterministic linear trend, cointegrating vector, $\boldsymbol{\beta}$, normalized to *nmp*,								
D(nmp,1)=C(1)(nmp(-1) +3.1510*imsoc(-1)-0.7990*ddebtdomes(-1)-20242107646*t-105095918926) +C(2)*D(nmp(-1),1)+C(3)*D(nmp(-2),1)+C(4)*D(imsoc(-1),1)+C(5)*D(imsoc(-2),1)+C(6)*D(ddebtdomes(-1),1)+C(7)*D(ddebtdomes(-2),1)+C(8)+C(9)*t* ($\boldsymbol{R^2 = 0.77}$, $\boldsymbol{R^2_{adj} = 0.66}$)								
-0.8131 (0.0000)	0.0793 (0.5583)	-0.2369 (0.1185)	2.0603 (0.0045)	2.3413 (0.0042)	-0.8887 (0.0113)	-1.3561 (0.0005)	1.81e+10 (0.0001)	-3e+08 (0.0056)
D(imsoc,1)=C(1)(nmp(-1) +3.1510*imsoc(-1)-0.7990*ddebtdomes(-1)-20242107646*t-105095918926) +C(2)*D(nmp(-1),1)+C(3)*D(nmp(-2),1)+C(4)*D(imsoc(-1),1)+C(5)*D(imsoc(-2),1)+C(6)*D(ddebtdomes(-1),1)+C(7)*D(ddebtdomes(-2),1)+C(8)+C(9)*t* ($\boldsymbol{R^2 = 0.29}$, $\boldsymbol{R^2_{adj} = 0.00}$)								
-0.0065 (0.9068)	0.0361 (0.5295)	0.0539 (0.3901)	0.2496 (0.3626)	-0.2890 (0.3499)	-0.1237 (0.3641)	0.0167 (0.9018)	-9.3e+08 (0.5512)	68503638 (0.2153)
D(ddebtdomes,1)=C(1)(nmp(-1) +3.1510*imsoc(-1)-0.7990*ddebtdomes(-1)-20242107646*t-105095918926) +C(2)*D(nmp(-1),1)+C(3)*D(nmp(-2),1)+C(4)*D(imsoc(-1),1)+C(5)*D(imsoc(-2),1)+C(6)*D(ddebtdomes(-1),1)+C(7)*D(ddebtdomes(-2),1)+C(8)+C(9)*t* ($\boldsymbol{R^2 = 0.60}$, $\boldsymbol{R^2_{adj} = 0.41}$)								
0.2715 (0.0090)	-0.1314 (0.1818)	0.0998 (0.3437)	-0.9353 (0.0518)	-1.4595 (0.0100)	-0.4056 (0.0857)	0.2467 (0.2854)	8.57e+08 (0.7437)	2.07e+08 (0.0328)

Note: D (variable, 1) means first difference of the variable, D (variable, 2) means second difference of the variable, etc. C (1) means coefficient 1, C (2) means coefficient 2, etc., (-1) means first lag of variable, (-2) means second lag of variable, etc., and t means time trend.

Table A38. VECM Estimation Results, Models 5 and 6, USSR

C(1), or α, (p-value)	C(2), (p-value)	C(3), (p-value)	C(4), (p-value)	C(5), (p-value)	C(6), (p-value)	C(7), (p-value)	C(8), (p-value)	C(9), (p-value)
VECM5: *nmp imind ddebtdomes*, all endogenous, lag length=4, cointegrating vector, $\boldsymbol{\beta}$, normalized to *nmp*, Variables have quadratic trends and cointegrating equation have intercept and non-deterministic linear trend								
D(nmp,1)=C(1)(nmp(-1) -0.5103*imind(-1)-0.7228*ddebtdomes(-1)-15002448812*t-102972221526) +C(2)*D(nmp(-1),1)+C(3)*D(nmp(-2),1)+C(4)*D(nmp(-3),1)+C(5)*D(nmp(-4),1)+C(6)*D(imind(-1),1)+C(7)*D(imind(-2),1)+C(8)*D(imind(-3),1)+C(9)*D(imind(-4),1)+C(10)*D(ddebtdomes(-1),1)+C(11)*D(ddebtdomes(-2),1)+C(12)*D(ddebtdomes(-3),1)+C(13)*D(ddebtdomes(-4),1)+C(14)+C(15)*t* ($\boldsymbol{R^2 = 0.92}$, $\boldsymbol{R^2_{adj} = 0.80}$)								
-3.0107 (0.0017)	1.2868 (0.0197)	0.8042 (0.0704)	0.5637 (0.0856)	0.4230 (0.1330)	0.6435 (0.4840)	3.4602 (0.0256)	2.4078 (0.0875)	3.3139 (0.0029)
C(10), (p-value)	**C(11), (p-value)**	**C(12), (p-value)**	**C(13), (p-value)**	**C(14), (p-value)**	**C(15), (p-value)**			
-3.1411 (0.0005)	-4.4208 (0.0004)	-2.7233 (0.0136)	-1.5401 (0.0245)	-5.37e+10 (0.0447)	1.12e+09 (0.0115)			
D(imind,1)=C(1)(nmp(-1) -0.5103*imind(-1)-0.7228*ddebtdomes(-1)-15002448812*t-102972221526) +C(2)*D(nmp(-1),1)+C(3)*D(nmp(-2),1)+C(4)*D(nmp(-3),1)+C(5)*D(nmp(-4),1)+C(6)*D(imind(-1),1)+C(7)*D(imind(-2),1)+C(8)*D(imind(-3),1)+C(9)*D(imind(-4),1)+C(10)*D(ddebtdomes(-1),1)+C(11)*D(ddebtdomes(-2),1)+C(12)*D(ddebtdomes(-3),1)+C(13)*D(ddebtdomes(-4),1)+C(14)+C(15)*t* ($\boldsymbol{R^2 = 0.79}$, $\boldsymbol{R^2_{adj} = 0.46}$)								
0.3416 (0.2377)	-0.2217 (0.2499)	-0.1193 (0.4624)	-0.2829 (0.0372)	0.1196 (0.2693)	1.2783 (0.0053)	-1.3568 (0.0269)	0.1590 (0.7569)	-0.3328 (0.3313)
C(10), (p-value)	**C(11), (p-value)**	**C(12), (p-value)**	**C(13), (p-value)**	**C(14), (p-value)**	**C(15), (p-value)**			
0.1050 (0.6689)	0.3922 (0.2504)	0.3822 (0.3073)	0.1609 (0.4956)	1.19e+10 (0.2238)	-2.18e+08 (0.1538)			
D(ddebtdomes,1)=C(1)(nmp(-1) -0.5103*imind(-1)-0.7228*ddebtdomes(-1)-15002448812*t-102972221526) +C(2)*D(nmp(-1),1)+C(3)*D(nmp(-2),1)+C(4)*D(nmp(-3),1)+C(5)*D(nmp(-4),1)+C(6)*D(imind(-1),1)+C(7)*D(imind(-2),1)+C(8)*D(imind(-3),1)+C(9)*D(imind(-4),1)+C(10)*D(ddebtdomes(-1),1)+C(11)*D(ddebtdomes(-2),1)+C(12)*D(ddebtdomes(-3),1)+C(13)*D(ddebtdomes(-4),1)+C(14)+C(15)*t* ($\boldsymbol{R^2 = 0.84}$, $\boldsymbol{R^2_{adj} = 0.59}$)								
1.3334 (0.0316)	-0.8364 (0.0406)	-0.2979 (0.3495)	-0.1162 (0.6179)	-0.4596 (0.0447)	-0.4138 (0.5574)	-0.3813 (0.7114)	-1.5081 (0.1536)	-3.1489 (0.0007)
C(10), (p-value)	**C(11), (p-value)**	**C(12), (p-value)**	**C(13), (p-value)**	**C(14), (p-value)**	**C(15), (p-value)**			
0.7456 (0.1405)	1.6598 (0.0253)	1.7243 (0.0331)	1.5236 (0.0071)	3.69e+10 (0.0673)	-4.71e+08 (0.1169)			
VECM6: *nmp imind intdomes*, all endogenous, lag length=2, cointegrating vector, $\boldsymbol{\beta}$, normalized to *nmp*, Variables have quadratic trends and cointegrating equation have intercept and non-deterministic linear trend								
D(nmp,1)=C(1)(nmp(-1) +16.0308*imind(-1)-77.0709*intdomes(-1)-18561721912*t-168212378932) +C(2)*D(nmp(-1),1)+C(3)*D(nmp(-2),1)+C(4)*D(imind(-1),1)+C(5)*D(imind(-2),1)+C(6)*D(intdomes(-1),1)+C(7)*D(intdomes(-2),1)+C(8)+C(9)*t* ($\boldsymbol{R^2 = 0.21}$, $\boldsymbol{R^2_{adj} = 0.00}$)								
-0.0202 (0.6235)	-0.0015 (0.9950)	-0.2689 (0.3282)	1.4773 (0.1965)	0.9410 (0.5395)	-0.5331 (0.8915)	-4.6006 (0.3453)	1.78e+10 (0.0093)	-12834675 (0.9511)
D(imind,1)=C(1)(nmp(-1) +16.0308*imind(-1)-77.0709*intdomes(-1)-18561721912*t-168212378932) +C(2)*D(nmp(-1),1)+C(3)*D(nmp(-2),1)+C(4)*D(imind(-1),1)+C(5)*D(imind(-2),1)+C(6)*D(intdomes(-1),1)+C(7)*D(intdomes(-2),1)+C(8)+C(9)*t* ($\boldsymbol{R^2 = 0.43}$, $\boldsymbol{R^2_{adj} = 0.18}$)								
-0.0115 (0.1710)	0.0583 (0.2224)	0.0593 (0.2805)	0.3504 (0.1275)	-0.2332 (0.4465)	0.2506 (0.7477)	-0.0136 (0.9887)	-1.10e+09 (0.3795)	784850 (0.9850)
D(intdomes,1)=C(1)(nmp(-1) +16.0308*imind(-1)-77.0709*intdomes(-1)-18561721912*t-168212378932) +C(2)*D(nmp(-1),1)+C(3)*D(nmp(-2),1)+C(4)*D(imind(-1),1)+C(5)*D(imind(-2),1)+C(6)*D(intdomes(-1),1)+C(7)*D(intdomes(-2),1)+C(8)+C(9)*t* ($\boldsymbol{R^2 = 0.61}$, $\boldsymbol{R^2_{adj} = 0.44}$)								
0.0068 (0.0028)	0.0046 (0.6877)	-0.0203 (0.1363)	-0.1366 (0.0204)	-0.1772 (0.0266)	0.4884 (0.0181)	0.4840 (0.0509)	5.41e+08 (0.0859)	-7435612 (0.4693)

Note: D (variable, 1) means first difference of the variable, D (variable, 2) means second difference of the variable, etc. C (1) means coefficient 1, C (2) means coefficient 2, etc., (-1) means first lag of variable, (-2) means second lag of variable, etc., and t means time trend.