When the Iron Curtain Falls, and Crisis Sets In: Understanding Reactions to Economic Shocks in the Eastern European Economies in Transition

by

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An honors thesis submitted in partial fulfillment

of the requirements for the degree of

Bachelor of Science

Undergraduate College

Leonard N. Stern School of Business

New York University

May 2011

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Faculty Adviser	Thesis Advisor

Abstract

This paper presents an empirical analysis of the macroeconomic and structural fundamentals of the fifteen Central Eastern and Southeastern European economies in transition during three economic crises over the last 20 years: the Transitional Recession associated with the fall of the Iron Curtain in 1989-1991, the Russian Ruble Crisis of 1998, and the Global Financial Crisis of 2008. Using univariate and multivariate analysis with a panel set of data, we look to explain variation among countries' compound declines in Gross Domestic Product over the course of an economic crisis in order to draw conclusions about shared characteristics of countries that suffer most. We find that a set of independent variables, including trade openness, external debt as a percentage of GDP, unemployment, degree of economic freedom, inflation, years spent under a centrally planned economy, and choice of exchange rate regime do, in fact, have distinct directional impacts on country reactions to crisis. We find that certain variables are more or less important for different crises, and we conclude from that that the nature of a crisis may interact uniquely with specific fundamentals. Existing literature lacks extensive research into the nature of declines and contractions; this paper contributes to filling that gap.

Acknowledgements

I am extremely grateful to my faculty adviser, Professor Paul Wachtel for his guidance and insight over the course of the last year. He has been a source of inspiration and a sounding board, integral to the completion of this project. I would also like to extend my thanks to Marti Subrahmanyam for his support and leadership of the Stern Honors Program, without which I would not have had the opportunity to pursue an undergraduate research project of this nature. Many thanks, also, to my family and friends who have endured incessant chatter about the fall of the Soviet Union, and love me still.

And to the Class of 2011 Stern Honors Program participants: We did it!

Introduction

After the fall of the Berlin Wall in 1989 and the dissolution of the Soviet Union in 1991, the peoples that had been clamoring for freedom and autonomy under Soviet occupation, the rigidity of the Socialist political and ideological system, and the tightly controlled, yet grossly abused centrally planned economic system, found that they had it. After years of resistance movements, protests, and political rumblings, they were free to undertake what would be considered the "greatest social project of the last century,"[i] in contemporaneously dismantling the centrally planned economy, each replacing it with a free market system, and each establishing its own political democracy. The twenty-nine sovereign nations that undertook this process after emerging from the rubble of the Soviet Bloc and its sphere of influence are called the "economies in transition." This paper concerns the fifteen Central Eastern and Southeastern European countries, three of which emerged as independent nations from the USSR, and the rest of which existed within the Soviet bloc's sphere of influence.

The early years of independence for the economies in transition were nothing if not eventful. The transitioning countries plunged themselves, unguided and without a blueprint, into the process of attaining the six elements of transition to a market economy: macroeconomic stabilization; price liberalization; trade liberalization and current account convertibility; enterprise reform (especially privatization); creation of a social safety net; development of institutional and legal framework.[ii] There exists a prolific body of academic research regarding the creation of a communist system, but effectively none about its subsequent deconstruction. In addition, they were greeted by the free market

world with an economic downturn the order of magnitude of which has not been witnessed in peacetime in modern history.[iii]

Each charted its own path of transition: some fast-track reformers, like Poland, Hungary, and Czechoslovakia, subscribed to the "Big Bang" or "Shock Therapy" theory of immediate and total transition with little consideration for the resultant human suffering, while others took a more gradual approach, risking the possibility of never fully making the jump to free markets and democracy. The countries exhibited widely different initial economic and political conditions preceding the collapse of the Soviet Union; this range explains much of the variation in the countries' degrees of success in achieving the elements of transition. These differences, coupled with differences in policy approaches influence the extent to which the economies in transition experienced stabilization and growth in the 1990s.

Many of the economies in transition quickly aligned with the West via membership in the North American Trade Organization, the World Trade Organization, and later, the European Union, almost certainly as much for political security as for the economic benefits and trade relationships. Others rejoined many of the former Soviet states in the Commonwealth of Independent States, a successor organization to the USSR. In spite of these differences in political alignment strategy, they remained tightly intertwined trading partners among themselves and with Russia.

Just when the economies in transition believed they had things under control, some of them exhibiting economic growth for the first time since transition, in the late 1990s, the Russian Ruble Crisis of 1998 wreaked havoc on the transition region, in addition to its impact on global financial markets. Although widely felt, the shock

associated with the Ruble Crisis was orders of magnitude milder than the shock precipitated by the Soviet Union's collapse seven years prior.

Following recovery from the Ruble Crisis, the economies in transition experienced a somewhat roaring period of economic growth in the early and mid-2000s; some of them earned nicknames, like the "Baltic Tigers," while others received far less fanfare. By 2003, the region had experienced strong growth for six consecutive years, and in that year, the region's GDP growth outpaced that of the global economy (5.6% vs. 3.2%). In 2004, the economies in transition grew at their fastest rate since the beginning of transition (6.5%).[iv] This strong single digit growth trend continued through 2007. They achieved political wins as well; nine countries formerly of the Soviet bloc acceded to the European Union in both 2004 and 2007, while all experienced the widening and deepening of European integration, intended to promote stability, security, and prosperity via the development of a "European mainstream," as expressed by the European Commission in 2006.

Things were looking up until the Global Financial Crisis of 2008 struck. Its effects were deeply felt all over the globe, but some of the most severe declines in the world were experienced by the economies in transition under investigation, while others experienced no contraction at all. The European average decline was about -4%. Data from the European Bank for Reconstruction and Development (EBRD) show that, on average, the 29 economies in transition contracted 6.3% in 2009, constituting the region's most severe decline since the aftermath of the fall of the Soviet Union. This tremendous variation among countries that share so many similarities—economically, politically, and in their tumultuous recent histories—attracted my attention and inspired the guiding

research questions in this paper: What influences the depth to which a country experiences decline over the course of an economic shock? Do the most severely reacting countries exhibit a shared set of macroeconomic or structural fundamentals? How can we explain economic susceptibility to economic crises and contagion?

This paper tries to explain the reactions to three economic shocks experienced by the fifteen Central Eastern and Southeastern European countries over the course of the last twenty years: the Collapse of the Soviet Union in 1991, the Russian Ruble Crisis in 1998, and the Global Financial Crisis in 2008. Section I describes each of the aforementioned crises, and their respective economic impacts on the region in question. The observable variation in impact across the region gives rise to Section II, which presents hypotheses based on theoretical arguments already espoused in an existing body of literature on the economies in transition and on economic shocks and crises. Section III describes the data and methodology used to explore the guiding research questions. Section IV presents empirical work and analysis, and concludes with a discussion of implications and future potential research.

I: Description of Each Crisis and Regional Impact on Countries Under Investigation

This section develops background and context for each crisis under investigation, the Transitional Recession, the Russian Ruble Crisis, and the Global Financial Crisis, then assesses the regional impact of each shock.

I.I Transitional Recession

When the command economy had reached maturity in the 1980s, it had outgrown its capacity for complexity, and had started to show signs of slowdown and weakness

characteristic of a system not built for post-industrial development: agricultural sector imbalances, decline in the growth rate, decline in capital productivity, investments and private consumption, unfinished construction, and a slowdown in the growth of the working population. [v]

By the time Mikhail Gorbachev came to power in 1985, everyone was aware of the command system's shortfalls, and wanted reform. His time in office is best known for attempts at this reform, most notably, glasnost (openness), and perestroika (economic restructuring). With respect to foreign policy, Gorbachev took a different approach as well, ending Soviet intervention in Afghanistan, and signing an agreement to destroy medium range missiles. He also decided, for the first time in the USSR's history, that focusing on internal reforms was more important than maintaining imperial dominance: the USSR took a step back from controlling the entire Eastern Bloc.

Meanwhile, liberalization was in full force in Eastern Europe, beginning with the Solidarity political movement in Poland, the first country to break away from Soviet influence, and the fall of the Berlin Wall and subsequent reunification of Germany, to which the Soviet Union agreed in 1990. These events created a domino effect, inspiring revolutions in Hungary, Bulgaria, Romania, the Czech Republic, Albania, Yugoslavia, and demands for self-determination in the Baltics, which were republics in the Union of Soviet Socialist Republics. These sweeping revolutions, followed by the dissolution of the Soviet Union, represented the death-knell of Communism in Europe, and the end of the centrally planned economy.[vi]

Gorbachev had not implemented crucial elements of reform before the Soviet Union began to disintegrate, and consequently, severe macroeconomic destabilization set

in, "…a clear sign of fatal crisis…all the more negative because the system was excessively centralized."[vii] He had been trying to save the Socialist structure of the economy by tweaking it bit by bit with reforms, instead of abandoning it altogether, and at the same time, was confronting the political challenge of increasingly demanding republics, which had passed declarations of sovereignty stating that their respective laws would preempt the laws of the USSR. The inflationary pressures and fight for power and resources damaged enterprises, particularly in the credit arena, as price changes overloaded the system, credit lines were unavailable, and non-payment rates were increasing—this, not surprisingly, took a toll on foreign trade.

The fall of the Iron Curtain represented the end of the Cold War, the end of Communism in Europe, the end of the Eastern Bloc and the Soviet Union, the end of central planning, the reclamation of sovereignty by the Baltics, the birth of 12 newly autonomous nations: it was the end of an era. The intertwined economies that experienced this collapse in the political, economic, and social status quo as economically destabilizing forces had reached their breaking point saw subsequent declines in output, the magnitude of which has not been seen in modern peacetime history. They were forced to find their way toward macroeconomic stabilization and "transition," a nebulous process that would rebuild their economies and political systems from the ashes of the Eastern Bloc.

As summarized in Table 1 below, the economies in transition saw an average compound contraction in GDP of -35%. The country with the mildest contraction was the Czech Republic at -13%, while Bosnia & Herzegovina contracted most deeply at -86%.

This summary table of compound declines across crises will be referenced throughout the rest of the discussion.

Table 1: Compound Declines - Summary Statistics

	Min	*Max*	*Range*	*Mean*	*Median*
Transitional Recession	-0.86	-0.13	0.73	-0.35	-0.29
Ruble Crisis	-0.18	-0.01	0.17	-0.08	-0.08
Global Fin. Crisis	-0.22	-0.01	0.21	-0.09	-0.07
Panel	-0.86	-0.01	0.86	-0.20	-0.15

I.II A Word on Transition

The transition experience of each country influences its political and economic ability to respond to economic crisis, and therefore, the variation we see in reactions to the shocks in question. While these countries share a common history of being either part of or in the sphere of influence of the Soviet Union, there are many reasons for the differences among them after twenty years of economic development and transition.

As there existed no blueprint for a smooth and linear progression from centrally planned economy and communist system to one based on a model of competitive markets and a democratic system, the economies in transition had to make it up as they went along. Many of them had only a vague notion of what 'transition' meant, i.e. transforming economic agents' behavior through radical change in the institutional framework that determines economic rewards and penalties by way of macroeconomic and sector-specific policy measures, institutional arrangements, operational regulations, and constraints on government intervention in the economy. They had virtually no idea how to do it. Zecchini describes the path as having evolved out of swings between periods of bold and sweeping reforms and periods wrought by delays in completion of projects already begun, and by little initiative for more progress. [viii]

They shared, however, the belief that transition was their ticket to economic development and a concomitant improvement in living standards, as well as to their political objective of a burgeoning liberal democracy. Expectations for rapid transformation were not met, and disillusion and a waning of confidence in both transition itself and its leaders materialized in 1994-1995, when 'transition fatigue'[ix] set in, leading up to the Russian Ruble Crisis of 1998.

I.III Russian Ruble Crisis 1998

The Ruble Crisis, riding on the coattails of the Asian Financial Crisis of 1997, shocked global financial markets, and had a deeply felt impact on Russia's major trading partners, many of which were, and still are, the economies in transition. An array of precarious existing conditions and "bad luck, bad policies, and bad institutions," spawned the combined currency, banking, and debt crisis—the makings of a classic financial crisis. In 1998, foreign investors, spooked by the Asian Crisis, launched speculative attacks on the Russian ruble because of increasing doubt about Russia's ability to maintain the ruble's managed float and to service its high levels of foreign debt as it ran low on hard currency. These attacks forced the currency's devaluation when the central bank could no longer support the exchange rate with its depleted foreign reserves. Russia then defaulted on its public and private debt and suspended payment to foreign creditors by commercial banks.

Russia's economic reforms, particularly its efforts in privatization and macroeconomic stabilization, implemented in 1995, had shown encouraging results: 1997 was its first year of growth in GDP since the fall of the Soviet Union, and in the previous year, the Paris Club approved Russia as a creditor nation, and they, along with the

London Club, began negotiating the repayment of over $93 billion in old Soviet debt. Russia's disinflation program of 1995, anchored the nominal exchange rate, and strengthened the real exchange rate for the next two years, until in 1998, the ruble's real exchange rate had increased to seven times its starting point in 1991. Consensus view now is that the ruble was overvalued, but at the time, opponents cited instability, inflation, and inelastic imports and exports as arguments against devaluation. In fact, the chairman of the Central Bank of Russia is quoted to have said, "When you hear talk of devaluation, spit in the eye of whoever is talking about it."[x] The ruble withstood a speculative attack in late 1997 in the wake of the East Asian crisis, defended by the Central Bank of Russia's move to deplete foreign-exchange reserves by $6 billion.

While macroeconomic indicators looked positive, Russia's lax fiscal policies and low tax collection rates contributed to a government deficit of between five and ten percent of GDP.[xi] This deficit had previously been financed by the central bank, but after the 1995 Central Bank Law disallowed that practice the issuance of government securities (GKO) fulfilled the same objective. Non-resident restrictions were removed from the GKO market; as a result, it's estimated that foreign investors held between 30 and 50% of outstanding GKO debt. Likewise, Russian banks began to increase their foreign liabilities—from 7% of assets to 17% in 1997.[xii] Banks were also major holders of the GKO short-term debt stock, 45% of which was coming due within six months or less. Eventually the debt situation became unsustainable: the GKO debt stock had risen to 14% of GDP since its introduction, half of federal tax revenue was allocated to debt service, government debt was equal to the money stock of the ruble, and foreign investor ownership of debt may have been as high as twice that of the official reserves. [xiii]

To add to the precarious circumstances, the East Asian crisis had inspired a wave of risk aversion and 'flight to quality' out of emerging markets, and oil prices began to fall in late 1997, taking a major toll on Russian oil earnings. Rash political movements, misstatements by the press, and misunderstandings by the public contributed to investor sensitivity to Russia's instability. These events include Yeltsin's liquidation of his government and its replacement by young corporate whippersnapper, Sergei Kiriyenko, as well as the failure of policymakers to reach an austerity plan agreement with the International Monetary Fund. Investors started selling their Russian holdings; the Russian stock, bond, and currency markets plummeted from investor fear of devaluation and default on domestic debt.

These forces at play appear to have poised Russia on the brink of crisis, which precipitated such that in August of 1998, Russia devalued the ruble by widening the exchange rate band, and effectively defaulted on the ruble-denominated government debt and declared a 90-day moratorium on repaying private foreign debt. The ruble was floated after only a few days, and the real exchange rate depreciated by 40%.

The Russian economy contracted 4.9% in 1998, imports decreased, and foreign direct investment has been spotty ever since. The implications of the crisis reached beyond Russia, injuring collectively the reputation of the economies in transition with respect to their attractiveness for FDI. The crisis destroyed foreign investor faith in Russia's ability to reform to a free market economy; it surely injured the reputation of all the economies in transition so closely associated with Russia. The trade implications were also considerable, since the process of reorientation of trade structure to the West was recently underway; Russia was still a major trading partner for many of them. Nine

of the fifteen economies under investigation experienced contractions in GDP associated with the Russian Ruble Crisis: Estonia saw a slight contraction of only 0.3%, while Serbia contracted a compound 18%. The average compound decline was 7.2%, and the median decline was by 4.5%. The currency devaluation alone contributed to a 50% decline in imports to Russia.[xiv]

I.IV Global Financial Crisis 2008

The global financial crisis spread from the United States throughout the world, making a name for itself as the worst recession since the Great Depression of the 1930s. It began in July and August of 2007 with a crisis in the U.S. mortgage market and a subsequent bursting of the housing bubble, which damaged financial institutions that had been profiting from high real estate valuations and risky securitized products relating to the mortgage market. The crisis intensified in September of 2008, with the collapse of Lehman Brothers and subsequent policy measures taken by the United States. These events shook investor confidence, which manifested in shocking global financial markets; subsequently, credit markets tightened, economic growth slowed worldwide, and international trade declined. The crisis spread to Europe, where several banks failed, the Euro struggled, and stock indices fell. The impact was deeply felt by the export-dependent economies in transition. [xv]

As the economies in transition continued to integrate economically with the West, they opened themselves up to the spread of the global financial crisis. They integrated in trade, finance, and labor: by 2007, many economies in transition had trade openness levels of over 100%; increases in foreign bank ownership and FDI drove financial integration; and the opening of European economies meant for movement of labor and

significant remittance flows.[xvi] Easy bank lending contributed to a credit boom, which meant a democratization of credit for households and businesses that had not had prior access to credit markets. Linked to this credit boom was also an increase in external debt levels. The EBRD has found that the depth of a country's decline in reaction to the crisis is correlated with its credit boom and external debt levels leading up to the crisis.

The economies in transition experienced sudden and massive declines in output, with much variation among countries, almost immediately after the crisis intensified in the United States and Western Europe. Interestingly, the EBRD tracks the spread of the crisis in three waves, hitting the Baltics and Kazakhstan first, and spreading throughout the entire region by the first quarter of 2009. The three waves can be observed in Exhibit 1 of the Appendix. The Baltics, Estonia, Latvia, and Lithuania, experienced surprisingly dramatic declines, at -18%, -22%, and -15%, respectively—some of the worst in the world. On average, the economies in transition declined by -9%, with Latvia representing the minimum, and Macedonia being least affected with a contraction of only -1%. The European average contraction, for comparison, was -4%.[xvii] The economies in transition were projected to begin to see anemic growth in 2010 as they recovered from the crisis; we observe various speeds and trajectories to recovery among them.

II: Theoretical Discussion and Hypotheses

In trying to explain a country's reaction to an economic shock, we examined a number of potential explanatory variables: a set of economic and other characteristics that might emerge as more or less important in association with or in actually determining the depth of a country's decline. This section of the paper lists these variables and hypotheses

regarding how, or in which direction, each variable might influence a country's reaction. Many of these variables have been addressed in existing literature on the economies in transition; this literature and theoretical basis is incorporated into the discussion.

Years Under Central Planning

The Years Under the Centrally Planned Economy variable aims to quantify a country's familiarity with market institutions. De Melo, Denizer, Gelb, and Tenev used this same proxy variable to measure "market memory" in their paper, "Circumstance and Choice: The Role of Initial Conditions and Policies in Transition Economies, 2001."[xviii] Intuitively, the longer a country experienced central planning, the fewer generations in its citizenry have familiarity with the market economy experience. A market based system, namely, institutions and laws, built from scratch by people indoctrinated by a lifetime of central planning are less likely to have proactive implementation, knowledgeable and widespread support, and may be easily abandoned for reversion to old system practices. In fact, transition experiences of this kind have been observed in a number of economies in transition.

Following this logic, we consider years under central planning a proxy for how much is required of a country to transition to a market economy, both in terms of building market system infrastructure and institutions and collective attitudes toward free markets. We try to discern if there is a tendency for countries that had less required of them to reach market-based economic norms to react either more or less severely to economic shocks over time. We expect to find that countries with more years under central planning experience deeper declines in the event of crisis.

Degree of economic freedom

This variable proxies a country's political progress toward liberal democracy, since economic freedom and democracy tend to go hand-in-hand, particularly in the transition economies, where they serve as the two main objectives or end-states of transition. To that end, the variable serves as proxy for an overall progress metric on the trajectory of transition. We use the Heritage Foundation and Wall Street Journal Index of Economic Freedom as a metric, which began evaluating countries in 1995.

We measure this relationship to evaluate if there is a relationship between the degree to which a country is democratic and economically free and the degree to which it reacts to crisis. Liberal democracy and a free market economic system are the desired end-states of transition because they are presumed to be harbingers of political security through alignment with the West, and of economic development and higher standards of living. We would expect that a country deemed to be closer to those goals, i.e. with a greater degree of economic freedom, to have a milder reaction to crisis, as its trading partners are likely more diverse, more developed nations, its entrepreneurs are likely more free to innovate, it attracts foreign investment and banks; however, by opening its economic borders, a country opens itself up to negative impacts and consequent contagion from its neighbors and beyond.

Trade Openness

Trade openness, calculated as a country's exports plus its imports as a percentage of GDP ((X+M)/GDP) measures the degree to which that country's economy is dependent on trade. Intuitively, the more open an economy is to trade with other parts of the world, the more susceptible it would be to crises and contagion stemming from either supply or demand shocks, originating in or simply affecting its trading partners. We

expect that higher trade openness will be positively correlated with more severe declines in response to economic shock.

It stands to reason that the more dependent a country is on other countries for its trade, the more it will be affected by any economic repercussions that stem from or indirectly affect those other countries. In fact, the EBRD's Transition Report 2010 cites Albania's being less integrated into global markets than its peers as a partial reason for its weathering the most recent crisis so well—growing 3.3% in 2009.[xix] Additionally, the EBRD region exhibits comparatively high foreign trade participation ratios due to increasing global economic integration, and particularly, to increasing economic integration with the European Union, of which many transition countries are now members.

Trade Dependence on the Council of Mutual Economic Assistance

The Council of Mutual Economic Assistance (Comecon/CMEA) was an economic organization founded in 1949 for the eastern bloc and other communist countries around the world. Many of the economies in transition were members of the CMEA, and traded extensively or exclusively with its other members. When virtually all of the members of the CMEA experienced the macroeconomic imbalances, declines in aggregate supply and demand, and political and economic turmoil of the transitional recession, their dependence on the CMEA for trade and economic stability became a significant vulnerability.

Adding to this trade isolation, under the CPE, resource-poor economies in transition frequently imported their raw materials, components, and energy from the USSR, and exported finished goods back. When the Soviet Union collapsed, these

countries lacked both the inputs to function independently, and the demand to support its production.[xx] We expect a country more reliant on the CMEA for its economic vitality to be harder hit by the collapse of these entities, and to experience a more challenging process of trade reorientation and restructuring. The second component of that hypothesis is likely to play a role in that country's reaction to future shocks; we expect to see countries with higher degrees of trade dependence on the CMEA experience deeper declines in response to crisis.

Exchange Rate Regime

A country's exchange rate serves as one of the main channels through which external events are transmitted to a domestic economy. It is also a key instrument in monetary policy, a determinant of the way in which a country responds to crisis. A fixed exchange rate leaves little scope for discretionary monetary policy because it removes monetary control from the central bank's functions. It can, however, effectively combat high inflation by serving as a nominal anchor for price stabilization.[xxi]

Many economies in transition aim to resolve their historic hyperinflation problems, particularly the Baltics and Bulgaria, by joining the Eurozone; Estonia notably attained that goal recently, in January of 2011. The strict requirements for joining the Eurozone, particularly those regarding inflation levels, inspire these Euro-aspiring countries to peg their domestic currencies to the Euro. Immediately after transition began, the desire to align both economically and politically with the West inspired some economies to peg their currencies to the U.S. dollar, but they have since changed the peg to the Euro. Other transition economies chose a floating rate simply because they didn't have the international reserves to support an exchange rate, and/or because their

stabilization programs lacked international credibility.[xxii] While a fixed exchange rate has been deemed preferable for transition economies that wish to control inflation, its benefits have been found to wear off once inflation has reached a manageable level. After that threshold has been reached, a change to a more flexible exchange rate regime is necessary to avoid economic overheating and other associated risks.

Currency pegs and more rigid exchange rate regimes in general, have been linked to more dramatic boom-and-bust cycles because they eliminate the automatic stabilization mechanisms that can mitigate risks associated with economic overheating.[xxiii] Some ascribe the extreme reaction of the Baltic economies to the most recent financial crisis to the extraordinary credit growth and general economic overheating that went unchecked leading up to the crisis. Their pegged currencies exacerbated the situation by limiting the policy options of the central banks, which may have otherwise employed monetary policies to influence the direction of these trends.

Based on this theoretical reasoning and these empirical findings, we expect to find that countries with fixed exchange rates experience deeper declines in response to crisis.

External Debt/GDP

External debt is the money a country owes foreign lenders. High levels of debt entail high costs of servicing that debt. We expect this high cost of debt service would only impair a country's efforts to respond to a crisis—presuming that it would need as much liquidity and flexibility as possible in order to implement effective strategies for stymieing crisis impacts. Moreover, if a country cannot service its debt, it is compelled to default on that debt; this possibility and the doubt it inspires in foreign investors could only exacerbate a crisis situation, as we saw in the Russian Ruble Crisis. On the other

hand, high levels of external debt represent a global estimation of a debtor's reliable reputation and mild credit risk. Regardless, we expect to find that countries with higher levels of external debt as a percentage of GDP experience deeper declines in reaction to crisis.

General Government Debt

A country with high levels of general government debt will have a harder time garnering the political support to implement financial stimulus packages and other policy measures designed to ameliorate a crisis' impact, as we saw even in the United States in the aftermath of the 2008 Financial Crisis. For this reason, we expect to find that countries with higher levels of general government debt experience deeper declines in response to crisis.

FDI and FDI per capita

Theoretically, more FDI should build up a cushion of capital inflows, employment, tax revenue, technological transfer, and other stabilizing and developmental benefits that would be a boon to a country in its response to a crisis. Additionally, high levels of FDI represent a testimony of foreign nations as to the promise and strength of the country in which they invest. Therefore, we expect to find that countries with higher levels of FDI experience milder declines in reaction to crisis.

Inflation/Ln(Inflation)

During the transitional recession, the economies in transition experienced hyperinflation, reaching into the thousands of percents for some. Inflation has been found to be both bad for and negatively associated with economic growth (Fischer 1993; De Gregario 1994). Furthermore, the economies in transition were found to not have

experienced economic growth until their levels of inflation reached below 50% per year.[xxiv] Many of them pegged their exchange rates and implemented massive stabilization programs in order to control inflation; however, most had not accomplished that goal by 1994. A high rate of inflation is typically associated with a weak and developing economy whose central bank has been ineffectual in combating it; we expect an economy in this stage of development would not weather a crisis well. We expect to find that countries with higher rates of inflation experience deeper declines in reaction to crisis.

Foreign-Owned Bank Asset Share

Foreign banks, especially those from Austria and Finland, established themselves as permanent and significant fixtures in the banking systems of many economies in transition beginning in the late 1990s. They benefit host countries by bringing stability, advanced technology, new risk management techniques, financial intermediation, and access to cross-border funding. They enable capital inflow and facilitate lending to the private sector, helping it generate healthy profits—all vitally important components of a country's economic vitality. They have, however, been cited as contributors to the credit booms that have been associated with some of the most severe contractions following a crisis. For this reason, we expect to find that countries with higher foreign-owned bank asset shares experience deeper declines in reaction to crisis.

Private Sector Share of GDP

The private sector accounts for high levels of investment and borrowing during favorable economic periods. These corporate activities are facilitated by strong credit expansion, which has been linked to boom-and-bust cycles, the likes of which were

complemented by severe contractions following the 2008 Financial Crisis. Furthermore, the private sector drives exports, which decline commensurately with demand in times of crisis. An economy with a more active private sector depends on that sector for economic growth, stability, and innovation, so when its private sector confronts damaging market circumstances and higher rates of bankruptcy, as well as the freezing of credit markets, and other symptoms of crisis, its output will decrease. As business output decreases, so too does the economy's in total. We expect to find that countries with higher percentages of GDP attributable to the private sector experience deeper declines in reaction to economic shocks than those for whom GDP is attributable to other sources.

Unemployment

Typically, we associate high unemployment first, with high human cost, and second, with or resulting from a weak economy, ill equipped to sustain a shock to its system; hence, the uproar when the United States' unemployment rate passed 10% following the 2008 financial crisis. Low unemployment, however, among other indicators, can signify overheating in an economy, which contributes to extreme boom-and-bust cycles, and consequently, to severe contractions in GDP during crisis. Because these two theories contradict one another, it's unclear which one may prevail, all other things equal. Since the circumstances surrounding the crises in question pertain more to the second theory, however, we expect to find that countries with lower unemployment levels experience deeper declines in reaction to crisis.

III: Description of Data

This section describes the data used for empirical analysis in this paper, and presents univariate analysis and discussion with respect to the paper's guiding research questions.

III.I Statistical Challenges

There are statistical challenges that emerge when exploring complex issues over time and across countries with inconsistent data. It is important to tread lightly in interpreting data that may be unreliable, may offer inadequate information to measure reform via quantitative metrics, or may miss variables germane to policy-making and evaluation.[xxv] These concerns pertain particularly to data from the economies in transition for the following reasons:

- Foremost, not all economies in transition collected data during transition. This missing data makes analysis of the transitional recession difficult.
- Under the centrally planned economy, the government manipulated the statistics it measured, whose inputs had often already been manipulated by business owners and manufacturers who reported them. During transition, the economies in transition needed to create a new culture in statistical services in order to effectively obtain accurate and objective records. Needless to say, this did not happen consistently or overnight.
- The central planners under the Soviet Union had control over the few nationalized firms' bookkeeping. In the era of transition, when privatization of enterprises was well underway, the existing statistical services struggled with the logistics of measuring many small firms' unstandardized bookkeeping. In addition, they had

not developed techniques to correctly estimate figures for aggregate groups; the consequences of these lapses are incomplete trade and income data.

- The national customs boundaries of Eastern Europe, particularly within the former Soviet Union, are ambiguous. This lack of clarity creates inconsistencies in external trade and balance of payments data, a failure to record small scale, cross-border trade as well as capital flight, and weaknesses in recording methodologies.
- Each economy followed its own path to transition; likewise, each economy applies its own methodological approach to compiling statistics, and often, that approach evolves over time. This lack of consistency in methodology further conflates comparisons of data over time and across countries.

III.II Dependent Variable: Compound Declines in GDP over Crisis Episodes

We define the dependent variable as the severity or depth of a country's reaction to an economic shock as its compound contraction of GDP in association with the economic shock in question: the peak to the trough of the decline, regardless of time. We eliminate countries that exhibited either no change or positive growth throughout the shocks in question because explaining positive growth is a related but tangential discussion, and has been thoroughly explored in an existing body of research. Also beyond the scope of this paper are the many other factors that contribute to a comprehensive measurement of the severity of a country's reaction to crisis, not least of which is human cost—with which the economies in transition are well familiar. We focus solely on compound contractions in GDP following the onset of a crisis. We calculated

this variable for each country using data from the European Bank for Reconstruction and Development (EBRD), using the following equation:

$$Y = -(1-(1+X1)*(1+X2)*(1+X3))*\ldots(1+Xn))$$

Where

Y = total compound contraction in GDP following the onset of a crisis, over the episode

X_n = contraction in GDP in year n following the onset of a crisis

Table 2 below lists the calculated compound declines in output experienced by each country under investigation. Where *n/a* is the entry, that country did not experience any contractions in GDP associated with the episode.

Table 2

Compound Declines in Output

	Transitional Recession	*Ruble Crisis*	*Global Financial*
Albania	-0.40	-0.11	*n/a*
B & H	-0.86	*n/a*	-0.03
Bulgaria	-0.27	-0.14	-0.05
Croatia	-0.41	-0.02	-0.07
Czech Republic	-0.13	-0.01	-0.04
Estonia	-0.38	*n/a*	-0.18
FYR Macedonia	-0.29	-0.05	-0.01
Hungary	-0.18	*n/a*	-0.06
Latvia	-0.33	*n/a*	-0.22
Lithuania	-0.47	-0.01	-0.15
Poland	-0.18	*n/a*	*n/a*
Romania	-0.29	-0.12	-0.09
Serbia & Mont	-0.59	-0.18	*n/a*
Slovakia	-0.25	*n/a*	-0.05
Slovenia	-0.22	*n/a*	-0.08

We can see from the summary statistics table that the transitional recession was characterized by declines in output several orders of magnitude greater than in the later two crises. Additionally, the range of 73 percentage points indicates that the variation among countries during this first crisis was considerably more than in the later two. On

average, a country would have experienced a 20% decline in output during any one of the three crises explored.

After ranking the countries by magnitude of compound GDP decline, we calculated the correlations between rankings in 1990 and 2008, 1990 and 1998, and 1998 and 2008, respectively, to see if there exists a relationship between a country's relative performance during one crisis with its relative performance in the others. A positive correlation of .384 between the transitional recession rankings and the ruble crisis rankings (1990-1998) is fairly intuitive since a country whose economy suffered more in the transitional recession would likely have wished to implement aggressive macroeconomic stabilization and growth programs to develop economically. These countries may not have had the resources to do so, or the time for the programs to have become transformative for the economy, and therefore, were just as susceptible to economic shock in 1998 as they were in 1990. Likewise, a country that did fairly well relative to its counterparts in the transitional recession would not have had reason, barring extenuating circumstances, to be less well-positioned to weather a shock in 1998. The other two crisis pairings, 1990-2008 and 1998-2008, showed negligible correlations.

III.III Independent Variables

There exists a range of years for each crisis episode in which countries began to exhibit contractions in GDP. Since we are interested only in explaining the depth of a decline with economic and country-specific characteristics, irrespective of time, we collect each explanatory variable from the year prior to each country's start of decline. For example, Albania exhibited a contraction in GDP associated with the Russian Ruble Crisis in 1997; we collect all of Albania's explanatory variable data from 1996. Table 3

below lists each country, and the year in which we collect its explanatory variable data, according to the year in which it began to exhibit a decline. Where there is a blank in the table, that country did not experience any contraction in GDP during or around the years associated with the economic shock in question.

Table 3

	Year Prior to Start of Decline		
	Transitional Recession	*Ruble Crisis*	*Global Financial*
Albania	1989	1996	
B & H	1989		2008
Bulgaria	1989	1995	2008
Croatia	1989	1998	2008
Czech Republic	1989	1996	2008
Estonia	1989	1998	2007
FYR Macedonia	1989	2000	2008
Hungary	1989		2008
Latvia	1990		2007
Lithuania	1989	1998	2008
Poland	1989		
Romania	1989	1996	2007
Serbia & Mont	1989	1998	
Slovakia	1989		2007
Slovenia	1989		2007

There are some important outliers to note from this table, particularly in the case of data collection around the Russian Ruble Crisis of 1998. Bulgaria experienced contractions in its GDP in both 1996 and 1997, for a compound total contraction of -14.5%, and then a rebound in 1998 of growth by 4%. The Russian Ruble Crisis climaxed in late August of 1998. It is entirely possible that Bulgaria's significant decline is attributable to other conflating factors, given its extraordinarily early onset if associated with the Ruble Crisis. Likewise, the Former Yugoslav Republic (FYR) of Macedonia experienced a single year of contraction (-4.5%) in 2001. We expect it is likely that this unique contraction can be ascribed to factors outside of the Ruble Crisis of three years prior, unless it was hit by a very delayed wave of impact. Nevertheless, we included both

observations in my empirical analysis because removing them from the panel data set did not significantly affect results.

We collect data for 15 independent variables primarily from the International Monetary Fund's World Economic Outlook Database, herein referred to as the IMF; the European Bank for Reconstruction and Development's Macroeconomic Database and Structural Change Indicators, herein referred to as the EBRD; the Index of Economic Freedom published by the Heritage Foundation and Wall Street Journal; the De Melo, Denizer, Gelb, and Tenev paper, "Circumstance and Choice: The Role of Initial Conditions and Policies in Transition Economies," originally published in the World Bank Economic Review in 2001, and herein referred to as De Melo and Gelb; the Fischer, Sahay, and Vegh paper, "Stabilization and Growth in Transition Economies: The Early Experience," published in the Journal of Economic Perspectives in 1996. The source and summary statistics for each variable are consolidated in Table 4 below, and will be referenced throughout the description of data discussion.

Table 4

Summary Statistics for Independent Variables

Variable	*Data Source*	*Observations*	*Unit*	*Min*	*Max*	*Range*	*Mean*	*Median*
Years Under CPE	De Melo and Gelb	32	Years	41	51	10	45.7	46.0
Trade Openness	EBRD/ calculations	26	%	0	138	138	80	81
Trade with CMEA	De Melo and Gelb	13	%	4	41	37	14	7
FDI	EBRD	36	USD, mil	-273.4	9194.9	9468.3	1331.8	201.3
FDI per capita	EBRD/calculations	24	USD, mil	-136.7	1209.9	1346.6	339.4	269.0
External Debt/GDP	EBRD	25	%	10.3	135.5	125.2	57.3	49.1
General Govt Debt	EBRD	20	% of GDP	3.7	114.9	111.2	28.8	21.4
Foreign Bank Share	EBRD	11	%	28.8	99.0	70.2	83.3	90.8
Private Sector GDP	EBRD	11	%	60.0	80.0	20.0	72.7	70.0
Econ. Freedom	WSJ Index	19	Index	46.7	77.9	31.2	61.6	61.7
Inflation	IMF	23	Index	0.1	27839.2	27839.1	2188.8	106.2
Repressed Inflation	De Melo and Gelb	13		-7.7	25.7	33.4	11.1	12.0
Unemployment	IMF	24	%	2.1	33.8	31.7	10.4	8.1

We measured the correlation between each independent variable and the dependent variable—compound declines in GDP—in a panel set of data that includes observations for all countries in all crises. We then measured the correlations between each independent variable and the dependent variable within each respective crisis episode. This correlation information is summarized in Table 5 below, and will be referenced throughout the description of data discussion.

Table 5

Correlation Statistics for Independent Variables with Declines

Variable	*Panel - Correlation*	*Transitional Recession*	*Ruble Crisis*	*Global Financial Crisis*
Years Under CPE	-0.26	-0.76	0.54	-0.76
Trade Openness	0.59	0.59	0.59	0.17
Trade with CMEA	-0.51	-0.51	*n/a*	*n/a*
FDI	0.37	0.24	0.67	0.26
Ln(FDI)	0.70	0.30	0.67	0.04
FDI per capita	0.16	0.29	0.79	0.20
External Debt/GDP	-0.07	0.18	-0.43	-0.63
General Govt Debt	-0.08	*n/a*	-0.69	0.43
Foreign Bank Share	0.18	*n/a*	*n/a*	0.18
Private Sector GDP	-0.23	*n/a*	*n/a*	-0.23
Econ. Freedom	-0.09	*n/a*	0.61	-0.41
Inflation	-0.11	*n/a*	0.55	-0.46
Ln(Inflation)	0.43	*n/a*	0.60	-0.47
Repressed Inflation	-0.61	-0.61	*n/a*	*n/a*
Unemployment	0.48	-0.55	0.19	0.60
Current Account Balance	-0.17	0.67	-0.62	0.41

Years Under Central Planning

We use data from the de Melo and Gelb, the authors of which collected the original data from the World Bank in 1992 and used it to gauge "Market Memory," society's memory of the market-based economic experience. The countries in question exhibit a fairly tight range between 41 and 51 years under central planning, with a median of 46 years, and an average of 45 years. These lengths of time pale in comparison to other economies in transition that spent up to 72 years under central planning. Whereas 70

years versus 40 years represents an additional generation of people unfamiliar with market systems and the capitalist experience, a range of ten years is unlikely to result in an impact of the nature hypothesized in the prior section.

The panel set of data, data from all three economic shocks, shows an aggregate correlation between years under central planning and the compound declines of -26%. When broken down into individual crises, however, the correlations change. In the transitional recession, the correlation increases to -76%, the Russian Ruble Crisis shows a correlation of 54%, and after the 2008 crisis, the correlation is again -76%. The Ruble Crisis correlation is thrown off by Estonia and Lithuania, which experienced the most time under central planning, as well as the mildest contractions post-crisis. This dramatic directional change in correlation across crises suggests that perhaps years under central planning is not a particularly conclusive variable, and suggests that as the nature of a crisis changes, so too do the important variables for determining a country's reaction to it.

When regressed against compound declines, years under central planning are statistically insignificant; however, as discussed in the next section, the variable becomes statistically significant when regressed with other explanatory variables in a multivariate analysis.

Economic Freedom

We collected the "Overall Scores" for each country in question from the Index of Economic Freedom, published annually since 1995 by The Wall Street Journal and the Heritage Foundation, a Washington D.C. think tank. The index measures ten elements of economic freedom, including freedom from corruption, property rights, investment freedom, and business freedom, in 183 countries around the world. Each element carries

equal weight in the compilation of an overall score. The Wall Street Journal and Heritage Foundation define economic freedom as follows:

> *"the fundamental right of every human to control his or her own labor and property.. In an economically free society, individuals are free to work, produce, consume, and invest in any way they please, with that freedom both protected by the state and unconstrained by the state. In economically free societies, governments allow labor, capital, and goods to move freely, and refrain from coercion or constraint of liberty beyond the extent necessary to protect and maintain liberty itself."*

The index ranges from 0-100, with the following breakdown and classifications:

Unfortunately, the data is not available for analysis of the transitional recession; however, we can deduce from the nature of central planning that the economies in transition would have received very low scores, had they been evaluated. The economies exhibited a range of scores between 46.7 and 69.1 in 1998, demonstrating a categorical range of between "repressed" and "moderately free." Encouragingly, the range of scores shifted up in the late 2000s to between 53.9 and 77.9, with the categorical range also shifting up to between "mostly unfree" and "mostly free." Notably, Estonia scored the highest in economic freedom in both years under consideration.

The correlation of this variable with the declines in each crisis showed another directional change between crises. In 1998, the correlation was a positive 61%. In 2008, the correlation was -41%. These were likely thrown off by Estonia, which exhibited the highest score of economic freedom in both crises, but in 1998, had the mildest reaction of all its peers (-.3%), while in 2008, experienced the second steepest decline of -18.3%. Again, this directional change in correlation suggests that perhaps more economically

free countries fared better in the specific nature of the 1998 crisis, whereas less free countries fared better amid the financial crisis of 2008.

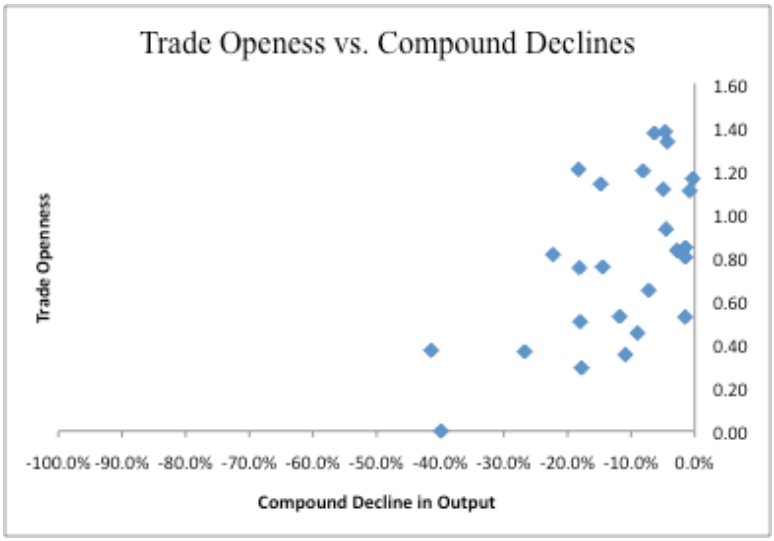
When regressed against compound declines, the economic freedom index variable is statistically insignificant; however, as discussed in the next section, it becomes statistically significant when regressed with other explanatory variables in a multivariate analysis.

Trade Openness

We calculated a modified trade openness statistic to overcome data limitations with data available from the EBRD: (Merchandise Imports + Merchandise Exports)/(GDP per capita * Population). Typically, trade openness is measured as (All Imports +All Exports)/GDP. Intuitively, the more open an economy is to trade with other parts of the world, the more susceptible it should be to crises and contagion. In a panel set of data, eliminating one outlier (Slovenia's 1990 trade openness of 41.38), the correlation between trade openness and decline is .592, i.e. a country with a higher degree of trade openness experiences a milder reaction to a crisis.

The significance of the correlation drops considerably in 2008, suggesting that relationship does not hold to the same extent. Because the transitional recession and the Russian Ruble Crisis were fairly regionally concentrated events, this relationship might indicate that countries with higher trade openness were relying on economies other than those in the CESEE region, and therefore, were somewhat protected from what was a largely regional impact in both crises. The effect diminishes in 2008, which follows the logic outlined, since the global economic crisis was a global event; countries with higher trade openness and potentially more diverse trading partners were not any more protected

from a global event than countries with lower trade openness and presumably fewer trading partners. A positive relationship is observable in the scatterplot below.



Regressed against the 20 compound declines for which there was corresponding data, trade openness is statistically significant at a 1% level, with a positive correlation such that as trade openness increases by 1%, so too does a country's decline lessen by 0.143. The table below shows the regression results. When we consider that the range of trade openness is between Albania with 0.0% trade openness in 1990 and Slovakia with 138% trade openness in 2008, this variable appears not immaterial in explaining declines in crisis. Similar results emerge from a multivariate analysis.

Regression Analysis: Trade Openness and Compound Declines

Predictor	*Coefficient*	*T-stat*	*P-value*
Constant	-0.2357	-5.57	0
Trade Openness	0.143	3.01	0.008
Observations	20		
Adjusted R^2	29.8%		

Exchange Rate Regime

We collected the exchange rate regime classification data for the transitional recession from the Fischer, Sahay, and Vegh paper, which labeled each country as having adopted either a fixed or flexible exchange rate regime. For the later two crises, we collected the data from the EBRD, which described more specifically the exchange rate regime each country employed. We used a dummy variable to look for a relationship between rigidity of exchange rate regime and reaction to crisis, classifying currency boards and fixed pegs as "fixed," and managed and independent floats as "flexible." 21 countries were classified as "fixed," and 13 countries were classified as "flexible." The overall correlation between exchange rate regime and compound decline is a positive 25%; fixed exchange rates are associated with milder declines in reaction to crisis. Again, however, the data exhibit a change in direction across crises, with strong positive correlations for the first two, and a negative correlation for the 2008 Financial Crisis.

External Debt/GDP

We gathered the external debt as a percentage of GDP data from the EBRD. The data for the transitional recession contains only four observations, which exhibit a positive correlation of 18%. The later two crises with many more data points exhibit a negative correlation of -53%, suggesting that countries with higher foreign debt ratios experience steeper declines as a result of an economic shock. The correlation in the 2008 crisis is particularly strong, at -63%. These correlations support the hypothesis detailed in the previous section. The data exhibit a range of 125.2 percentage points; even a very small coefficient may explain considerable variation.

When regressed bivariately against compound declines, the external debt variable is statistically insignificant; however, as discussed in the next section, it becomes

statistically significant when regressed with other explanatory variables in a multivariate analysis.

General Government Debt

We collected the general government debt data from the EBRD, which offers observations only for the Russian Ruble Crisis and the 2008 Financial Crisis. We expected that high levels of government debt would impair the ability to effectively respond to crisis with stimulus packages, etc., and thereby result in steeper declines; the data show a -69% correlation following the ruble crisis, affirming this hypothesis, but a positive correlation in 2008 of 43%, contradicting this hypothesis. In the aftermath of the ruble crisis, countries with higher levels of government debt experienced deeper declines, whereas in the global financial crisis, this relationship reversed.

FDI and FDI per capita

The net stock of foreign direct investment data also came from the EBRD. Taking the natural log of the FDI data, we find a correlation of 70% between the natural log of a country's net FDI stock and that country's compound decline in response to the crisis. Dividing net FDI stock by population, we calculate FDI per capita, and found a 16% correlation with the compound declines; however, again we see the case of a directional change in correlation across crises.

Both the fall of the Soviet Union and the Ruble Crisis exhibit positive correlations—29% and 79% respectively—whereas, the 2008 financial crisis shows a negative correlation of -20%, to be interpreted that higher levels of FDI per capita are associated with steeper declines in reaction to a crisis. A potential explanation for this

counterintuitive finding may be that a measure for FDI stock doesn't capture the speed or momentum of flows of money into or out of the country.

Typically, FDI is desirable because it is a more permanent type of investment than more liquid investments in securities, currencies, or government bonds, and it brings with it intangible benefits for economic development. In the case of the global financial crisis, the levels of FDI were orders of magnitude higher than in the prior two crises, and arguably all developed nations, the foreign investors in the economies in transition, were affected, as opposed to in the prior two shocks, which were more regional in nature. These investors were likely scrambling to divest as much as possible as soon as they realized the severity of the crisis; higher levels of FDI in a country means it has more money to be divested. Perhaps countries with higher levels of FDI per capita experienced higher rates of divestiture when crisis set in, further exacerbating the crisis' impact on their economies because of the surprise nature of the divestiture of funds they had been relying on for a number of economic development benefits. Slovenia, for example, is the only country to exhibit a negative FDI stock in the year before its decline began. Several others exhibit negative FDI stock in the following year, the year in which GDP contractions commence, while the rest of the countries experience significant decreases in their net FDI stock per capita.

Inflation/Ln(Inflation)

We collected inflation index level data from the International Monetary Fund's World Economic Outlook database. Because of the very few observations available from the IMF for the year associated with the fall of the Soviet Union, we also collected repressed inflation numbers from the de Melo and Gelb Initial Conditions paper to serve

as a proxy. De Melo and Gelb define repressed inflation as the percentage change in real wages less the percentage change in real GDP and consider it the most reliable proxy for inflation in the early years of transition. The repressed inflation numbers show a -61% correlation with the compound declines associated with the fall of the Soviet Union, whereas the inflation index numbers show a directional change in correlation over the later two crises: 55% in 1998, and -46% in 2008. These numbers suggest that in 1998, countries with higher levels of inflation experienced milder reactions to the crisis, whereas in both 1990 and 2008, countries with higher levels of inflation experienced more severe reactions to the crises.

Foreign-Owned Bank Asset Share

The EBRD began releasing an index of structural and institutional change indicators in 2004, in which it reports the asset share of foreign-owned banks. Unfortunately, this data is available only for analysis of the global financial crisis of 2008, but is worth exploring, nonetheless. The economies in transition exhibit a wide range of foreign bank ownership: Slovenia at the low end with 28.8% of assets, and Slovakia and Estonia at the other extreme, with 99% and 98.8% respectively. The extremely high numbers may be attributable to the close economic and political ties between Estonia and Finland, the latter of which has a very strong banking sector. The mean asset share of all the countries in question is 83.28%, and the median is 90.8%. The data show only an 18% correlation with the compound declines associated with the 2008 Financial Crisis, so in this case, more foreign bank ownership is mildly correlated with less severe reactions to crisis.

Private Sector Share of GDP

Data for the private sector's contribution to GDP was also taken from the EBRD's Structural and Institutional Change Indicators Index, published annually beginning in 2004; we therefore explore it only with respect to the Financial Crisis of 2008. The economies in question exhibit a fairly tight range of 20%: Bosnia and Herzegovina at the minimum with 60%, and Estonia and Slovakia at the maximum with 80%. The data show a -23% correlation with the compound declines associated with the financial crisis, i.e. higher percentages of GDP attributable to the private sector are associated with steeper declines in crisis.

The private sector produces a considerable amount of its output for foreign trade purposes; in the event of a drastic decline in demand, exports collapse, and private sector output falls. As trade openness increased throughout the years, and trading relationships with more western and more diverse partners also developed, we can intuitively explain why in a far-reaching, global crisis, countries relying on the private sector for GDP, and that private sector, in turn, relying largely on trade, would see consequent sharper contractions in GDP.

Unemployment

The data for unemployment rates came from the International Monetary Fund's World Economic Outlook Database. Overall, the data show a positive correlation of 48% with compound declines in crisis. The IMF provides only five observations associated with the fall of the Soviet Union, which show a negative correlation of -55%; the more complete data associated with the two later crises demonstrate positive correlations of 19% and 60% respectively. These findings, while counterintuitive that higher unemployment would be associated with milder declines in crisis, affirm the hypothesis

that lower rates of unemployment may be symptomatic of overheating in an economy. This is particularly germane to the discussion of the 2008 financial crisis, in which extreme boom-and-bust cycles have been cited as having played a significant role in deepening reactions.

IV: Multivariate Analysis and Discussion

We used an Ordinary Least Squares (OLS) regression approach to exploring the relationships between the aforementioned explanatory variables and the countries' compound declines in GDP over the course of a crisis episode. Several of the variables are correlated with one another, evidencing the multicollinearity of the data set; however, the effects are fairly limited, as regression coefficients show almost no change upon manipulation of the data. Many fundamentals may matter with respect to explaining output declines, but because of the few observations available for the countries and episodes in question, it is impossible to explore them all at once.

In the first multivariate regression, we test four independent variables: years under central planning, economic freedom, ln(FDI), and exchange rate regime. The regression results are summarized in Table 6 below. With 18 observations, both years under central planning and exchange rate regime tested statistically significant at a 10% level.

Years under central planning produced a coefficient of -0.01, consistent with the aforementioned hypothesis that countries with more years under central planning would experience deeper declines in reaction to crisis. With every additional year a country spent as a centrally planned economy, it experienced, on average, a decline deeper by .01. Considering that the range of years spent under central planning by the countries in

question was only 10, this relationship explains a relatively immaterial element of decline. Unlike the other variables tested, years under central planning is a fixed, permanent, never-to-be-repeated characteristic of a country. There is no predictive or preventative conclusion to be derived from these results, but they do inform our understanding that the time a country spent under central planning still, 20 years later, influences its ability and chosen approach to respond to economic shock. Exploring just exactly what about the time under central planning influences a country, and gauging whether a proxy for that exists and if it can be addressed, would be an interesting area for further research.

Additionally to be taken away from this regression analysis is the statistical significance of a country's choice to apply a fixed or flexible exchange rate regime. Contrary to the hypothesis detailed in a prior section, its positive coefficient indicates to us that the countries that had a fixed exchange rate experienced a milder reaction to crisis by 0.075.

Table 6

Multivariate Regression Analysis

Predictor	*Coefficient*	*T-stat*	*P-value*
Constant	0.3847	1.64	0.123
Years Under CPE	-0.01	-2.07	0.058
Econ. Freedom	-0.001	-0.63	0.538
Ln(FDI)	-0.006	-0.79	0.444
ERR	0.075	2.01	0.064
Observations	18		
R^2	28.6%	*Adjusted* R^2	8.2%

The results of the second multivariate regression for discussion are shown in Table 7 below. We test exchange rate regime, external debt as a percentage of GDP, trade openness, and economic freedom as the right hand side variables. Most notably, external

debt and trade openness both tested statistically significant at a 5% level. External debt tested very significant, with a p-value of 0.004, with a negative coefficient that affirms the hypothesis detailed in a previous section. We had expected to find that as external debt/GDP increases, a country's decline in response to crisis deepens; as external debt/GDP increases by 1%, a country's decline deepens by 0.0013. While significant, this variable's effect is immaterial.

Trade openness, on the other hand, tested significant with a positive coefficient, such that as a country's trade openness increases by 1%, its decline in response to crisis is milder by 0.107. When we consider that the range in countries' trade openness is 138%, we see that the variable explains material variation among countries' declines.

Table 7

Multivariate Regression Analysis

Predictor	*Coefficient*	*T-stat*	*P-value*
Constant	-0.041	-0.49	0.634
ERR	0.028	1.19	0.252
External Debt	-0.0013	-3.38	0.004
Trade Openness	0.107	2.26	0.04
Econ. Freedom	-0.002	-0.94	0.363
Observations	18		
R^2	53.2%	*Adjusted* R^2	39.9%

The third regression equation worth discussing has an adjusted R^2 of 52.9%, and the five right hand variables tested statistically significant at a 5% level. The regression output is shown in Table 8 below. Years under central planning and trade openness tested with almost exactly the same coefficients as in the aforementioned regressions.

The unemployment rate tested significant with a positive coefficient that affirms the hypothesis detailed in a prior section: as a country's unemployment rate increases by 1%, its reaction to crisis is milder by 0.004. This relationship is interesting because it is

somewhat counterintuitive, but it's not a particularly material explanation of variation, given the range in unemployment rates of 31.7%.

Also interesting, but fairly immaterial is the economic freedom variable, which tested significant, but with a negative coefficient that not only contradicts the hypothesis set forth in a previous section of the paper, but also conflicts with the findings that years under central planning also contribute to deeper declines. Economic freedom is a proxy for how close the economies in transition to the desired end-states of transition: free market economy and liberal democracy. The finding, however, that as a country's economic freedom increases, as it gets closer to the desired end-states of transition, its reaction in crisis deepens, despite the immateriality of the effect, flies in the face of the more intuitive finding that a country with more to overcome to achieve market-based systems, i.e. more years under central planning, experiences deeper declines.

Table 8

Multivariate Regression Analysis

Predictor	*Coefficient*	*T-stat*	*P-value*
Constant	0.526	2.76	0.02
Unemployment	0.004	2.84	0.017
Ln(Inflation)	0.024	3.13	0.011
Econ. Freedom	-0.006	-2.47	0.033
Trade Openness	0.108	2.19	0.053
Years Under CPE	-0.012	-2.86	0.017
Observations	15		
R^2	68.6%	*Adjusted* R^2	52.9%

Conclusion

What we can take away from this analysis is that the answer to the guiding research questions of this paper are that yes, there are, in fact, macroeconomic and structural characteristics that explain the extent to which countries experience declines in output over the course of economic shocks. Some of them are static, like the number of

years a country spent under a centrally planned economy; others are dynamic and ever-changing, like a country's degree of trade openness, its unemployment rate, the degree to which it is deemed economically free, its levels of foreign debt, its choice of exchange rate regime, and its levels of inflation. Understanding the directional impact of each of these variables, and the ways in which they interact, can only inform economic and policy-making going forward.

Likewise, this paper shows that many important macroeconomic and structural indicators show no relationship whatsoever with the extent of a country's decline in output over crisis episodes. Arguably, it is just as important for countries to be aware of the characteristics that do not require their time or attention preceding or during crisis because they have no bearing on performance, as it is to be aware of those that determine the depth of their declines. All of this information, statistically significant and insignificant, material and immaterial, should inform the decisions of policy-makers and country leadership with respect to allocation of time, attention, and resources.

Granted, there are many unique characteristics of the particular economies in transition and the particular crises that were explored in this paper, so the relationships uncovered may be far from universally applicable. However, this paper does demonstrate that there are relationships to be found in any set of countries over crisis episodes, and may be a valuable source of information in shedding light on best practices for economies of a certain nature. In fact, looking for an ideal combination of economic factors and characteristics that optimize a crisis reaction for a given economic profile, and how that ideal combination differs with respect to other economic profiles would be an interesting opportunity for future research.

Another conclusion to be drawn is that frequently, the statistical testing of independent variables in this paper contradicted the directional impact hypotheses espoused in an existing body of research. Not to say that empirical testing disproves these hypotheses—for another group of countries or another group of crises, they may hold true without fail, and this may be due to any number of data discrepancies—but recognizing contradictory empirical evidence informs future research in the area of crisis response.

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Appendix

Exhibit 1