Spring 5-1-2011

The Effects of Trade Openness on Per Capita GDP during Banking Crises

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A Capstone Project Submitted in Partial Fulfillment of the Requirements
of the Renée Crown University Honors Program at Syracuse University
and the
Program of Distinction in Economics at Syracuse University

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April 2011

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Abstract

This paper examines the real per capita gross domestic product (GDP) growth effects of country trade volume interacted with the recent occurrence of banking crisis. Panel macroeconomic data availability permits the inclusion of banking crises which have occurred worldwide over roughly the past five decades.

Linear regression results provide suggestive evidence that greater trade volume, interacted with the recent occurrence of a banking crisis, may have a large, positive effect on real per capita GDP. A 100 point openness index increase causes an average increase of approximately 2.3% per capita GDP when interacted with the presence of a banking crisis. A change from autarky (index zero) to high openness (index 100), for example, substantially offsets the average negative effect of a banking crisis at openness = 0, approximately -6.9% per capita GDP. However, this measurement is imprecise, with robust standard errors of approximately 0.022, or 2.2% of per capita GDP.

Additionally, greater trade openness may aid in the recovery of per capita GDP following a banking crisis. At openness = 0, the average annual effect of each of the ten years following a crisis is -0.2% GDP per capita, approaching statistical significance with robust standard errors of 0.17% GDP per capita, giving the 10-year recovery period a total impact of -2.0% GDP per capita. Interacting openness with years-since-crisis, however, yields an average increase of 0.3% per capita GDP per annum, per 100 openness index points, during the recovery period. This measurement is less precise, however, with robust standard errors of 0.33% GDP per capita. In other words, a banking crisis may put lasting, downward pressure on GDP if no trade is allowed.

I hypothesize that greater preexisting openness may offer countries more options to maintain their consumption components of real per capita GDP via substitution (importing), or to pursue export-led growth policies more easily, as high trade volume would imply the preexistence of developed physical and legal infrastructure for trade activity. Further research is warranted to investigate these mechanisms with greater precision, and to determine if trade openness is serving as a proxy variable for flexibility or resiliency in financial markets, financial openness, generally competent macro policy management or another unknown variable.

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Preface

This paper represents my first econometric study. It serves as both my Capstone Project for the Renée Crown University Honors Program and as my undergraduate thesis for the Program of Distinction in Economics at Syracuse University. The work itself was conducted through the Economics Department, which supports this small corps of students (six, during the 2010-2011 academic year) with a full-time professor, as a two-semester, credited course sequence.

Chris Rohlfs, my advising professor, imposed strict standards for research design in terms of causality. In other words, topics yielding only correlative results were not acceptable. This restriction is industry best practice, so to speak, but it also limits the types of questions that a researcher may ask.

Most of my early topic proposals did not make the cut. They were broad lines of inquiry in which only opaque, correlative relationships were likely to be found. An example would have been a global study of the economic precursors to armed conflict. The topic proved too murky, too devoid of sound data containing the clear, exogenous "shocks" upon which natural experimental design pivots.

I found a more manageable alternative in what might be considered the consolidated field of international macroeconomics and finance, which I had been studying during this paper's conceptual stage. The financial crisis of 2007-2008 was still the elephant in the room, and I was fascinated by its mechanics. But I was also struck by how much economists still did *not* know about financial crises, especially given their destructive power. Each case study seemed to contain at least one unresolved economic debate, suggesting plentiful opportunities for new research.

I had already come into contact with the recent work of Carmen Reinhart and Kenneth Rogoff on the history of financial crisis, and thought that their simple, yet unique datasets on banking crises could make an excellent starting point. I had read quite a bit on the effects of financial openness as it relates to both economic growth and crisis management, but this was mostly presented in theoretical terms. What I wanted to see were some hard numbers.

It turned out, however, that I hadn't seen many hard numbers about financial openness for a reason: by and large, the data does not exist. I began framing my regressions with a crude proxy variable – trade openness – as a placeholder, while looking for better measurements of financial openness. But once I ran a few regressions on the trade openness variable, it seemed to have an interesting effect all by itself, and potentially a very large one. So I changed course, back into uncharted territory.

This study has given me firsthand exposure to the capricious nature of discovery. It is part diligence and part intuition, but also part accident. I complete this paper having gained more questions than answers. Indeed, I believe that is what has made the experience worthwhile.

Acknowledgements

Special thanks to:

Professor Chris Rohlfs, my primary advisor for this paper and my econometrics instructor. This paper would not have been possible without his guidance and technical expertise in both the theory and practice of statistical research.

Professor Don Dutkowsky, who generously offered his time to read and edit drafts of this paper, and whose teaching first inspired my interest in the field of economics.

Professor J. David Richardson, an invaluable resource on all things international trade, who also read and commented on drafts of this paper.

Professor Jerry Kelly, for bravely agreeing to teach economic statistics to me.

My thesis seminar classmates, for their constant feedback, mutual support and good cheer.

Professor Robert D. McClure, who from my first semester at Syracuse has been a mentor to me in all areas of life.

My family, most especially my parents, Rose and Andrew Brozdowski, for a lifetime of loving support.

Advice to Students

Research early, research often. It is far easier to have too much detail and make cuts than it is to scramble to fill in missing details. Ask questions. Econometric analysis is not easy, even for Ph.D.s; you are not alone. Stare at your data. Then stare at them some more. Be able to tell a story about what the numbers mean.

Make sure you can clearly verbalize just what your models are measuring. Know the strengths and weaknesses of the methods that you have used. Be open and honest about them, both in writing and in oral presentations. Try to imagine other ways you might have conducted your study, so you can explain why you ultimately chose the methods you did. If you need to, go back to your textbooks and your notes to refresh yourself on what the best modeling techniques might be for your data.

Do not hesitate to contact professional researchers with authority on your topic. But if you do, familiarize yourself with their work first so you're not asking them to spoon-feed you. Researchers spend a lot of time with their work, so chances are good that they will open up if you show genuine interest. Personal relationships can help you overcome dead-ends; strangers get locked out.

If you can, present your findings formally to a panel of professors with knowledge of your topic. This is a good way to obtain a lot of sound advice on your research very quickly. You will get more people to commit to a 30-minute presentation than to read your entire paper, so use this opportunity to supplement your readers' line editing.

I. Introduction

In the field of financial crisis analysis, attention is mainly focused on financial variables. At most, trade balance may be addressed as a component of the current account balance. But trade openness – a country's relative volume of trade – is seldom discussed. Meanwhile, the effects of trade openness on long-term per capita gross domestic product (GDP) growth, development and productivity have been studied extensively, albeit with mixed results (Bekaert; Easterly). This study attempts to identify a linkage between the economic openness literature and financial crisis literature, which have largely remained separate. To accomplish this, the present study examines the historical per capita GDP growth effects of trade openness when interacted with the occurrence of a banking crisis.

Simply possessing well-developed physical and legal facilities to execute trade transactions may make trade policies easier to execute. In other words, countries that are relatively more "practiced" at trade may be able to use trade more easily as a policy tool. Ready availability of foreign exchange from trade transactions could also provide some cushioning in the event of a crisis (Gerber Ch. 12, Montiel Ch. 19). It is plausible then that a country's sheer volume of trade might enhance a country's ability to mitigate the recessionary effects of financial crisis through trade. I will state some specific hypotheses on the mechanics of this process in later sections. This paper serves as a point of departure, encouraging researchers to more closely examine whether trade for trade's sake promises some previously-unrecognized benefits to the countries of the world, beyond productivity and growth.

The estimation strategy for this study involves standard, linear, ordinary least squares regressions run on large, macroeconomic panel datasets. The dataset is

narrowed to include only data from 10 years before a given crisis through 10 years afterward, including the initial year, for a total of 21 country-years per crisis observation. These ranges are truncated in cases toward the beginning and end of the dataset where further data is unavailable, and in cases of overlapping "serial" crisis periods.

I calculate average trade openness indexes for each affected country over the four country-years directly preceding the onset of a banking crisis, plus the crisis initial year, for a five-year openness average. I then interact this variable with a dummy variable for country post-crisis status, assigned to the 10 country-years following that banking crisis. I then regress this interaction term on the natural log of real per capita GDP to isolate the interaction term's effects on per capita GDP growth. I progressively add controls over five specifications, the final specification controlling for time trend; country fixed effects; country-specific trends, or the interaction term between country and year; and finally, year fixed effects.

I draw my banking crisis dates and locations from Reinhart and Rogoff (2008), and macroeconomic panel data from Version 6.3 of the Penn World Tables (Heston et al). The data were merged to form a strongly balanced panel, including 153 unique country-crises over the period from 1963 to 2007.

Linear regression results provide suggestive evidence that greater trade volume, interacted with the recent occurrence of a banking crisis, may have a large, positive effect on real per capita GDP. A 100 point openness index increase caused an average increase of approximately 2.3% per capita GDP when interacted with the presence of a banking crisis. A change from autarky (index zero) to high openness (index 100), for example, would substantially offset the average negative effect of a

banking crisis at openness = 0, approximately -6.9% per capita GDP. However, this measurement is very imprecise, with robust standard errors of approximately 0.022, or 2.2% of real GDP per capita.

The remainder of this paper proceeds as follows: Section II describes the data sources and characteristics of this study in greater detail; Section III further describes the regression modeling strategy employed; Section IV discusses the results of the study; and Section V gives concluding remarks. Bibliographical information is provided thereafter, followed by a data appendix containing the tabulated regression results referenced in the report; a corresponding table of means; and two versions of the historical crisis data adapted from Reinhart and Rogoff. Finally, the report includes an extended summary for administrative use.

II. Data

Data Source 1: Reinhart and Rogoff (2008)

Crisis data is drawn from Reinhart and Rogoff's 2008 paper, "This Time is Different: A Panoramic View of Eight Centuries of Financial Crises," specifically "Table A3: Banking Crises Dates and Capital Mobility: 1800-2007," which tabulates historical occurrences of banking crises. Because it is often difficult to mark the end date of a banking crisis, the data include only initiation years. I describe my method for handling this limitation in the Data Description subsection below.

In their study, Reinhart and Rogoff mark a banking crisis "by two types of events: (1) bank runs that lead to the closure, merging, or takeover by the public sector of one or more financial institutions; and (2) if there are no runs, the closure, merging, takeover, or large-scale government assistance of an important financial

institution (or group of institutions), that marks the start of a string of similar outcomes for other financial institutions" (Reinhart and Rogoff 81). The Type I crisis is considered "systemic," and more severe than the Type II crisis, summarized by Reinhart and Rogoff as an episode of milder "financial distress" (*ibid.*). Reinhart and Rogoff's summary tables do not discriminate between the two types, however; therefore, neither could the present study.

The layout of Reinhart and Rogoff's Table A3 also makes it difficult to determine the intended dates for one observation each in Slovenia and Macedonia, but these are both entered as 1992 based on the context of table. One observation in Myanmar is dropped because the Penn World Tables, described in the following subsection, do not contain data for Myanmar, Burma or any variation thereof. One country-year observation of "Congo – 1992" is dropped because it cannot be determined which country this is meant to represent during that time period.

Data Source 2: Penn World Tables, Version 6.3

Country macroeconomic data is drawn from Version 6.3 of the Penn World Tables. This includes basic statistics for real per capita gross domestic product (real per capita GDP), trade openness (synonymously, "trade volume"), and population.

PWT's data for "China Version 1" is favored because it represents the "official" reporting of China's data, and does not rely on the PWT developers' estimates which produced "China Version 2"(Heston).

PWT's updated "RGDPL2" measurement of per capita GDP is employed because its designers claim that resulting growth calculations are more stable between versions of PWT, although this is not of direct concern to the present study

(Heston). Linear regressions are run on the natural log of this per capita GDP measurement, so coefficients can be easily interpreted as rates of change.

Data Description

Reinhart and Rogoff's data are merged with the full Penn World Tables (PWT), Version 6.3, using Stata statistical software. Country names are amended to conform to PWT coding. The resulting merged panel dataset is strongly balanced, and includes 153 distinct country-crisis combinations as sample observations. This study does not attempt to account for contagion effects. For example, if a banking crisis originates in one country, but allegedly causes a banking crisis in another country, both country-crises are counted as separate observations. The resulting sample dataset is provided in the Appendix as Tables 3A and 3B, organized respectively by chronology and by country.

As the end date of a given crisis is very difficult to discern, and no unified data exists to measure crisis duration, in this study a country is considered to be in a "post-crisis" state for the crisis initial year plus the 10 following years. Therefore, the post_crisis variable is coded as a dummy that takes on the value 1 for the crisis initial year plus the ten following years.

For every observation of an initial crisis year in a given country, data is examined over the time interval from 10 years prior to the crisis onset, through 10 years following the crisis onset, i.e., for 21 years total including the crisis initial year. Multiplying by the 153 unique crisis observations; subtracting out overlap between instances of frequent crises within a single country; and then subtracting unavailable

years near the beginning and at the end of the dataset for which no further data exists, yields 2706 country-year observations in the study sample.

The "openness" variable in this study is the five-year average of a country's PWT "openk" statistic, taken over the four years leading up to a given country-crisis plus the crisis initial year. This was done in an effort to neutralize possible, unknown effects of impending crisis on the openness variable, and also to reduce the effects of random year-to-year variation in country openness. PWT calculates openness as an indexed proportion of country real GDP, in constant dollars, as openk = [(Exports + Imports) / GDP] x 100.

Table 2 contains the table of means for the main regression's datasets. The first column gives a concise description of each variable, how each is calculated, how each is coded, and what assumptions underlie them, where applicable. For each variable, values were calculated for its arithmetic mean; standard deviation (S.D.); number of observations (n); and its minimum and maximum values in the data to impart a sense of scale or range.

The column labeled "Study Sample" lists these calculations based only on the restricted sample dataset which produced the main regression table found in Table 1, the model and inferential results for which are discussed in the following Sections III and IV. The column labeled "Full PWT," standing for "Full Penn World Tables," calculates the same statistics for the entirety of the Penn World Tables macro panel data, without dropping any observations. Therefore the number of observations (n) is higher in the Full PWT column than in the Study Sample column for any given variable.

Table 2 allows the reader to judge potential selection bias based on differences between the sample and population dataset characteristics. The means of some variables were altered considerably by sample selection. "Post_crisis" and "years_since_crisis," for example, display expectedly sharp jumps in their means, because the study sample focuses only on country-years in proximity to a crisis.

Country population headcount mean increased considerably as well, from about 28 million in the full PWT to nearly 43 million in the study sample, a possible warning that country size may be distorting regression results. However, mean real per capita GDP changes only modestly, from $8,690 down to about $7,970 in the study sample, and with smaller standard deviation. The means and standard deviations for the natural log of real per capita GDP remain nearly identical between the study sample and the full dataset.

The mean of PWT's annual openness measurement, "openk," shrinks by a modest 10 index points in the study sample. Observations on the change in mean for this study's five-year average pre-crisis openness measurement, "openness," are of limited use, however, since this statistic is only calculated in pre-crisis years.

On balance, the study sample appears only minimally biased in most meaningful comparisons with its population means.

Table 3A tabulates the 153 study sample country-crisis initial year observations in chronological order. Cursory examination shows that many crisis initial years were shared widely by several countries, making a strong case for the inclusion of year fixed effects controls in the regression. A number of these "bad years" include groups of countries in obvious geographical proximity, like the African countries in 1988 and 1992, or Asian Pacific countries in 1997, perhaps

indicating contagion effects. But these are often joined by one or more countries not geographically grouped, or even obviously economically integrated.

Table 3B organizes the same country-crisis sample data by country, allowing ready observation of "serial" crises within a particular country. Many countries on the list appear only two or three times, but their banking crises often fall within a decade of one another. In this study, these situations are considered serial crises in the sense that their average "openness" statistics are retained from the earlier crisis if 10 recovery years had not passed before the subsequent crisis.

III. Model

The regressions designed for this study are modeled as follows:

$$ln(GDP_{it}) = \beta_0 + \beta_1 * Openness_{it} * Post\ Crisis_{it} + \beta_2 * Openness_{it} * Years\ Since\ Crisis_{it} + \beta_3 * Post\ Crisis_{it} + \beta_4 * Years\ Since\ Crisis_{it} + \beta_5 * Openness_{it} + \boldsymbol{\beta}_{\mathbf{x}} * \mathbf{x}_{\mathbf{it}} + u_{it}$$

where the vector x varies across five different specifications, each specification progressively including an additional control. The first specification includes no controls. The second includes a time trend control. The third adds country fixed effects. The fourth adds country-specific trends. The fifth adds year fixed effects. Autocorrelation issues were partially addressed by clustering by country-decades. The controls included in each specification are also summarized in Table 1 of the Appendix, with the regression results.

The interaction term between openness and a country's post-crisis status represents the one-time level-shift effect of trade openness on a country's real per

capita GDP given that a banking crisis has taken place within the past 10 years. This is compared with the per capita GDP level-shift effect of the post_crisis variable by itself, i.e., at openness = 0, or trade autarky, in the Results section. The years_since_crisis variable and its interaction term with openness also receive closer attention in the Results section below as descriptions of a country's recovery from economic crisis in the absence or presence of trade openness. The openness variable by itself is of little use in this study due to the inclusion of country fixed effects and a large degree of multicollinearity in the panel data, but it is included for completeness.

Because the data included some countries which experienced frequent, or serial crises, mean openness was only recalculated for a country if more than 10 years had passed since that country's last crisis. This was done in an effort to eliminate possible disruptive effects of a crisis on openness, which in turn may have helped precipitate another crisis in rapid succession. Table 3B in the Appendix sorts the sample country crises by country and then by year to help identify when and where these serial crises took place.

IV. Results

Table 1 in the Appendix tabulates the main regression results from this study. The first column lists each regressor, detailed descriptions for which can also be quickly referenced in the first column of Table 2. All coefficients represent the effects of the regressor on the natural log of real per capita GDP, so these results may be interpreted directly as rates of change on per capita GDP. Robust standard errors appear below each coefficient in parentheses, and results that are statistically significant at the 0.05 level appear with two asterisks.

Each column numbered (1) through (5) represents a new specification with an additional control variable added. Column (1), or specification 1, contains no controls, and specifications 2 through 5 add one control each, as described above in the Model section. Toward the bottom of Table 1 is a Controls checklist to indicate which control variables are active in each specification. The discussion below focuses on specifications 4 and 5, favoring specification 5 with its full complement of controls.

In Table 1, regression coefficients and standard errors involving the openness variable (openness, openness*post_crisis and openness*years_since_crisis) are multiplied by a factor of 100 to describe the effect on GDP resulting from an increase of 100 openness index points. This is done to express how economies with very different levels of openness may fare very differently through financial crises, rather than fixating on the relatively trivial effects of single openness index point changes.

The results from this study can be split into two major categories: those concerning an economy's ability to resist the initial "shock" of a crisis onset, and those concerning an economy's ability to recover afterward. Coefficients on the post_crisis dummy variable, which is coded as 1 for a country crisis initial year and the 10 subsequent country-years, represent the one-time level-shift downward, or shock, to real per capita GDP resulting from a banking crisis, given that openness = 0. The coefficient on the interaction term of openness with this post_crisis variable may then be thought of as a measurement of the GDP "shock resistance" provided per 100 additional index points of trade volume.

Coefficients on the years_since_crisis variable, coded 1 through 10 for the 10 country-years following the crisis onset year, may be interpreted as the average annual recovery effect on real per capita GDP of the passage of time during the post-crisis period given that openness = 0. The interaction term between this and the openness variable then describes the GDP recovery effect of 100 additional index points of trade volume. As noted above, the openness variable by itself is of little use in this study due to the inclusion of country fixed effects and a large degree of multicollinearity in the panel data, but it is included in Table 1 completeness.

In terms of "shock resistance," linear regression results provide suggestive evidence that greater trade volume, interacted with the recent occurrence of a banking crisis, may have a large, positive effect on real per capita GDP. With all controls included (specification 5), a 100 point openness index increase caused an average increase of approximately 2.3% per capita GDP when interacted with the presence of a banking crisis. A change from autarky (index zero) to high openness (index 100), for example, would then substantially offset the average negative effect of a banking crisis at openness = 0, approximately -6.9% per capita GDP. However, this measurement is imprecise, with robust standard errors of approximately 0.022, or 2.2% of per capita GDP.

In terms of recovery effects, greater trade openness may aid in the recovery of per capita GDP following a banking crisis. Again with all controls included, at openness = 0, the average annual effect of each of the ten years following a crisis is -0.2% GDP per capita, approaching statistical significance with robust standard errors of 0.17% GDP per capita. This gives the 10-year recovery period in autarky a total impact of -2.0% GDP per capita. Interacting openness with years-since-crisis,

however, yields an average increase of 0.3% per capita GDP per annum, per 100 openness index points, during the recovery period. This measurement is less precise, however, with robust standard errors of 0.33% GDP per capita. In other words, a banking crisis may put lasting, downward pressure on GDP if no trade is allowed, but increasing openness can reverse the effect into a the positive recovery that one would intuitively expect.

For the post_crisis, years_since_crisis, openness*years_since_crisis and openness regressors in Table 1, little change occurs between specifications 4 and 5 with the addition of year fixed effects. The coefficient on openness*post_crisis interaction term, however, is increased by nearly an order of magnitude from 0.39% GDP per capita to 2.31% GDP per capita, while its robust standard errors remain stable, shifting only from 2.24% GDP per capita to 2.19% GDP per capita to boost precision considerably. I favor specification 5 because it controls for worldwide economic shocks in certain years, which may be correlated with the incidence of banking crises.

To explain this scenario of trade volume providing some sort of cushioning during a financial crisis, I hypothesize that countries with proportionally high pre-crisis trade volumes would also naturally possess better infrastructure to execute trade transactions, like extensive ports, roadways and legal authorities. It would be faster and easier for countries so equipped to pursue familiar trade-oriented growth policies to stave off recession in case of emergency. These might include classic export-led growth policies, which would bring a tandem benefit of foreign exchange inflows that could help alleviate foreign-exchange related financial crises (Montiel Ch. 19). The greater variety and availability of cheaper, imported substitute goods

often implied by greater trade volume might also help to increase real income, propping up the consumption component of GDP during a recession. Open trade might then be thought of more as a pressure release valve for an economy in crisis, rather than a cushion.

The idea that a banking crisis could cause permanent damage to income recovery in a closed economy is harder to explain, although it is intriguing. If true, this phenomenon may lend credence to the idea that some exogenous policy kick-start or stimulus of the varieties just discussed is needed to overcome the breakdown of credit availability and general macro sluggishness attendant to banking sector crises, which would be more difficult in a closed economy. Strong negative correlation between relative trade volume and country (economic) size might indicate that smaller economies somehow recover faster, although this could probably be argued either way. Fortunately, many of these hypotheses can be readily, quantitatively examined in future research.

V. Conclusion

This paper explores the possibility of previously unrecognized benefits to trade openness or increased trade volume. If this study's predictions can be confirmed, they would increase precision when calculating the national costs and benefits of an open economy. Similarly, the results of this study suggest that policymakers may be able to improve financial crisis management strategies by incorporating policy elements that increase trade openness.

The results of this study are not conclusive, but do suggest some positive relationship between a country's economic openness and its ability to weather

banking crises. This line of research contains rich opportunities for expansion: similar experiments could be run on various prototype measurements for financial openness, and other varieties of financial crisis could be examined with respect to trade openness.

All decisions to increase economic openness involve political and economic tradeoffs. If the financial crisis-mitigating effects of economic openness suggested in the present study hold true, then policies which reduce trade barriers or otherwise encourage trade become more attractive. This is particularly relevant in the wake of the 2007-2008 global financial crisis, as national governments worldwide seek to improve crisis mitigation strategies. Furthermore, openness is a convenient policy tool because trade policies are set almost exclusively by national governments.

The exact mechanism whereby trade openness might have a positive effect on GDP given the special case of financial crisis is not readily apparent. Trade openness may be acting as a proxy for some form of market flexibility that allows recovery of consumption or income during crises through imports and exports. Or trade openness may have some positive correlation with financial openness, the upshot being that more financially open countries may have more options available for crisis management. It is also possible that openness in trade serves as an indicator of generally competent macro policy management. Further study is merited to explore these possible relationships with greater precision.

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Appendix

Table 1: Effects on ln_(Real GDP Per Capita)

		(1)	(2)	(3)	(4)	(5)
openness * post_crisis	Coefficient	0.00249	0.00204	-0.00284	0.00379	0.02307
	Robust S.E.	(0.33112)	(0.32749)	(0.05798)	(0.02239)	(0.02186)
openness * years_since_crisis		-0.01306	-0.01315	0.00128	0.00468	0.00358
		(0.04935)	(0.04905)	(0.00725)	(0.00350)	(0.00332)
post_crisis		0.02248	0.03785	-0.08616**	-0.05298**	-0.06909**
		(0.19878	(0.20134)	(0.03167)	(0.01206)	(0.01133)
years_since_crisis		0.02358	0.02607	-0.00627	-0.00311	-0.00251
		(0.02927)	(0.03053)	(0.00481)	(0.00200)	(0.00174)
openness		-0.24206	-0.23627	-1.00425	-1.66628**	-1.66254**
		(0.21129)	(0.21404)	(0.72694)	(0.45326)	(0.26134)
Controls						
Time Trend			Yes	Yes	Yes	Yes
Country Fixed Effects				Yes	Yes	Yes
Country-specific Trends					Yes	Yes
Year Fixed Effects						Yes

** Indicates significance at the .05 level

Coefficients involving openness represent change in real GDP resulting from shift of openness index from 0 to 100.

Multiply values by 100 for percentage terms.

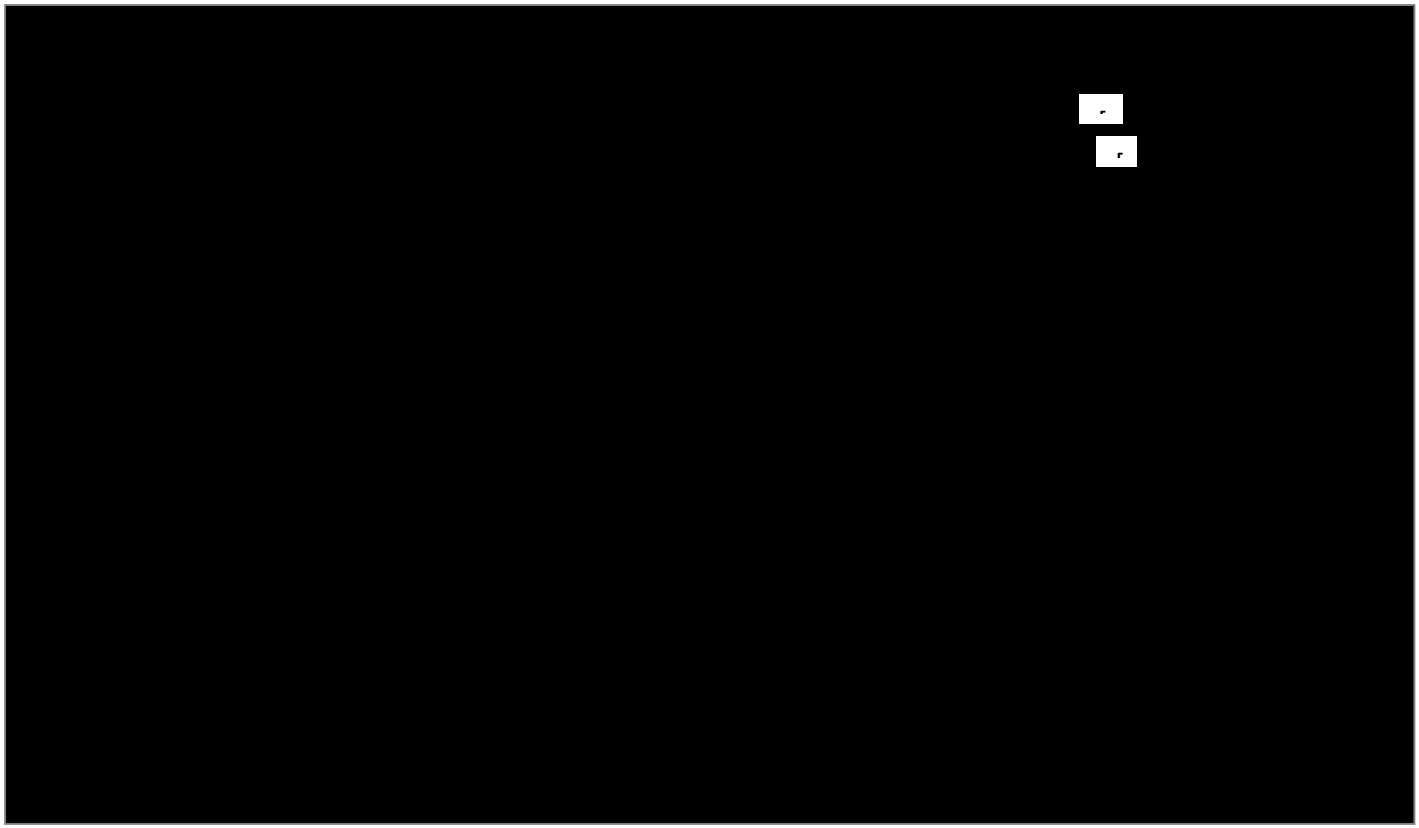

Table 3A: Beginning Dates of Sample Banking Crises in Chronological Order

Brazil	1963	Canada	1983	Nicaragua	1987
Uruguay	1971	Korea, Republic of	1983	Bangladesh	1987
United Kingdom	1974	Kuwait	1983	Mali	1987
Chile	1976	Taiwan	1983	Mozambique	1987
Central African Republic	1976	Morocco	1983	Tanzania	1987
Germany	1977	Peru	1983	Lebanon	1988
Israel	1977	Thailand	1983	Panama	1988
Spain	1977	Equatorial Guinea	1983	Benin	1988
South Africa	1977	Niger	1983	Burkina Faso	1988
Venezuela	1978	United Kingdom	1984	Central African Republic	1988
Argentina	1980	United States	1984	Cote d`Ivoire	1988
Chile	1980	Mauritania	1984	Madagascar	1988
Ecuador	1980	Argentina	1985	Nepal	1988
Egypt	1980	Brazil	1985	Senegal	1988
Mexico	1981	Malaysia	1985	Australia	1989
Philippines	1981	Guinea	1985	Argentina	1989
Uruguay	1981	Kenya	1985	El Salvador	1989
Hong Kong	1982	Denmark	1987	South Africa	1989
Singapore	1982	New Zealand	1987	Sri Lanka	1989
Colombia	1982	Norway	1987	Italy	1990
Turkey	1982	Bolivia	1987	Algeria	1990
Congo, Dem. Rep.	1982	Cameroon	1987	Brazil	1990
Ghana	1982	Costa Rica	1987	Egypt	1990

Table 3A: Beginning Dates of Sample Banking Crises in Chronological Order (Continued)

Romania	1990	China	1992	Argentina	1995
Sierra Leone	1990	Kenya	1992	Azerbaijan	1995
Czech Republic	1991	Nigeria	1992	Brazil	1995
Finland	1991	Cape Verde	1993	Cameroon	1995
Greece	1991	Venezuela	1993	Lithuania	1995
Sweden	1991	Guinea	1993	Paraguay	1995
United Kingdom	1991	Eritrea	1993	Russia	1995
Georgia	1991	India	1993	Swaziland	1995
Hungary	1991	Kyrgyzstan	1993	Guinea-Bissau	1995
Poland	1991	Togo	1993	Zambia	1995
Slovak Republic	1991	France	1994	Zimbabwe	1995
Djibouti	1991	Armenia	1994	Croatia	1996
Liberia	1991	Bolivia	1994	Ecuador	1996
Sao Tome and Principe	1991	Bulgaria	1994	Thailand	1996
Japan	1992	Costa Rica	1994	Yemen	1996
Slovenia	1992	Jamaica	1994	Taiwan	1997
Macedonia	1992	Latvia	1994	Indonesia	1997
Albania	1992	Mexico	1994	Korea, Republic of	1997
Bosnia and Herzegovina	1992	Turkey	1994	Malaysia	1997
Estonia	1992	Burundi	1994	Mauritius	1997
Indonesia	1992	Congo, Republic of	1994	Philippines	1997
Angola	1992	Uganda	1994	Ukraine	1997
Chad	1992	United Kingdom	1995	Vietnam	1997

Table 3A: Beginning Dates of Sample Banking Crises in Chronological Order (Continued)

Colombia	1998
Ecuador	1998
El Salvador	1998
Russia	1998
Bolivia	1999
Honduras	1999
Peru	1999
Nicaragua	2000
Argentina	2001
Guatemala	2001
Paraguay	2002
Uruguay	2002
Dominican Republic	2003
Guatemala	2006
United States	2007

Adapted from Reinhart and Rogoff, Table A3 (2008)

"China" represents PWT "China Version 1"

Table 3B: Beginning Dates of Sample Banking Crises Sorted by Country

Albania	1992	Burundi	1994	Ecuador	1980
Algeria	1990	Cameroon	1987	Ecuador	1996
Angola	1992	Cameroon	1995	Ecuador	1998
Argentina	1980	Canada	1983	Egypt	1980
Argentina	1985	Cape Verde	1993	Egypt	1990
Argentina	1989	Central African Republic	1976	El Salvador	1989
Argentina	1995	Central African Republic	1988	El Salvador	1998
Argentina	2001	Chad	1992	Equatorial Guinea	1983
Armenia	1994	Chile	1976	Eritrea	1993
Australia	1989	Chile	1980	Estonia	1992
Azerbaijan	1995	China	1992	Finland	1991
Bangladesh	1987	Colombia	1982	France	1994
Benin	1988	Colombia	1998	Georgia	1991
Bolivia	1987	Congo, Dem. Rep.	1982	Germany	1977
Bolivia	1994	Congo, Republic of	1994	Ghana	1982
Bolivia	1999	Costa Rica	1987	Greece	1991
Bosnia and Herzegovina	1992	Costa Rica	1994	Guatemala	2001
Brazil	1963	Cote d`Ivoire	1988	Guatemala	2006
Brazil	1985	Croatia	1996	Guinea	1985
Brazil	1990	Czech Republic	1991	Guinea	1993
Brazil	1995	Denmark	1987	Guinea-Bissau	1995
Bulgaria	1994	Djibouti	1991	Honduras	1999
Burkina Faso	1988	Dominican Republic	2003	Hong Kong	1982

Table 3B: Beginning Dates of Sample Banking Crises Sorted by Country (Continued)

Hungary	1991	Mauritania	1984	Russia	1998
India	1993	Mauritius	1997	Sao Tome and Principe	1991
Indonesia	1992	Mexico	1981	Senegal	1988
Indonesia	1997	Mexico	1994	Sierra Leone	1990
Israel	1977	Morocco	1983	Singapore	1982
Italy	1990	Mozambique	1987	Slovak Republic	1991
Jamaica	1994	Nepal	1988	Slovenia	1992
Japan	1992	New Zealand	1987	South Africa	1977
Kenya	1985	Nicaragua	1987	South Africa	1989
Kenya	1992	Nicaragua	2000	Spain	1977
Korea, Republic of	1983	Niger	1983	Sri Lanka	1989
Korea, Republic of	1997	Nigeria	1992	Swaziland	1995
Kuwait	1983	Norway	1987	Sweden	1991
Kyrgyzstan	1993	Panama	1988	Taiwan	1983
Latvia	1994	Paraguay	1995	Taiwan	1997
Lebanon	1988	Paraguay	2002	Tanzania	1987
Liberia	1991	Peru	1983	Thailand	1983
Lithuania	1995	Peru	1999	Thailand	1996
Macedonia	1992	Philippines	1981	Togo	1993
Madagascar	1988	Philippines	1997	Turkey	1982
Malaysia	1985	Poland	1991	Turkey	1994
Malaysia	1997	Romania	1990	Uganda	1994
Mali	1987	Russia	1995	Ukraine	1997

Table 3B: Beginning Dates of Sample Banking Crises Sorted by Country (Continued)

United Kingdom	1974
United Kingdom	1984
United Kingdom	1991
United Kingdom	1995
United States	1984
United States	2007
Uruguay	1971
Uruguay	1981
Uruguay	2002
Venezuela	1978
Venezuela	1993
Vietnam	1997
Yemen	1996
Zambia	1995
Zimbabwe	1995

Adapted from Reinhart and Rogoff, Table A3 (2008)

"China" represents PWT "China Version 1"

Summary

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Summary
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April 2011

The Effects of Trade Openness on Per Capita GDP during Banking Crises

In the field of financial crisis analysis, attention is mainly focused on financial variables. Trade balance is sometimes addressed as a component of the current account balance, but trade openness – a country's relative volume of trade – is seldom discussed. Meanwhile, the effects of trade openness on long-term GDP growth, development and productivity have been studied extensively, with mixed results. This study attempts to identify a linkage between the economic openness literature and financial crisis literature, which have largely remained separate. To accomplish this, the present study examines the historical effects of trade openness in the special case of banking crisis.

This gap in the literature is understandable, as trade volume at first seems less important than trade balance. Yet even elementary economic models, like Investment Saving/Liquidity preference Money supply-Balance of Payments (ISLM-BOP), Mundell-Fleming and their descendants, illustrate fundamental links between the real economy and financial markets. It is plausible then that real economic variables like trade openness deserve more careful examination in the analysis of financial crisis.

Large, macroeconomic datasets were merged with a list of country-years combinations in which banking crises occurred. Statistical regressions were then run

on the interaction term formed by a country's economic openness given the recent occurrence of a banking crisis. Data sources for the report consisted of the Penn World Tables (Version 6.3) for country macroeconomic panel data (multiple countries over approximately 60 years); and Table A3 of Reinhart and Rogoff's 2008 paper, "This Time is Different: A Panoramic View of Eight Centuries of Financial Crisis," cataloging the initiation years of historical banking crises and which countries were primarily affected. To account for the idea that banking and other financial crises ostensibly have some fundamental incubation period before their apparent onset, the openness measure entered into the regression represents an average over the four preceding years plus the initial year of each unique country-crisis episode.

Linear, statistical regression models provide suggestive evidence that greater trade volume, interacted with the recent occurrence of a banking crisis, may have a large, positive effect on real per capita GDP. A 100 point openness index increase causes an average increase of approximately 2.3% per capita GDP when interacted with the presence of a banking crisis. A change from autarky (index zero) to high openness (index 100), for example, substantially offsets the average negative effect of a banking crisis at openness = 0, approximately -6.9% per capita GDP. However, this measurement is imprecise, with robust standard errors of approximately 0.022, or 2.2% of per capita GDP.

Additionally, greater trade openness may aid in the recovery of per capita GDP following a banking crisis. At openness = 0, the average annual effect of each of the ten years following a crisis is -0.2% GDP per capita, approaching statistical significance with robust standard errors of 0.17% GDP per capita, giving the 10-year recovery period a total impact of -2.0% GDP per capita. Interacting openness with

years-since-crisis, however, yields an average increase of 0.3% per capita GDP per annum, per 100 openness index points, during the recovery period. This measurement is less precise, however, with robust standard errors of 0.33% GDP per capita. In other words, a banking crisis may put lasting, downward pressure on GDP if no trade is allowed.

The exact mechanism whereby trade openness might have a greater, positive effect on GDP given the special case of financial crisis is not readily apparent, and could merit further study. Trade openness may be acting as a proxy for some form of market flexibility that allows recovery of consumption or income during crises through imports and exports. Or trade openness may have some positive correlation with financial openness, the upshot being that more financially open countries may have more options available for crisis management. It is also possible that openness in trade and finance serve as indicators of generally competent macro policy management. But if economic openness by itself possesses some virtue of crisis mitigation, policies that reduce trade barriers or actively encourage international trade become that much more attractive.

The results of this study are not conclusive, but do suggest some positive relationship between a country's economic openness and its ability to weather banking crises. This line of research contains rich opportunities for expansion: similar experiments could be run on various prototype measurements for financial openness, and other varieties of financial crisis could be examined beyond banking crises.