

ECONOMIC
RESEARCH
FORUM



منتدى
البحوث
الاقتصادية

2011

working paper series

HOW CAN RECESSIONS BE BROUGHT
TO AN END? EFFECTS OF MACROECONOMIC
POLICY ACTIONS ON DURATIONS
OF RECESSIONS

Bedri Kamil Onur Tas

Working Paper No. 615

**HOW CAN RECESSIONS BE BROUGHT TO AN END?
EFFECTS OF MACROECONOMIC POLICY ACTIONS
ON DURATIONS OF RECESSIONS**

Bedri Kamil Onur Tas

Working Paper 615

August 2011

Send correspondence to:

Bedri Kamil Onur Tas
TOBB ETU Department of Economics, Turkey
onurtas etu.du.tr

First published in 2011 by
The Economic Research Forum (ERF)
21 Al-Sad Al-Aaly Street
Dokki, Giza
Egypt
www.erf.org.eg

Copyright © The Economic Research Forum, 2011

All rights reserved. No part of this publication may be reproduced in any form or by any electronic or mechanical means, including information storage and retrieval systems, without permission in writing from the publisher.

The findings, interpretations and conclusions expressed in this publication are entirely those of the author(s) and should not be attributed to the Economic Research Forum, members of its Board of Trustees, or its donors.

Abstract

This paper analyzes how effective macroeconomic policy actions are in ending recessions. We also investigate which structural factors help the countries come out of recessions, in other words experience shorter recessions. We implement survival regression analysis and conclude that expansionary monetary policy significantly decreases durations of recessions whereas fixing the exchange rate does not have an effect on the durations of recessions. Expansionary fiscal policy has undesired effects and decreases the probability that recession will end; in other words, increases the durations of recessions. The analysis of country specific factors indicates that emerging countries experience shorter recessions. Recessions in countries with higher trade openness last significantly longer. Financial openness and institutional quality do not have significant effects of recession durations. The empirical analysis takes into account alternative probability distributions and endogeneity of monetary policy actions.

ملخص

تحلل هذه الورقة مدى فعالية إجراءات السياسة الاقتصادية الكلية في إنهاء الركود. ونحقق أيضا في العوامل الهيكلية التي تساعد البلدان على الخروج من الركود، وبعبارة أخرى على تجربة أقصر فترات من الركود. لذلك نستخدم بقاء تحليل الانحدار ونخلص إلى أن السياسة النقدية التوسعية تقلل بشكل ملحوظ من فترات الركود في حين أن سياسة تثبيت سعر الصرف لا يكون لها تأثير على فترات الركود. السياسة المالية التوسعية لها آثار غير مرغوب فيها وتقلل من احتمال انتهاء الركود، وبعبارة أخرى، فهي تزيد من فترات من الركود. تحليل العوامل الخاصة بكل بلد يشير إلى أن الدول النامية تشهد فترات أقصر من الركود. الركود الاقتصادي في البلدان ذات الانفتاح التجاري العالي تستمر لفترات أطول بكثير. الانفتاح المالي ونوعية المؤسسات ليس لديهما آثار هامة على فترات الركود. يأخذ التحليل التجريبي بعين الاعتبار التوزيعات الاحتمالية البديلة والإجراءات الداخلية للسياسة النقدية.

“... economists seem strangely unsure about what to tell policy-makers to do to end recessions.” Romer and Romer (1994), pg. 1.

1. Introduction

There is an ongoing debate about optimal macroeconomic policy during recessions. The main objective of optimal policy is to end the recession as quickly as possible, in other words to decrease the duration of the recession. Although there are many studies, which investigate the factors that *start* recessions (affect the probability of being in a recession), the analysis of macroeconomic policy and factors that *end* recessions (decrease duration of recessions) is limited.

In this paper, we take the statement of “ending the recession” literally and analyze the factors and policy actions that affect the probability that the recession will end (hazard rates of recessions). We implement survival-time analysis to investigate the following questions: 1) Does the structure of the country at the start of recession have an effect on the durations of recessions? 2) How do macroeconomic policy actions affect durations of recessions? The first question analyzes which countries are more resistant to recessions and shake the recessions off more quickly. The effect of structural factors (trade openness, financial openness, institutional quality, emerging country) on recession duration is examined. The second question focuses on the comment by Romer and Romer (1994) and investigates the effectiveness of macroeconomic policy actions (monetary, fiscal, exchange rate regime) to end recessions. The effect of monetary expansion, fiscal expansion and change in the exchange rate regime on the probability that the recession will end (hazard rate of recession) is examined.

The paper proceeds as follows. Section 2 summarizes the main results of the related studies. Section 3 explains the methodology and the data. Section 4 presents the summary statistics of recessions and policy actions during recessions. Section 5 conducts the survival regression analysis and presents the results. Section 6 argues the policy implications of the empirical results of section 5 and section 7 concludes.

2. What have we learned from previous studies about recessions?

Most of the empirical studies in the literature focus on the factors that help predict recessions. Estrella and Mishkin (1999) investigate the probability of U.S. recessions and show that stock prices are useful with one-to-three-quarter horizons and the spread, which represents the term structure of interest rates, is a reliable predictor of U.S. recessions beyond one-quarter. Birchenhall et al. (1999) build a logistic model that successfully predicts US business cycles. Crucini (2008) et al. implements a multi-country approach and examines the factors that drive G-7 business cycles. They find that productivity and fiscal policy¹ are the main factors that cause variance of output.

Although there is a vast literature² that investigates how recessions start², fewer studies examine how to end them. Romer and Romer (1994) analyze monetary and fiscal policy in the postwar US recessions. Their simulations conclude that compared to fiscal policy, monetary policy is more effective in ending recessions. Bordo and London-Lane (2010) investigate the behavior of the Fed at the end of recessions. They conclude that since 1960 the Fed is late to tighten money supply after recessions, which caused higher levels of

¹ Productivity shocks constitute 54% and fiscal policy shocks cause 20 percent of the variance of output respectively.

² There are many other excellent papers that investigate predictability and causes of recessions. Here, we can only mention some representative studies to save space.

inflation. Claessens et al. (2009) analyzes the linkages between macroeconomic and financial variables during recessions for 21 OECD countries. They identify 122 recessions³ and find evidence that recessions associated with credit crunches and house price busts tend to be deeper and longer than other recessions. Although they report the behavior of interest rates and government consumption during recessions, they do not analyze the effect of macroeconomic policy actions on the duration of recessions and the role of those policy actions in ending recessions. Their focus is more on the fundamental factors that start recessions than factors and policy actions that shorten duration of recessions.

Several studies investigate the fiscal behavior during recessions. Kaminsky et. al (2004) present that OECD countries are countercyclical or acyclical whereas developing countries are procyclical. Erbil (2011) examines fiscal policy in oil producing countries and concludes that fiscal policy is highly procyclical on middle-income groups while it is procyclical in high-income countries. Similar to our study, Claessens et al. (2009) measure fiscal policy as changes in government consumption and analyze 21 OECD countries. They conclude that fiscal policy is countercyclical.

To sum up, most of the studies examine the U.S. economy and factors that start recessions. Our study contributes to a large body of research analyzing recessions in the following ways. First of all, we investigate recessions in a multi-country setting of 22 countries, which include both industrial and developing countries. Second and more importantly, we investigate the effectiveness of alternative macroeconomic policy actions, monetary and fiscal policy expansions and change in the exchange rate regime, in ending recessions. The effect of macroeconomic policy actions on recession durations has not been investigated in the literature. We also examine the structural factors that determine the robustness of a country to recessions to answer the question of which countries experience shorter recessions. Finally, we implement the survival (duration) analysis regression methodology, which has not been used in the literature to examine recessions.

3. Data and Methodology

We analyze recessions in 22 different countries: Australia, Austria, Brazil, Canada, China, France, Germany, India, Italy, Japan, Jordan, Korea, Mexico, New Zealand, South Africa, Spain, Sweden, Switzerland, Taiwan, Turkey, UK and U.S. Table A.I in the Appendix presents the number of recessions identified for each country. The recession dates of Turkey are from the Central Bank of Turkey and for the remaining 21 countries we used the recessions identified by the Economic Cycle Research Institute (ECRI)⁴. The ECRI identification is preferred because ECRI has established reference cycle chronologies for 21 economies based on the same methodology used to establish the official business cycle dates for the United States by the NBER^{5,6}. Quarterly durations of recessions are used as the duration variable in our analysis. The hazard ratio of recession duration, in other words the probability that the recession ends is used as the dependent variable.

³ They also identify 112 credit contraction episodes, 114 episodes of house price declines, and 234 episodes of equity price declines.

⁴ The dataset is available at <http://www.businesscycle.com/resources/cycles>.

⁵ The detailed description of the procedure is available at <http://www.nber.org/cycles/july2003/recessions.html>.

⁶ An alternative methodology would be the BBQ methodology as in Claessens et al. 2009. This methodology identifies the peaks and lows using a 5-quarter window. A complete cycle is defined as the period from one peak to the next two phases, the contraction phase and the expansion phase. It is reported by the Euro Area Business Cycle Committee that the BBQ methodology gives different results on business cycles compared to NBER results. Thus, we do not implement the BBQ methodology and prefer the recessions identified by the ECRI, which coincides with the NBER methodology.

Trade openness, financial openness and institutional quality are used to represent the economic structure of the economy. Trade openness is calculated using the standard ratio of imports and exports to GDP. Financial openness index is from Chinn and Ito (2008)⁷, which is based on the binary dummy variables that codify the tabulation of restrictions on cross-border financial transactions reported in the IMF's Annual Report on Exchange Arrangements and Exchange Restrictions. We use the constraint on executive variable in Polity IV as a measure of institutional quality as in Acemoglu and Johnson (2005).

3.1. Indicators of Policy

To analyze the effect of policy actions in ending recessions it is necessary to determine the indicators of policy: monetary, fiscal and exchange rate regime.

We use the change in the money market rate as suggested by Romer and Romer (1994).⁸ We calculate the change in levels of the interest rates as in Claessens et al. (2009) as a measure of monetary policy actions during recessions. We follow Kaminsky et al. (2004) and Claessens et al. (2009) and use the percent change in government expenditure to gauge fiscal policy actions as a response to recessions. Finally, exchange rate regimes are identified using the classification of Levy-Yeyati and Sturzenegger (2005). They classify exchange rate regimes as float (1), interim (2) and fixed (3). Their dataset is available⁹ for the 1974-2004 time period.

3.2 Methodology

We implement survival-time (duration) analysis methodology to investigate the factors that affect durations of recessions. In survival analysis, the survivor function is used as the dependent variable. The survivor function presents the probability of surviving past a certain time. The hazard function of the survival analysis provides the probability of leaving the initial state in the given time interval. In this study, the durations of recessions are calculated in quarterly terms and the econometric model is developed in quarterly hazard rates. The Weibull probability distribution is used to model survival probabilities. The Weibull distribution is suitable for modeling data with monotone hazard rates that either increase or decrease exponentially with time. Figure I presents that the Weibull distribution is suitable for the analysis of recession durations. The equations below present the survivor rate functions and the regression equation:

$$S(t)=exp(-\lambda_j t_j^p) \quad (1)$$

$$\lambda_j=exp(x_j\beta) \quad (2)$$

$$\log[h_i(tX_i)]=X_i\beta \quad (3)$$

where $\lambda=exp(x_j\beta)$. x_j are the covariates. The hazard function for recession i (the probability that the recession will end) can be written as $h(t)=\lambda t$. X_i is a vector of explanatory variables, and β is a vector regression coefficients. The β coefficients are estimated using maximum likelihood. The significance of β indicates that the variable has an effect on the hazard rate of recession duration and a positive coefficient indicates that hazard rate rises as that variable increases and the recession is more likely to end.

⁷ Explanation and dataset is available at <http://www.ssc.wisc.edu/~mchinn/research.html>.

⁸ Bernanke and Blinder (1992) also argue "interest rate on Federal funds is extremely informative about future movements of real macroeconomic variables, more so than monetary aggregates or other interest rates."

⁹ The dataset is available at profesores.utdt.edu/~ely/papers.html.

The distribution function of the hazard function is an incremental part of survival regression analysis. We use the Weibull distribution, which is the appropriate distribution function for modeling hazard rates that decreases with time. To be able to obtain robust empirical results we also use the Cox proportional hazards model, which does not require prior determination of the distribution function. Using the Cox model, one could estimate the relationship between the hazard rate and explanatory variables without making assumptions about the shape of the hazard function. In the Cox proportional hazards model (Cox 1972), the hazard is assumed to be

$$h(t)=h_0(t)exp(\beta_1x_1+\dots+\beta_kx_k) \quad (4)$$

The Cox model allows us to calculate the coefficients of the duration regression without specifying a distribution function.

3.3. *Endogeneity*

As presented by Romer and Romer (1994) monetary policy might be endogenous. There exists a contemporaneous interaction between changes in the interest rate and duration of recessions. Thus, the maximum likelihood estimates might understate the effects of changes in the money market rate. Because of the potential bias of the maximum likelihood, estimates are derived from 2SLS instrumental variables estimation of the regression where the changes in the money market are treated as endogenous. We use first and second lag of inflation as instruments as suggested by the Hausman (1978) overidentification test. For the analysis of policy actions of GDP in section 6, we use first and second lag of money market rate, which is determined as valid instruments by the Hausman overidentification test.

For fiscal policy, major policy shifts require at least several quarters to implement. Also, as stated by Romer and Romer (1994) there are many important sources of variation for fiscal policy other than economic conditions thus significant correlation with the error term is unlikely. Romer and Romer claim, “for fiscal policy the bias from using OLS is likely to be small”.

We begin our analysis by presenting a descriptive analysis of duration of recessions, macroeconomic structure and policy variables.

4. Summary of Recessions and Macroeconomic Variables

We first examine the summary statistics of durations of recessions. The mean of recessions experienced in 22 countries is 18.67.¹⁰

Figure 1 presents the survival probability of recessions where 9 observations are right censored.

The maximum duration¹¹ of recessions is 58 months, which happened in New Zealand between September 1986 and June 1991. The longest recession in developing countries happened in South Africa between February 1989 and August 1992. The equality of survivor

¹⁰ One interesting indication of table I is that the mean of recession duration is higher in industrial countries than developing countries. Although the hypothesis of equality of means do not reject the null hypothesis that the means of industrial and developing countries are equal. Fragment. Consider revising.

¹¹ The ECRI also identifies the recession that started in November 1995 and still continues (170 months between 1995-2009) in Jordan. This recession is excluded from the dataset because it significantly distorts the summary statistics.

functions tests accept the null hypothesis that survivor functions of industrial and developing countries are equal at 5 percent but reject the null at 10 percent significance level.¹²

4.1. Economic Conditions of Countries at the Beginning of Recessions

Table 2 summarizes the macroeconomic and structural variables. The industrial countries are more integrated to the global economy with higher scores of trade openness, financial openness and globalization index. Industrial countries had fixed exchange rate regimes at the start of 17 recessions out of 37.¹³

4.2. Macroeconomic Policy Changes During Recessions

Table 3 shows the policy response of countries to recessions. The changes in variables during recessions are used as policy response variables. Table III presents that money market rate decreased substantially during recessions. Also, fiscal expansion is used as a policy tool during recessions since the percentage change in government expenditure is positive. These findings are inline with the results of Claessens et al. (2009).

Money market rate decreased after the start of the recession in 44 out of 53 recessions in industrial countries and in 13 out of 30 recessions in developing countries.¹⁴ Although the mean of change in the money market rate is negative only in 13 recessions in the emerging markets the central bank lowered the interest rate as a reaction to recessions. In 57 of 59 recessions government expenditure increased in industrial countries and in 20 of 23 recessions government expenditure increased in developing countries.¹⁵ These results present that fiscal policy is used more widely during recessions compared to monetary policy (lower interest rates). The change in the exchange rate regime is displayed in the table.

5. Survival Regression Analysis

In this section, we estimate the coefficients of equation 3 and 4 to analyze the effect of macroeconomic variables and policy actions on the durations of recessions.

5.1. Which Countries Experience Lower Recession Durations?

Table IV presents the regression specifications where the explanatory variables are variables that show the structure of the economy. The log-relative hazard form is estimated indicating that the coefficients gauge the effect of the variable on the hazard rate of recessions, measuring the probability that the recession will end.

First two columns show the regression specifications for the survival model with Weibull distribution and the last two columns present the results of Cox model. In both regression specifications the coefficient of trade openness is significant and negative. The negative coefficient indicates that the hazard rate is lower and the recession tends to be longer when the trade openness of the country is higher.¹⁶ The second and fourth columns investigate the effect of institutional quality and being a developing country on the probability that the regression will end. The coefficients of both institutional quality and developing country dummy are positive and significant for the Weibull model. This result indicates that developing countries and countries with higher institutional qualities experience shorter recessions.

¹² Log- rank test $\chi^2(1) = 2.81$ $\text{Pr} > \chi^2 = 0.0937$, Wilcoxon test $\chi^2(1) = 3.52$ $\text{Pr} > \chi^2 = 0.0605$.

¹³ The dataset of Levy-Yeyati and Sturzenegger (2005) is available only for 77 recessions.

¹⁴ The money market rate is available for 83 recessions.

¹⁵ Government expenditure data is available for 82 recessions.

¹⁶ This result might be caused by the fact during recessions the decrease in net import will eliminate the effect of policy actions on aggregate demand.

5.2. Which Macroeconomic Policy is More Effective in Decreasing Duration of Recessions?

We now turn to the effects of macroeconomic policy actions on durations of recessions. We examine the effects of monetary policy measured by change in money market rate, fiscal policy measured by percent change in government expenditure and effect of change in the exchange rate regime as a response to recessions. Table V presents the 2SLS instrumental survival regression results of equation 2 where the explanatory variables are changes in macroeconomic policy variables.

Table 5 shows that monetary policy and fiscal policy have negative and significant coefficients. The negative coefficient of the change in the money market rate indicates that when the interest rate gets lower than the hazard rate of durations increases. This means that expansionary monetary policy increases the probability that the recession will end. Thus, expansionary monetary policy significantly decreases recession durations. The negative coefficient of the fiscal expansion variable is somewhat surprising since it indicates that when the government expenditure increases as a response to recessions the hazard rate gets lower. In other words, recessions last longer when government expenditure increases. This result presents that expansionary fiscal policy decreases the hazard rate and increases duration of recessions. These results are in line with Mishkin (2009) who claims that "... monetary policy is more potent during financial crises because aggressive monetary policy easing can make adverse feedback loops less likely." Finally, the change in the exchange rate regime from float to a more rigid regime¹⁷ does not have an effect on the hazard rate. Thus, the change in the exchange rate as a response to recessions does not have an impact of durations of recessions.¹⁸

The adverse effect of fiscal expansion on recession duration presented in table V is contrary to theoretical arguments. Both the neoclassical and Keynesian theories support the idea that fiscal policy should smooth the volatility of output. As presented in Claessens et al. (2009) we find that the reaction of government policy is inline with these theoretical arguments. Table III shows that government expenditure increases in percentage terms during recessions. But table V concludes that these expansionary reactions are ineffective and have unfavorable effects by increasing recession durations.¹⁹ To sum up, table V gauges the effectiveness of different policy actions in ending recessions. Policy recommendations can be driven from these empirical results. The survival regressions indicate that expansionary monetary policy significantly increases the probability that the recession will end but expansionary fiscal policy might have undesired results and increase the duration of recessions.

¹⁷ A positive value of the difference in the exchange rate variable presents that the country switched from a float (1) to fixed (3) exchange rate regime.

¹⁸ This result indicates that under fixed exchange rate regime monetary policy becomes endogenous and the effectiveness of monetary policy is eliminated.

¹⁹ A possible explanation for this result can be provided by the literature, which investigates the dynamics behind the procyclical behavior of fiscal policy. As presented by Erbil (2011) two arguments are proposed in the literature: 1) constraints to financing 2) structure of the economy. These two arguments can be used to explain adverse effects of fiscal expansion of recession duration. Since tax revenues are significantly lower during recessions expansionary fiscal policy should be financed by borrowing at higher interest rates since a recession also limits lending capacity. This borrowing would distort the future budget balance of all countries, which will make it harder for countries to shake off recessions. In other words, excessive borrowing during recessions to conduct countercyclical fiscal policy would have negative effects on the economy through higher interest rates and higher budget deficits in the future.

6. Policy Implications of the Empirical Findings

The discussion about optimal macroeconomic policy response to recessions intensified as the global recession that started in 2007 still persists. Since August 2007, the Federal Reserve has eased aggressive monetary policy as a response to the financial crisis started in the United States (Mishkin, 2009). Many economists like Krugman (2008) argue that monetary policy has not been effective. Mishkin (2009) stated some participants in the FOMC share the view that the Federal Reserve lost its ability to promote the economy by cutting interest rates. The minutes from the October 28-29, 2008, meeting indicate that

“Some members were concerned that the effectiveness of cuts in the target federal funds rate may have been diminished by the financial dislocations ...”

As presented above there is an ongoing debate about the effectiveness of macroeconomic policies among both policy makers and academicians. The empirical results presented in section 5 and 6 contribute to this discussion by displaying that monetary policy is effective in ending recessions whereas expansionary fiscal policy have undesired effects and increase duration of recessions. These results are in line with Mishkin (2009) who claims that “... monetary policy is more potent during financial crises because aggressive monetary policy easing can make adverse feedback loops less likely.” A third policy alternative of changing the exchange rate regime from flexible to fixed does not have an effect on ending recessions. As results, the empirical results indicate that aggressive monetary policy should be implemented to decrease the duration of recessions.

7. Conclusion

In this paper, we analyzed the structural factors and macroeconomic policy actions that affect the durations of recessions. Survival regression analyzes indicate that countries that are more integrated to the global economy, especially countries with high trade openness, have high recession durations.

The second analysis of the regression analysis focuses on the question of whether macroeconomic policy actions are effective in ending recessions. The results are in line with Romer and Romer (1994) and Mishkin (2009). We find that expansionary monetary policy is very effective in ending the recessions whereas expansionary fiscal policy has undesired effects and increases duration of recessions. Changing the exchange rate regime does not have an effect on recession durations. The empirical results of this paper have many policy implications about optimal policy reactions during recessions.

References

- Acemoglu Daron, Johnson Simon, 2005, “Unbundling Institutions”, *Journal of Political Economy*, 113(5): 949-995.
- Baxter, Marianne and Robert G. King, 1999, “Measuring Business Cycles: Approximate Band-Pass Filters for Economic Time Series”, *The Review of Economics and Statistics*, Vol. 81, pp. 575-59.
- Bernanke, Ben S. and Alan S. Blinder, 1992, “The Federal Funds Rate and the Channels of Monetary Transmission.” *American Economic Review*, 82(4), pp. 901-21.
- Birchenhall, Chris R., Hans Jessen, Denise R. Osborn and Paul Simpson, 1999, “Predicting U.S. Business-Cycle Regimes”, *Journal of Business & Economic Statistics*, Vol. 17, No. 3, pp. 313-323.
- Chinn, Menzie and Hiro Ito, 2008, “A New Measure of Financial Openness”, *Journal of Comparative Policy Analysis* 10(3): 307-320.
- Claessens, Stijn, M. Ayhan Kose and Marco E. Terrones, 2009, “What Happens During Recessions, Crunches and Busts? ”, IMF Working Paper No. 08/274.
- Cox, D. R. 1972. Regression models and life-tables (with discussion). *Journal of the Royal Statistical Society, Series B* 34: 187–220.
- Crucini, Mario J. and M. Ayhan Kose and Christopher Otrok, “What Are the Driving Forces of International Business Cycles? ”, National Bureau of Economic Research, Working Paper Series No: 14380.
- Erbil, Neşe, 2011, “Cyclicality of Fiscal Behavior in Developing Oil-Producing Countries: An Empirical Review”, *Economic Research Forum 17th Conference Papers*.
- Estrella, Arturo and Frederic S. Mishkin, 1999, “Predicting U.S. Recessions: Financial Variables as Leading Indicators”, *The Review of Economics and Statistics*, Vol. 80, No. 1, pp. 45-61.
- Hausman, J. A. 1978. Specification tests in econometrics. *Econometrica* 46: 1251–1271.
- Kaminsky, Graciela, C. Reinhart, and C. Vegh, 2004, “When it Rains it Pours: Pro-cyclical Capital Flows and Macroeconomic Policies,” NBER Working Papers No: 10780.
- Levy-Yeyati, Eduardo and Federico Sturzenegger, 2005, “ Classifying exchange rate regimes: Deeds vs. words”, *European Economic Review*, Volume 49, Issue 6, August 2005, pp. 1603-1635.
- Mishkin, Frederic S., 2009. “Is Monetary Policy Effective during Financial Crises? ”, *American Economic Review*, vol. 99(2), pages 573-77, May.
- Romer, Christina D. and David H. Romer, 1994, “What Ends Recessions? ”, NBER *Macroeconomics Annual*, Vol. 9, pp. 13-57.

Figure 1: Survival Probability of Recessions Calculated using Kaplan-Meier Methodology. Small numbers show the observations lost due to right censoring.

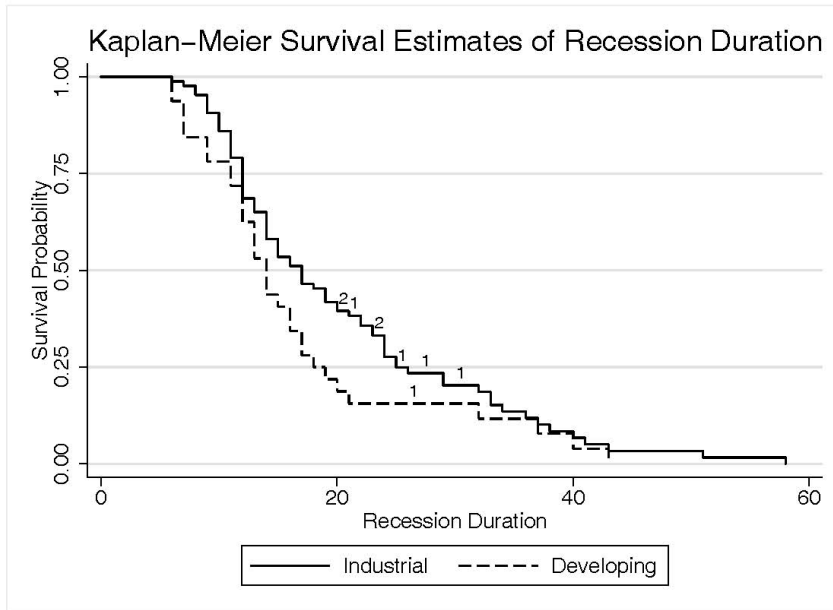


Table 1: Duration of Recessions

Number of Observations	Mean	Standard Deviation	Min	Max
118	18.67	10.1	6	58
86	19.55	10.26	6	58
32	16.31	9.43	6	43

Table 2: Macroeconomic Conditions of Countries at the Start of Recessions

	Mean	Standard Deviation	Min	Max
	Full Sample			
GDP Per Capita	13688	10377	207	38138
Inflation	28.48	126.4	-1.34	1180.03
Government Expenditure over GDP	0.17	0.06	0.08	0.58
Exchange Rate Regime		24 float, 13 interim, 20 fixed		
KOF Globalization Index	53.5	16.67	16.5	89.07
Trade Openness	40.19	23.22	8.49	124.6
Financial Openness	0.48	1.57	-1.8	2.54
Institutional Quality	6.3	1.29	2	7
	Industrial Countries			
GDP Per Capita	18654	8966	4041	38138
Inflation	7.1	5.38	-0.8	20.82
Government Expenditure over GDP	0.18	0.04	0.09	0.29
Exchange Rate Regime		24 float, 13 interim, 20 fixed		
KOF Globalization Index	59.4	14.5	29.6	89.07
Trade Openness	47.44	18.8	17.6	93.18
Financial Openness	1.27	1.35	-1.8	2.54
Institutional Quality	6.7	0.86	2	7
	Developing Countries			
GDP Per Capita	3402	2570	207	11347
Inflation	69.29	211.56	-1.34	1180.03
Government Expenditure over GDP	0.17	0.1	0.08	0.58
Exchange Rate Regime		24 float, 13 interim, 20 fixed		
KOF Globalization Index	40.89	13.93	16.5	60.36
Trade Openness	40.57	30.3	8.49	124.6
Financial Openness	-0.83	0.9	-1.81	1.18
Institutional Quality	5.52	1.64	2	7

Table 3: Changes in Policy Variables during Recessions

	Mean	Standard Deviation	Min	Max
	Full Sample			
Money Market Rate	-24.72	222.51	-1999.83	134.42
Government Expenditure (% Change)	25.06	42.64	-18.21	286.13
Exchange Rate Regime		2 switched from fix to float, 1 from float to fix 1 from interim to fix, 3 from fix to interim, 3 from interim to float, 7 from float to interim, 38 did not change.		
	Industrial Countries			
Money Market Rate	-2.26	2.26	-8.62	4.25
Government Expenditure (% Change)	16.21	19.71	-0.42	103.62
Exchange Rate Regime		1 switched from fix to float, 0 from float to fix 0 from interim to fix, 2 from fix to interim, 2 from interim to float, 4 from float to interim, 28 did not change.		
	Developing Countries			
Money Market Rate	-64.4	370.73	-1999.83	134.42
Government Expenditure (% Change)	47.76	70.14	-18.21	286.13
Exchange Rate Regime		1 switched from fix to float, 1 from float to fix 1 from interim to fix, 1 from fix to interim, 1 from interim to float, 3 from float to interim, 10 did not change.		

Note: the table presents the differences in the variables during recessions.

Table 4: Regression results of Duration on Structure of the Country at the Start of Recessions

Variable	Weibull model		Cox model	
	(1)	(2)	(1)	(2)
Trade Openness	-0.024 (4.62)** [0.98]		-0.013 (2.34)* [0.99]	
Financial Openness	-0.087 (1.04) [0.92]		-0.101 (1.22) [0.9]	
Institutional Quality		0.454 (3.44)** [1.57]		0.188 (1.70)
Developing		0.767 (2.30)* [2.15]		0.754 (2.40)*
Model Specifications				
Log-Likelihood	-58.73	-81.36	-182.61	-236.74
Number of Observations	59	75	59	75

Notes: Hazard ratios are presented in square brackets. Absolute value of z statistics in parentheses. * significant at 5%; ** significant at 1%.

Table 5: Effects of Macroeconomic Policy on Duration of Recessions 2SLS IV Regression Results

Variable	Weibull model		Cox model	
	(1)	(2)	(1)	(2)
Money Market Rate	-0.018 (5.13)** [0.98]	-0.018 (3.81)** [0.98]	-0.014 (3.78)** [0.99]	-0.013 (2.88)** [0.99]
Government Expenditure (% Change)	-0.018 (5.05)** [0.98]	-0.015 (3.19)** [0.99]	-0.015 (3.25)** [0.99]	-0.013 (2.48)** [0.99]
Exchange Rate Regime (from float to fixed)		-0.019 (0.08) [0.98]		-0.042 (0.17) [0.96]
Model Specifications				
Log-Likelihood	-145.8	-32.45	-236.1	-121.29
Number of Observations	78	43	78	43

Notes: Hazard ratios are presented in square brackets. Absolute value of z statistics in parentheses. * significant at 5%; ** significant at 1%. First and second lag of CPI inflation at the start of recession are used as instrumental variables. Constant term is not displayed.