DISCUSSION PAPERS IN ECONOMICS

Working Paper No. 10-13

Trade Liberalization, Privatization and Economic Growth

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November 2010

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This paper presents a study of the impact of trade liberalization policy on economic growth with the simultaneous application of privatization policy in 25 transitional countries. The analysis applies two stage least squares to panel data from 1994 to 2006 for these 25 countries. The estimated results provide evidence of a significantly positive effect of both trade liberalization and privatization on economic growth, when controlling for political conflict and macroeconomic stability. This chapter deals with the endogeneity of openness and privatization by using appropriate instrumental variables and test for the validities of instrumental variables.

1. INTRODUCTION

After the end of the communist era, the Eastern European countries, the commonwealth of independent states, and countries like Vietnam and China went through economic reforms that included trade liberalization and privatization, with the hope of improving their economies to achieve higher growth rates. The simultaneous, rather than separately timed, enactment of trade liberalization policies and privatization policies has been a distinguishing characteristic of these transition economies. Therefore, studies that investigate only the relation between trade liberalization and economic growth, or only the relation between privatization and economic growth, may not be suitable to analyze transition economies. Thus, this paper focuses on the simultaneous effects of the two policies on economic growth.

What are the simultaneous effects of trade liberalization and privatization on economic growth? Addressing this question is of critical importance to policy makers in transition countries, who have an interest in finding a reasonable adjustment between the two policies, in order to improve economic growth.

We have seen many papers observing the separated impact of trade liberalization on economic growth such as Edwards (1998), Frankel and Romer (1999), Rodriguez and Rodrick (2000), Chang, Kaltani and Loayza (2005), Romalis (2006) or the separated impact of privatization on economic growth such as Plane (1997), Cook and Uchida (2003), Godoy and Stiglitz (2006). But, there are lack of studies on the simultaneous effect of both trade liberalization and privatization on economic growth. Barlow (2006) was one of the rare papers that considered the simultaneous effects of both policies, in 22 transition countries from 1993 to 2001. The author found that trade liberalization had a positive effect on economic growth, while privatization had a negative effect. However, the effect of privatization on economic growth seems be ambiguous because the coefficient of privatization was sensitive to the data

sample and had both negative and positive signs,¹ and more than half of the regressions were not statistically significant. Barlow also overcame the endogeneity of openness and privatization by applying Instrumental Variable – Generalized Moment Method (IV-GMM)², the instruments for openness and privatization were the lags, the differences in openness and the differences in privatization.

Not only Barlow (2006), but many other papers tried to solve endogeneity problems of openness and privatization. Finding the appropriate instruments was a challenge for economists. After a long period of examination of this problem, it appeared that there were only two types of instruments for openness that included the geographical variables recommended by Frankel and Romer (1999) and the decrease of U.S. MFN tariffs recommended by Romalis (2005). The instruments of Romalis were probably not suitable for transition countries, and the data were not sufficient, since the United States was not a large trading partner of many transition countries. Therefore, the impact of decreasing U.S. MFN tariffs may not have proxied for higher market access of transition countries in order to push up their trade volumes.

In the course of reviewing the literature, I have found that the important role of checking whether openness or privatization in their models need to be instrumented, or whether their instruments are weak or not redundant and exogenous were not recognized. But, ignoring these tests may lead to biased results.

Thus, there is a gap in the literature on endogeneity that needs to be studied, and that gap has become an important focus of this research. The contribution of this research project to literature is three-fold. First, I construct the appropriate instrumental variables for openness and privatization. Second, I apply econometric techniques to test the endogeneity and the validity of instruments. Third, I provide a forecast of the simultaneous effects of openness and privatization on economic growth, the foundation for making macroeconomic policies in the transition countries.

I use a data set including 25 transition countries during the period from 1994 to 2006. To overcome the endogeneity of openness and privatization, I apply the two-stage least–squares test (2SLS) to estimate the effects of openness and privatization on economic growth under both fixed and random effects. The set of instrumental variables includes the openness index of trading partners of transition countries, the date of a country's becoming a WTO member, the ratio of government debt over GDP, the ratio of public share over private share in GDP and the product of time and a land-locked dummy. I check the validity of instruments by applying the Wu-Hausman test, the weak instrument test, the test for redundancy and the test for overidentifying restrictions. The results from these tests show that openness and privatization need to be instrumented and that the instruments are valid. I also test fixed effects versus random effects by using the Hausman test (1978), the Breush-Pagan statistic test, and

¹ Barlow cut the original sample into smaller samples and then regressed again. The coefficient signs of privatization in those small samples were both negative and positive.

 $^{^{2}}$ IV-GMM is method combined instrumental variable method and generalizing method of moment. The instruments are lag and difference of variable its self. Arellano and Bond (1991) recommend this method. See chapter 8 in Balgati (2001).

the test for fixed effects. The Hausman test (1978) provides evidence for the use of fixed effects. The primary estimation results suggest that both openness and privatization have a positive effect on economic growth when political conflict and macroeconomic stability are controlled for.

I check the robustness of the empirical results in two ways. (1) One way is to classify the original sample into six groups: Central European, Baltic, European CIS, South East Europe, Caucasia and Central Asian Countries. Taking out each group from the original sample, and then running regressions, I have found that the signs of coefficients of all independent variables are the same as the signs of the coefficients of those variables in the original sample, and they are mostly significant. (2) The other way is to check the robustness of my estimated results in the specification of the instrumental variable (the landlocked dummy interacted with time). I regress the sample in three steps. First, I include the time dummy variable. Second, I replace this variable by the landlocked dummy variable. Third, I add both the time dummy variable and the landlocked dummy variable to the instrument set. The statistical results show that coefficients of all variables in the structural equation are still statistically significant and have the same sign and small changes in value as the original estimated results.

The rest of this chapter is organized as follows. The second section is a literature review; the third section describes the methodology; and the fourth section reports the primary estimation results. The fifth section presents the conclusions.

2. METHODOLOGY

The purpose of this research is to estimate the relations between privatization, openness and growth, by correcting the endogeneity of openness and privatization. I will use 2SLS estimation of single-equation linear models with the appropriate instrumental variables.

Woodridge (2002) considered the first equation of the structural model (p. 83, eq.5.1):

$$y_{1} = Y_{1} \gamma_{1} + X_{1} \beta_{1} + \xi_{1} \gamma_{1} + \xi_{1} \gamma_{1} \gamma_{1} + \xi_{1} \gamma_{1} \gamma_{1}$$

where y_1 is T x 1 vector of the dependent variable; Y_1 is T x (M^{*} -1) vector of the endogenous explanatory variables; X_1 is T x K^{*} vector of the exogenous variables included in the 1st equation; ε_1 is T x 1 vector of the error term; T is the number of observations; M^{*} is the number of endogenous explanatory variables; and K^{*} is the number of exogenous variables included in the 1st equation. In my econometric model, y_1 denotes GROW. Y_1 includes PRI and OPEN. X_1 consists of WAR, INFLA, INVEST, EMPLOY and PRODU. T = 325, M^{*} = 2 (PRI and OPEN) and K^{*}=5 (WAR, INFLA, INVEST, EMPLOY and PRODU).

The reduced form of Y_1 is (Woodridge, 2002, p. 83, eq. 5.4)

$$Y_{1}_{T_{X}(M^{*}-1)} = X_{T_{XK}} \hat{\Pi}_{1} + \hat{V}_{1}_{T_{X}(M^{*}-1)},$$
(2)

where X is T x K vector of the determinant variables; $\hat{V_1}$ is T x (M^{*}-1) matrix of error term; K is the number of all determinant variables K=10. X includes X₁ and X₂. X₁ is T x K^{*} vector of the determinant variables included in the 1st equation. X₂ is T x K^{**} vector of the determinant variables excluded from 1st equation (hereafter called the excluded instruments). K^{**}=K – K^{*} is the number of determinant variables excluded from equation 1 (K^{**}=5). X₂ is assumed to satisfy the IV exclusion restriction that there is no correlation between X₂ and the dependent variable in the structural equation. In my model, X₂ includes instrumental variables: (1) The WTO dummy variable, (2) The landlocked dummy variable, (3) The openness index of largest trade partners, (4) The ratio between public output and private output, (5) The ratio between government debt and GDP. The motivation to choose these instruments is explained in Section 2.4.1, p.35-37. These excluded instrumental variables are assumed to satisfy the IV exclusion restriction that they do not correlate with GROW: E (X₂, y₁) = 0. Arguments about the IV exclusion restriction the next part.

An estimation result may still be biased if the instruments of endogenous explanatory variables are not valid. To test the consistency of 2SLS, I have implemented the following tests: the Wu-Hausman test (See Woodridge, 2002, p.119), the weak instrument test (See Stock and Yogo, 2004), the redundancy test (See Breusch et al. 1999), and the overidentifying restriction test -Sargan test (See Woodridge, 2002, p.123).

According to Baltagi (2001), the omitted variables can occur when we cannot include some necessary variables in the regression model, due to reasons such as unavailability of data or ignorance. Therefore, the error term will include these omitted variables. If the omitted variables and the independent variables are correlated, then those variables are endogenous. In this study, I deal with the edogeneity by applying 2SLS as mentioned above. However, in panel data, we can see the other occurrence of omitted variables as time-constant variables, called *unobserved effects*. Unobserved effects often capture features of individuals (although in my model, they are features of countries) that do not change over time and they are under two forms: (1) random effect model and (2) fixed effect model. To deal with the unobserved effects, I have carried out the following tests: the test for fixed effects (F-test), Breusch-Pagan (1980) specification test (BP test), Hausman Specification Test (1978) (See Green, 2008, p.194-208).

3. PRIMARY EMPIRICAL RESULTS

3.1 Data

I use a panel data set that covers 25 transition countries from 1994 to 2006. The transition countries include Albania, Armenia, Azerbaijan, Belarus, Bulgaria, Croatia, the Czech Republic, Estonia, FYR, Georgia, Hungary, Kazakhstan, Kyrgyz, Latvia, Lithuania, Moldova, Poland, Romania, Russia, Slovakia, Slovenia, Tajikistan, Turkmenistan, Ukraine and Uzbekistan.

The dependent variable (GROW) is the growth rate of GDP. The main independent variables are the openness index (OPEN) and privatization (PRI). The level of privatization is measured by an average of indexes of small-scale and large-scale privatization. The calculation of indexes of large-scale privatization (LSP) is based on the privatization levels of the assets of large-scale public enterprises; for example, more than 75%, 50%, or 25% and less than 25%. The

calculation of indexes of small-scale privatization (LSP) is also based on the privatization levels of the assets of small-scale public enterprises. These indexes are established and reported by EBRD. The openness index is measured by the ratio of trade volumes to GDP. The data on trade volumes and GDP are also taken from EBRD.

My econometric model includes control variables such as change in investment/GDP (INVEST), change in employment, change in labor productivity (PRODU), war (WAR) and the inflation rate (INFLA).³ The INVEST variable is a proxy for the change in physical capital. The EMPLOY variable is a proxy for the change in labor. The PRODU variable is a proxy for technological progress. The WAR variable is a proxy for political conflict, while INFLA is a proxy for macroeconomic instability. WAR is a dummy variable, which receives the value of one if a country has political conflict in that year and otherwise is zero. The information related to political conflict in transition countries in my data set is taken from the website www.cia.gov/cia/publications/factbook/. The data of all other control variables are obtained from EBRD.

The instruments for openness and privatization are WTO, PARTNER, TIME_LANDLOCK, GOVDE and PUB PRI. WTO is the year in which a country became a WTO member. WTO is a dummy variable, which receives the value of one if the country began to be or already was a WTO member in that year and zero otherwise. The data is taken from website www.wto.org. PARTNER is the average weight of an openness index of the composite of the five largest trading partners. These openness indexes are also measured by the ratios between trade volumes and GDP. The information about trading partners and the data on trade volumes of partners are taken from COMTRADE data set. The data about GDP of trade partners are taken from World Bank's data set at the website www.worldbank.org. TIME LANDLOCK is the multiplication of two variables: YEAR and LANDLOCK. YEAR is a time variable, which receives value from 1994 to 2006. LANDLOCK is dummy variable, which receives the value of one if a country is landlocked, and zero otherwise. The data on LANDLOCK is taken from www.cia.gov/cia/publications/factbook/. GOVDE is government debt over GDP. The data on government debt is taken from EBRD. PUB_PRI is the ratio of public share of GDP over private share of GDP. The data on public firms' share over GDP and private firms' share over GDP are obtained from EBRD.

Rose (2004) and Subramanian and Wei (2003) studied the effect of WTO on trade. According to the authors, when countries became members of WTO, they had to follow bilateral mutual negotiations on cutting trade protection, and therefore, their openness increased. This conclusion led to the assumption that having become a WTO member was a important factor in change in the openness of the country. In this research, therefore, I have constructed a WTO variable and consider it a potential instrument of openness.

Romalis (2005) showed that a decrease in U.S. MFN tariffs—he assumes that the United States was the largest trade partner of developing countries—increased the possibility of market access for a developing country, and therefore increased the openness of that country. Therefore, the openness index of the largest trade partners of each transition country could

³ The traditional theory of economic growth holds that economic growth is determined by production factors such as investment, labor and technological progress. Besides, the role of inflation rate and political conflict on the economic growth of transition countries is affirmed by many authors, such as Barlow (2006).

provide necessary information to explain change in the openness index of that country. For this reason, therefore, I constructed the variable PARTNER and chose it as a potential instrument of openness.

Frank (1999) used LANDLOCK as an instrument of openness. This arose from the idea that geographic characteristics of each country provided advantages or created limitations for that country in trade with the rest of the world. Therefore, I have borrowed from Frank the use of LANDLOCK as a potential instrument of openness. However, LANDLOCK is a dummy variable and a time-constant variable, which receives the value of one if the country is landlocked and zero otherwise. To use it as an instrument for openness in the panel data sample, I multiply the LANDLOCK variable by the TIME variable to create a new variable, TIME_LANDLOCK. This means that I consider that LANDLOCK impacts openness through its joint impact with TIME on openness. This structure translates LANDLOCK into a time series. Section 5 confirms that this specification of the instrumental variable TIME_LANDLOCK is robust.

During the communist era, the public sector characteristically dominated the whole economy of a transition country. The operation of public firms did not aim toward profitability, but only toward social welfare.⁴ The government had to use financial sources such as taxes, foreign debt, and exports to subsidize the operation of public firms. Lacking knowledge of management, technological progress, the dynamics of competition, and the relationship between demand and supply, public firms tended to operate ineffectively. The communist economy suffered from a high pressure of government debt owed to foreign countries. When the communist government did not have enough capacity to continue subsidizing public firms, then the government had to sell public firms to domestic or foreign investors. Therefore, higher levels of government debt created higher motivation for privatization in the transition countries. Plane (1997) used the ratio of government debt to GDP as the instrument of privatization. In this paper, I have followed Plane (1997) in choosing the ratio of government debt to GDP as an instrument of privatization.

Privatization transforms public firms into private firms. The purpose of privatization is not only to release the government from its heavy financial burden and to improve the effectiveness of public firms, but also to establish the foundation for market mechanisms through creating competitive sectors and private firms, and to push up economic growth. On the other hand, the governments of transition countries think that political institutions need to be ensured by economic forces such as the contribution of public firms in the economy. Therefore, the share of public firms' output to GDP, relative to the share of private firms' output to GDP, can be considered important information to explain the change in privatization level. It follows from this that using only the share of private firms' output to GDP does not provide necessary information to explain the change in privatization levels. Therefore, I have adopted the ratio of public firms' output to GDP to private firms' output to GDP as an instrument for privatization. This is the first use of this ratio in this way.

These instruments are assumed to satisfy the IV excluded restriction that they do not directly affect growth, but only have direct impact on openness and privatization. To my knowledge, there are not any theoretical or empirical models that display the direct effect of WTO, PARTNER, LANDLOCK, and PUB_PRI on economic growth. There is evidence to support the

⁴ See Matsumara, T. (1998), p.473.

relationship between WTO, PARTNER, and LANDLOCK and trade or openness, and none that shows becoming a WTO member, having sea border, or the openness index of the largest trade partner has any direct linkage with the economic growth of a country.

There has been some concern about the direct impact of government debt on economic growth, but few studies have been done concerning this relationship. Recently, Reinhart and Rogoff (2010) have claimed that debt at low or moderate levels does not affect economic growth, but that if the ratio between debt and GDP is higher than 90%, then debt does have a negative effect on economic growth. The claim of Reinhart and Rogoff (2009) has little relevance to this study. In my sample set, the average level of debt over GDP is 40.5%. There are only 16 observations—the total observations equal 325—that show a ratio between debt and GDP that is greater than 90%. Examining the case of the Kyrgyz Republic, for example, we find that there is no linkage between debt and economic growth. The economic growth rate at the high ratio, in fact, is higher than the economic growth rate at the low ratio. In 1995, the ratio between debts and GDP was 52.4 % and the economic growth rate was -5.40 %, while in 2000, the ratio between debts and GDP was 107.34 % and the economic growth rate was 5.44 %. There are also many cases in which the economic growth rates are very different, although the ratio of debts over GDP is the same.

The other concern is whether the ratio of public output over private output affects the economic growth rate. Up to now, there have not been any theoretical or empirical studies that have mentioned the direct effect of this ratio on economic growth. This ratio is only a characteristic of transitional economies. The ratio between public output and private output can be considered an indicator used by governments of transition countries to adjust the privatization level. I do not find any statistical evidence to support the relationship between economic growth and the ratio between public output and private output in my sample. Albania maintained the same ratio between public output and private output (0.333) during the time period from 1996 to 1999, but the economic growth rate changed within a large range (9.1 % in 1996; -10.2 % in 1997; 12.7 % in 1998; and 10.1 % in 1999). Many other countries provide similar evidence. For example, from 1994 to 1996, Belarus kept the same ratio between public output and private output (0.5667), but the economic growth rate changed from -11.7% in 1994 to 2.8 % in 1996. From 1997 to 2000, the ratio between public output and private output was 4, but the economic growth rate changed (11.4% in 1997; 8.4% in 1998; 3.4% in 1999; 5.8 % in 2000; and 4.7 % in 2001). From 2001 to 2004, the ratio between public output and private output was 3, but the economic growth rate varied (5.0% in 2002; 7.0 % in 2003; and 11.4 % in 2004).

Table 1 displays a summary of the main variables and also some of the characteristics of my sample. The observations total 325 and the data on variables such as OPEN, PRI, WAR, TIME_LANDLOCK, PUB_PRI, WTO, and PARTNER can be fully seen. From 1994 to 2006, the growth rate of GDP reached its highest rate at 34.5 %. The growth rate of GDP that is higher than 10 % is about 11% of whole sample. However, 16% of whole sample has negative growth rate of GDP. The lowest growth rate of GDP is 30.9%. The other feature of the sample is the inflation rate. 52% of the whole sample has a two-digit inflation rate; 39% of the whole sample has a three-digit inflation rate; 4% of the whole sample has a four-digit inflation rate. However, 1.8% of the whole sample has a negative inflation rate. The change in investment is also great. The growth rate of investment is 23.4% on average, 100.49% as the maximum rate and -311% as the minimum rate. The ratio of public share of GDP to private share of GDP decreases from 1994

to 2006. The average ratio is 1.027, the maximum ratio is 5.666, and the minimum ratio is 0.25. In general, the government debt to GDP reduces. The average level of the government debt to GDP is 40.5%; the maximum ratio of government debt to GDP is 319.79 % in Hungary in 1994.

Table 1: Statistical Summary of All Variables						
Ob	Mean	Std. Dev.	Min	Max		
319	3.937749	6.736982	-30.9	34.5		
325	82.95631	29.42397	34.7	241.8		
325	3.275462	0.7658746	1	4.165		
325	0.1569231	0.3642891	0	1		
318	97.72408	458.4971	-1.374	6041.595		
306	6.450654	12.66028	-66.2	84.3		
316	-0.2433544	4.310237	-22	28.3		
290	59.61503	190.2608	-31.58657	1965.308		
325	1040	1000.744	0	2006		
325	1.027479	1.092151	.25	5.666667		
325	0.4338462	0.4963686	0	1		
297	40.50165	32.21594	3.996	319.792		
325	69.56384	15.43999	27.108	115.775		
	ummary o Ob 319 325 325 318 306 316 290 325 325 325 325 325 297 325	ummary of All VariablesObMean3193.93774932582.956313253.2754623250.156923131897.724083066.450654316-0.243354429059.6150332510403251.0274793250.433846229740.5016532569.56384	ObMeanStd. Dev.3193.9377496.73698232582.9563129.423973253.2754620.76587463250.15692310.364289131897.72408458.49713066.45065412.66028316-0.24335444.31023729059.61503190.260832510401000.7443251.0274791.0921513250.43384620.496368629740.5016532.2159432569.5638415.43999	ObMeanStd. Dev.Min3193.9377496.736982-30.932582.9563129.4239734.73253.2754620.765874613250.15692310.3642891031897.72408458.4971-1.3743066.45065412.66028-66.2316-0.24335444.310237-2229059.61503190.2608-31.586573251.0274791.092151.253250.43384620.4963686029740.5016532.215943.99632569.5638415.4399927.108		

Before presenting the estimation results, I provide the results from an econometric test that show evidence supporting the choice of random effect versus fixed effect model as well as instruments.

3.2 Random Versus Fixed Effect

The test results are reported in Table 2.

First, I have used the F-test to test the individual effects. The result rejects the null hypothesis, since F (23, 231) = 5.81 and p = 0.000. Therefore, the unobserved effects and model must be estimated by either random or fixed effects.

Next, I have used the Breusch-Pagan test to test the null hypothesis H_0 that the variance of unobserved effects (c_i) is zero. The test rejects the null hypothesis, since chi-sq (1) = 67.08 and p = 0.000. This result provides evidence that my model can be estimated either by random or fixed effects.

The above results did not give concrete direction for my estimate. Therefore, I employed the test for random versus fixed effects discussed by Hausman (1978). The Hausman statistic for fixed effects versus random effects reports chi-sq (7) = 54.08 and p = 0.000. Based on this result, I will estimate my econometric model only by fixed effects.

Table 2: Random versus Fixed Effect

F-Test that all u_i = 0	Breusch-Pagan Test
F(23, 231) = 5.81	Chi-sq (1) = 67.08
P-value = 0.0005	P-value = 0.000
	F-Test that all u_i = 0 F(23, 231) = 5.81 P-value = 0.0005

3.3 Testing the Validity of Instruments

The results from testing the validity of instruments are reported in Table 3 with fixed effects estimation. All tests are passed, to support the validity of all instruments. Table 3 reports the results of four tests: the endogeneity test, the test for weak instruments, the IV redundant test, and the Sargan test.

In the fixed effects model, the endogeneity test can be implemented by using the Wu-Hausman test. The Wu-Hausman statistic rejects the null hypothesis that there is no correlation between GROW and the residuals from the first stage regression, because F (2,229) = 14.89 and p = 0.000. Therefore, the Wu-Hausman test suggests that both PRI and OPEN are endogenous variables.

In addition, the joint test of weak instruments provides evidence that the chosen instruments are not weak. In the first stage regression of PRI, F (5,228) = 42.19 and p = 0.000, while in the first stage regression of OPEN, F (5,228) = 9.94 and p-value = 0.0000. The Cragg–Donald Wald F statistic is 8.201. It is higher than 5.91, the critical value for the weak instrument test of Stock and Yogo (2004), based on 20% maximal IV relative bias and a 5% significance level for the case of two endogenous explanatory variables and five excluded instruments. It is also higher than 6.89, the critical value for the weak instrument test of Stock and Yogo (2004), based on 30% maximal IV relative size and 5% significance level, for the case of two endogenous explanatory variables and five excluded instrument set is not weak in the case of 20% maximal IV relative bias and 30% maximal IV relative size.

Table 3: The Statistics of All Tests for the Validity of the Instruments under Fixed Effects

Endogeneity test by Wu-Hausman test						
Hypothesis H ₀ : No correlation between GROW and residuals from first stage regression.						
If H_0 is rejected, there is correlation and PRI & OPEN need to be instrumented.						
F (2, 229) = 14.89						
P-value = 0.0000						
Test of weak instrument						
Hypothesis H_0 : All instruments are wea	ak					
If H ₀ is rejected, then all instruments ar	e not weak					
First stage regression of PRI: Joint test	of all instruments					
F(5, 228) = 42.19						
P-value = 0.0000						
First stage regression of OPEN: Joint to	st of all instruments					
First stage regression of OPEN. Joint te $r/r_{228} = 0.04$	st of all instruments					
F(5, 220) = 9.94						
P-value - 0.0000						
Cragg-Donald Wald E statistic:		8 201				
Stock-Yogo weak ID test critical values:	5% maximal IV relative bias	13.97				
	10% maximal IV relative bias	8 78				
	20% maximal IV relative bias	5 91				
	30% maximal IV relative bias	4 79				
		1.75				
	5% maximal IV size	19.45				
	10% maximal IV size	11.22				
	20% maximal IV size	8.38				
	30% maximal IV size	6.89				
IV redundancy test: (LM test of redund	lancy of specified instruments)					
Hypothesis H ₀ : instrument is redundant or instrument provides no useful information.						
If H_0 is rejected, then instruments provide useful information and are not redundant.						
Instrument Chi-sq(2)	P-value					
TIME_LANDLOCK 9.297	0.0096					
2UB_PRI 12.217 0.0022						
WTO 11.676	0.0029					
GOVDEB 7.953	0.0188					
PARTNER 15.911	0.0004					
Sargan statistic: (overidentificatio test of all instruments):						
Hypothesis H : all instruments are exogenous						
$P_{1} = 0.1174$						
Sargan test statistic: $CnI-sq(3) = 5.844$, P-value = $0.11/4$						

On the other hand, the test for redundancy of each instrument confirms that each instrument provides useful information to explain PRI and OPEN, hence they cannot be omitted. Test statistics for TIME_LANDLOCK, PUB_PRI, WTO, GOVDE, and PARTNER are 9.297, 12.217, 11.676, 7.953 and 15.911, respectively. P-values are 0.0096, 0.0022, 0.0029, 0.0188, and 0.0004, respectively.

Finally, the Sargan test, or the overidentification test, suggests that the overidentification restriction is valid. The instrumental variables are valid in the sense that they are uncorrelated with error term in the structural equation. In the fixed effects model, chi-sq (3) = 5.844 and p-value = 0.1174.

3.4 2SLS Estimated Results

Table 4 reports the estimation result of 2SLS. The column in Table 4 corresponds to 2SLS estimation's results for fixed effects. In each cell, the first line reports the estimated regression coefficient value of the standardized beta coefficient and the level of statistical significance. Symbols ***, **, * denote 0.01, 0.05, 0.1 significance levels, respectively. The second line reports standard error. The coefficients of all regressors are statistically significant.

Empirical results from 2SLS estimation under fixed effect suggest that privatization and openness simultaneously promote economic growth in transition countries. Since both policies promote the same direction of economic growth, the joint impact of the two policies on economic growth is automatically predicted as positive.

Independent	No standard Beta coefficient		Standard Beta coefficient		
Variable	Dependent variable: GROW		Dependent variable: GROW		
	Random Fixed Effects		Random	Fixed Effects	
	effects		effects		
PRI	3.088***	6.918***	0.351***	0.786***	
	(0.778)	(1.347)	(0.088)	(0.153)	
OPEN	0.100***	0.085**	0.436***	0.371**	
	(0.028)	(0.039)	(0.122)	(0.168)	
WAR	-3.546***	-6.090***	-0.191***	-0.329***	
	(1.069)	(1.521)	(0.057)	(0.082)	
INFLA	-0.011***	-0.009***	-0.786***	-0.644***	
	(0.002)	(0.002)	(0.127)	(0.134)	
PRODU	0.194***	0.161***	0.364***	0.301***	
	(0.023)	(0.021)	(0.0436)	(0.039)	
EMPLOY	0.208***	0.212***	0.133***	0.136***	
	(0.074)	(0.063)	(0.047)	(0.040)	
INVEST	0.064***	0.048***	0.162***	0.121***	
	(0.015)	(0.013)	(0.038)	(0.035)	

Table 4: Summary of 2SLS Regression Results

Note: * = 0.1 significant level; ** = 0.05 significant level; and *** = 0.01 significant level

My result is different from previous studies: that trade liberalization has a statistically significant positive effect on economic growth, and that privatization has a statistically nonsignificant, negative effect on economic growth for transition countries. When comparing estimation methods, IV-GMM applied by previous studies used only internal instruments, including first lag and first difference of independent variables, but did not use external instruments. Internal instruments cannot provide sufficient information to explain endogenous variables (openness and privatization). In this case, misspecification in application of the estimation method may have been a reason for the negative sign and statistical insignificance of the coefficient of the privatization variable.

My findings relate to the impact of production factors on the economic growth of transition countries, and give evidence to support the traditional theory of endogenous growth. Those three factors simultaneously contribute positively to economic growth. The standardized beta coefficients for physical capital, labor and technological progress are 0.121, 0.136, and 0.301, respectively. The standardized beta coefficient of technological progress is highest and is nearly triple that of physical capital and labor. This shows that technological progress is the most important factor in production. Transition countries should focus on upgrading advanced technology to improve their economic growth.

Comparing the standardized beta coefficients in fixed effects estimation, I have realized that the privatization policy had nearly twice the relative effect on economic growth as the openness policy, from 1994 to 2006. In fixed effects estimation, the standardized beta coefficient of privatization is 0.786, while the beta coefficient of openness is 0.371. If openness were to increase by one standard deviation, economic growth would increase only by 0.371 of a standard deviation; while if the privatization level were to increase by one standard deviation, economic growth would increase by 0.786 of a standard deviation. This shows that in order to accelerate economic growth, governments of transition countries might well emphasize privatization policy. It also implies that during the period from 1994 to 2006, building the foundation for market mechanisms through establishing competitive sectors played an important role in economic reform of transition economies. However, statistical data shows that openness increased considerably from 1994 through 2006, except for a few countries such as Albania, Armenia, and Uzbekistan, while the privatization level increased little. The growth rate of openness reached a maximum of 124.5%, while the growth rate of privatization reached a maximum of 40%. This may have been caused by the difficulties in implementing the privatization process, such as asset evaluation of public firms, choosing the privatization method, procedure in selling stocks and other problems.

In addition, the empirical results show the important role of stabilizing political conflict and mostly macroeconomic conditions. Political conflict and macroeconomic instability can decrease considerably the effects of privatization policy and trade liberalization in promoting economic growth. The standardized beta coefficient of INFLA is -0.644, which is very close to the value of the standardized beta coefficient of OPEN and PRI under an absolute comparison. To maintain the positive effects of trade liberalization and privatization policies on economic growth, governments of transition countries would need to implement macroeconomic stabilization policies and minimize political conflict. The statistical data from 1994 to 2006 provides promising signs of stabilization of the macroeconomics of transition countries. The inflation rate of transition countries decreased considerably, from an inflation rate of three or four digits in 1994, to an inflation rate of one or two digits in 2006. In general, political conflict is well controlled in many transition countries in my data sample, except for Kyrgyz, Georgia, Moldova, and Uzbekistan.

3.5 Robustness Check

I checked the robustness of the empirical results in two ways. The first was to observe the changes in the coefficients with different structures of the sample. The second was to check whether the instrumental variable of the landlocked dummy interacted with time, a reasonable specification.

First, I classified the original sample into six groups: Central European, Baltic, European CIS, South East Europe, Caucasia, and Central Asian Countries. I took out each group from the original sample and then ran the regressions. The statistical results show that signs of coefficients of all independent variables in the smaller sample are the same as the signs of coefficients of those variables in the original sample. More than 80% of the total coefficients are statistically significant. Some loss of significance is expected with the smaller samples. Table 5 reports the results of the robustness check for fixed effect estimation only.

Independent	Dependent Variable: GROW					
Variables	(1)	(2)	(3)	(4)	(5)	(6)
PRI	8.767***	7.086***	6.324***	10.456***	6.748***	3.936***
	(1.497)	(1.445)	(1.147)	(2.074)	(1.408)	(1.309)
OPEN	0.047	0.088**	0.052	0.042	0.085**	0.063**
	(0.083)	(0.041)	(0.036)	(0.040)	(0.035)	(0.027)
WAR	-5.084	-6.071***	-6.682***	-4.369**	-6.733***	-3.809**
	(2.077)	(1.598)	(1.884)	(1.781)	(1.734)	(1.286)
INFLA	-0.007***	-0.009***	-0.008***	-0.005**	-0.009***	-0.013***
	(0.002)	(0.002)	(0.001)	(0.002)	(0.001)	(0.002)
PRODU	0.156***	0.163***	0.162***	0.161***	0.177***	0.141***
	(0.025)	(0.022)	(0.020)	(0.027)	(0.022)	(0.019)
EMPLOY	0.208***	0.229***	0.206***	0.364***	0.194***	0.117*
	(0.072)	(0.069)	(0.061)	(0.079)	(0.067)	(0.062)
INVEST	0.036***	0.048***	0.035***	0.039**	0.058***	0.070***
	(0.014)	(0.014)	(0.012)	(0.015)	(0.013)	(0.014)
CONT	-27.525***	-26.502***	-21.758***	-34.865***	-26.499***	-14.998***
	(7.018)	(4.741)	(4.313)	(6.256)	(4.708)	(3.743)
Number of	199	230	221	210	235	215
Observation						

Table 5: Robustness Report of Fixed Effects Estimation by Dropping Countries of One Region

Note:

Central European countries: Czech, Slovak, Hungarian, Poland, Slovenia. Baltic countries: Estonia, Latvia, Lithuania.

European CIS countries: Belarus, Moldova, Ukraine.

South East Europe countries: Albania, Bulgaria, Croatia, FYR Macedonia, Romania Caucasia countries: Armenia, Azerbaijan, Georgia. Central Asian Countries: Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan

- (1) Take Central European Countries out of original sample
- (2) Take Baltic Countries out of original sample
- (3) Take European CIS countries out of original sample
- (4) Take South East Europe countries out of original sample
- (5) Take Caucasia countries out of original sample
- (6) Take Central Asian Countries out of original sample

* = 0.1 significant level; ** = 0.05 significant level; and *** = 0.01 significant level

Second, I examined the robustness of my estimated results with the instrumental variable TIME_LANDLOCK. I regressed the sample in three ways. First, I included the time dummy variables: dummy1994, dummy1995... dummy2006 in the instruments set. DummyT variable received the value of one for the year of T and zero otherwise (T = 1994, or 1995... or 2006). Second, I replaced the TIME_LANDLOCK variable by the LANDLOCK variable only. Third, I added both time dummy variables and the LANDLOCK variable in the instrumental set. The statistical results show that coefficients of all variables in the structural equation are still statistically significant and have the same sign. The values of coefficients are changed very little compared with the original estimated results. The P-value of openness is little higher than that of the original estimated result. All results reported in Table 6 confirm the robustness of my original estimated results.

Independent	Original	Robustness Check			
Variable	Estimate	(1)	(2)	(3)	
	Results				
PRI	6.918***	6.122***	7.194***	6.122***	
	(1.347)	(1.207)	(1.401)	(1.207)	
OPEN	0.085**	0.054*	0.073*	0.054*	
	(0.039)	(0.031)	(0.043)	(0.031)	
WAR	-6.090***	-5.861***	-5.806***	-5.861***	
	(1.521)	(1.391)	(1.568)	(1.391)	
INFLA	-0.009***	-0.009***	-0.009***	-0.009***	
	(0.002)	(0.001)	(0.002)	(0.001)	
PRODU	0.161***	0.168***	0.161***	0.168***	
	(0.021)	(0.020)	(0.021)	(0.020)	
EMPLOY	0.212***	0.235***	0.217***	0.235***	
	(0.063)	(0.060)	(0.063)	(0.060)	
INVEST	0.048***	0.048***	0.048***	0.048***	
	(0.013)	(0.012)	(0.013)	(0.012)	

Table 6: Robustness Check of the Specification of the TIME_LANDLOCK Variable

Note:

(1): Adding time dummy variables

(2): Replace TIME_ LANDLOCK variable by LANDLOCK variable

(3): Adding both time dummy variables and LANDLOCK variable

* = 0.1 significant level; ** = 0.05 significant level; and *** = 0.01 significant level

3. CONCLUSION

This paper estimates the simultaneous effect of trade liberalization and privatization policies on economic growth. I used 2SLS with a full package of tests for endogeneity, weak instruments, redundancy and overidentifying restrictions. The tests establish the empirical validity of the model as specified. The main finding is that openness and privatization have statistically significant and simultaneously positive effects on economic growth. Based on comparison of beta coefficients, privatization policy effects on economic growth are greater than trade liberalization policy. In addition, political and macroeconomic stability influence economic growth considerably. For these countries, a political conflict offsets the contribution of one standard deviation in privatization and trade liberalization on economic growth. The robustness check confirms that all empirical results are robust.

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