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BALANCE OF PAYMENTS STAGES IN THE WORLD OVER THREE DECADES

Masanori Ono

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TOKYO CENTER FOR ECONOMIC RESEARCH
1-7-10-703 Idabashi, Chiyoda-ku, Tokyo 102-0072, Japan

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Abstract

This paper classifies 175 countries over just 30 years according to the balance of payments stages that Crowther (1957) used in proposing a hypothesis that the stage depends on the progression in a nation's development. This investigation demonstrates that a nation's stage in the balance of payments has a nonlinear relationship with its economic development. A country at the stage of immature creditor-lender enjoys higher GDP per capita than at any other stage in its development. It is also remarkable to report that about 25% of countries in the world lend money to the rest of the world in almost every year.

Masanori Ono
TCER
and
Fukushima University
Faculty of Economics and Business
Administration
1 Kanayagawa, Fukushima-shi ,Fukushima
960-1296, Japan
e012@ipc.fukushima-u.ac.jp

Balance of payments stages in the world over three decades

Masanori Ono*

Fukushima University
Faculty of Economics and Business Administration
Fukushima-shi, 960-1296, Japan
Email: e012@ipc.fukushima-u.ac.jp

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Abstract

This paper classifies 175 countries over just 30 years according to the balance of payments stages that Crowther (1957) used in proposing a hypothesis that the stage depends on the progression in a nation's development. This investigation demonstrates that a nation's stage in the balance of payments has a nonlinear relationship with its economic development. A country at the stage of immature creditor-lender enjoys higher GDP per capita than at any other stage in its development. It is also remarkable to report that about 25% of countries in the world lend money to the rest of the world in almost every year.

Keywords: GDP per capita; Creditor; Debtor; Multiple Comparisons

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1. Introduction

This paper is intended to test for the balance of payments stages hypothesis. Crowther (1957) first proposed the hypothesis that the balance of payments stage depends on the progression of a nation's development. He classified the progression into six stages, as detailed in Table 1. The hypothesis predicts that as a country becomes more developed, it will reach a higher stage in the balance of payments. Using the data from 1952 to 1954, he classified 36 countries into the six stages. In the paper's table 4, for example, he regarded Japan as being in stage 1, Mexico in stage 2, Finland in stage 3, Switzerland in stage 4, the U.S. in stage 5, and no countries in stage 6. Using data for the late 1990s, Japan's Ministry of Economy, Trade and Industry (2002) classifies 26 countries into the six stages. For example, it assigns stage 1 to Mexico, stage 2 to New Zealand, stage 3 to Finland, stage 4 to Japan, and stage 5 to Switzerland. The U.S. and the U.K. are regarded as midway in the transition from stage 6 to stage 1. In a straightforward comparison over a forty-year period, Japan and Switzerland had moved forward, Mexico and the U.S. had moved backward, and Finland had stayed the same.

Onitsuka (1974) theoretically justifies the hypothesis' prediction under some assumptions, such as a country's high saving ratio. Regarding empirical investigations, however, Halevi (1971, p. 116) concludes "there is no discernible orderly progression

through balance of payments stages connected with rising income per capita.” He uses data for 81 countries in the early 1960s. In addition to GDP per capita, Razgallah (2004) includes an index for industrial specialization in explanatory variables to estimate the stage index. He uses data for 194 countries in the 1990s to apply to the regression model. Razgallah’s estimation does not support the hypothesis when using his complete data set. However, the estimation only for high-income countries suggests that a country is transformed from a debtor to a creditor when the GDP per capita goes beyond a certain threshold.

In sum, the hypothesis may hold under some restricted circumstances. As long as the GDP per capita represents the degree of a nation’s economic development, I presume that there is some relationship between the balance of payments stages and GDP per capita. However, I postulate that the relationship forms a nonlinear shape.

Crowther (1957, p. 12) states, “a mature and developed country can become so improvident, or be so overwhelmed by the calamities of war, that it can fall right back to the start again and become a Debtor-Borrower.” In fact, Japan’s Ministry of Economy, Trade and Industry (2002) concludes that the U.S. and the U.K. are in the midst of such a transition, from stage 6 to stage 1. If we assume the balance of payments stages have a positively linear relationship with the GDP per capita, the GDP per capita at stage 6

must be the largest and the GDP per capita at stage 1, the smallest. I suggest, instead, that the largest GDP per capita lies before stage 6; say, at stage 5 or 4. Thereafter, a country's GDP per capita falls from the highest-level stage to stage 6 and falls further from stage 6 to stage 1. Presumably, it then rises again from stage 1 to the highest level.

This paper is organized as follows: Section 2 introduces data; Section 3 reports the descriptive statistics of real GDP per capita by stage; Section 4 performs mean-equality tests in multiple comparisons; Section 5 describes the distribution of stages over time; and Section 6 presents conclusions.

2. Data

This paper uses data from the IMF's International Financial Statistics (hereafter, IFS) for balance of payments and those in the IMF's World Economic Outlook Database (hereafter, WEO) for real GDP per capita.

To calculate real GDP per capita, first I obtain "Gross domestic product based on purchasing-power-parity (PPP) per capita GDP (Current international dollar)" from the WEO. This variable is presented in terms of the nominal international dollar. Second, I follow the IMF's WEO Data Forum on "GDP at PPP at current and constant prices"¹ to

¹ See the IMF website at <http://forums.imf.org/showthread.php?t=109>.

convert the GDP per capita in current PPP dollars into constant prices. For this conversion, I denote variables as follows:

$NGDP_{it}$: nominal GDP per capita based on PPP for country i at year t (in terms of the international dollar), obtained from the WEO

$RGDPNC_{it}$: real GDP per capita for country i at year t (in terms of national currency), obtained from the WEO.

Here, I define real GDP per capita based on PPP for country i at year t as:

$$(1) \quad RGDP_{it} = NGDP_{i2000} \times RGDPNC_{it} / RGDPNC_{i2000}.$$

In the conversion, I select 2000 as the base year for constant prices. Eventually, equation (1) evaluates $RGDP_{it}$ in terms of international dollars in 2000. This conversion allows us to compare a country's real GDP per capita with another one in both cross-sectional and time-series dimensions.

The data sample period starts in 1980 and ends in 2009 because the WEO's GDP is available from 1980 and the IFS's data are available up to 2009 at the time of writing this paper. It should be noted that the countries appearing in the IFS are not exactly the same as those in the WEO. We used 175 countries that appear in both the IFS and the WEO.

Table 2 shows a list of major accounts in the balance of payments. To classify

countries by Table 1, I follow Crowther (1957) to define:

(a) Net trade of goods and services = (A1) + (A3),

(b) Net investment income = (A2),

(c) Net capital receipt = (B) + (C).²

Because of the identity in the balance of payments,

$$(2) \quad (A1) + (A2) + (A3) + (B) + (C) = -(D)$$

Therefore, we have:

$$(3) \quad (a) + (b) + (c) = -(D).$$

We have eight mathematically possible cases because each of (a), (b), and (c) can have a plus or minus sign.³ As long as $(D) = 0$ in equation (3), however, we can exclude a case where $(a) > 0$, $(b) > 0$, $(c) > 0$, and a case where $(a) < 0$, $(b) < 0$, $(c) < 0$.

In fact, Table 1 displays the remaining six cases as stages. Practically speaking, nonetheless, these two excludable cases can take place in the data when $(D) \neq 0$. When $(D) \neq 0$ for a country in a year in my data, I exclude the country-year from the data because the data accuracy seems to be unreliable.

² In Crowther (1957), (C) was Gold in the gold standard system at that time. In some countries, he excludes (A3) and (B1) from (a) and (c), respectively. It should be noted that the data I use rest on the IMF's fifth edition (1993) of the balance payments manual, the details of which are different from those available to Crowther (1957) at that time.

³ Each account can be also zero. However, I cannot find an exact zero value in any account.

I began with 5,250 country-years (=175 countries times 30 years). I excluded 94 country-years because $(D) \neq 0$. In addition, I dropped 1,054 country-years for which the IFS does not report even one of (A1), (A3), (A2), (B), and (C). Thus 4,102 country-year observations remained in my data from the IFS.

In contrast, I derived 4,661 observations for $RGDP_{it}$ by using equation (1) from the WEO, in which $NGDP_{it}$ and $RGDPNC_{it}$ were missing in some countries in some years. After the conversion from nominal to real values, I have 3,995 country-year observations for which both stage and real GDP per capita are available at the same time.

3. Descriptive Statistics

For $RGDP_{it}$, Figure 1 illustrates the mean and median by stage. As expected in Section 1, $RGDP_{it}$ has a nonlinear relationship with the level of stage. Both mean and median become the highest at stage 4. In addition to the mean and median, Table 3 reports other descriptive statistics of $RGDP_{it}$ classified by stage. Although the minimum value is the smallest at stage 1, the maximum value becomes the highest at stage 3. One may say that an outlier exists in stage 3. The standard deviation is smaller in stages 1 and 2 than in the other stages. The skewness has a positive sign except for stage 4. A

positive sign means the distribution has a long right tail. In stages 1, 2, and 3, the kurtosis exceeds 3, the value above which the distribution is peaked relative to the normal distribution. In stage 4 and 5, the kurtosis is less than 3, the value below which the distribution is flat relative to the normal distribution. For all stages, finally, the Jarque-Bera test statistic rejects the null of normal distribution at the 1% significant level. Figures 2-1 to 2-6 demonstrate the distribution of real GDP per capita by stage. They appear not to be normally distributed.

4. Empirical Test

This section performs a mean equality test by multiple pairwise comparisons. As examined in the preceding section, real GDP per capita by stage does not reveal a normal distribution. Tsushima (undated) suggests that one apply the Steel-Dwass method to this case.⁴ In my data, an outlier appears to exist as the maximum value at stage 3. However, the Steel-Dwass test statistic is robust to outliers because their method employs a nonparametric estimation. Table 4 reports the test statistics in the upper cell and the corresponding p-value in the lower cell.⁵ The null hypothesis for comparison in mean between stages i and j is:

⁴ See also Nagata and Yoshida (1997), who give a detailed explanation about Steel (1960) and Dwass (1960).

⁵ I used a program available at <http://aoki2.si.gunma-u.ac.jp/R/Steel-Dwass.html>.

$$H_{\{i,j\}}: \mu_i = \mu_j$$

where μ_i and μ_j are mean values of stage i and j , respectively. I reject nulls $H_{\{1,2\}}$, $H_{\{1,3\}}$, $H_{\{1,4\}}$, $H_{\{1,6\}}$, $H_{\{2,3\}}$, $H_{\{2,4\}}$, $H_{\{2,6\}}$, $H_{\{3,4\}}$, $H_{\{3,6\}}$, $H_{\{4,5\}}$, and $H_{\{4,6\}}$ at the 1% significant level and $H_{\{1,5\}}$ at the 10% level. On the other hand, I retain nulls $H_{\{2,5\}}$, $H_{\{3,5\}}$, and $H_{\{5,6\}}$ at the 10% significant level.

All mean-comparisons with stage 4 are rejected. This evidence confirms that the real GDP per capita becomes statistically significantly the highest at stage 4. As represented by the mean in Figure 1, the relationship between income and the balance of payments stages progresses along the following stages:

- (1) As income statistically significantly increases, a country evolves from one stage to the next in the course from stage 1 to stage 4.
- (2) From stage 4 to stage 5, the real GDP per capita decreases statistically significantly.
- (3) However, it stays at the same level from stage 5 to stage 6.
- (4) Finally, income falls significantly from stage 6 to stage 1.

5. The Stages' Distribution by Year

Figure 3 illustrates the distribution of stages by year. Countries at stage 1 make up

about 50% of all countries. As shown in Table 1, countries at stages 1, 2, and 6 borrow money from those at stages 3, 4, and 5. It is remarkable that those borrowers constitute about 75% of the total, whereas the creditors form about 25% of it. Figure 4 presents a three-dimensional illustration of Figure 3. In the early 1980s, few countries were at stages 2, 3, and 4. One may say that polarization of the countries into stages 1 and 6 intensified during the period. However, the share of countries at stages 2 and 3 increased in the late 1980s and in the 2000s, respectively.

To evaluate the changes numerically, Figure 5 depicts descriptive statistics of stage by year. The mean has fluctuated between 2.0 and 2.5. The median has been at 2.0 except in the early 1980s, 1998, and 2008, when it was 1.0. The standard deviation has been around 1.5 except for the early 1980s, when it was near 2.0. The skewness decreased from 1.5 in the 1980s to 1.0 in the 2000s. The kurtosis also decreased, from around 4.0 in the late 1980s to about 3.0 in the 2000s.

Broadly speaking, these changes reflect the emergence of countries at stages 2 and 3 after the early 1980s. One final point: the financial crisis that erupted in 2007 may have caused a drop in the median in 2008.

6. Concluding Remarks

As illustrated in Figure 1, a nation's stage in the balance of payments has a nonlinear relation with its real GDP per capita. In Table 4, mean-equality tests in many pairs revealed statistically significant differences from each other. This evidence supports Halevi's (1971) empirical rejection of the linear projection in the relation. In addition, it may accord with Razgallah's (2004) acceptance of the linearity between debtors and creditors. In Table 1, a country is a debtor at stage 3 and a creditor at stage 4. In Figure 1, a country's real GDP per capita increases as the country moves from stage 3 to stage 4. Recall that Razgallah (2004) discovered this linearity in the data for high-income countries only.

However, changes in the distribution of stage over time should receive more investigation in future research. For example, the median dropped from 2 to 1 in 1998 and 2008. We should subject these incidents to economic interpretation, recognizing factors such as a financial crisis.

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Table 1. The balance of payments stages

Stage	name	(a) Net trade of goods and services	(b) Net investment income	(c) Net capital receipt
1	Immature debtor-borrowers	-	-	+
2	Mature debtor-borrowers	+	-	+
3	Debtor-lenders and debtor-rePAYers	+	-	-
4	Immature creditor-lenders	+	+	-
5	Mature creditor-lenders	-	+	-
6	Creditor-borrowers	-	+	+

Table 2. Major accounts in the balance of payments

(A) Current Account (A1+A2+A3)	
	(A1)Goods &Services
	(A2)Income
	(A3)Current Transfers
(B) Capital & Financial Account (B1+B2)	
	(B1)Capital Account
	(B2)Financial Account
(C) Chages in Reserve Assets	
(D) Errors & Omissions	

Table 3. Descriptive statistics of real GDP per capita

Stage	Mean	Median	Max.	Min.	Std. Dev.	Skew.	Kurt.	Obs.	Jarque-Bera	Jarque-Bera's p-value
1	6115.81	3200.77	33311.65	256.79	6926.27	1.5110	4.4892	1806	854.09	0.0000
2	8194.86	5326.45	37621.50	276.91	7712.27	1.2185	3.6323	723	190.96	0.0000
3	11222.36	7165.76	67717.74	353.57	11086.91	1.8239	7.3508	688	924.10	0.0000
4	20155.91	23550.42	48873.01	518.95	11904.86	-0.1999	1.9250	253	13.87	0.0010
5	9914.07	3894.77	32817.46	563.55	10343.12	0.8531	2.2352	82	11.95	0.0025
6	8132.29	3799.64	41617.52	370.75	9814.33	1.5346	4.1995	403	182.35	0.0000
All	8566.56	4665.07	67717.74	256.79	9369.18	1.5944	5.7746	3955	4218.71	0.0000

Table 4. Steel-Dwass statistics for real GDP per capita's mean by stage

	Stage	1	2	3	4	5	6
Stage	mean	6115.812	8194.859	11222.36	20155.91	9914.067	8132.289
1	6115.812		8.984111 ***	14.10991 ***	17.3920 ***	2.7604 *	3.41411 ***
			0.0000	0.0000	0.0000	0.0640	0.00840
2	8194.859			5.4149 ***	13.3786 ***	0.3297	3.39804 ***
				0.0000	0.0000	0.9995	0.00888
3	11222.36				10.0014 ***	2.2344	7.29019 ***
					0.0000	0.2219	0.00000
4	20155.91					6.8214 ***	12.20965 ***
						0.0000	0.00000
5	9914.067						0.83155
							0.96173
6	8132.289						

Upper cell ... the Steel-Dwass statistics

Lower cell ... p-value

*** Statistically significant at the 1% level

** Statistically significant at the 5% level

* Statistically significant at the 10% level

Figure 1. Mean and median by stage

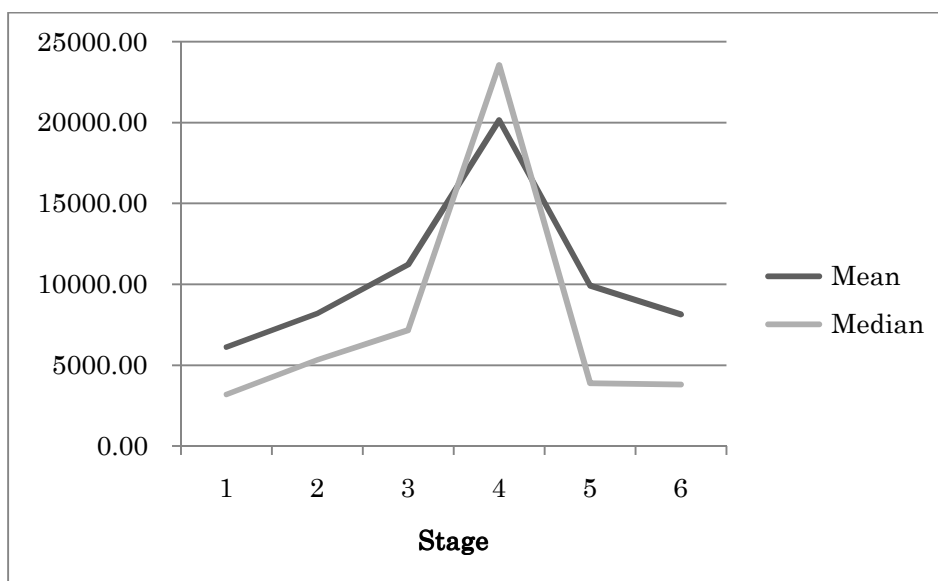


Figure 2-1. Real GDP per capita at stage 1

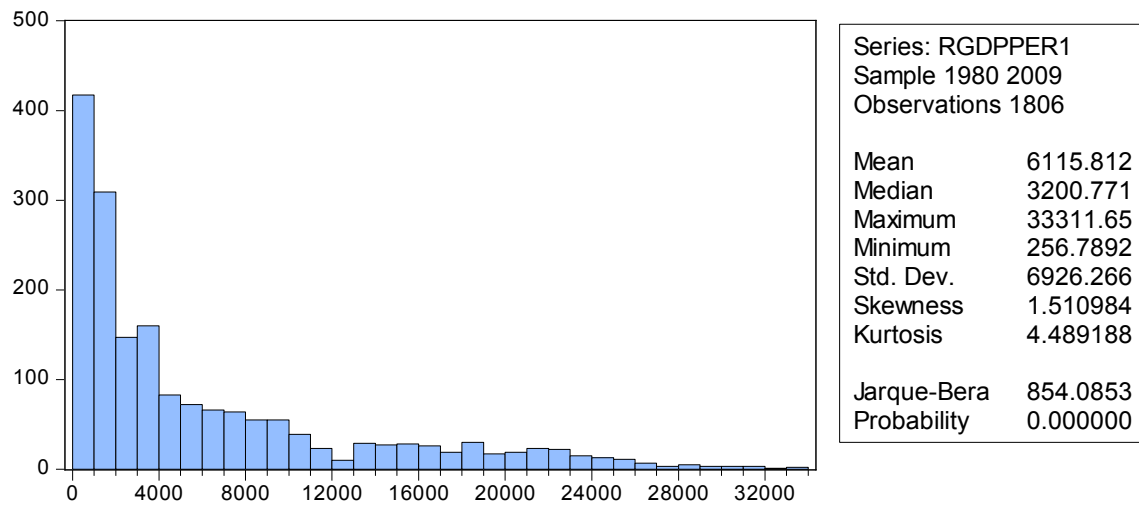


Figure 2-2. Real GDP per capita at stage 2

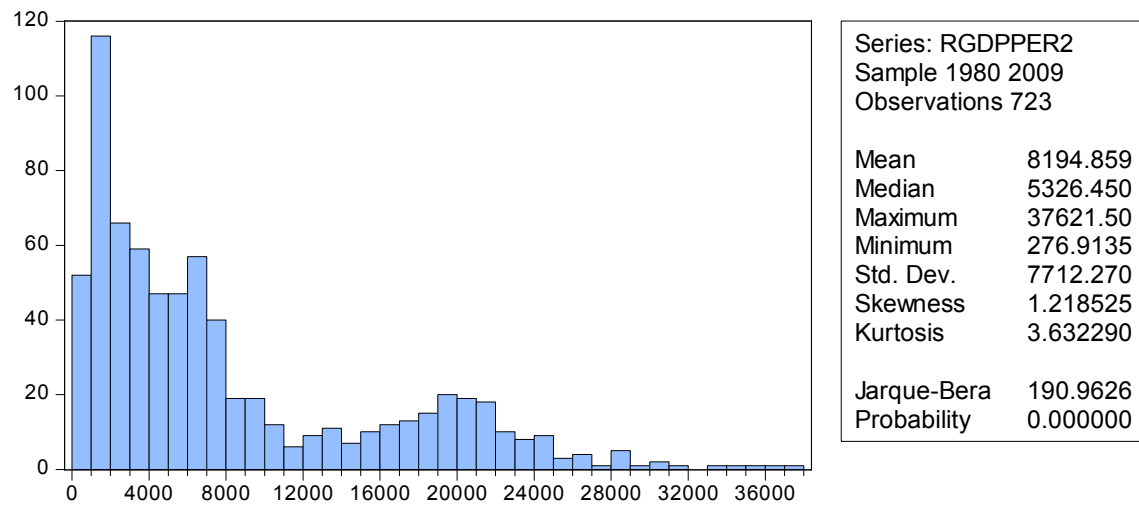


Figure 2-3. Real GDP per capita at stage 3

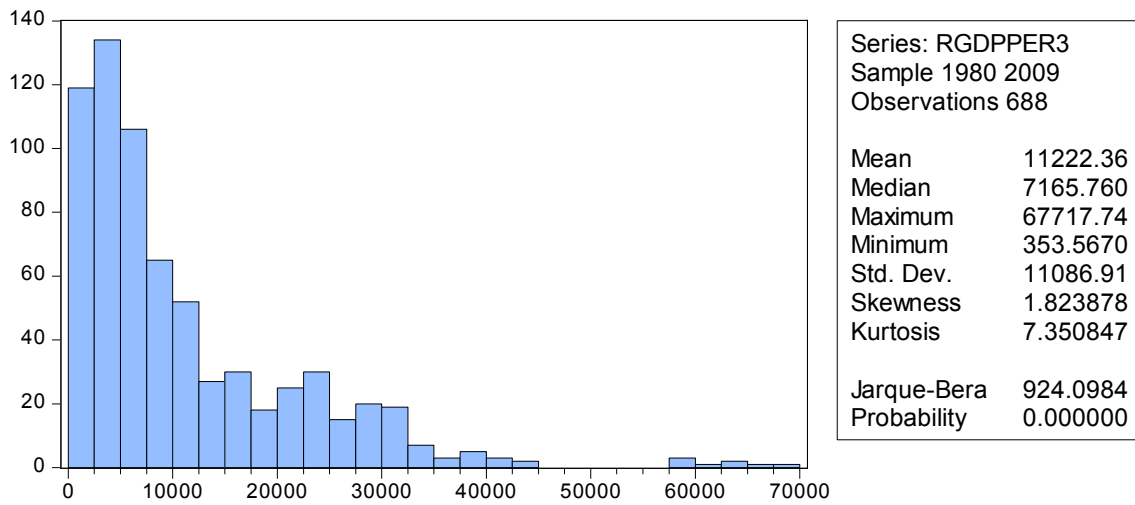


Figure 2-4. Real GDP per capita at stage 4

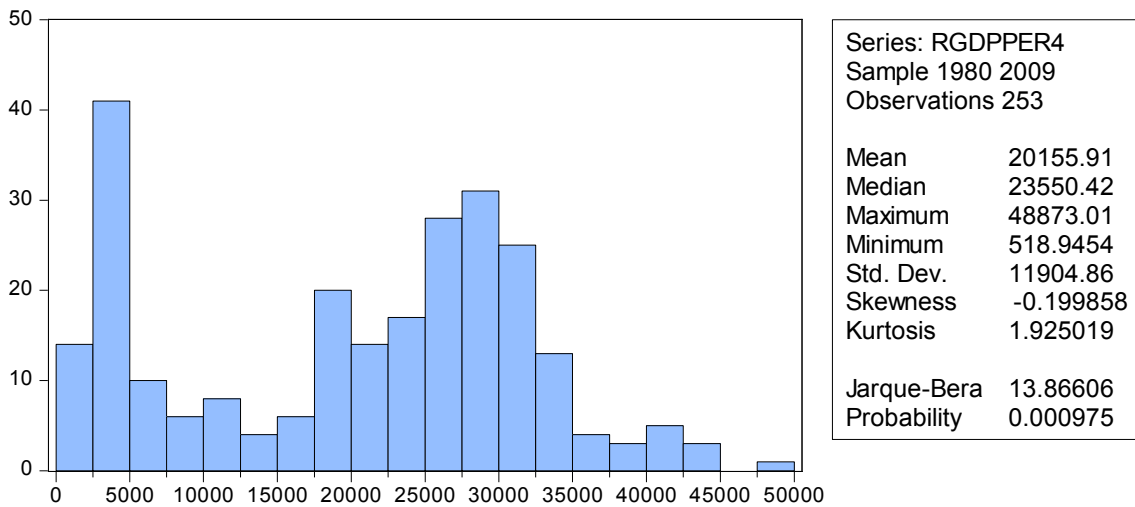


Figure 2-5. Real GDP per capita at stage 5

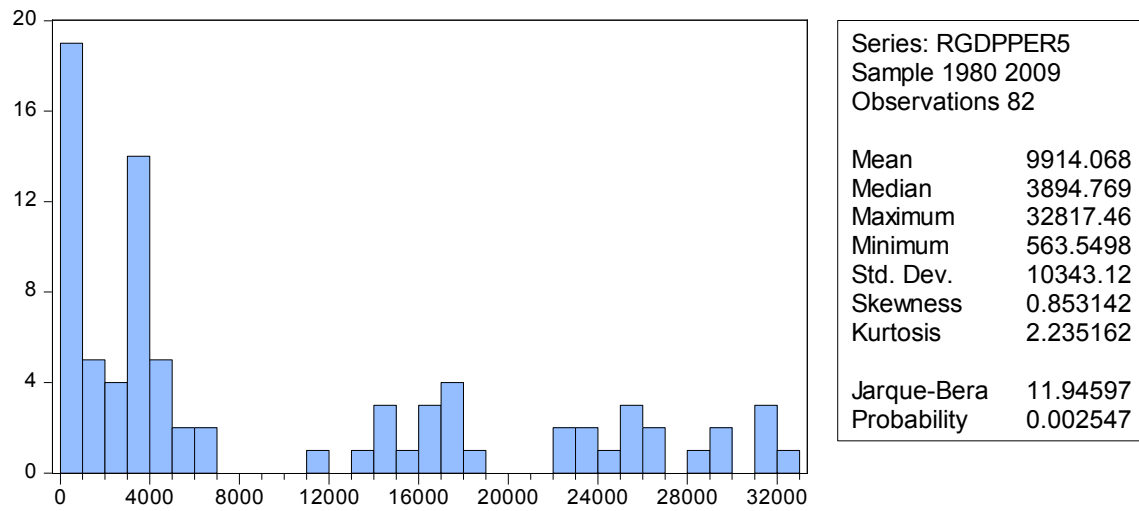


Figure 2-6. Real GDP per capita at stage 6

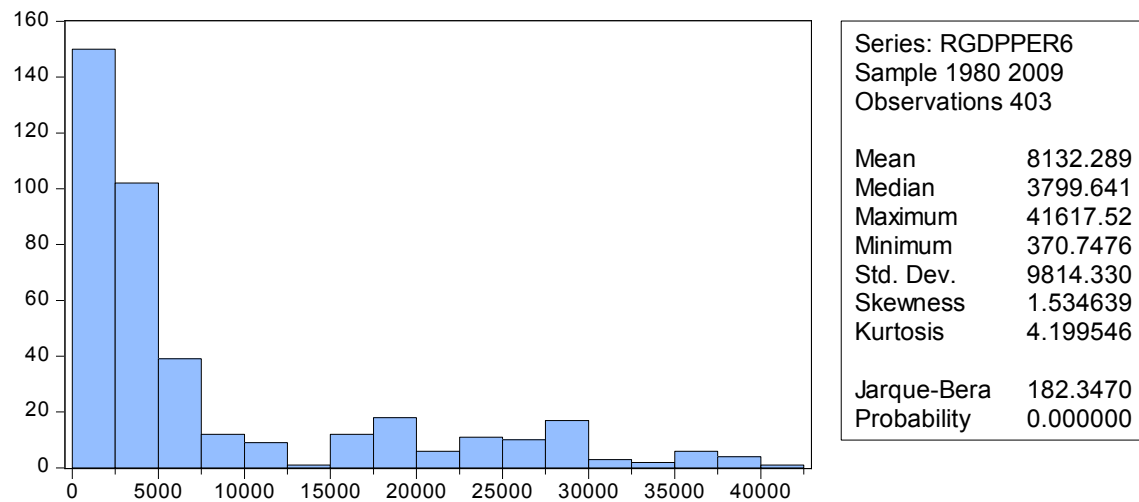


Figure 3. Stage distribution by year

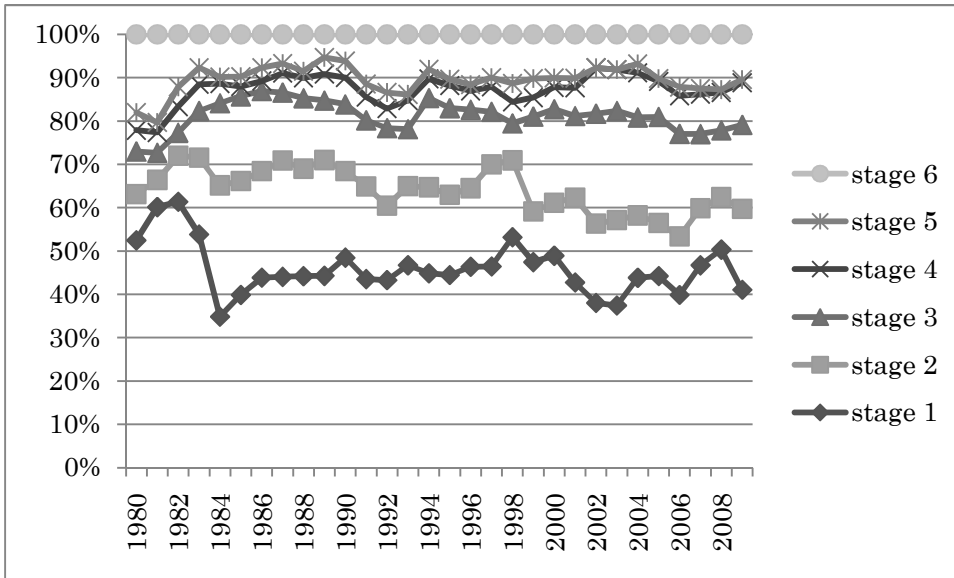


Figure 4. Stage distribution by year in 3-D.

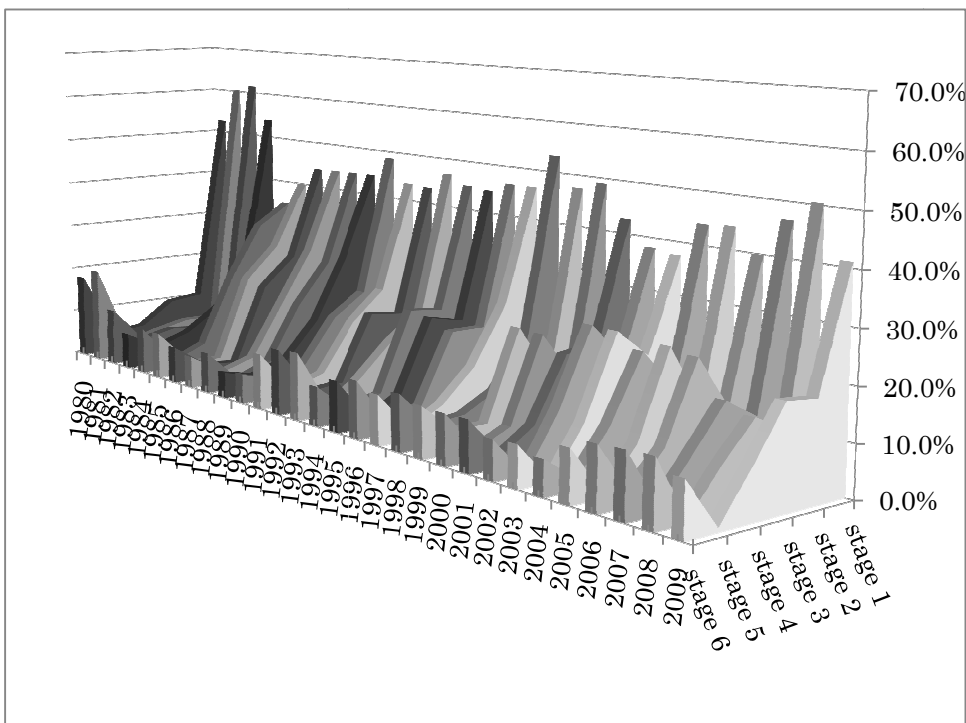


Figure 5. Descriptive statistics of stage by year

