

Impact of Workers' Remittances on the Real Effective Exchange Rate in the Former Soviet Union

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Abstract

As a result of the development of global economic integration, migrant workers' remittances have significantly increased over the last two decades. However, the impact of large international inflows including remittances on economies of recipient countries remains controversial. One of the important effects is the Dutch disease effect, in which real exchange rate overvaluation with a large flow of remittances brings de-industrialization and causes negative long-term effects on the recipient economy. We estimated the impact of workers' remittances on the real effective exchange rate (REER) in the Former Soviet Union (FSU) countries and developing countries in the world with a consistent method, based on the REER data calculated by Darvas (2012) and several other control variables that may affect the real exchange rate. Our empirical results suggest that greater workers' remittances in the FSU region do lead appreciation of the real exchange rates as well as in other developing countries.

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I. Introduction

As a result of the development of global economic integration, migrant workers' remittances have significantly increased over the last two decades. The World Bank (2012) reported that remittance flows to developing countries are estimated to reach \$406 billion in 2012, a growth of 6.5% over the previous year. These flows are expected to rise by 8% in 2013 and 10% in 2014, reaching \$534 billion in 2015. Remittances seem to play a significant role in poverty reduction. Existing empirical studies indicate some good aspects of workers' remittances. However, some studies have reported that the flows are so massive that the remittances can appreciate the real exchange rate of recipient economies, and leave the country in a similar condition to the so-called "Dutch Disease."

In addition, although lots of literature investigated the impact of large international inflows on development, very few studies have empirically estimated the impact of remittances on the real effective exchange rate, in particular in the Former Soviet Union.

The Former Soviet Union (FSU), or the post-Soviet States, is composed of 15 independent states that seceded from the Union of Soviet Socialist Republics (USSR) in its dissolution. In contrast with the Commonwealth of Independent States (CIS), the FSU includes such countries as Baltic countries and Georgia, which do not participate in the organization. In addition, our study includes Mongolia to those observation countries, as it has historically deep relations with the USSR and now sends lots of migrant workers to the Russian Federation. Turkmenistan and Uzbekistan are, however, excluded from our study, as their datasets are unbalanced (some of their data are unavailable). Overall, the countries we use in samples are: Armenia, Azerbaijan, Belarus, Estonia, Georgia,

Kazakhstan, Uzbekistan, Latvia, Lithuania, Moldova, Mongolia, Russia, Tajikistan, and Ukraine.

In this paper, we do not focus directly on whether or not the remittances hinder economic growth through the real exchange rate overvaluation. Our main focus are (i) whether migrant workers' remittances really appreciate the real effective exchange rate (REER); (ii) if they do, whether the effects of the remittances on the REER in the Former Soviet Union (FSU) are the same as that in other regions; (iii) if not, what makes the differences in the impact between the FSU and other developing countries.

The following sections are structured as follows: in the next Section II, we will briefly describe the situation of the remittances in the FSU region and discuss the Dutch Disease effect on remittances. In Section III, we will introduce our empirical model, the First-Differenced model, and describe all variables that are used in the study. Our results will be presented in Section IV, and their implications will be discussed in Section V. Finally, technical discussions such as the mathematical and econometrical ways of model building will appear in Appendices.

II. Remittances and the Real Exchange Rate

1. Description of Remittances in the Former Soviet Union

There is a large number of migrants within the FSU region, especially from/to Russia. Since the republics had been one union in the past, their common language (Russian), economic and social system, and business culture makes it easier for people to migrate

within those countries. According to the Migration and Remittances Factbook (World Bank, 2011), more than a half of the emigration from Europe and Central Asia is intra-regional and 7 of top 10 migration corridors in the region are from/to the Russian Federation (Table 1).

Table 1 Top 10 migration corridors in Europe and Central Asia

	From	To
1	<i>Russia</i>	<i>Ukraine</i>
2	<i>Ukraine</i>	<i>Russia</i>
3	Turkey	Germany
4	<i>Kazakhstan</i>	<i>Russia</i>
5	<i>Russia</i>	<i>Kazakhstan</i>
6	<i>Belarus</i>	<i>Russia</i>
7	<i>Uzbekistan</i>	<i>Russia</i>
8	<i>Azerbaijan</i>	<i>Russia</i>
9	Romania	Italy
10	Romania	Spain

Source: Migration and Remittances

Factbook 2011, World Bank

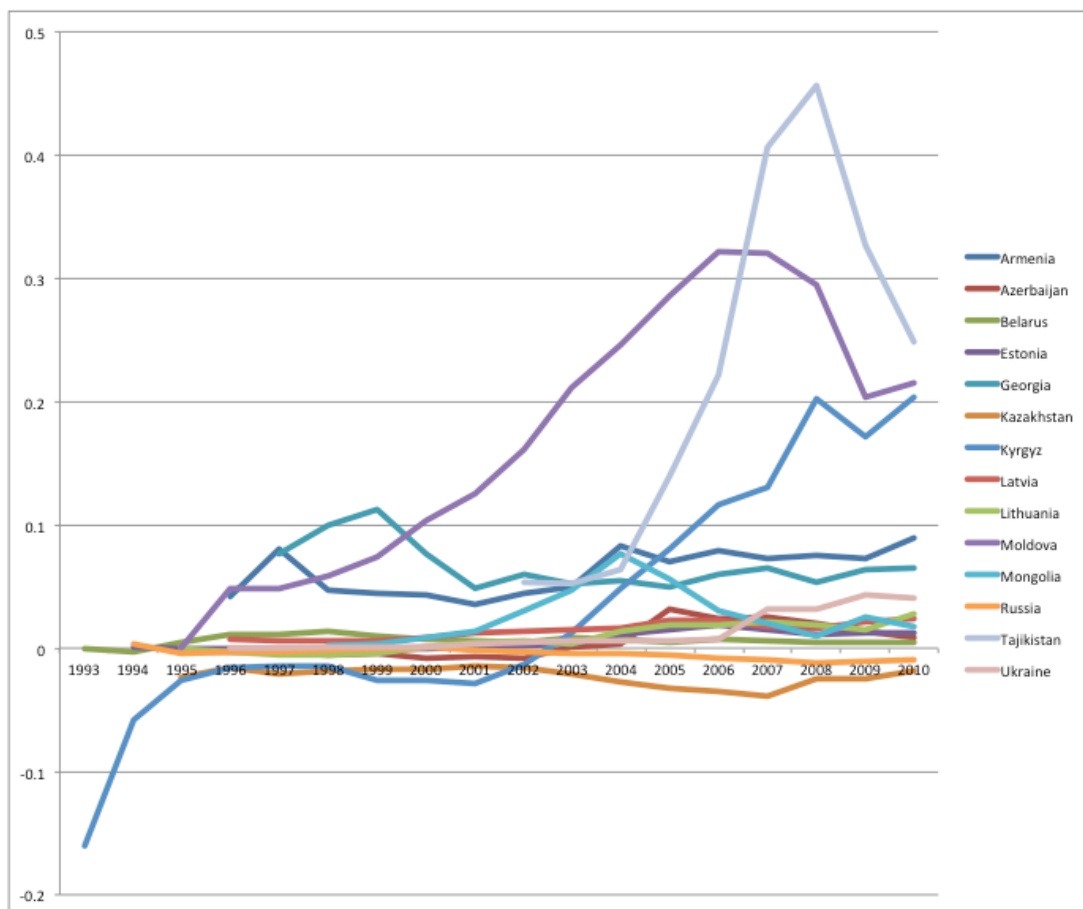
For many neighboring economies sending numerous workers to other countries, workers' remittances have become one of the most important international flows as well

as foreign direct investment (FDI) and official development assistance (ODA).

Remittances in the FSU region have significantly increased during the last decade, as Russia has experienced a rapid growth in the 2000's. Tajikistan, for example, received more than 2.5 billion dollars of remittances in 2008, which accounts for 49.3% of its GDP, while it received 78.6 million dollars in 2002, which is only 6.4 % of its GDP¹ (Figure 1).

A major difficulty in analyzing remittances within the Former Soviet Union is, as Shelburne (2011) indicates, some of their remittance data are not always reliable, since

Figure 1 Net received remittance-GDP ratio



¹ Source: own calculation using the WDI data
 Source: World Development Indicator (World Bank)

they do not cover the whole components. Even if they do, the estimates appear to be unreliable, considering other information such as population flows. However, these are not problems associated only with the CIS; the majority of remittance data of developing countries are not reliable to some extent.

2. The Impact of Remittances on Development and Dutch Disease Effect

The impact of large remittance flows on developing countries still leaves room for discussion. Many studies suggest that remittances have positive influences on recipient economies. Since they have no obligation of repayment, their effects on development are similar to the international aid. They boost capabilities of household consumption and investment, and prevent developing countries from balance-of-payments crises.

However, there are some possible factors that can hinder the economic growth of developing countries in the long run. One of the major factors is the Dutch disease effect². The Dutch Disease refers to the economic phenomenon in which a large capital inflow results in a higher wages in the domestic industries and therefore real exchange rate appreciation, causing factor reallocation and de-industrialization (a decline in production of tradable sector).

² The original theory of the Dutch Disease refers to the phenomenon in which, in a resource-rich country, an increase in the revenue of natural resource sector leads to higher wages, consumer price and exchange rate, and causes lower growth in the tradable sector such as manufacture, which leads to de-industrialization in the long term. The classic model of the Dutch Disease has been developed by Corden (1984).

In order to determine the channels in which remittances have effects on the exchange rate, we assume the FSU countries as open small economies. In a small open economy, the change of the long-term real exchange rate is explained by purchasing power parity (PPP). The theory of PPP states that the exchange rate between two countries' currencies is determined by the change of the countries' relative prices. For example, PPP predicts that a fall in a country's domestic purchasing power (an increase in the domestic price level) will be associated with a currency depreciation.

According to Corden (1984), there are three possible channels that can appreciate the countries' exchange rate. First, although a growing demand does not raise the prices of tradables, the prices of non-tradable items increase due to the demand, since they are determined in the domestic markets. This is called the "spending effect."

Second, the "resource move effect" is that the relative price change between tradable and non-tradable industries makes the latter more profitable and moves factors of production to the non-tradable sector.

Finally, there is the "income effect" that with the assumption of consumption-leisure trade-off, an increased non-labor income is likely to make households decide to reduce their labor supply, since they can now consume more goods and leisure. This reduced labor supply would raise wages and make the effects of the real exchange rate appreciation mentioned above more severe. Overall, the appreciation of the real exchange rate brings deindustrialization of the economy and therefore brings increased import and reduced export.

Real exchange rate appreciation itself, however, is not necessarily what should be

avoided. If the exchange rate rises, the negative effects of the appreciation can be mitigated in some cases. For example, if there are productivity gains in the non-tradable sector, it offsets the effects of the increasing demand. Also, if a large share of the remittances is spent for additional imports, the price effect on non-tradable goods can be limited.

Lopez et al. (2007) claims that there are a number of connected macroeconomic effects that can result from a real exchange rate appreciation through the Dutch Disease phenomenon associated to remittances flows. It may cause adverse effects on the tradable sector of the economy. Although remittance flows are likely to promote the non-tradable sector as a result of the increased domestic demand, the tradable sector would be adversely affected by the real exchange rate appreciation and lose its competitiveness in the global market.

III. Empirical Framework

1. Model

For the empirical analysis, we employ the *First-Differenced Model with no constant* that is described as follows:

$$\Delta \log(reer_{it}) = \theta \Delta x_{it} + \beta \Delta \log(remit_{it}) + \gamma \Delta \log(remit_{it}) \times fsu + \varepsilon_{it},$$

where $reer_{it}$ is the real effective exchange rate, Δ is the first difference operator

($\Delta \log(reer_t) = \log(reer_t) - \log(reer_{t-1})$) (see Annex 2 and 3 for more detailed

discussions about the model and technical problems), $remit_{it}$ is the ratio of the real effective exchange rate to country i 's GDP, x_{it} represents a set of control variables which we will discuss in short. ε_{it} is an error term. fsu is a dummy variable which takes 1 if the country is in the FSU region, and 0 otherwise. $\gamma\Delta\log(remit_{it})$ is therefore an interaction term of the remittances and the dummy variable fsu . The model follows Lopez et al. (2007), Amuedo-Dorantes and Pozo (2004) and Suzuki (2008).

Our primary focus is on the coefficient of the real effective exchange rate (REER). Since we expect that more remittances to developing countries will appreciate the REER of recipient country, we should find $\beta > 0$. However, if the remittances have no impact on the REER, then we would find $\beta = 0$. And $\beta < 0$ means that the remittances depreciate the REER, which is contrary to our expectation. The interaction term $\gamma\Delta\log(remit_{it}) \times fsu$ shows the difference in the impact of remittances on the REER between the FSU countries and other developing countries. As we expect that remittances appreciate (or depreciate) as much as in other regions, γ should be equal to zero. If we find $\gamma > 0$, remittances have more impact on the FSU region. Finally, if $\gamma < 0$, then that suggests remittances have less impact on the FSU region. Other variables such as terms of trade and trade openness are expected to capture exogenous economic shocks or peculiar economic conditions of a country, respectively.

As our interest is in the change of the exchange rate, not in its level, all of the data we use (except for the variable for productivity) are log-transformed and first-differenced, which shows the rate of change of each variable. Thus, the coefficients in the output of our

regression model indicate the rate of change in the exchange rate when adding a unit of each variable. The variables of which the minimum value is negative are transformed after added 1 (2 for net foreign assets).

2. Data and Variables

Our dataset is a panel data of 158 developing countries (14 in the FSU region) by the definition of IMF from 2000 to 2010. The details of the variables are presented below.

i. Real Effective Exchange Rate (dependent variable)

The real effective exchange rate (REER) is an index that shows the development of the real value of a country's currency against the basket of the trading partners of the country adjusted for the effects of inflation. The weights are determined by comparing the relative trade balances, in terms of one country's currency, with each other country within the index. Because the REER describes countries' purchasing power more effectively, therefore this index is widely used for diagnoses of the "Dutch Disease."

Although there were no publicly available REER data with a consistent methodology for the post-Soviet States until recently, Darvas (2012) has re-calculated and released CPI-based REER for 178 countries including these countries, mixing the real exchange

rates from several sources (see Annex 1 for the calculation method of the real effective exchange rate).

ii. Remittances (+)

This variable is the net amount of the received remittances by a country to its current GDP. This is calculated from the payment and receipt of remittances. The dataset comes from the world development indicators (WDI) of the World Bank. As we have discussed above, increasing remittances may appreciate the real exchange rate through the Dutch disease effect.

iii. Remittances in the FSU

Remittances in the FSU are an interaction term of the multiplied remittances and the variable *fsu*. The *fsu* is a dummy variable that takes 1 if the country is in the FSU region, and 0 otherwise. This variable is expected to catch the differences in the effects of remittances between those in the FSU countries and other regions. If the coefficient of this variable is positive, it means remittances cause more REER appreciation (or less depreciation) in the FSU region, and vice versa. If the coefficient is 0, remittances

appreciate (depreciate) the REER as much as in other regions.

iv. Terms of Trade (+)

Terms of trade index is calculated as the ratio of the export unit value indices to the import unit value indexes, measured relative to the base year 2000. This index comes from WDI.

The effect of the terms of trade on the exchange rate, however, is not clear. The increase in the relative price of exports to imports encourages labor flows to the export sector and thus causes REER appreciation. In addition, the additional income through trade may increase demand for non-tradables, which raises the real exchange rate.

v. Trade Openness (+/-)

Trade openness is, as in the existing literature, measured by the sum of exports and imports over country's GDP. This index is calculated based on the value-of-trade data from the international financial statistics (IFS) and GDP from the WDI.

The impact of greater trade openness on the real exchange rate depends on several factors. According to Suzuki (2008), lower trade openness may protect the domestic

industry, lead to higher prices in the internal market, and therefore appreciate the real exchange rate. On the other hand, an increase in export with greater supply of tradable goods also improves trade openness, which is often caused by real exchange rate depreciation.

vi. Productivity (+)

We employ GDP per capita growth to measure a country's productivity, anticipating that countries with higher per capita incomes experience appreciation of their currencies. The data comes from the WDI. Note that this variable for productivity is neither log-transformed nor first-differenced, as per capita GDP growth shows the rate of GDP change.

Balassa (1964) and Samuelson (1964) assume that "productivity improvement in the sectors producing traded goods to be positively correlated with the ratio of the general price index to the index of the prices of traded goods." If the prices of traded goods are roughly equal in all countries, lower labor productivity in the tradables industries of poor countries implies lower wages than abroad, lower production costs in non-tradables, and therefore lower price of non-tradable goods. Rich countries with higher labor productivity in the

tradables sector, however, will tend to have higher non-tradables prices and higher price levels. The result is that the higher prices relative to other countries will be associated with the appreciation of country's currency. This is called the *Balassa-Samuelson effect*.

vii. General Government Final Consumption Expenditure (+/-)

General government final consumption expenditure includes all government current expenditures for purchases of goods and services (including compensation of employees). It also includes most expenditure on national defense and security, but excludes government military expenditures that are part of the government capital formation.

The impact of government expenditure on the real effective exchange rate depends on how it is spent. If the government spends most of them on non-tradables, it will increase the relative price of non-tradable goods, causing real exchange rate appreciation. Therefore, countries with greater amount of government spending are also likely to experience higher currency rates.

viii. Net Foreign Assets (+)

Net foreign assets are the sum of foreign assets held by monetary authorities and

deposit money banks, less their foreign liabilities. We calculated the ratio of net foreign assets to GDP that are obtained from the WDI.

According to Obstfeld and Rogoff (1995), an increase in the net foreign assets makes households decrease their labor supply, which brings less supply of non-tradables. Therefore, that decreases the prices of non-tradable items and, in turn, most likely appreciates the real exchange rate.

ix. International Aid (+)

For the data of international aid, we employ the ratio of net received official development assistance (ODA) and official aid to country's GDP. All the data are obtained from the WDI.

International aid may also appreciate the exchange rate. Rajan and Subramanian (2005) claim that aid inflows offset beneficial effects of aid, at least to some extent, through exchange rate overvaluation. Suzuki (2008) indicates that the appreciation of the real exchange rate caused by the aid is less than that by remittance inflows.

Table 2 Expected signs of explanatory variables

Explanatory variables	Signs
Remittance	+
Remittance in the FSU	0
Terms of trade	+
Trade openness	+/-
Productivity	+
Government's consumption expenditure (cg)	+/-
Net foreign assets	+
International aid	+

IV. Estimation and Results

Our estimation results obtained by the First-Differenced Model are presented on Table 3. As for control variables, except for the remittance in the FSU countries (*fsufdlremit*), they are statistically significant at least at 10% level. Contrary to our expectation, the coefficients of the net foreign assets (*fdlnfa*) and foreign aid (*fdlaid*) are negative (significant at 1% and 5% level, respectively). Other variables follow our expectation. Note that the coefficient of the foreign aid is so small that it shows almost no correlation with the real exchange rate.

The coefficient of remittance (*fdlremit*) is 0.1825888 (statistically significant at 1% level), which means an increase in remittances by one unit brings a REER appreciation of 18.3% on average in the developing countries under study, except for the FSU region. The coefficient of remittances in the FSU countries (*fsufdlremit*) is -0.0698488, but has no statistical significance even at the level of 10%, which cannot reject the hypothesis that the impact of the remittances on the REER in the FSU is the same as those in other developing countries. This result implies the remittances in the FSU appreciate as much as in the rest of the world.

Table 3 Results

Source	SS	df	MS			
Model	1.56110121	8	.195137651	Number of obs = 819		
Residual	3.46027347	811	.004266675	F(8, 811) = 45.74		
Total	5.02137468	819	.006131105	Prob > F = 0.0000		
				R-squared = 0.3109		
				Adj R-squared = 0.3041		
				Root MSE = .06532		

fdlreer	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
fdltot	.0411594	.0246465	1.67	0.095	-.007219	.0895379
fdlopen	-.2279772	.0184579	-12.35	0.000	-.2642082	-.1917462
gdpgrowth	.2034322	.0496087	4.10	0.000	.1060555	.3008088
fdlnfa	-.1582491	.0536254	-2.95	0.003	-.2635102	-.0529881
fdlcn	.0373813	.0211258	1.77	0.077	-.0040865	.0788491
fdlaid	-.0085636	.0041481	-2.06	0.039	-.0167059	-.0004213
fdlremit	.1825888	.0156493	11.67	0.000	.1518709	.2133067
fsufdlremit	-.0698488	.0450521	-1.55	0.121	-.1582812	.0185837

Source: own calculation

V. Concluding Remarks and Policy Discussion

In this paper, we reviewed the impact of workers' remittances on the real exchange rate. Our main findings are that an increase in workers' remittances in the FSU region does contribute to real effective exchange rate appreciation, and the impact on the exchange rate in the region is approximately the same as that in other developing countries in the world. Most of the coefficients of the control variables follow our expectation. Despite our expectation, the net foreign assets have negative impacts on the REER, and there was no strong correlation between the exchange rate and foreign aid. One of the reasons of this is that our dataset contains aid loans. Suzuki (2008) suggests that the impact of foreign aid on the REER is stronger when the aid is granted to developing countries. Moreover, Shelburne and Palacin (2011) indicate there are several reasons for workers to give false declaration, which may make remittance estimates of the countries in the CIS quite unreliable and underestimated.

So what should policymakers do? Because the channels of the remittances affect the real exchange rate is similar to those of what the standard Dutch Disease does, the policies that ease the Dutch Disease effects are also applicable. First, the governments confronted with the rapidly increasing remittances should carry out the austerity budget, when the increased remittances make their economies close to overheating. The stabilization fund such that oil-exporting countries have may be effective both to keep them from economic bubbles and to stabilize the economy.

Second, our empirical results show that foreign aid appreciates the real exchange rate less than the remittances. This result is consistent with Suzuki (2008) that indicates that the

impact of foreign aid is smaller than that of remittances. In those countries where the inflow of migrants' remittances is large relative to its size of economy, policymakers should reduce the income tax that decreases the labor supply, and increase the indirect tax such as the VAT, so that that offsets decrease in the labor supply caused by the remittances.

Since the remittances in the FSU region are on the rapid increase, policymakers in the region must consider its impact. One thing that policymakers should know is, however, that the REER appreciation may cause a reallocation of the factors of production, but it does not necessarily imply lower economic growth. As we concluded above, a large inflow of remittances does appreciate the REER, and overvaluation of the real exchange rate may hinder growth in the tradable sector, but it is obvious that remittances and other large international inflows have positive effects on the country's economy. The appreciation of the REER could be rationalized as factor reallocation from the tradable sector to the non-tradable sector if the country becomes richer on the whole. Policymakers should minimize the negative Dutch Disease effect of remittances and other large international inflows, and optimize the use of those flows.

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VII. Annex

1. Calculation of the Real Effective Exchange Rate

The real effective exchange rate (REER) is calculated as³:

$$REER_t = \frac{NEER_t \cdot PI_t}{PI_t^{foreign}}, \quad NEER_t = \prod_{i=1}^N S(i)_t^{w^{(i)}}, \quad PI_t^{foreign} = \prod_{i=1}^N PI(i)_t^{w^{(i)}}$$

where $REER_t$ is the real effective exchange rate of the country against a basket of currencies of trading partners, $NEER_t$ is the geometrically weighted average of the nominal effective exchange rate between the country and its trading partner, and the PI_t is the price index of the country, $PI_t^{foreign}$ is the geometrically weighted average of the price indices of trading partners.

Although there are several indices that can be used for PI , for example the producer price index (PPI), Darvas (2012) employs the consumer price index (CPI) that is broadly available even for developing countries.

2. First-Differenced Model⁴

Panel data is a data set constructed from repeated cross sections over time. Letting i denote the cross sectional unit and t the time period, we can write a panel data model as

³ Darvas (2012)

⁴ Wooldridge (2009)

$$y_{it} = \beta x_{it} + a_i + u_{it}, \quad t = 1, 2, \dots, T$$

$$y_{it+1} = \beta x_{it+1} + a_i + u_{it+1}, \quad t = 1, 2, \dots, T$$

where a_i denotes an unobserved effect for each cross-sectional unit i (in our model, each country), and u_{it} is an error term. Because a_i is constant over time, differencing the second equation from the first, we can omit the unobserved effect.

$$\Delta y_i = \Delta \beta x_{it} + \Delta u_{it}, \quad t = 1, 2, \dots, T$$

where Δ denotes the change from t to $t+1$. The above is the *First-Differenced equation*,

whose resulting estimator $\hat{\beta}$ (*first-differenced estimator*) can be simply obtained by the

Ordinary Least Squares (OLS) method. The key assumption to apply the OLS is

$\text{Cov}(\Delta x_{it}, \Delta u_{it}) = 0$ that denotes Δu_{it} is uncorrelated with Δx_{it} . This is called the *strict*

exogeneity assumption. As long as this condition holds, the first-differenced estimator is

unbiased and consistent.

3. Log-transformation and Growth Rate

Using a theorem that $\log x - \log y = \log(x/y)$, the growth rate of x at $t+1$ is calculated as follows:

$$\Delta \log x = \log x_{t+1} - \log x_t = \log \left(\frac{x_{t+1}}{x_t} \right) = \log \left(1 + \frac{x_{t+1} - x_t}{x_t} \right)$$

If x is small enough, $\log(1 + x) \approx x$. Then, we obtain

$$\log \left(1 + \frac{x_{t+1} - x_t}{x_t} \right) \approx \frac{x_{t+1} - x_t}{x_t}$$

Because $(x_{t+1} - x_t)/x_t$ denotes the growth rate of x , this equation indicates $\Delta \log x$ is a good approximation of the growth rate of x .