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Capital flight from resource rich developing countries

Kazue Demachi
Graduate School of International Cooperation Studies, Kobe University

Abstract

This paper analyzes the magnitude and determinants of capital flight from resource-rich developing countries (RRDCs) using macro-panel data from 21 countries from 1990 to 2011. Calculations reveal that capital flight from RRDCs was less serious than that experienced by some Latin American countries during the 1980s. In addition, capital flight was more episodic than chronic during the period studied. Econometric analysis indicates a linkage between natural resource revenues and capital flight during the period. However, the linkage between inflows of new debt and capital flight is far stronger, as previous capital flight literature suggests.

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Contact: Kazue Demachi - demachi@people.kobe-u.ac.jp.
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1. Introduction

Countries richly endowed with natural resources experienced prolonged economic stagnation from the 1980s into the 1990s. Many studies have examined this paradoxical situation, called the *resource curse* (Auty 1990, Gelb and associates 1988, Karl 1997, Sachs and Warner 1995; 2001). Since 2000, however, resource-rich developing countries (RRDCs) have been experiencing an influx of foreign direct investment (FDI) into their natural resources sectors, generating higher resource revenues and rapid economic growth.

Today, RRDCs gained advantages that permit them to boost their own economies. Regardless of their rising resource revenues and GDP growth, however, large populations within RRDCs still suffer under weak governmental institutions, immature financial systems, poor public infrastructure, high unemployment and poverty (IMF 2012).

Despite the influx of resource revenues, not much capital remains inside many RRDCs because their economies have low absorption capacities. Although some resource revenues may be maintained abroad as official reserves, large quantities might be exiting those economies as capital flight. Capital flight from developing countries was extensively discussed during the 1980s Latin American debt crisis. Large quantities of capital injected into crisis-ridden countries as development assistance or new loans is believed to have "round-tripped" into foreign bank accounts as private assets (Boyce 1992, Kant 1996, Pastor 1990). In addition to Latin America, Ndikumana and Boyce (2011a) suggested a heavy incidence of capital flight from countries in Sub-Saharan Africa. A link between capital flight and foreign capital inflows also can exist in RRDCs from other regions, as they are also experiencing an influx of foreign capital in the form of natural resource revenues.

This study calculates capital outflows from RRDCs and investigates their determinants. It especially analyzes the linkage between natural resource revenues and capital flight. This paper proceeds as follows. Section 2 defines capital flight and calculates its magnitude among RRDCs. Section 3 presents the analysis of the determinants of capital flight using time-series panel data from 21 countries from 1990 to 2011. Section 4 concludes.

2. Capital flight

There are several traditional approaches to the estimation of capital flight. One widely used approach is the residual method proposed by Dornbusch (1985) and applied by Pastor (1990) and Boyce and Ndikumana (2001). The residual method defines capital flight (KF) as

$$KF = \Delta Debt + (FDI + PI)net - (\Delta Res + CA\ deficit), \quad (1)$$

where $\Delta Res, CA\ deficit$ and $\Delta Debt$ denote the increase in foreign reserves, current account deficit and changes in quantity of outstanding debt, respectively.

In the analyses of 1980s debt crisis, the underlying assumption has been that countries which are short of foreign reserves and running current account deficits are heavily indebted. That is, the current account deficit must be filled by inflows from FDI, portfolio investments or increases in international borrowing. Therefore, the setting in Equation (1) excludes the possibility of changes in foreign exchange due to a reversal of foreign reserves or a current account surplus.

However, a glance at RRDCs since 2000 reveals that they are not necessarily running current account deficits. To accommodate economic realities, the residual method is extended as

$$KF = \Delta Debt + (FDI + PI)net + \left(\Delta' \ Res + CA\ balance\right). \quad (2)$$

That is, capital flight is *symmetrically* calculated, where $\Delta' \ Res$ denotes either negative or positive changes in foreign reserves. Equation (2) does not ignore instances of current account surplus; it allows that countries may hold foreign reserves from previous boom years that are sufficient to cover their current account deficits. All data for calculation are from *Balance of Payment* statistics, except for debt data, which is from *International Debt Statistics* (IMF 2013, World Bank 2013b).

Figure 1 shows capital flight for the 21 countries estimated based on Equation (2). As shown in Table 1, the stock of capital flight for the period estimated was positive for only 9 of 21 countries. Negative estimated values could perhaps indicate reversals of foreign assets, but among RRDCs it is more likely that they imply officially unrecorded capital inflows, including inflows related to natural resource production.

The size and trend of capital flight for 1990–2011 were notably more episodic than chronic, except among countries such as Malaysia and Venezuela. Estimates up to 20% of GDP are shown for some countries, notably Azerbaijan in the late 2000s and Malaysia in 2008. Since both countries were growing relatively faster than their counterparts, their fuller integration into the global economy may explain this result.

3. Determinants of capital outflows: Panel data analysis

3.1 Data and model

This section analyzes the determinants of capital flight using time-series panel data. We arbitrarily defined RRDCs as countries whose total natural resource rents exceed 30% of GDP. Crude oil, natural gas, coal, mining and forest are included as natural resources. The selection of sampled countries is restricted by data availability, but we identified developing economies with relatively high dependence on natural resource rents using the *World Development Indicators* (2013a). The dataset is incomplete for several countries, rendering the panel unbalanced. The existence of panel unit roots is tested in advance. Based on the test results, some variables are converted to stationary series through first-differencing or conversion to the growth rate (Table 2).

The influence of movements in international resource prices on capital flight is significant for this analysis. Changes in international resource prices strongly influence RRDCs' revenues. Therefore, a correlation between changes in international resource prices and capital flight suggests that international capital inflows as resource revenues are one source of capital flight. However, movements in prices of different natural resources are closely correlated; constructing an explanatory variable using natural resource prices induces a strong cross-sectional contemporaneous correlation, which leads to inefficient estimators. Therefore, we instead use the annual change in total natural resource rent (ΔNRR) as an explanatory variable. Natural resource rent is calculated as the difference between resource prices and production cost multiplied by quantity produced. In general, higher international natural resource prices are reflected in the increase of natural resource rent.

We used the seemingly unrelated model (SUR) to circumvent the cross-sectional contemporaneous correlation (Zellner 1962, Avery 1977). We applied a fixed-effects model to this sample, but the F test failed to reject the null hypothesis that inclusion of an individual fixed effect for each country is redundant. Rejection of fixed-effects model may indicate that country-specific time-invariant characteristics are captured effectively by the included explanatory variables.

Ndikumana and Boyce (2003) suggest that there is inertia in capital flight and include lags as an explanatory variable in their model. This analysis adopts their method, and the regression model is defined as

$$KF_{i,t} = \alpha + \beta KF_{i,t-1} + \gamma \Delta NRR_{i,t} + \eta X_{i,t} + \upsilon_{i,t}. \qquad (3)$$

In Equation (3), $KF_{i,t}$ is based on the previously estimated size of capital flight. To be consistent with previous literature, capital flight is expressed in the regression as the share of merchandize exports (KF1). Alternatively, capital flight is measured as a first difference of its share of GDP (KF2). In the latter case, its coefficient should be interpreted as the degree of acceleration in capital flight. *NRR* is the total share of natural resource rent in GDP. *X* is a vector of control variables explained below and $\upsilon_{i,t}$ is the error term. Explanatory variables such as *NRR* and those included in *X* are assumed to be exogenous to capital flight.

3.2 Control variables

Our selection of control variables parallels previous capital flight literature. Table 4 presents the detailed definitions and data sources. Public debt flow has been the primary focus of previous studies. However, as a result of accelerated globalization in recent years, the private sector of RRDCs can be also integrated into the global financial market. If new capital inflows via foreign borrowing induce and accelerate capital flight, as suggested by Dornbusch (1985), Cuddington (1987), Pastor (1990) and Boyce (1992), an increase in not only public but also private debt flow generates an increase in capital flight. Therefore, we used annual growth rate of total sovereign and private sector debt, including short-term debt as [DEBT].

Other control variables are the inflation rate [INFLATION] and FDI inflows [FDI]. A higher inflation rate is said to prompt capital flight because it means lower real interest rates in the host economy. During the period studied, extensive FDI was directed into RRDCs' natural resource sectors (World Economic Forum et al. 2011). Even though investment in RRDCs generally increases regardless of their political and economic risks, some RRDCs have attracted FDI by improving their investment climate. In that case, FDI inflow will be associated with less capital flight.

In some regressions, each country's crude oil rent share [OILRENTS] is included to capture the special characteristics of oil-producing countries, which tend to encounter more serious economic, political and social problems. In their cases, the natural resource curse is sometimes renamed the *oil curse* (Ross 2012).

Previous estimations suggest that capital flight from resource-rich African countries such as Nigeria is distinctively large (Boyce and Ndikumana 2001, Ndikumana and Boyce 2003, 2011a, 2011b, Schneider 2003). The World Bank's report in 1993 suggests that capital flight from Africa is worse than that from Latin America (World Bank 1993:24). *World Financial Markets* issued by Morgan Guaranty Trust Company lists Nigeria alongside South Africa among 18 countries suffering the worst capital flight (Morgan Guaranty Trust Company

1986:13). To explore this premise, we include an Africa dummy [SSA] for countries in Sub-Saharan Africa. Summary statistics of the dependent and explanatory variables are shown in Table 3.

3.3 Results

Tables 5 and 6 show the regression results of the SUR model. The lag term of KF is large and statistically significant in each estimation. This finding can be interpreted as the inertia of capital flight, but it also can result from a weak serial correlation in KF, even though existence of the unit-root process is rejected by tests.

ΔNRR is not statistically significant in the regression when KF is measured as share of merchandize exports; however, the coefficient of OILRENT is significant. On the other hand, when KF is measured as a first difference of GDP share, ΔNRR has a positive sign, suggesting an increase in NRR results in accelerated capital flight. These combined results declare a good reason to perceive a linkage between resource revenues and capital flight.

DEBT has positive and significant effects on capital flight in both KF measures. This finding suggests that longstanding assertions in the literature were valid for RRDCs during the sampled period—i.e. that borrowed money makes a round-trip into foreign accounts or assets. In fact, the coefficient is far larger than that of ΔNRR.

The coefficient of FDI is statistically significant and negative in every estimation, suggesting that FDI inflows are associated with reduction in capital flight. This finding may suggest that people living in economies sufficiently sound to attract FDI feel no need to move private assets abroad.

Contrary to suppositions in previous literature, INFLATION has a negative sign, but its coefficients are not statistically significant.

The dummy for Sub-Saharan Africa bears a negative sign in the capital flight estimation, but it is statistically significant only when KF is measured as a share of merchandize exports. The coefficient turns positive and insignificant when KF is measured otherwise. This finding is weakly contradictory to the suggestion in previous studies that capital flight from Africa is more serious than from other regions.

4. Conclusion

Estimating capital flight from RRDCs using the extended residual method, this study has suggested that, unlike the 1980s, capital flight from 21 countries during 1990–2011 was more episodic than chronic. Regression results showed that an increase in NRR, that is, increase in natural resource revenue leads to more capital flight. Since NRR in share of GDP denotes the degree of resource dependence for an economy, this result can be also understood that greater dependence on natural resources leads to accelerated capital flight. This finding partly explains why resource-rich countries experience the “resource curse” of economic and social stagnation. However, findings here also suggest that a linkage between foreign debt inflows and capital flight continues to exist, and its effect on capital flight is far stronger than the effect of changes in natural resource revenues. Further analysis into RRDCs’ effective use and reallocation of natural resource revenues is required for future scholarship.

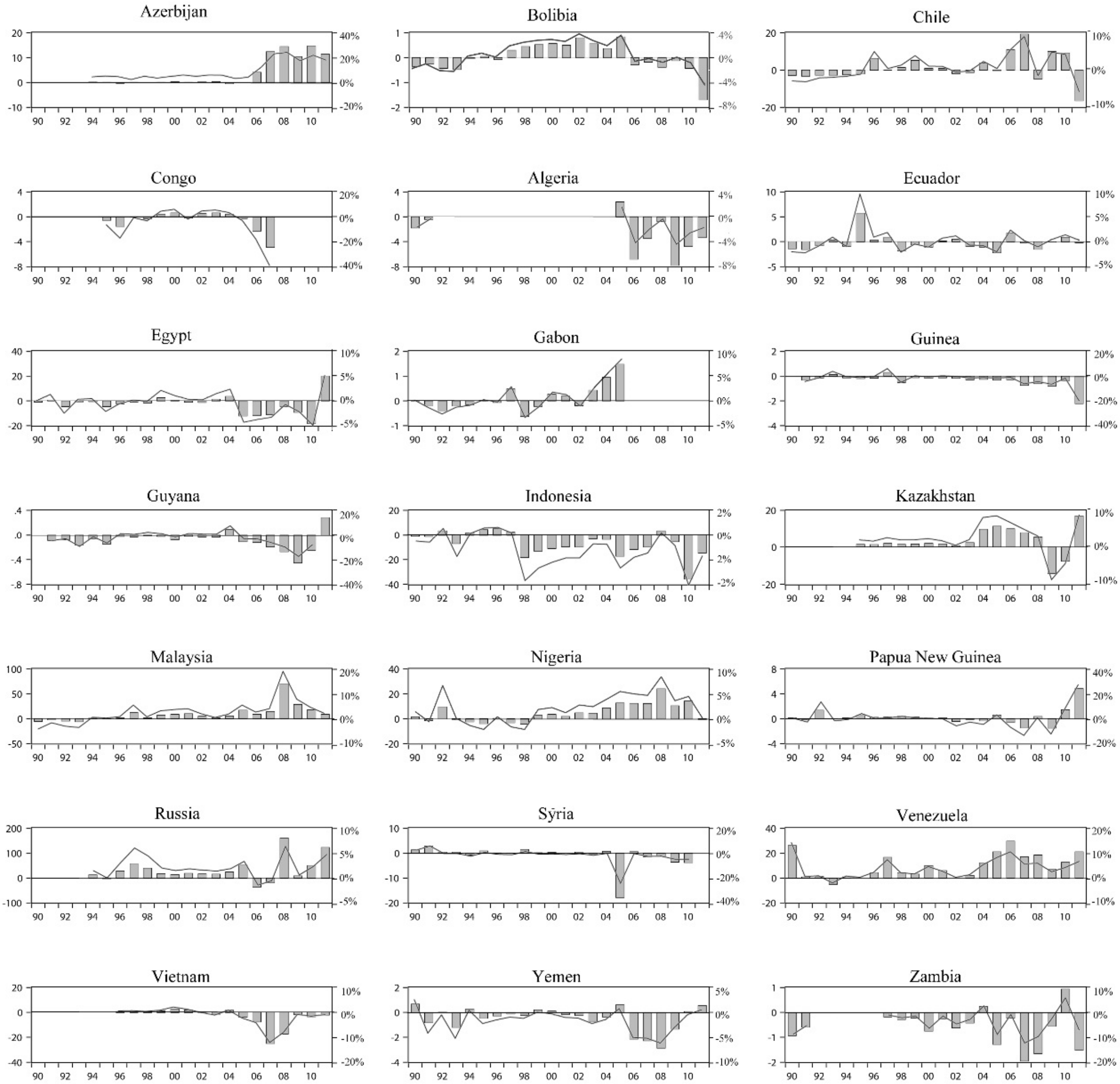

Figure 1. Estimated capital flight

Note: In Billion US dollars (bars, left scale) and share of GDP (line, right scale).

Table 1. Stock of Capital Flight during the sample period

Country	Capital Flight	Calculated period
Azerbaijan	67.51	1993-2011
Bolivia	-0.20	1990-2011
Chile	26.30	1990-2011
Congo	-7.58	1995-2007
Algeria	-28.97	1990-1991 2005-2011
Ecuador	-5.47	1990-2011
Egypt	-59.14	1990-2011
Gabon	1.68	1990-2005
Guinea	-7.72	1991-2011
Guyana	-1.87	1991-2011
Indonesia	-154.25	1990-2011
Kazakhstan	54.30	1995-2011
Malaysia	201.95	1990-2011
Nigeria	107.93	1990-2011
Papua New Guinea	6.44	1990-2011
Russia	576.25	1994-2011
Syria	-17.51	1990-2010
Venezuela	202.64	1990-2011
Vietnam	-53.17	1996-2011
Yemen	-10.77	1990-2011
Zambia	-10.48	1990-1991 1997-2011
Total of 21 countries	887.88	

Note. In billion dollars (constant US$ 2005).

Table 2. Panel unit root test results

Series	Definition	Common unit root	Individual unit root		Intercept/trend
		LLC	ADF	PP	
KF1	Share of merchandize export	-2.395***	89.814 ***	137.754***	Individual intercept
KF2	Share of GDP	-0.143	67.994***	130.452***	Individual intercept
	First difference of GDP share	-2.934***	177.905***	663.949***	No intercept no trend
NRR	GDP share	-3.583***	63.149**	57.3424	Individual intercept and trend
	First difference of GDP share	-14.770***	235.701***	350.408***	No intercept no trend
DEBT	Growth rate (log difference)	-11.871***	208.590***	283.755***	No intercept no trend
FDI	GDP share	-4.032***	78.516***	97.506***	Individual intercept
INFLATION	Annual rate	-9.830 ***	155.748***	160.897***	No intercept no trend
OILRENTS	GDP share	-4.036***	66.151***	65.820***	Individual intercept and trend

Note. Lag lengths are set to 1 for all tests.
LLC, ADF, PP denote Levin, Lin and Chu t test, Augmented Dickey-Fuller Fisher Chi-square test, Philippe-Peron Fisher Chi-square test, respectively. ** and *** denotes 5% and 1% level significance.

Table 3. Summary statistics of the panel data

	Observations	Mean	Standard deviation	Maximum	Minimum
KF1	419	0.013	0.331	1.275	-1.994
KF2	398	0.001	0.120	0.608	-0.641
ΔNRR	461	0.034	0.164	0.767	-0.796
DEBT	434	0.023	0.273	3.878	-1.259
FDI	461	0.046	0.062	0.522	0.000
INFLATION	457	0.386	1.673	15.467	-0.235
OILRENTS	457	16.646	16.299	75.708	0.000
SSA (dummy)	462	0.190	0.393	1.000	0.000

Table 4. Data and sources used for estimation

Data	Definition	Source
NRR	Total natural resource rent, share in GDP.	WDI
Merchandize Export	Current US$.	WDI
GDP	Current US$.	WDI
DEBT	External debt stocks, total.	IDS
FDI	Foreign direct investment, net inflows in reporting economy.	WDI
INFRATION	Inflation, consumer prices, annual rate.	WDI
OILRENTS	Crude oil rent share in GDP.	WDI

Note: IDS: International Debt Statistics (World Bank 2013a)
WDI: International Debt Statistics (World Bank 2013b)

Table 5. Determinants of capital flight (KF1)

	SUR Model				
	(1)	(2)	(3)	(4)	(5)
Dep. Var:	KF1	KF1	KF1	KF1	KF1
C	0.04254 (0.0105)**	0.04089 (0.0106)**	0.04072 (0.0106)**	0.05049 (0.0109)**	0.02062 -0.0108
KF1(-1)	0.41017 (0.0437)**	0.40277 (0.0443)**	0.39989 (0.0439)**	0.39223 (0.0444)**	0.36409 (0.0452)**
DEBT	0.28037 (0.0362)**	0.27957 (0.0359)**	0.27511 (0.0375)**	0.27029 (0.0374)**	0.27201 (0.0409)**
FDI	-0.87349 (0.1149)**	-0.87146 (0.1147)**	-0.90517 (0.1162)**	-0.92423 (0.1223)**	-1.01473 (0.1279)**
INFLATION		0.01164 (0.0301)	-0.00320 (0.0307)	0.00224 (0.0315)	-0.01309 (0.0290)
ΔNRR			0.12938 (0.0569)*	0.12163 (0.0556)*	0.06815 -0.059
SSA				-0.04374 (0.0197)*	-0.06556 (0.0208)**
OILRENTS					0.00308 (0.0006)**
Observations:	411	410	410	410	407
R-squared:	0.4662	0.463	0.4644	0.4514	0.4926

Note: Standard errors in parenthesis.
** and *** denote 5% and 1% level significance, respectively.

Table 6. Determinants of capital flight (KF2)

	SUR Model				
	(1)	(2)	(3)	(4)	(5)
Dep. Var:	KF2	KF2	KF2	KF2	KF2
C	0.00709 (0.0034)*	0.00796 (0.0038)*	0.00791 -0.0041	0.00544 -0.0043	0.00014 -0.0053
KF2(-1)	-0.40719 (0.0447)**	-0.42376 (0.0451)**	-0.41649 (0.0436)**	-0.41767 (0.0435)**	-0.43649 (0.0456)**
DEBT	0.15057 (0.0154)**	0.14492 (0.0157)**	0.14175 (0.0165)**	0.14749 (0.0168)**	0.10649 (0.0178)**
FDI	-0.12986 (0.0492)**	-0.13153 (0.0487)**	-0.14579 (0.0477)**	-0.1279 (0.0487)**	-0.09978 -0.052
INFLATION		-0.01068 (0.0119)	-0.01324 (0.0116)	-0.01108 (0.0117)	-0.01183 (0.0111)
ΔNRR			0.06407 (0.0150)**	0.06258 (0.0151)**	0.06383 (0.0158)**
SSA				0.01254 -0.0067	0.00663 -0.007
OILRENTS					0.00032 -0.0002
Observations:	375	374	374	374	370
R-squared:	0.3908	0.3784	0.4066	0.4143	0.3637

Note: Standard errors in parenthesis.
** and *** denote 5% and 1% level significance, respectively.

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