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Working Paper 09/108
May 2009

Economics Working Paper Series

Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

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May 7, 2009

Abstract

This paper examines the impact of oil on economic growth in transition economies of the former Soviet Union (FSU) and Central and Eastern Europe (CEE). We use oil production and reserves data in a series of panel estimations to show that oil has had strong and robust positive growth effects between 1990-2006. This is confirmed when we consider the different oil ownership structures. Additionally, we find that privatization levels have had positive growth effects, while privatization speed has had negative effects on growth.

Keywords: oil, resource curse, economic growth, transition countries, oil ownership
JEL classification: Q32, O40, O13, P28

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1 Introduction

The apparent paradox that natural resource abundance leads to lower growth performance has sparked much research into the so-called resource curse (see Sachs and Warner, 1995). The issue is not confined to the realm of economics: in political science, as well, there have been numerous studies on the influence of natural resources on institutional quality and political stability (see Rosser, 2006 for an overview). Recent contributions from both fields have pointed to the particularly strong negative economic and political impacts of mineral resource abundance, especially oil.

It is therefore not surprising that the interest in oil and development has extended to the transition economies of Central and Eastern Europe (CEE) and the former Soviet Union (FSU).[1] Several transition economies, particularly some of the newly independent nations of the FSU, possess sizeable oil and gas reserves. The Russian Federation, Azerbaijan, Kazakhstan, Turkmenistan, and Uzbekistan are part of the Caspian Sea Basin, which is estimated to hold the largest oil and gas deposits outside the Persian Gulf.[2] According to one recent study, these countries together constitute "the most important – and fastest-growing [in terms of oil supply] – oil-producing region outside OPEC" (Ahrend and Tompson, 2006, p. 5).

After a large decline through the mid-1990s, all oil-producing FSU countries have seen very high recent growth rates: according to the most recent estimates by the European Bank for Reconstruction and Development (EBRD), the largest oil producer in the region, Russia, still had a GDP growth rate of 8% during the first half of 2008. The other oil producing FSU countries have had similar or even higher recent growth rates, with Azerbaijan reaching a record 30.5% growth in real GDP in 2006. This raises the question of whether oil can help us explain the growth performance of transition economies, and whether its contribution to growth has – on average – been positive or negative.

The fact that all countries of the FSU and CEE started on their transition paths at more or less the same time, and with very similar initial socio-economic conditions, makes the analysis of the influence of oil abundance on growth

[1] The term "transition" countries or economies commonly refers to countries that are (or were) in the process of transforming their economic (and political) systems from a socialist centrally-planned economy to a more open and market-based one. Here, we concentrate on the more recent transition countries of CEE and the FSU, plus Mongolia, without considering China, the East Asian and other transition countries.

[2] The Caspian Sea Basin also includes Iran. There is still some degree of uncertainty over the exact dimension of the reserves in the region, see e.g., von Hirschhausen and Engerer (1999) and Ahrend and Tompson (2006).

particularly appealing. Once we have controlled for other economic and political factors, we should be able to isolate the effect of oil with more precision than is usually possible in larger and more heterogeneous country samples.

The present paper focuses on answering this question by examining the determinants of growth since the start of transition in 27 countries from 1990-2006 in a series of empirical estimations. The results show that on average oil abundance, measured in terms of production or reserves, has unequivocally increased economic growth, even after considering many other plausible factors. With other words, there is no sign of an oil curse so far. On the contrary, the exploitation of their mineral resources seems to have helped the resource-rich countries in their recovery from the transition shock.

Moreover, the analysis also offers a first attempt at differentiating the growth effects of oil based on the resource's ownership structure. The findings show that fully state-owned oil sectors seem to have contributed most positively to growth, followed by domestic private ownership of oil. However, the small number of oil states in the sample and the limited variation in ownership strategies caution against generalising this result.

A further conclusion regards the debate on privatization (or liberalization) speeds: by separating privatization levels from privatization speed, we show that the overall level has had positive growth effects, while higher speed (in the style of "shock therapy") has dampened growth. Finally, after more than a decade of transition, only a few measures of initial conditions still have an effect on economic performance.

The paper is organised as follows: Section 2 provides a literature overview; Section 3 presents the data and methodology; Section 4 shows the estimation results; and Section 5 closes with a discussion of the results.

2 Literature review

This paper draws on two strands of literature: the first regards the resource curse, while the second looks at growth and development in transition economies. Only a handful of studies so far explicitly include the former issue in the treatment of the latter.

The resource curse literature has been greatly influenced by the research of Sachs and Warner (1995, 1999), who popularized primary resource exports over GDP as a measure of resource wealth. The contributions since then have been too numerous to list in detail here; for a critical discussion and more extensive literature overview, see Brunnschweiler and Bulte (2008a,b). Several studies have not only differentiated resources based on their geographical concentra-

tion and easier appropriability – so-called point resources – but have stressed the particularly deleterious effects of petroleum, describing the long-term corruptive influence of plentiful oil rents on institutional quality and growth (e.g., Karl, 1997; Sala-i-Martin and Subramanian, 2003), and on institutional quality, political stability and armed conflict (e.g., Ross, 2001, 2006; Fearon, 2005).[3]

The performance of transition countries has been a similarly popular research topic in the last years. Although the transition of China and Vietnam had already featured in scholarly debates, the fall of the Iron Curtain and the dissolution of the Soviet Union was an unprecedented event not only for political scientists and historians, but also for economists. The sheer size of the task of simultaneously transforming so many formerly centrally-planned economies into market-based systems, and building the supporting institutional (and social) structures – often practically from scratch – has prompted countless contributions on the merits of one transition strategy versus another, and the determinants of successful post-transition growth.

One of the earliest studies to evaluate the determinants of post-transition economic perfomance was provided by De Melo et al. (1996), who introduced a widely used index of liberalization to measure reform progress. Subsequent work includes De Melo et al. (1997) and Krueger and Ciolko (1998), who concentrate on the importance of initial conditions such as pre-transition macroeconomic distortions for explaining growth performance; Heybey and Murrell (1999), who first distinguish between the effects of liberalization (or privatization) *speed* and *level*; Havrylyshyn and van Rooden (2003), who concentrate on the importance of institutions and the policies that emerge. Most recently, Godoy and Stiglitz (2006) have re-evaluated previous findings to conclude that initial conditions are no longer determining factors in economic performance, and that "shock therapy" (fast-liberalizing) countries have grown more slowly in the first ten years of transition. Thorough literature overviews are given by Guriev and Ickes (2000), who focus on the microeconomic factors influencing growth in CEE and FSU countries, and Campos and Coricelli (2002). The latter are also among the few authors to emphasize the importance of financial (credit) markets for a successful transition.

The role of resource wealth has been considered in several studies on the economic performance of transition countries. De Melo et al. (1997) were the first to include a simple qualitative measure of natural resource abundance in their estimations of the determinants of growth, inflation and liberalization

[3]There are of course also dissident views: see Brunnschweiler (2008), Brunnschweiler and Bulte (2008), and Alexeev and Conrad (2009) on oil and growth, and Smith (2004) and Brunnschweiler and Bulte (2009) on oil and civil war.

in the transition economies of CEE, the FSU and East Asia. They classified the countries in the sample as resource-poor, moderately or highly resource-abundant, and included this measure in one of their principal-components clusters of initial conditions. The results indicate that resource abundance had (weak) positive growth effects, although it is difficult to pinpoint the influence of natural resources in the cluster. Several studies have since used a similar approach, including Berg et al. (1999) and Fischer and Sahay (2000). Gylfason (2000) uses the share of natural capital in total wealth to measure natural resource abundance and finds that resource-abundant transition countries have seen lower income growth and development progress than their resource-poor counterparts. Kronenberg (2004) takes the share of primary exports in total exports to arrive at a similar conclusion.

Given the presence of several mineral fuel-abundant countries in the group of recent transition countries from CEE and the FSU,[4] it isn't surprising that some studies have focused on the influence of oil (and gas) on economic performance. Esanov et al. (2001) argue that resource rents have allowed the fuel mineral-rich FSU countries to postpone real reform efforts. Ahrend (2002) examines the case of Russia and finds that resource abundance – proxied by oil, gas and coal production – had a positive impact on the economic performance of Russian regions during the first few years of transition.

Finally, it is worth mentioning the contributions of Jones Luong and Weinthal (2001, 2009), who focus on the oil (and gas) ownership structures in mineral-rich FSU countries. They draw some conclusions on the fiscal policy outcomes under the different ownership structures, without however extending their predictions to overall economic performance (see the following section for a more detailed discussion).

3 Data description and methodology

Our primary interest lies in determining whether the oil-rich transition countries have fared better or worse in terms of economic growth than their oil-poor counterparts. We concentrate on the countries of Central and Eastern Europe (CEE) – including some former Yugoslav republics technically in Southeastern Europe – and the newly independent states of the Former Soviet Union (FSU). We have also collected data on Mongolia, which – though nominally independent – was a socialist country very closely tied to the Soviet Union, and began its transition process during the same timeframe. This gives us a sample of 15 FSU

[4] For an overview of the oil and gas sectors in the FSU, see von Hirschhausen and Engerer (1999) and Ahrend and Tompson (2006).

and 11 CEE countries plus Mongolia, for a total of 27 transition countries, all of which started their economic and political transitions within a limited period between 1990-1992.[5]

All these countries had a common experience of socialist rule over many decades, and faced similar challenges at the start of their transition, including the huge task of transforming their economies from planned into market-based systems. In addition, many countries also found themselves as newly independent states, with no or only limited political experience in independent policy-making in living memory. Moreover, because they started their transition within a couple of years of each other, we can also say that the external political and economic environment was much the same for all.[6] These similar initial conditions therefore allow us to effectively control for many factors which may possibly influence economic performance, giving us a unique chance of isolating the effects of oil wealth.

On the downside, it is also clear that the observation period from 1990-2006 is necessarily short, ranging from a minimum of 9 to a maximum of 17 yearly observations (depending on the start of transition and data availability), which limits the options for empirical work. In particular, we will follow most of the literature on transition economies and perform panel estimations with yearly data.[7]

Since all initial conditions variables and several other covariates are time-invariant, we concentrate on results using random effects estimations. However, our main conclusions remain valid using fixed effects estimation (results are shown in the Appendix).

The dependent variable is (log) yearly per capita GDP growth (G), estimated with income data from the TransMonee database. We regress this on

[5]The countries included and the start of their transition are: FSU (1992): Armenia, Azerbaijan, Belarus, Estonia, Georgia, Kazakhstan, Kyrgyzstan, Latvia, Lithuania, Moldova, Russian Federation, Tajistikan, Turkmenistan, Ukraine, Uzbekistan; CEE: Albania (1991), Bosnia and Herzegovina (1992), Bulgaria (1991), Croatia (1990), Czech Republic (1991), Hungary (1990), Macedonia (1990), Poland (1990), Romania (1991), Slovakia (1991), Slovenia (1990); and Mongolia (1990).

[6]This point is not to be discounted, given the importance of international financial organizations such as the International Monetary Fund and the European Bank for Reconstruction and Development in shaping transition policies.

[7]Some early studies resorted to cross-country OLS estimations, with mixed success. Our own OLS estimations for the period since the start of transition gave only weak results (see Appendix, Table B). It is conventional in growth empirics using panel data to perform estimations with five or ten-year averages, in order to eliminate cyclical fluctuations. However, using five or even three-year averages radically reduced the number of observations in our sample, rendering statistical inference meaningless. Instead, we try to control for major common cyclical shocks during our short time period, see below.

several independent variables according to the following equation:[8]

$$G_{it} = \alpha_1 + \alpha_2 oil_{it} + \alpha_3 X_{it} + \alpha_4 IC_{it} + \omega_{it}. \quad (1)$$

oil denotes our measure of oil wealth in country i in period t. We use both a flow and a stock measure, namely oil production (*oilprodpc*) and oil reserves (*oilrespc*), dividing them by population in order to have relative indicators. Oil reserves are better able to capture the concept of oil abundance, while oil production is also subject to other factors such as market price fluctuations, extraction and delivery disruptions, and seasonal influences in the more inhospitable regions.[9] Both measures may be influenced by technology levels; however, because of these countries' common legacies – including very high education levels – it is reasonable to say that if there is indeed an endogeneity issue, the bias will be equal across the sample and therefore not drive our results.[10] The data are based on the BP oil and gas database and cross-checked with the U.S. Energy Information Agency (EIA) database for consistency.[11]

The sample contains six countries that produce a substantial amount of oil. Five of them are FSU countries, namely Azerbaijan, Kazakhstan, Russia, Turkmenistan, and Uzbekistan. The sixth one, Romania, is part of the CEE group of countries. The largest producer in both relative and absolute terms is Russia, which at the end of the period (in 2006) had nearly 80 billion barrels in proven oil reserves and was producing nearly 9.8 million barrels of oil per day; followed by Kazakhstan with nearly 40 billion barrels in reserves and over 1.4 million barrels in daily production; Azerbaijan (7 billion barrels reserves, over 650 thousand daily production); Turkmenistan (600 million barrels reserves, around 186 thousand barrels daily production); Uzbekistan (nearly 600 million barrels reserves, 125 thousand production); and Romania (over 470 million barrels reserves, 104 thousand production).

[8] The main results employ same-year variables to maximize the sample size. In robustness tests, we also used explanatory variables lagged by one to five years. Despite the smaller sample sizes, the principal findings – particularly on the sign and significance of the oil variables – remained unchanged (available upon request).

[9] In additional robustness tests (see below) we also use net per capita oil exports, as well as the ratio of oil exports over total merchandise exports and over GDP (measures of oil dependence). We present results for oil reserves and production because in our view they come closer to capturing oil *abundance* or *wealth*.

[10] It is worth noting that civil conflict is also not likely to have influenced oil extraction substantially in any of these oil producing countries: Azerbaijan and Russia both saw conflict during this period, but the conflict areas were not close to major oil fields.

[11] The EIA database is more detailed than the BP database; however, the EIA data include information on oil refinery and related production, as well as minimal amounts of oil, while the BP data concentrate on major oil producers and are therefore more useful for our purpose.

X is a vector of covariates that includes (log) inflation, (log) population, the average privatization level (*privat*) and speed (*privatspeed*), a measure of banking reform (*bankref*), investment (*inv*), and an economic shock measure. We distinguish between privatization level and speed (following Heybey and Murrell, 1999; Berg et al., 1999; and Godoy and Stiglitz, 2006) by using the average value of the EBRD Transition Report indicators for combined small- and large-scale privatization. The transition indicators range between 0 and 5, where 5 denotes full liberalization (or economic transition). Privatization speed since transition is calculated as $(L(t) - L(0))/t$, where t denotes the number of years since the start of transition.[12] The banking reform measure is also taken from the EBRD Transition Report indicators and measures overall banking sector reform and interest rate liberalization; it takes into account the recent conclusion of Campos and Coricelli (2002) that the role of financial sector development in transition countries, though potentially very important, has often been neglected in empirical studies. Investment *inv* is expressed in percent of GDP and taken from the TransMONEE database. In order to capture possible time trends, we include an economic shock measure for the major financial crisis that hit East Asia and then Russia and the rest of the FSU and CEE between 1997-1998. The variable *fincrisis* takes on a value of zero until 1997, and then increases with every successive year after the crisis to capture the diminishing dampening economic effects of the shock over time.

IC includes several measures of initial conditions that have been mentioned in the literature, namely (log) initial income (*lninitialinc*), the urbanization rate in 1990 (*urban1990*), and a measure of trade dependence in 1990 (*tradep1990*).[13] Urbanization rates (from De Melo et al., 1997) and the initial income – defined as (log) per capita income during the first year of transition (TransMonee database) – both proxy for the level of initial economic development, with the latter also controlling for convergence effects. The trade shares in GDP (from De Melo et al., 1997) reflect the degree of dependence on trade with other countries in the Council for Mutual Economic Assistance (CMEA)

[12] Similar results were found when using only the privatization speed during the first five or first ten years of transition.

[13] Several other measures of initial conditions have been used in the literature, often "condensed" into principal components. They include average growth before transition; a dummy variable for proximity to a market economy; an indicator for repressed inflation during central planning; the black market premium before transition; years under central planning; a measure of "over-industrialization"; and a categorical variable for previously independent states, decentralized or newly independent states (see De Melo et al., 1997 for more details). None of these variables – or their combination in principal components – was robustly related to growth over the longer period considered in this paper.

area; it can be expected that the higher the economic interdependence, the greater the negative shock from the sudden disruption due to transition.

For further details and descriptive statistics on all variables, see the Appendix.

3.1 The issue of oil ownership

The literature has largely ignored the issue of the ownership structure of mineral resources and the possible influence it has on the effects of resource wealth on a country's economic and political development. The most common (implicit) assumption has been that mineral deposits and companies have been mainly state-owned since the 1960s, despite the involvement of many private firms around the world (see for example Karl, 1997). Yet, the mineral ownership structure could have potentially large effects: whether a resource is owned by a private firm or by the government of the resource-rich nation has implications for rent appropriation, exploration and production decisions, and even for the exposure to market price fluctuations.

An exception is given by the studies of Jones Luong and Weinthal (2001, 2009), which have concentrated on the ownership structures of mineral wealth, in particular oil, how they emerged, and what institutional effects they have. The authors developed their theory to analyse the oil and gas-rich former Soviet states, and then extended it to other mineral-rich countries. They propose that it is not resource wealth that "curses" mineral-rich countries, but rather their chosen ownership structure. They distinguish between four different possible ownership structures (see Jones Luong and Weinthal, 2001, 2009 for a more detailed description): the first is state ownership with control (S1), where the state has the rights of developing and exploiting mineral deposits and holds over 50% of mineral sector company shares. Second, state ownership without control (S2), where the state still owns the rights to the mineral deposits as well as the majority ($> 50\%$) of shares, but allows greater scope for foreign investment with foreign managerial and operational control, for example in production sharing agreements (PSAs). The third possibility is private domestic ownership (P1), where private domestic firms hold the rights to the development of mineral deposits and the majority of shares ($> 50\%$) in the sector. The fourth and final ownership structure is private foreign ownership (P2), where private foreign companies own both the rights to develop the mineral deposits and the majority of shares ($> 50\%$) in the mineral sector.

Jones Luong and Weinthal mainly concentrate on how the different ownership structures affect the institutional outcomes in mineral-rich states, in

particular the fiscal regimes. S1 can be expected to foster weak fiscal regimes, in the sense of unstable and inefficient tax systems, and low incentives for budgetary discipline and transparency. At the other end of the spectrum, P1 would tend to foster strong fiscal regimes, because this structure gives both domestic private owners and the governing élites incentives for demanding and supplying strong institutions, which limit the government's ability for rent extraction while setting clear rules for mineral exploitation. Fiscal regimes under S2 and P2 are classified as "hybrid", because foreign investors are able to stabilize their fiscal burden and also – to the extent that the governing élites have an incentive for transparency – direct the use of the proceeds from mineral rents towards socio-economic development.

As a consequence, we would expect countries that choose an ownership structure of type P1 to reap the greatest positive long-term economic benefits from mineral wealth, with those choosing S1 most likely to suffer from a "curse" of mineral wealth on their economic performance. S2 and P2-type ownership structures would lead to economic outcomes somewhere in between these two extremes.

In order to examine whether the mineral ownership structure changes the growth impact of oil, we interact our oil variables with a dummy for ownership type according to the following equation:

$$G_{it} = \beta_1 + \beta_2 oil_{it} + \beta_3 ownership_{it} * oil_{it} + \beta_4 X_{it} + \beta_5 IC_{it} + \epsilon_{it}. \qquad (2)$$

We set S1 as the base ownership strategy, whose growth effect is given by β_2.[14] β_3 indicates whether a different strategy has led to higher (i.e. positive coefficient) or lower (i.e. negative coefficient) growth effects of oil; the total effect of alternative ownership strategies is given by the sum $\beta_2 + \beta_3$. The remaining covariates are defined as above in equation (1).

The ownership structures of the five oil-rich countries of the FSU and Romania are shown in Table 1 (based on Jones Luong and Weinthal, 2001, 2009). Most of the countries chose S1 at some point. The only country to implement a P1-type strategy was Russia, which switched to S1 in 2005 after a series of takeovers of private domestic oil companies by state-controlled firms. Azerbaijan, and more recently Uzbekistan and Kazakhstan, have an S2-type ownership structure, while Kazakhstan (until 2004) and Romania (since 2004) chose full foreign private ownership under P2. The fact that we have only one example of P1 in our sample may limit the latitude for statistical inference; nevertheless,

[14] Similar overall results are achieved by using the other ownership types as the base outcome (results available upon request).

this exploratory analysis should deliver some interesting insights on the role of mineral ownership in the "oil curse" debate.

4 Estimation results

We present the main estimation results in the following subsections, concentrating first on the growth impacts of oil in FSU and other transition countries, and then on the role of oil ownership.

4.1 Oil and growth in transition economies

Table 2 presents estimation results for equation (1) on the sample of 15 FSU countries. Columns (1)-(5) show specifications using oil production per capita (*oilprodpc*), while columns (6)-(10) use oil reserves per capita (*oilrespc*).

We start out with a parsimonious specification, adding only our oil measure, inflation, privatization level and speed, and the initial conditions variables (columns (1) and (6)). We then successively control for size effects (*lnpop*), investment rates, banking sector development, and the shock produced by the financial crisis of 1997-98. The results remain consistent regardless of the specification: first, oil – both in terms of per capita production and reserves – has strong positive growth effects. Using the results from column (1) to calculate the beta coefficients, we see that one standard deviation increase in oil production (equal to an additional 0.0226 barrels per capita per day) would lead to an increase in growth of $(0.0226 * 1.866/0.1225)$ 0.344 standard deviations, or just over one third (all other things equal). Similarly, column (6) shows that a standard-deviation increase in oil reserves per capita (0.5 thousand barrels per capita) would have a positive growth effect of 0.14 standard deviations. Moreover, the magnitude of the effects does not vary substantially across specifications, further suggesting that the coefficients are relatively precisely estimated. With other words, the effect is economically important – especially regarding oil production – though not overwhelming.

The other coefficients mostly have the expected signs, with the basic covariates entering with high significance, particularly in the specifications with oil production. Inflation has a negative impact on growth; privatization levels affect economic performance positively, while privatization speed on the other hand has a negative effect. This is in line with Godoy and Stiglitz (2006), who also found that transition countries that implemented a "shock therapy" approach to privatization saw slower growth than those that chose a more gradualist approach, and contradicts the earlier findings of Berg et al. (1999) who had arrived at the opposite conclusion. However, it is yet too early to tell how

long-lasting these growth-dampening effects of fast privatization were, since we can only judge performance over the first 15 years since the start of transition.

(Some aspects of) initial conditions continue to have an influence on growth performance, though not always in the expected direction: highly urbanized countries have seen higher growth rates, while initially relatively poor economies show signs of convergence with the higher-income countries. Trade dependence has also had a strong influence on growth outcomes, albeit not in the expected direction: it appears that countries that were more outward-oriented at the start of transition did not suffer long from the collapse of the CMEA trading region, but were able to take advantage of at least some of their previously established export industries to fuel growth during the transition period.

Larger countries seem to have fared slightly better than smaller ones, measured by the size of their populations. Investment has generally had a positive impact on growth, though not always significant. Interestingly, banking reforms have not had any strong positive growth effects: on the contrary, the coefficient is consistently negative and in one case even marginally significant. It may be that the overall economic effects of financial intermediation development have not yet had time to take hold. Finally, the financial crisis does not seem to have had any lasting impact on the economies of the FSU.

The findings described above carry over to the results for the larger sample including all 27 transition countries, shown in Table 3. Most importantly, both oil production and oil reserves have strong positive growth effects, with beta coefficients of 0.177 and 0.105, respectively (using the results from columns (1) and (6)). With other words, the effects are smaller in the larger sample, though still important and highly significant. Note also that the dummy variable for the FSU shows that the former Soviet countries have had lower growth rates overall, *ceteris paribus*.

The estimation fits in terms of their R-squareds are good, both for the smaller FSU sample and the larger sample with all transition countries. This indicates that the chosen specifications capture many factors that have been relevant for growth since the start of transition. In further robustness tests, we also added measures for income inequality, education levels, years under central planning, domestic credit to the private sector, a regime failure dummy, the overall average EBRD transition indicator value, and variations on the privatization speed measure to cover only the first five or ten years of transition. Most additional regressors were insignificant, with the exception of the privatization speed variables, and the central planning years measure (in the FSU sample). Finally, we also used three alternative oil measures, namely per capita oil exports, and the ratio of oil exports to total merchandise exports and to GDP (the

latter two more aptly capturing oil dependence). The results remained qualitatively and quantitatively robust to these changes (available upon request). Most importantly, per capita oil exports and oil exports over total merchandise exports were positive and highly significant, while oil exports over GDP – albeit positive – were not significant.

In the Appendix (Tables C-E), we also show results using fixed effects panel estimations. These confirm the main results: per capita oil production and reserves have had positive growth impacts in both samples, with oil production proving particularly robust even in the smaller FSU sample. Moreover, the magnitudes of the growth effects increase w.r.t. to the findings using random effects. However, the overall estimation fits are notably reduced by choosing this estimation strategy, indicating that the time-invariant regressors are important determinants of growth.

4.2 Does oil ownership matter?

As mentioned above, an interesting but often neglected issue concerns the effect of resource ownership on the ultimate impact of mineral wealth on the economy. In order to examine whether the ownership structure changes the results seen above, in Table 4 we add an interaction term between the oil measure and the ownership type dummy (according to equation (2)), with full state ownership (S1) being the base outcome.[15] This means that the coefficient for the oil measure (*oilprodpc* or *oilrespc*) shows the effect for S1-type ownership of oil resources, while the interaction terms give the variation for the respective ownership strategy.

We first test whether the four oil variables – the oil measures with and without interaction – are jointly significant. Joint significance is confirmed in three out of four cases, namely in columns (1) and (3) (at the 1%-level) and column (2) (3%-level), while we cannot reject joint insignificance for specification (4).

Second, it is interesting to see that the net growth effect of oil, measured either in terms of production or of reserves, remains positive and significant for all ownership structures. Recall that the net growth effect of oil in countries with S2-type ownership, for example, is given by summing up the coefficients of the respective interaction term (S2=1) and the oil measure without interaction. The overall positive impact is particularly strong in the smaller FSU sample; oil reserves in the full sample narrowly miss conventional significance, being significant only at the 11%-level.

[15] We show results only for the basic specifications for both samples; adding additional variables did not affect the findings. Moreover, for space reasons we don't show the results for the other covariates. Full results are available upon request.

However, although the interaction terms are rarely even marginally significant, they are all consistently negative. This suggests that all ownership structures have brought lower positive growth effects than majority state ownership without important foreign investment (S1), the base group. A P1-type structure achieves only the second-largest positive impact, followed by the two "hybrid" ownership structures of S2 and P2. Comparing the magnitudes of the effects with those found in the previous specifications without differentiating by ownership structure, countries with S1-type oil ownership have had larger positive growth benefits, with beta coefficients for oil production of 0.48 in the FSU and 0.25 in the full sample, and of 1.03 and 0.56, respectively, for oil reserves. The size of the positive growth effects for countries choosing other ownership structures is more in line with the magnitudes found in Tables 2-3.

These findings apparently contradict the expectations based on the hypotheses of Jones Luong and Weinthal (2001, 2009), according to which S1-type (P1) mineral resource ownership leads to the worst (best) fiscal regime outcomes, and therefore supposedly also to the worst (best) overall economic performance. The explanation may however lie less in a mistake in the theoretical prediction than in the size of the sample at our disposal for the empirical estimations. The findings are likely due to the small number of petroleum-rich states among transition countries on the one hand, and on the other to the fact that most of these oil states have chosen S1-type ownership strategies for at least part of the (short) time period under examination. Only one country (Russia) chose P1. This introduces a statistical bias in favor of S1-type ownership strategy. Therefore, we view these results as an interesting first attempt at differentiating oil-rich countries according to the ownership structure of their mineral sectors and evaluating the economic effects of the chosen strategies, and encourage further research into this issue.

5 Discussion and conclusions

The so-called resource curse has been a popular research topic among economists and political scientists during the last decade. Many studies concur that negative economic and political outcomes are most likely with certain types of natural resources – often termed point-source resources – one of which is oil. Some of the reasons for oil's negative effects supposedly lie in the high rents that can be extracted from oil production, and oil's relatively easy appropriability, which both make it an attractive target for corruptive and potentially economically and politically disruptive rent-seeking.

This paper examined the oil curse hypothesis for a narrow set of transition

countries of the former Soviet Union (FSU) and Central and Eastern Europe (CEE), which present the interesting characteristic of having started out on a major economic and political reform path at virtually the same time and with very similar initial socio-economic conditions. Some 15 years later, this huge experiment allows us to draw some conclusions on whether the presence of oil in a handful of these countries has contributed to economic performance, and if so, in what direction. The findings show without any doubt that oil – measured both in terms of per capita production and reserves – has so far on average had decidedly positive growth effects. Moreover, the positive growth effects of oil are confirmed for different mineral ownership strategies, which is – to our knowledge – the first time that this issue has been addressed explicitly in the context of resources and growth.

However, it is also important to note that the strong positive growth effects found so far in the transition economies of the FSU and CEE need not necessarily hold in the future, as well. A necessary provision for continued strong growth performance is the wise investment of oil revenues not only into the oil sector itself (in order to maintain and possibly enlarge production and distribution throughout the estimated extraction period), but also into other sectors of the economy (in the sense of long-term economic diversification). This provision may not be met in all countries under analysis. For example, there are signs that Russia's economy is worryingly biased towards the oil and gas sector, while at the same time not enough new investment is being undertaken to secure future production. This combination bodes ill for long-term development in the region's largest economy.

And it remains to be seen whether integration into the European Union may not prove to be a much more important driver of economic growth in the future than mineral wealth, setting the CEE countries even farther apart from their fellow former Council for Mutual Economic Assistance members of the FSU. Already it is apparent from the empirical results that FSU countries – including the oil-rich ones – are generally lagging behind the CEE countries in economic performance. It will therefore be interesting to re-examine the results of the present paper further down the road to see whether there is still no oil curse in sight.

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Table 1. Oil ownership strategies in transition countries

	Oil ownership strategy
FSU	
Azerbaijan	S2
Kazakhstan	P2 (until 2004), S2 (since 2005)
Russian Federation	P1 (until 2004), S1 (since 2005)
Turkmenistan	S1
Uzbekistan	S1 (until 2000), S2 (since 2001)
Other transition countries	
Romania	S1 (until 2003), P2 (since 2004)

Notes: Oil ownership strategies taken from Jones Luong and Weinthal (2001, 2009).

Table 2. Oil and growth in FSU countries

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
oilprodpc	1.866***	1.748***	1.558***	1.562***	1.471***					
	(3.62)	(3.45)	(3.23)	(3.35)	(3.35)					
oilrespc						34.226***	34.723***	30.302***	33.165***	31.367***
						(3.49)	(3.46)	(3.21)	(3.60)	(3.90)
lninflation	-0.0162***	-0.0162***	-0.0167***	-0.0172***	-0.0174***	-0.0203***	-0.0195***	-0.0196***	-0.0201***	-0.0207***
	(-2.73)	(-2.67)	(-2.74)	(-2.83)	(-2.91)	(-3.22)	(-3.06)	(-3.15)	(-3.25)	(-3.43)
avgprivat	0.0741***	0.0797***	0.0796***	0.0958***	0.0916***	0.0590***	0.0691***	0.0713***	0.0902***	0.0837***
	(4.52)	(4.53)	(4.54)	(4.47)	(4.20)	(3.79)	(4.00)	(4.23)	(4.32)	(4.06)
privatspeed	-0.124***	-0.113***	-0.104**	-0.123**	-0.126**	-0.137***	-0.123***	-0.107**	-0.129***	-0.125**
	(-2.97)	(-2.71)	(-2.45)	(-2.57)	(-2.48)	(-3.27)	(-2.96)	(-2.52)	(-2.71)	(-2.44)
lnpop		0.0146	0.0166*	0.0113	0.00995		0.0201**	0.0224**	0.0160	0.0129
		(1.62)	(1.81)	(1.13)	(1.03)		(2.11)	(2.27)	(1.51)	(1.28)
inv			0.00104	0.00114	0.00120			0.00161*	0.00173*	0.00173*
			(1.23)	(1.35)	(1.40)			(1.76)	(1.88)	(1.91)
bankref				-0.0278	-0.0291				-0.0328	-0.0372*
				(-1.38)	(-1.49)				(-1.59)	(-1.85)
fincrisis					0.000929					0.00210
					(0.43)					(1.00)
lninitialinc	-0.0722***	-0.0727**	-0.0719**	-0.0622**	-0.0562**	-0.0411*	-0.0461*	-0.0504*	-0.0398	-0.0327
	(-2.61)	(-2.50)	(-2.46)	(-2.06)	(-2.01)	(-1.70)	(-1.80)	(-1.89)	(-1.46)	(-1.35)
tradedep1990	0.00566***	0.00719***	0.00691***	0.00682***	0.00637***	0.00287***	0.00538***	0.00534***	0.00530***	0.00474***
	(3.53)	(3.48)	(3.34)	(3.26)	(3.15)	(2.80)	(3.06)	(3.00)	(2.98)	(2.90)
urban1990	0.00347***	0.00328**	0.00314**	0.00321**	0.00305**	0.00237*	0.00228*	0.00226	0.00239*	0.00226*
	(2.62)	(2.27)	(2.13)	(2.16)	(2.35)	(1.87)	(1.65)	(1.57)	(1.68)	(1.85)
Observations	214	214	214	214	214	214	214	214	214	214
Countries	15	15	15	15	15	15	15	15	15	15
r2within	0.640	0.640	0.640	0.650	0.640	0.620	0.630	0.640	0.640	0.630
r2between	0.480	0.430	0.430	0.430	0.460	0.460	0.400	0.410	0.430	0.470
r2overall	0.610	0.620	0.620	0.620	0.630	0.580	0.600	0.610	0.620	0.620

Notes: All estimations are random effects GLS panel estimations with real per capita growth as the dependent variable. Constant term included in all estimations (not shown). Robust z-statistics in parentheses. *, **, *** statistically significant at 10, 5, and 1 percent levels, respectively.

Table 3. Oil and growth in transition countries

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
oilprodpc	1.153***	1.125***	0.978***	0.846***	0.869***					
	(3.25)	(3.07)	(2.85)	(2.83)	(2.90)					
oilrespc						27.61***	26.16***	22.65***	21.66***	21.90***
						(3.66)	(3.56)	(3.43)	(3.65)	(3.69)
lninflation	-0.0179***	-0.0180***	-0.0181***	-0.0190***	-0.0194***	-0.0185***	-0.0190***	-0.0189***	-0.0198***	-0.0201***
	(-4.96)	(-4.87)	(-4.92)	(-4.86)	(-4.81)	(-4.99)	(-4.95)	(-4.99)	(-4.92)	(-4.86)
avgprivat	0.0511***	0.0515***	0.0506***	0.0532***	0.0543***	0.0473***	0.0477***	0.0472***	0.0524***	0.0532***
	(5.45)	(5.51)	(5.47)	(4.82)	(4.90)	(5.13)	(5.16)	(5.21)	(4.77)	(4.85)
privatspeed	-0.0906***	-0.0898***	-0.0885***	-0.0981***	-0.106***	-0.0978***	-0.0968***	-0.0934***	-0.102***	-0.108***
	(-3.39)	(-3.32)	(-3.36)	(-3.88)	(-3.75)	(-3.71)	(-3.67)	(-3.66)	(-4.10)	(-3.87)
fsu	-0.0428**	-0.0454**	-0.0412**	-0.0367**	-0.0363**	-0.0205	-0.0283	-0.0261	-0.0256	-0.0250
	(-2.18)	(-2.19)	(-2.02)	(-2.00)	(-1.98)	(-1.35)	(-1.63)	(-1.55)	(-1.61)	(-1.56)
lnpop		0.00226	0.00320	0.00342	0.00382		0.00597	0.00654	0.00607	0.00644
		(0.47)	(0.69)	(0.84)	(0.93)		(1.28)	(1.45)	(1.49)	(1.57)
investment			0.000755	0.000830	0.000896			0.00104	0.00109	0.00115
			(1.02)	(1.17)	(1.23)			(1.38)	(1.49)	(1.54)
bankref				-0.00915	-0.00721				-0.0119	-0.0105
				(-1.02)	(-0.79)				(-1.30)	(-1.12)
fincrisis					-0.00138					-0.00105
					(-0.89)					(-0.67)
ln initial income	-0.0296***	-0.0295***	-0.0299***	-0.0250***	-0.0264***	-0.0260***	-0.0252**	-0.0268***	-0.0223**	-0.0233**
	(-3.01)	(-2.76)	(-2.82)	(-2.71)	(-2.81)	(-2.72)	(-2.44)	(-2.60)	(-2.41)	(-2.47)
tradedep1990	0.00186***	0.00200**	0.00178**	0.00164**	0.00168**	0.00118**	0.00157**	0.00136*	0.00132**	0.00134**
	(2.60)	(2.42)	(2.14)	(2.22)	(2.29)	(2.12)	(2.14)	(1.86)	(1.97)	(2.00)
urban1990	0.00125*	0.00121*	0.00120*	0.00119*	0.00119*	0.00128**	0.00114	0.00114*	0.00119*	0.00118*
	(1.90)	(1.67)	(1.71)	(1.93)	(1.93)	(1.99)	(1.61)	(1.67)	(1.90)	(1.90)
Constant	0.0632	0.0270	0.00409	-0.0176	-0.0170	0.0565	-0.0399	-0.0579	-0.0696	-0.0705
	(1.04)	(0.23)	(0.037)	(-0.18)	(-0.18)	(0.95)	(-0.35)	(-0.54)	(-0.71)	(-0.73)
Observations	396	396	396	396	396	396	396	396	396	396
Countries	27	27	27	27	27	27	27	27	27	27
r2within	0.540	0.540	0.540	0.540	0.540	0.530	0.530	0.530	0.530	0.540
r2between	0.330	0.320	0.320	0.310	0.300	0.370	0.350	0.360	0.330	0.320
r2overall	0.500	0.500	0.500	0.510	0.510	0.490	0.490	0.500	0.500	0.500

Notes: All estimations are random effects GLS panel estimations with real per capita growth as the dependent variable. Constant term included in all estimations (not shown). Robust z-statistics in parentheses. *, **, *** statistically significant at 10, 5, and 1 percent levels, respectively.

Table 4. Oil ownership and growth in FSU countries

	(1)	(2)	(3)	(4)
oilprodpc	2.587***		1.608**	
	(3.25)		(2.49)	
oilrespc		252.3**		145.7
		(2.17)		(1.61)
s2*oil variable	-0.794	-197.9*	-0.266	-101.4
	(-0.96)	(-1.74)	(-0.37)	(-1.11)
p1*oil variable	-0.266	-19.64	-0.948	-83.24
	(-0.30)	(-0.17)	(-1.23)	(-0.84)
p2*oil variable	-0.783	-209.1*	-0.634	-123.2
	(-0.92)	(-1.86)	(-0.84)	(-1.37)
fsu			-0.0389**	-0.0294
			(-1.96)	(-1.48)
Observations	214	214	396	396
Sample	FSU	FSU	all transition	all transition
Number of countryid	15	15	27	27
r2within	0.640	0.630	0.540	0.530
r2between	0.410	0.380	0.350	0.350
r2overall	0.610	0.590	0.500	0.500

Notes: All estimations are random effects GLS panel estimations with real per capita growth as the dependent variable. Initial conditions (initial income, trade dependence in 1990, and urbanization in 1990), inflation, privatization level and speed, and constant term included in both estimations (not shown). Robust z-statistics in parentheses. *, **, *** statistically significant at 10, 5, and 1 percent levels, respectively.

Appendix

Data description

post-transition growth: Year-on-year growth rate of real GDP per capita (constant prices) after start of transition. Source: TransMONEE database, May 2008, UNICEF Innocenti Research Centre.

oil production per capita (***oilprodpc***): Oil production in barrels per day. Source: British Petroleum 2008 Statistical Review of World Energy, cross-checked with Energy Information Agency database.

oil reserves per capita (***oilrespc***): Oil reserves in million barrels. Source: British Petroleum 2008 Statistical Review of World Energy, cross-checked with Energy Information Agency database.

oil ownership dummy variables (***S1***, ***S2***, ***P1***, ***P2***): Oil ownership structure classified as majority state-owned with no or little foreign investment (S1), majority state-owned with substantial foreign investment (S2), majority private domestic ownership (P1), and majority foreign private ownership (P2). Source: Jones Luong and Weinthal (2001, 2009).

(log) **inflation** (***lninflation***): natural logarithm of inflation (GDP deflator), annual %. Source: World Development Indicators.

privatization level (***avgprivat***) and **speed** (***privatspeed***): privatization is given by the yearly average of small- and large-scale privatization indicators. privatization speed since start of transition is calculated as (L(t)-L(0))/t where t denotes the number of years since the start of transition. Source: EBRD Transition Report.

(log) **population** (***lnpop***): Natural logarithm of population. Source: TransMONEE database, May 2008, UNICEF Innocenti Research Centre, and Penn World Tables 6.2.

investment in percent of GDP (***inv***): Investment as percent of GDP. Source: TransMONEE database, May 2008, UNICEF Innocenti Research Centre.

banking reform (***bankref***): Banking reform and interest rate liberalisation indicator. Source: EBRD Transition Report.

financial crisis (***fincrisis***): Financial crisis measure with value zero until 1997 and increasing value with every year after the crisis.

(log) **initial income** (***lninitialinc***): Natural logarithm of GDP per capita (constant prices) in year of start of transition. Source: TransMONEE database, May 2008, UNICEF Innocenti Research Centre.

trade dependence in 1990 (***tradep1990***): Trade dependence in 1990 in percent of GDP. From de Melo et al. (1997).

urbanization rates in 1990 (***urban1990***): Urbanization rate in 1990 in percent of total population. From de Melo et al. (1997).

FSU country dummy (***fsu***): Country dummy with value one for 15 countries of former Soviet Union.

Table A. Descriptive statistics

FSU countries					
Variable	Obs	Mean	Std. Dev.	Min	Max
post-trans growth	219	0.0061	0.1225	-0.581	0.2854
oil production pc	262	0.015	0.0226	0	0.0931
oil reserves pc	228	0.0002	0.0005	0	0.0027
ln inflation	270	3.3399	2.0825	-2.9986	9.6449
privatization level	270	2.5424	1.0949	1	4.165
privatization speed	225	0.2844	0.2137	0	1.335
ln population	405	15.8367	1.1761	14.1108	18.8174
investment (percent GDP)	232	24.3668	8.0799	-0.7	59
banking reform	270	1.8827	0.8393	1	4
ln initial income	260	7.0828	0.764	5.7287	8.315
urbanisation 1990	237	56.9958	13.317	32	74
trade dependence 1990	237	28.6768	7.4265	11	41
All transition countries					
Variable	Obs	Mean	Std. Dev.	Min	Max
post-trans growth	406	0.0143	0.1048	-0.581	0.6268
oil production pc	421	0.0065	0.0161	0	0.0931
oil reserves pc	421	0.0001	0.0004	0	0.0027
ln inflation	410	3.0814	1.9302	-3.0945	9.6449
privatization level	422	2.997	0.9089	1	4.1650
privatization speed	422	0.2621	0.2096	-0.5	1.335
ln population	422	15.7386	1.0718	14.1108	18.8174
investment (percent GDP)	421	23.9798	7.0864	-0.7	59
banking reform	422	2.3090	0.8846	1	4
ln initial income	414	7.4429	0.8519	5.7287	8.9951
urbanisation 1990	420	58.0119	11.0182	32	74
trade dependence 1990	420	19.8129	12.1474	3.7	41

Table B. OLS estimations

	(1)	(2)	(3)	(4)
			All transition	All transition
	FSU	FSU	countries	countries
avg oil production pc	0.7076		-0.0405	
	(1.17)		(-0.11)	
avg oil reserves pc		16.377***		8.426
		(2.78)		(1.42)
avg privatization	0.0368**	0.0241**	0.00575	0.00569
	(2.09)	(2.39)	(0.62)	(0.60)
ln inflation	0.00879	0.00467	-0.0114**	-0.0124**
	(1.38)	(0.88)	(-2.17)	(-2.37)
ln initial income	-0.0385*	-0.0264	-0.0267***	-0.0268***
	(-1.81)	(-1.62)	(-3.13)	(-3.08)
trade dependence 1990	0.00337*	0.00218***	-0.000126	-0.0000728
	(1.70)	(2.91)	(-0.28)	(-0.16)
urbanisation 1990	0.00280***	0.00245***	0.00215***	0.00214***
	(3.00)	(2.72)	(3.34)	(3.29)
Constant	-0.122	-0.0900	0.138**	0.141***
	(-1.43)	(-1.18)	(2.50)	(2.59)
Observations	15	15	27	27
R-squared	0.62	0.62	0.48	0.48
F-stat P-value	0.2	0.09	0.042	0.041

Notes: All estimations are OLS with per annum per capita growth since transition as the dependent variable. Robust t-statistics in parentheses. *, **, *** statistically significant at 10, 5, and 1 percent levels, respectively.

Table C. Fixed effects - oil and growth in FSU countries

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
oilprodpc	1.282*	1.233*	1.166	1.263*	1.177					
	(1.87)	(1.80)	(1.61)	(1.70)	(1.53)					
oilrespc						31.66	29.13	21.49	24.80	20.56
						(0.96)	(0.89)	(0.60)	(0.68)	(0.55)
ln inflation	-0.0136***	-0.0130**	-0.0132**	-0.0136**	-0.0135**	-0.0137***	-0.0130**	-0.0134**	-0.0137**	-0.0136**
	(-2.65)	(-2.52)	(-2.53)	(-2.59)	(-2.58)	(-2.65)	(-2.52)	(-2.56)	(-2.59)	(-2.57)
avg privat	0.104***	0.108***	0.107***	0.113***	0.112***	0.105***	0.109***	0.108***	0.112***	0.110***
	(7.10)	(7.21)	(7.09)	(6.25)	(6.04)	(7.09)	(7.21)	(7.08)	(6.15)	(5.90)
privat speed	-0.0603*	-0.0672**	-0.0666**	-0.0756**	-0.0683*	-0.0637*	-0.0709**	-0.0698**	-0.0759**	-0.0639
	(-1.82)	(-2.01)	(-1.98)	(-2.07)	(-1.71)	(-1.92)	(-2.11)	(-2.07)	(-2.06)	(-1.60)
lnpop		0.151	0.149	0.131	0.129		0.157	0.153	0.142	0.136
		(1.22)	(1.20)	(1.04)	(1.01)		(1.27)	(1.23)	(1.11)	(1.06)
investment			0.000232	0.000285	0.000233			0.000465	0.000494	0.000397
			(0.28)	(0.35)	(0.28)			(0.55)	(0.58)	(0.46)
bankref				-0.0135	-0.0151				-0.00907	-0.0121
				(-0.63)	(-0.70)				(-0.42)	(-0.55)
fincrisis					0.00119					0.00195
					(0.46)					(0.76)
Observations	214	214	214	214	214	214	214	214	214	214
Countries	15	15	15	15	15	15	15	15	15	15
r2within	0.66	0.66	0.66	0.66	0.66	0.65	0.65	0.65	0.65	0.66
r2between	0.19	0.0004	0.0005	0.0005	0.0005	0.21	0.0008	0.0007	0.0008	0.0008
r2overall	0.47	0.12	0.13	0.15	0.15	0.47	0.12	0.13	0.14	0.15

Notes: All estimations are fixed effects GLS panel estimations with real per capita growth as the dependent variable. Constant term included in all estimations (not shown). t-statistics in parentheses. *, **, *** statistically significant at 10, 5, and 1 percent levels, respectively.

Table D. Fixed effects - oil and growth in transition countries

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
oilprodpc	1.947***	1.955***	1.884***	2.030***	2.201***					
	(3.11)	(3.12)	(2.89)	(3.13)	(3.35)					
oilrespc						66.60**	66.92**	61.46*	67.80**	71.85**
						(2.22)	(2.23)	(1.93)	(2.15)	(2.26)
ln inflation	-0.0170***	-0.0169***	-0.0170***	-0.0181***	-0.0188***	-0.0172***	-0.0172***	-0.0172***	-0.0183***	-0.0189***
	(-5.53)	(-5.50)	(-5.51)	(-5.88)	(-6.06)	(-5.57)	(-5.55)	(-5.55)	(-5.91)	(-6.03)
avg privat	0.0636***	0.0634***	0.0630***	0.0832***	0.0842***	0.0636***	0.0634***	0.0629***	0.0824***	0.0832***
	(8.12)	(8.06)	(7.96)	(7.82)	(7.92)	(8.06)	(8.00)	(7.90)	(7.70)	(7.77)
privat speed	-0.0450*	-0.0438*	-0.0435*	-0.0584**	-0.0738***	-0.0474*	-0.0462*	-0.0458*	-0.0603**	-0.0725***
	(-1.85)	(-1.79)	(-1.77)	(-2.35)	(-2.75)	(-1.94)	(-1.88)	(-1.86)	(-2.41)	(-2.68)
ln pop		-0.0397	-0.0391	-0.0625	-0.0534		-0.0368	-0.0359	-0.0584	-0.0510
		(-0.40)	(-0.40)	(-0.64)	(-0.54)		(-0.37)	(-0.36)	(-0.59)	(-0.52)
investment			0.000250	0.000430	0.000556			0.000341	0.000511	0.000617
			(0.39)	(0.68)	(0.87)			(0.53)	(0.79)	(0.94)
bank ref				-0.0326***	-0.0275**				-0.0316***	-0.0275**
				(-2.81)	(-2.28)				(-2.70)	(-2.26)
fincrisis					-0.00264					-0.00207
					(-1.52)					(-1.19)
Observations	397	397	397	397	397	397	397	397	397	397
Countries	27	27	27	27	27	27	27	27	27	27
R-squared within	0.55	0.55	0.55	0.56	0.56	0.54	0.54	0.54	0.55	0.55
r2between	0.12	0.12	0.12	0.05	0.05	0.17	0.15	0.15	0.07	0.08
r2overall	0.41	0.36	0.36	0.3	0.32	0.41	0.35	0.35	0.29	0.31

Notes: All estimations are fixed effects GLS panel estimations with real per capita growth as the dependent variable. Constant term included in all estimations (not shown). t-statistics in parentheses. *, **, *** statistically significant at 10, 5, and 1 percent levels, respectively.

Table E. Fixed effects - oil ownership and growth

	(1)	(2)	(3)	(4)
oilprodpc	3.667*		3.921**	
	(1.89)		(2.26)	
oilrespc		188.3		271.6
		(0.65)		(1.09)
s2*oil variable	-2.662	-157.9	-2.203	-207.1
	(-1.30)	(-0.55)	(-1.21)	(-0.82)
p1*oil variable	0.638	-11.87	0.584	7.315
	(0.55)	(-0.090)	(0.55)	(0.061)
p2*oil variable	-2.876	-161.3	-2.316	-211.8
	(-1.32)	(-0.56)	(-1.20)	(-0.84)
Observations	214	214	397	397
Sample	FSU	FSU	all transition	all transition
Countries	15	15	27	27
R-squared within	0.66	0.65	0.55	0.54
r2between	0.0700	0.170	0.0400	0.120
r2overall	0.390	0.450	0.350	0.390

Notes: All estimations are fixed effects GLS panel estimations with real per capita growth as the dependent variable. Inflation, privatization level and speed, and constant term included in both estimations (not shown). t-statistics in parentheses. *, **, *** statistically significant at 10, 5, and 1 percent levels, respectively.

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