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**Working Paper**

## Natural resources and capital structure

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Sanna Kurronen

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Sanna Kurronen

## Natural resources and capital structure

### Abstract

This paper examines the effect of natural resources on capital structure of the firm. Using an extensive dataset of listed firms in 70 countries, we show that firms operating in resource extraction industries have less debt and that that debt tends to have a longer maturity than that of other non-financial firms. Moreover, non-resource firms in resource-dependent countries are found to be less indebted than their counterparts in other countries. The results suggest that the very fact of a firm's location in a resource-dependent country may be an overlooked country-specific determinant of firm capital structure and that financial institutions in resource-dependent countries may play a role in exacerbating a nation's resource curse.

JEL classifications: G32, O13, Q32.

Keywords: resource dependence, capital structure, panel data.

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# 1 Introduction

In countries highly dependent on their mineral resource sectors, the failure to diversify industrial activity is sometimes characterized as a resource curse. It is not clear, however, whether a resource curse is merely the natural outcome of organizing an economy around its resource sector based on factor endowments.

In this paper, we consider the link between resource sector and finance. Given the dominance of the resource sector in “cursed” countries, we presume that financial institutions there are focused on meeting the needs of the resource sector. Kurronen (2015) notes that resource-dependent economies tend to extend less domestic credit to the private sector and rely more heavily on market-based financial instruments than their non-resource-dependent counterparts. Here, we extend the discussion to firm level and consider how capital structure of a firm differs from other firms when it operates directly in the resource sector or otherwise happens to be located in a resource-dependent country.

Our hypothesis is that financial sectors in resource-dependent countries are geared to serving large, well-known resource firms with considerable tangible assets. These conditions result in a financial infrastructure that may be challenging for small firms and emerging industries. We test our hypothesis using an extensive micro-level dataset containing financial data for listed firms in 70 countries. Listed firms in general are larger on average than non-listed firms and enjoy easier access to external finance (Baum et al., 2011).

We contribute to the existing literature in two ways. First, we consider how the capital structure of a resource firm might differ from firms in other sectors. We present empirical evidence covering a wide range of countries that suggest resource firms tend to have less debt than other non-financial firms and that that debt has a longer maturity. Second, we show that other firms in resource-dependent countries are less indebted than their counterparts in other countries. For this reason, we argue that mere location in a resource-dependent country is a country-specific determinant of firm capital structure.

The remainder of this paper consists of four sections. Section 2 introduces the related literature. Section 3 discusses the data and methodology. Section 4 presents the empirical results. Section 5 concludes.

## 2 Capital structure of resource firms

Contrary to the classic assumption of Modigliani and Miller (1958), firms do not always choose debt levels optimal to their needs. The literature shows, for example, that, due to supply frictions, observed capital structures differ from those demanded by the firms (Faulkender and Petersen, 2006). Beck (2011) makes a similar assertion based on survey data of firms in resource-dependent countries.

Recent literature highlights firm- and industry-specific factors affecting the capital structure of firms. Frank and Goyal (2009) show that leverage tends to increase with firm size and more tangible assets. Lower leverage, in turn, is related to higher profitability and high market-to-book ratios. They also find evidence that firms increase leverage when anticipate high inflation.

These results are not unambiguous, however. Considering data for nine Eastern European countries, Jõeveer (2013) finds that firms with a high share of tangible assets have lower leverage.

Fan et al. (2012) demonstrate that country-specific factors are more important in determining firm capital structure than the particular industry in which the firm does business. They also find that legal systems originating in common law are associated with lower debt ratios, whereas higher development level, higher corruption and the existence of an explicit bankruptcy code are related to higher debt ratios. Higher debt ratios are also observed in countries where the tax benefit of leverage is positive. This study further notes that debt maturity tends to be longer in countries with common law legal origins and shorter in more corrupt countries and in countries with large government bond markets. Specifically, the authors suggest that suppliers of capital influence the debt-ratio choices of firms. They find that leverage is higher in countries with deposit insurance, suggesting that the role of banking industry is important.

Jõeveer (2013) finds evidence for emerging countries that a large presence of foreign banks and high level of bank concentration coincide with lower leverage of firms.

Holmstrom and Tirole (1997) argue that lending to large firms is less vulnerable to credit supply shocks than lending to smaller or riskier firms. Further, borrowers facing relatively high agency costs are the first to face limitations in access to finance in a “flight to quality” (e.g. Bernanke et al., 1996). Given that resource firms are typically large, well-known and possess considerable tangible assets, we would expect a certain degree of immunity to supply shocks and easier access to finance for resource firms than other firms in resource-dependent countries.

Recent discussions in structural economics highlight the evolving role of the financial sector at various stages of economic development. As economies develop, they tend to become increasingly reliant on market-based finance. Moreover, a country's deviation from its optimal financial structure is reflected in depressed levels of economic activity (Demirguc-Kunt et al., 2011).

Lin et al. (2009) observe that the optimal mix of banks and markets or big and small banks depends on the economy's factor endowments. The relative composition of labor, capital and natural resources define the optimal structure for production, while the production structure defines the optimal financial sector. Capital- intensive countries tend to have big production firms and are thus better served by a market-based financial system or big banks. Labor-intensive economies, in contrast, have smaller firms better served by small, local banks. Unfortunately for our purposes, the authors merely acknowledge natural resources as an initial factor endowment without delving deeper into the specific role of natural resources.

Engerman and Sokoloff (2002) and Acemoglu et al. (2001) discuss colonial endowments. They note that colonies built around extractive industries or agriculture with large returns to scale tended to have weak property rights. In colonies settled by large groups of immigrants, in contrast, property rights tended to be stronger and levels of education and financial and economic development higher. As a result, beneficial institutions could not be said to be exogenously determined.

To the best of our knowledge, no paper in the literature investigates the capital structure of resource firms or the capital structure of firms in resource-dependent countries using micro-level data. In contributing to the existing literature, our hypothesis is that large resource assets lead to a resource-dependent economy with a financial sector geared to serving large resource firms. Smaller firms and emerging industries thus lack adequate access to financial services, thereby exacerbating the resource curse.

## 3 Data and methodology

### 3.1 Data description

Using firm data from Bloomberg, we gather financial data from companies included in the main equity indices of 73 countries over the period 2007–2013. For the largest equity market, the US, we use firms in the S&P500. A list of all the equity indices used appears in Appendix 1.



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Our approach omits fully state-owned companies, which obviously play huge roles in many resource-rich countries. The problem is that financial information on such companies is often quite limited, which makes them anyway difficult to include in the data (Wolf, 2009).

We also limit the data to non-financial firms and countries with observations for at least three firms. We remove observations with missing values on debt or assets and trim the data by excluding observations where book leverage exceeds four times the median absolute deviation from the median.<sup>1</sup> Our final sample consists of 4,319 non-financial firms over seven years and 25,373 firm-year observations from 70 different countries of domicile.

We measure capital structure with commonly used indicators (Fan et al., 2012). Book leverage, or more precisely, short-term and long-term interest-bearing debt to total assets is used as the main indicator of company leverage as this is the most available indicator on leverage. While ratios based on market values might be more relevant, managers focus on book leverage because debt is better supported by assets in place than by growth opportunities (Myers, 1977). Book leverage is also preferred because financial markets fluctuate considerably (as evidenced during our sample period). We use market leverage, i.e. short- and long-term interest-bearing debt to total market value of the firm as an alternative measure of leverage. To provide a more thorough picture of the capital structure of firms, we separately consider the ratio of short- and long-term debt to assets and the share of long-term debt to total debt as a measure of debt maturity. As the investments of resource firms tend to be bulky, we expect them to have debt with longer maturity than non-resource firms (Berglof and Lehmann, 2009).

As our firm-specific control variables, we use common measures of firm size, tangibility and profitability (see e.g. Titman and Wessels, 1988). Firm size is measured by taking a natural logarithm of the US dollar value of total assets. As a measure of tangibility, we use the amount of property, plant and equipment relative to total assets. Profitability is measured by cash from operations to total assets as it describes the capability of the firm to generate cash to finance investments. We also use market-to-book ratio as an additional firm-specific variable to describe growth opportunities.

Our country-specific control variables are mostly taken from the World Bank World Development Indicators (WDI). We use variables that the literature finds significantly related to capital structure measures, i.e. GDP growth rate, inflation, bank concentration, domestic lending

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<sup>1</sup> As we are very careful in removing outliers as the tails of distribution could contain valuable information, our approach initially excludes only 56 or 0.2% of firm-year observations. Thereafter, we test the robustness of the results with more restricted samples.

to private sector, stock market turnover, corruption and profit tax rate.<sup>2</sup> We also include three binary variables: “developed” to indicate a country was classified as high income country by World Bank in 2008, “deposit insurance” to show the country has some sort of deposit insurance scheme, and “common law” to highlight common law origins of the legal system. Credit rating is taken from Standard and Poor’s ratings as of 2011.

The summary statistics are presented in Table 1.<sup>3</sup> Both firm and country variables and their sources are described in detail in Appendix 2. The market variables in Table 1, the trading volume of equity markets and market-to-book ratio suffer extensively from missing values. We omit them from our regressions whenever the estimated coefficient for the variable in question is insignificant to reduce the loss of observations. We do the same with bank concentration, credit to private sector and tangibility.

Table 1 Summary statistics of selected variables

Statistic	n	Mean	St. Dev.	Min.	Median	Max.
Book leverage	25,373	0,24	0,18	0,00	0,23	1,02
Market leverage	23,506	0,25	0,22	0,00	0,20	1,07
Maturity	25,373	0,53	0,36	0,00	0,62	1,00
St debt	25,373	0,09	0,12	0,00	0,05	1,00
Lt debt	25,373	0,15	0,15	0,00	0,12	1,02
Size	25,230	6,75	2,85	-9,39	7,13	13,59
Tangibility	23,018	0,34	0,24	0,00	0,31	1,02
Profitability	25,223	0,09	0,12	-3,32	0,08	1,68
Market-to-book	23,509	1,44	1,34	0,02	1,04	28,32
Corruption	25,373	-0,43	1,05	-2,53	-0,08	1,28
CPI	25,251	4,29	4,07	-4,86	3,27	40,64
Concentration	24,280	0,61	0,26	0,07	0,60	1,00
Private credit	24,135	1,09	0,58	0,11	1,13	2,24
Market activity	23,647	82,32	90,77	0,02	58,09	952,67
GDP growth	25,373	3,34	3,87	-14,81	2,96	19,59
GDP/cap	25,369	24,099.88	21,622.46	533,17	15,655.08	102,832.30
Profit tax	25,366	0,39	0,14	0,11	0,37	1,19

Variables: “Book leverage”– Total long- and short-term interest bearing debt to total assets; “Market leverage”– Total long- and short-term interest bearing debt to market value of the firm; “Maturity”– Long-term debt total debt; “St debt”– Short-term interest bearing debt to total assets; “Lt debt”– Long-term interest bearing debt to total assets; “Size”– Natural logarithm of assets in US dollars, millions; “Tangibility”– Fixed assets to total assets; “Profitability”– Cash from operations to total assets; “Market-to-book”– Market value to total assets; “Corruption”– Corruption, high value indicates more corrupt, “CPI”– Consumer price inflation, %, year-on-year; “Concentration”– The share of assets of the three largest banks of total bank assets; “Private credit”– Domestic credit to private sector, % of GDP; “Market activity”– Stock market turnover, % of GDP; “GDP growth”– Annual real GDP growth rate, %; “GDP/cap”– Gross domestic product in US dollars per capita; “Profit tax”– Profit tax, % of commercial profits.

<sup>2</sup> For some countries, we have only one observation for profit tax rate in 2013. As tax rates generally do not fluctuate much, we use this observation for all years. In any case, when we test the results without the indicator they remain very similar. For corruption, we have inverted the scale of original data for higher values to indicate more corrupt.

<sup>3</sup> Variable means by country are listed in Appendix 3.

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We classify resource firms as firms that have GICS classifications in the industrial categories “Metals & Mining” and “Oil & Gas Exploration & Production” or its sub-industry categories “Oil & Gas Drilling,” “Integrated Oil & Gas” or “Coal & Consumable Fuels.” This gives us 580 individual firms and 3,501 firm-year observations.

Resource-dependent countries are defined as countries where minerals account for more than 40% of total exports on average during the sample period (Nili and Rastad, 2007). Because our purpose is to establish whether or not a given country’s competitiveness is based largely on minerals, we use mineral exports to total exports as our indicator of resource dependence. The alternative measure of mineral exports in excess of 10% of GDP is overbroad here as it captures countries such as Estonia, which has a very large export sector but modest resource endowments. Including such countries as resource-dependent would distort our findings.

Countries where minerals share of total exports exceeds 40% in our sample include Australia, Bahrain, Chile, Colombia, Egypt, Kazakhstan, Kuwait, Nigeria, Norway, Oman, Peru, Qatar, Russia, Saudi Arabia, South Africa, United Arab Emirates and Venezuela. However, as WDI data omits diamond producers, we follow Kurronen (2015) and add diamond exports data to major diamond producers where data was available. Thus, Botswana was included in the group of resource-dependent countries so we have 18 countries out of 70.

The correlation matrix in Table 2 shows that more profitable firms have less debt and that bigger and more tangible firms use more debt, which is in line with Frank and Goyal (2009). Longer debt maturity is associated with larger firm size, jurisdictions with common law legal origins, lower rates of corruption and greater economic development. High rates of GDP growth, inflation and corruption seem to coincide with shorter debt maturity.

Among our control variables, corruption seems to be highly correlated with other explanatory variables. In particular, it is highly and negatively correlated with level of economic development, credit rating and level of bank credit to private sector.

Table 2 Correlation matrix

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1 Book leverage		0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,06	0,00	0,00	0,00	0,08	0,00	0,00	0,22	0,00	0,00	0,01
2 Market leverage	0,79		0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,80	0,00	0,00	0,00	0,63	0,00	0,00	0,00
3 Maturity	0,32	0,19		0,00	0,00	0,00	0,00	0,00	0,00	0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
4 St debt	0,58	0,54	-0,39		0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,28	0,00	0,00	0,00	0,00	0,00	0,00	0,85	0,00
5 Lt debt	0,76	0,55	0,69	-0,08		0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
6 Size	0,13	0,08	0,43	-0,18	0,30		0,21	0,00	0,00	0,36	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,58	0,00	0,00
7 Tangibility	0,19	0,16	0,21	-0,02	0,25	-0,01		0,00	0,00	0,00	0,00	0,00	0,05	0,00	0,00	0,00	0,00	0,00	0,00	0,08	0,00	0,00
8 Profitability	-0,21	-0,31	0,06	-0,25	-0,07	0,08	0,10		0,00	0,99	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,96	0,09	0,00
9 Market-to-book	-0,17	-0,42	-0,10	-0,12	-0,12	-0,04	-0,08	0,26		0,00	0,00	0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,53	0,00
10 Resource firm	-0,06	-0,08	0,02	-0,03	-0,05	-0,01	0,17	0,00	0,04		0,00	0,00	0,00	0,00	0,02	0,03	0,00	0,00	0,91	0,00	0,00	0,00
11 Resource country	-0,08	-0,10	-0,04	-0,05	-0,06	-0,10	0,07	0,04	0,05	0,03		0,29	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
12 Corruption	-0,01	0,05	-0,41	0,29	-0,25	-0,51	0,09	-0,06	-0,02	-0,06	0,01		0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
13 CPI	-0,03	0,04	-0,23	0,15	-0,15	-0,38	0,01	-0,03	-0,05	-0,03	0,15	0,54		0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,15	0,00
14 Concentration	-0,03	0,07	-0,05	0,01	-0,04	-0,04	0,05	-0,03	-0,15	-0,05	0,18	-0,20	-0,10		0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
15 Private credit	0,05	0,00	0,27	-0,14	0,17	0,50	-0,17	0,03	0,03	-0,02	-0,32	-0,66	-0,54	0,04		0	0,00	0,00	0,00	0,00	0,00	0,00
16 Market activity	-0,01	-0,12	0,25	-0,18	0,13	0,47	-0,11	0,08	0,14	-0,01	-0,18	-0,46	-0,32	-0,21	0,63		0,00	0,00	0,00	0,00	0,52	0,00
17 Common law	-0,04	-0,14	0,33	-0,28	0,17	0,31	-0,03	0,10	0,11	0,12	-0,03	-0,57	-0,16	-0,08	0,44	0,51		0,00	0,00	0,00	0,00	0,00
18 GDP growth	-0,03	-0,12	-0,23	0,15	-0,16	-0,25	0,03	-0,03	0,17	0,02	0,08	0,45	0,31	-0,30	-0,36	-0,14	-0,24		0,00	0,00	0,00	0,00
19 Developed	0,01	0,00	0,34	-0,26	0,21	0,48	-0,07	0,04	-0,03	0,00	0,08	-0,83	-0,49	0,15	0,54	0,45	0,45	-0,50		0,09	0,00	0,00
20 Deposit insurance	0,04	0,12	0,11	-0,04	0,08	0,00	-0,01	0,00	-0,17	-0,03	-0,44	-0,05	-0,06	-0,06	0,15	-0,04	-0,09	-0,30	0,01		0,00	0,00
21 Profit tax	0,06	0,07	0,07	0,00	0,07	0,12	-0,06	-0,01	0,00	0,04	-0,22	0,03	0,01	-0,12	0,06	0,00	-0,02	-0,05	-0,12	0,13		0,00
22 Rating	-0,02	-0,14	0,32	-0,25	0,18	0,52	-0,06	0,08	0,13	0,09	0,08	-0,79	-0,57	-0,07	0,61	0,56	0,46	-0,18	0,67	-0,19	-0,08	

Notes: Pearson correlation coefficient in lower triangle and corresponding p-values in the upper triangle. Variables– “Book leverage”– Total long- and short-term interest bearing debt to total assets; “Market leverage”– Total long- and short-term interest bearing debt to market value of the firm; “Maturity”– Long-term debt total debt; “St debt”– Short-term interest bearing debt to total assets; “Lt debt”– Long-term interest bearing debt to total assets; “Size”– Natural logarithm of assets in US dollars, millions; “Tangibility”– Fixed assets to total assets; “Profitability”– Cash from operations to total assets; “Market-to-book”– Market value to total assets; “Resource firm”– Binary variable for 1=resource firm; “Resource country”– Binary variable with 1=Resource-dependent country; “Corruption”– Corruption, high value indicates more corrupt, “CPI”– Consumer price inflation, %, year-on-year; “Concentration”– The share of assets of the three largest banks of total bank assets; “Private credit”– Domestic credit to private sector, % of GDP; “Market activity”– Stock market turnover, % of GDP; “Common law”– Binary variable with 1=common law legal origins; “GDP growth”– Annual real GDP growth rate, %; “Developed”– Binary variable with 1=developed country; “Deposit insurance”– Binary variable for deposit insurance with 1=deposit insurance scheme; “Profit tax”– Profit tax, % of commercial profits; “Rating”– S&P country credit rating.

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Based on our data, resource firms have lower debt levels and that carry debt of longer maturity than other firms. The difference is statistically significant for both leverage variables at 1% level based on the Welch Two Sample t-test (Table 3). Due to the volatile period around the global financial crisis, we also check the variables for each year separately to discover any anomalies that might drive our results. The result for significant difference in both book and market leverage is valid for each year in our sample except for 2013, where we find no significant difference for resource firms and other firms. The result on debt maturity is not as strong; we find statistically significant difference for individual years between the two groups only for 2012 and 2013 at the 10% and 5% significance levels, respectively.

When dividing our sample by country groups, we find the result of significant difference in leverage between resource and non-resource firms robust for rich countries and resource-dependent countries. However, we find no significant difference in developing countries for book leverage for resource and non-resource firms. The leverage for resource firms is clearly higher in developing countries than in developed countries. For developed countries, we find no significant difference in debt maturity for resource and non-resource firms. Summary statistics are presented in Table 3 for various country groups.

Table 3 also shows that resource firms have more tangible assets than other firms in our data *except* such firms in resource-dependent countries. Most empirical evidence has shown (Frank and Goyal 2009) that, like the resource firms in our data, firms with more tangible assets are expected to have more, not less, debt. This finding might be due to the volatile end product prices of raw materials, which heighten uncertainty of cash flow for resource firms, despite their observed asset tangibility. Resource firms are also no larger in terms of assets than other firms except in resource-dependent countries. This finding could be explained by the fact that our sample consists only of firms included in the main equity index of each country. We find no difference in profitability for resource firms and other firms.

We confirm the findings with US data, where the differences in country-specific factors do not disturb the analysis. As US financial markets have size and depth to service the needs of the firms, we expect firm capital structure in the US to well reflect the demand for capital. Within our sample of 420 non-financial US firms, 41 are classified as resource firms. The results in Table 3 are robust with the cross-country data.

Table 3 Summary statistics of the firm variables by groups

	Resource firms						Non-resource firms						Welch t-test p-value
	N	Mean	St. Dev.	Min.	Median	Max.	N	Mean	St. Dev.	Min.	Median	Max.	
<b>All countries</b>													
Book leverage	3,501	0,21	0,17	0	0,2	0,94	21,872	0,24	0,18	0	0,23	1,02	<0.01
Market leverage	3,193	0,21	0,2	0	0,15	0,95	20,313	0,26	0,22	0	0,21	1,07	<0.01
Maturity	3,501	0,55	0,38	0	0,64	1	21,872	0,53	0,36	0	0,61	1	0,01
Size	3,494	6,71	3,38	-9,39	7,25	13,08	21,736	6,75	2,75	-8,9	7,1	13,59	<0.01
Tangibility	3,001	0,44	0,26	0	0,44	1,02	20,017	0,33	0,23	0	0,29	1	<0.01
Profitability	3,484	0,09	0,15	-3,32	0,09	1,59	21,739	0,09	0,11	-2,45	0,08	1,68	0,99
<b>Developed countries</b>													
Book leverage	1,825	0,19	0,15	0	0,18	0,91	11,378	0,25	0,17	0	0,24	1,01	<0.01
Market leverage	1,697	0,18	0,18	0	0,15	0,89	10,883	0,26	0,21	0	0,22	1,07	<0.01
Maturity	1,825	0,64	0,37	0	0,79	1	11,378	0,65	0,33	0	0,77	1	0,42
Size	1,818	7,75	2,36	-2,33	7,94	13,08	11,242	8,11	2,06	0,39	8,4	13,59	0,01
Tangibility	1,716	0,49	0,28	0	0,51	1,02	10,868	0,3	0,22	0	0,26	1	<0.01
Profitability	1,824	0,09	0,15	-3,32	0,1	1,59	11,357	0,09	0,09	-2,45	0,09	1,1	0,2
<b>Developing countries</b>													
Book leverage	1,676	0,25	0,19	0	0,23	0,94	10,494	0,24	0,19	0	0,22	1,02	0,12
Market leverage	1,496	0,24	0,23	0	0,17	0,95	9,430	0,26	0,24	0	0,2	0,99	0,01
Maturity	1,676	0,44	0,35	0	0,44	1	10,494	0,4	0,35	0	0,37	1	<0.01
Size	1,676	5,57	3,93	-9,39	6,47	12,95	10,494	5,3	2,66	-8,9	5,21	11,76	<0.01
Tangibility	1,285	0,38	0,21	0	0,38	0,94	9,149	0,36	0,24	0	0,32	1	<0.01
Profitability	1,660	0,09	0,15	-1,75	0,08	0,77	10,382	0,08	0,13	-1,62	0,08	1,68	0,2
<b>Resource-dependent countries</b>													
Book leverage	716	0,18	0,16	0	0,15	0,91	3,697	0,21	0,18	0	0,2	0,93	<0.01
Market leverage	668	0,16	0,17	0	0,11	0,89	3,407	0,21	0,2	0	0,17	0,99	<0.01
Maturity	716	0,53	0,37	0	0,65	1	3,697	0,49	0,38	0	0,56	1	0,01
Size	716	6,8	2,32	-0,98	6,71	12,95	3,697	6,03	2,08	-0,71	6,1	11,41	<0.01
Tangibility	697	0,38	0,24	0	0,38	0,89	3,553	0,38	0,24	0	0,35	0,98	0,63
Profitability	703	0,1	0,15	-0,91	0,1	1,59	3,615	0,1	0,12	-1	0,09	1,1	0,87
<b>Non-resource countries</b>													
Book leverage	2,785	0,22	0,18	0	0,21	0,94	18,175	0,25	0,18	0	0,24	1,02	<0.01
Market leverage	2,525	0,23	0,21	0	0,17	0,95	16,906	0,27	0,23	0	0,22	1,07	<0.01
Maturity	2,785	0,55	0,38	0	0,63	1	18,175	0,54	0,36	0	0,62	1	0,04
Size	2,778	6,68	3,61	-9,39	7,42	13,08	18,039	6,9	2,85	-8,9	7,41	13,59	<0.01
Tangibility	2,304	0,46	0,26	0	0,46	1,02	16,464	0,32	0,22	0	0,28	1	<0.01
Profitability	2,781	0,09	0,14	-3,32	0,09	0,77	18,124	0,09	0,11	-2,5	0,08	1,68	0,79
<b>US</b>													
Book leverage	279	0,2	0,1	0	0,21	0,47	2,584	0,24	0,16	0	0,24	1,01	<0.01
Market leverage	267	0,19	0,13	0	0,17	0,73	2,487	0,21	0,17	0	0,16	0,96	0,1
Maturity	279	0,89	0,23	0	0,98	1	2,584	0,8	0,29	0	0,91	1	<0.01
Size	279	9,29	1,68	-0,76	9,26	12,76	2,584	9,29	1,25	1,54	9,24	13,59	0,04
Tangibility	271	0,67	0,19	0,01	0,72	0,96	2,376	0,23	0,19	0	0,16	0,9	<0.01
Profitability	279	0,13	0,08	-0,14	0,13	0,41	2,583	0,12	0,09	-2,45	0,11	0,52	0,02

Variables: “Book leverage”– Total long- and short-term interest bearing debt to total assets; “Market leverage”– Total long- and short- term interest bearing debt to market value of the firm; “Maturity”– Long-term debt total debt; “Size”– Natural logarithm of assets in US dollars, millions; “Tangibility”– Fixed assets to total assets; “Profitability”– Cash from operations to total assets. Welch two-sample t-test will null hypothesis: no difference in means.

Table 3 also highlights the fact that non-resource firms in resource-dependent countries seem to have less debt than their counterparts in other countries. This could be due to different industrial mixes among surveyed countries or other country-specific factors that do not need to be independent of resource-dependence. While debt maturity is slightly longer for the resource firms than other firms in our full sample, the average maturity is shorter in resource-dependent countries than elsewhere.

### 3.2 Methodological strategy

To detect the main determinants for capital structure, we follow Jõeveer (2013), performing an analysis of variance (ANOVA) for three categorical regressors: country, industry and year. We then extend the model using analysis of covariance (ANCOVA) to include continuous firm-specific variables: size, tangibility and profitability. This approach allows us to decompose the variation of dependent variable among the independent variables. The model can be written as

$$Y_{ijkt} = \alpha + \beta_j + \gamma_k + \delta_t + \vartheta X_{ijt-1} + \varepsilon_{ijt}, \quad (1)$$

where  $i, j, k$  and  $t$  are the indexes of firm, country, industry and year, respectively.  $Y_{ijkt}$  is the capital structure indicator of firm  $i$ , country  $j$ , industry  $k$  and year  $t$ .  $\beta_j$  is the country fixed effect,  $\gamma_k$  is the industry fixed effect and  $\delta_t$  is the year effect.  $\vartheta X_{ijt-1}$  presents the firm specific one-period lagged variables and  $\varepsilon_{ijt}$  is the random disturbance.

We then extend the model to include the time-varying country-specific factors. The model becomes

$$Y_{ijkt} = \alpha + \gamma_k + \delta_t + \vartheta X_{ijt-1} + \varphi C_{jt-1} + \varepsilon_{ijt}, \quad (2)$$

where  $\varphi C_{jt-1}$  represents the one-period lagged country-specific variables that can vary over time. We do not include country fixed effects here, as it would capture the resource country indicator. We use pooled OLS to detect the effect of different firm and country specific capital structure determinants. Next, we limit our sample to firms with no close link to the resource sector to determine whether location in a resource-dependent country affects the capital structure of the firm.

We use robust standard errors clustered by firm to capture the correlation in regression residuals known to cause bias in OLS estimations using firm panel data (Petersen, 2009). We also cluster standard errors by year to check whether our dummies failed to capture a time effect.

The difference in standard errors is very small compared to pooled OLS with White standard errors, and in line with the capital structure example presented by Petersen (2009).

## 4 Results

### 4.1 Variance decomposition

In line with Jõeveer (2013), we see the most important determinant of a firm's book leverage is its industry (Table 4). Country is also an important factor. Despite the fact that a major financial crisis hit the global economy during our sample period, year plays a role only in terms of market leverage.

Debt maturity structure is clearly more dependent on country of domicile than a firm's industry affiliation. This may reflect the fact that some countries have more market-based financial systems, which coincides with long-term debt, while bank-based financial structures are associated more with short-term debt (Demirgüç-Kunt and Maksimovic, 2002).

When we add firm-specific variables, profitability emerges as the most important firm-specific variable in explaining leverage. Profitable firms, not surprisingly, have less need for external debt (Frank and Goyal, 2009). This result is different from Jõeveer (2013), who finds asset tangibility is the most important firm-specific determinant for leverage. Firm size is the most important firm-specific explanatory variable for maturity structure in our data, but our dummies for country and industry remain very important in explaining firm leverage.

For columns 7–9 in Table 4, we replace the country dummy with country-specific fixed and time-variant variables. We also add binary indicators for resource firm and resource country. The assigned country variables capture some, but not all, of the variation related to the country dummies in columns 4–6. In particular, the model is poor at capturing book leverage, something expected from the literature (see e.g. Fan et al., 2012). We break this variable down into short- and long-term debt in the regressions to detect variation in detail.

Notably, the mere fact of being domiciled in a resource-dependent country appears to be one of the most important country-specific determinants of the level of leverage in our sample firms. The resource firm indicator also explains part of the variation in leverage, even after we control for industry fixed effects. The maturity structure, however, is not explained by our resource indicators when controlling for several other factors.



Table 4 Variance decomposition

	Book Leverage	Market Leverage	Maturity	Book Leverage	Market Leverage	Maturity	Book Leverage	Market Leverage	Maturity
	1	2	3	4	5	6	7	8	9
Country	0,37	0,43	0,73	0,25	0,32	0,46			
Industry	0,62	0,50	0,27	0,30	0,36	0,18	0,34	0,28	0,19
Year	0,01	0,07	0,00	0,00	0,05	0,00	0,01	0,03	0,00
Size				0,07	0,04	0,26	0,07	0,04	0,22
Tangibility				0,16	0,08	0,10	0,18	0,09	0,11
Profitability				0,22	0,26	0,00	0,29	0,30	0,00
Resource firm							0,01	0,01	0,00
Resource country							0,02	0,03	0,00
Private credit							0,01	0,02	0,03
Market activity							0,01	0,05	0,05
Concentration							0,02	0,01	0,04
Deposit insurance							0,01	0,01	0,01
Corruption							0,01	0,01	0,10
CPI							0,00	0,01	0,02
Profit tax							0,01	0,01	0,01
Common law							0,01	0,05	0,07
GDP growth							0,00	0,02	0,02
Developed							0,00	0,01	0,06
Rating							0,01	0,04	0,06
R2	0,13	0,23	0,35	0,21	0,32	0,39	0,17	0,30	0,37
Obs	25373	23506	25373	22753	21083	22753	19001	17569	19001

Notes: Each cell represents the variation that is addressed to the given explanatory variable as a share of total variation explained by the model. Dependent variables: "Book leverage"– Total long- and short-term interest bearing debt to total assets; "Market leverage"– Total long- and short-term interest bearing debt to market value of the firm; "Maturity"– Long-term debt total debt. Independent variables: "Size"– Natural logarithm of assets in US dollars, millions; "Tangibility"– Fixed assets to total assets; "Profitability"– Cash from operations to total assets; "Resource firm"– Binary variable for 1=resource firm; "Resource country"– Binary variable with 1=Resource-dependent country; "Corruption"– Corruption, high value indicates more corrupt, "CPI"– Consumer price inflation, %, year-on-year; "Concentration"– The share of assets of the three largest banks of total bank assets; "Private credit"– Domestic credit to private sector, % of GDP; "Market activity"– Stock market turnover, % of GDP; "Common law"– Binary variable with 1=common law legal origins; "GDP growth"– Annual real GDP growth rate, %; "Developed"– Binary variable with 1=developed country; "Deposit insurance"– Binary variable for deposit insurance with 1=deposit insurance scheme; "Profit tax"– Profit tax, % of commercial profits; "Rating"– S&P country credit rating in numeric scale.

## 4.2 Regression results

Our regression results presented in Table 5 show that resource firms and firms in resource-dependent countries tend to have less debt, even when controlling for firm- and country-specific factors. The result is especially clear in the case of short-term debt. The coefficient for debt maturity is positive, but insignificant, for both resource indicators. Firm-specific control variables are similar to the main findings of the previous literature. Bigger and more tangible firms have more debt and that debt carries longer maturity. Profitability is negatively associated with leverage.

Table 5 Pooled regression results

	<i>Dependent variable:</i>				
	Book leverage	Market leverage	Short-term debt	Long-term debt	Maturity
Size	0.011*** (,001)	0.010*** (,002)	-0.001* (,001)	0.013*** (,001)	0.039*** (,002)
Tangibility	0.135*** (,015)	0.150*** (,016)		0.125*** (,011)	0.277*** (,023)
Profitability	-0.355*** (,029)	-0.473*** (,038)	-0.191*** (,016)	-0.159*** (,016)	-0.062** (,031)
Market-to-book	-0.004** (,002)	-0.040*** (,003)	-0.004*** (,001)	-0.003* (,002)	-0.017*** (,004)
Resource firm	-0.064*** (,020)	-0.082*** (,020)	-0.029*** (,011)	-0.042*** (,016)	0,047 (,034)
Resource country	-0.024** (,010)	-0.031*** (,011)	-0.017*** (,005)	-0,007 (,007)	0,021 (,016)
Private credit	0.037*** (,009)	0.059*** (,010)	0.035*** (,005)		-0.043*** (,013)
Market activity	-0.011* (,006)	-0.030*** (,006)	-0.009*** (,002)		0.019** (,009)
Concentration	-0.071*** (,015)	-0.088*** (,018)		-0.069*** (,009)	-0.199*** (,022)
Deposit insurance	-0.024** (,011)	-0.029*** (,011)	-0.026*** (,005)	-0,002 (,007)	0.030* (,016)
Corruption	-0.018** (,008)	-0.029*** (,009)	0.013*** (,004)	-0.027*** (,005)	-0.112*** (,013)
CPI	0,001 (,001)	0.003*** (,001)	0.001*** (,001)	-0.001*** (,001)	-0.003*** (,001)
Profit tax	0,025 (,020)	0.041* (,023)	-0,013 (,010)	0.047*** (,016)	0.085*** (,032)
Common law	-0.025*** (,009)	-0.063*** (,010)	-0.040*** (,004)	0.017*** (,006)	0.089*** (,014)
GDP growth	0,001 (,001)	-0,0003 (,001)	0.001*** (,0)	0,000 (,001)	-0.003*** (,001)
Developed	-0,005 (,012)	0.030** (,013)	-0,004 (,006)	-0,001 (,008)	-0.056*** (,018)
Rating	-0.005*** (,001)	-0.011*** (,002)	-0.002*** (,001)	-0.003*** (,001)	-0.005** (,002)
Constant	0.190*** (,036)	0.430*** (,045)	0.130*** (,015)	0.063** (,027)	0.454*** (,060)
Observations	14,457	14,261	16,620	16,457	14,457
R <sup>2</sup>	0,19	0,34	0,23	0,29	0,39

Notes: Robust standard errors clustered by firm below coefficient in parenthesis. Year and industry dummies included in all regressions. \*p<0.1; \*\*p<0.05; \*\*\*p<0.01. Dependent variables: "Book leverage"– Total long- and short-term interest bearing debt to total assets; "Market leverage"– Total long- and short-term interest bearing debt to market value of the firm; "St debt"– Short-term interest bearing debt to total assets; "Lt debt"– Long-term interest bearing debt to total assets; "Maturity"– Long-term debt to total debt. One period lagged values of independent variables are used. Independent variables: "Size"– Natural logarithm of assets in US dollars, millions; "Tangibility"– Fixed assets to total assets; "Profitability"– Cash from operations to total assets; "Resource firm"– Binary variable for 1=resource firm; "Resource country"– Binary variable with 1=Resource-dependent country; "Corruption"– Corruption, high value indicates more corrupt, "CPI"– Consumer price inflation, %, year-on-year; "Concentration"– The share of assets of the three largest banks of total bank assets; "Private credit"– Domestic credit to private sector, % of GDP; "Market activity"– Stock market turnover, % of GDP; "Common law"– Binary variable with 1=common law legal origins; "GDP growth"– Annual real GDP growth rate, %; "Developed"– Binary variable with 1=developed country; "Deposit insurance"– Binary variable for deposit insurance with 1=deposit insurance scheme; "Profit tax"– Profit tax, % of commercial profits; "Rating"– S&P country credit rating in numeric scale. Independent variables "Tangibility", "Market-to-Book", "Private Credit", "Market activity" and "Concentration" removed from the regressions when the coefficient is not statistically significant at 10% level due to large amount of missing observations.

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A country's institutional environment matters greatly for firm capital structure. Previous research shows banks tend to provide shorter term debt than debt markets. Our regression here also backs up the notion that a higher level of bank credit to private sector is linked to more, but shorter, term debt. Correspondingly, higher stock market activity coincides with less debt and of longer maturity as firms in more market-based financial systems rely more heavily on equity finance and bond issues to raise money. Bank concentration is related to less debt, especially long-term debt. Common law legal origins and deposit insurance schemes are related to less debt and debt with longer maturity.

Country credit rating is negatively related to leverage, even if we do not control separately the development level in our regressions. That result is in line with Jõeveer (2013) and could reflect the finding of Fan et al. (2012) that government bond markets seem to crowd out firm debt. In our regressions, the level of economic development is positively related to market leverage. Somewhat surprisingly, debt maturity is shorter in developed countries, which contradicts the positive correlation observed between the two variables in Table 2. Overall leverage is lower in more corrupted countries and debt maturity tends to be shorter. Contrary to our result, Fan et al. (2012) find that the level of debt is *higher* in more corrupted countries. They reason that this is due to the widespread use of equity financing in less corrupted countries. However, we also have opposite signs for the coefficient when looking at short- and long-term debt in isolation. The association of higher corruption to more short-term and less long-term debt is in line with results of Fungáčová et al. (2015). In countries with weak institutions, banks seem unwilling to provide long-term financing. Similarly, higher inflation coincides with shorter debt maturity. However, as noted from correlation matrix in Table 2, corruption is also highly correlated to development level and country credit rating, so variables are susceptible to multicollinearity that can lead to instability in the coefficients without compromising the model.

When it comes to short-term debt and total debt relative to assets, our model seems to capture only about a fifth of variation. In contrast, long-term debt and debt relative to firm value are better captured by our model. This level of explanatory power is in line with previous research with similar cross-country firm leverage data (Fan et al., 2012).

Our results are not driven only by flight to quality in the exceptional time of global financial crisis; the results hold for 2007 before the financial crisis hit. Given that we do not have country dummies in our regressions, we confirm that the results are not driven by individual

countries either, by removing one by one countries with a large amount of observations, namely the US, Indonesia, Thailand and China. The results remain robust.<sup>4</sup>

Table 6 Pooled regression results with interaction terms

	Dependent variable:				
	Book leverage	Market leverage	Short term debt	Long term debt	Maturity
Size	0.015*** (,002)	0.014*** (,002)	-0,001 (,001)	0.016*** (,001)	0.043*** (,003)
Tangibility	0.155*** (,018)	0.169*** (,019)		0.151*** (,013)	0.281*** (,025)
Profitability	-0.360*** (,034)	-0.504*** (,047)	-0.199*** (,019)	-0.154*** (,018)	-0.060* (,034)
Market-to-book	-0.005** (,002)	-0.040*** (,003)	-0.004*** (,001)	-0.004*** (,001)	-0.018*** (,004)
Resource firm	0,056 (,034)	0,026 (,035)	-0,026 (,016)	0.086*** (,028)	0.142** (,061)
Resource country	-0.022** (,010)	-0.029*** (,011)	-0.017*** (,005)	-0,007 (,007)	0,024 (,016)
Private credit	0.040*** (,009)	0.063*** (,010)	0.036*** (,005)		-0.039*** (,013)
Market activity	-0.012** (,006)	-0.031*** (,006)	-0.009*** (,002)		0.017* (,009)
Concentration	-0.070*** (,015)	-0.086*** (,018)		-0.066*** (,009)	-0.197*** (,022)
Deposit insurance	-0.025** (,011)	-0.030*** (,011)	-0.026*** (,005)	-0,001 (,007)	0.027* (,016)
Corruption	-0.016* (,008)	-0.026*** (,009)	0.013*** (,004)	-0.026*** (,005)	-0.109*** (,013)
CPI	0,001 (,001)	0.003*** (,001)	0.001*** (,001)	-0.001* (,001)	-0.003** (,001)
Profit tax	0,026 (,020)	0.043* (,023)	-0,013 (,010)	0.044*** (,015)	0.086*** (,032)
Common law	-0.023** (,009)	-0.062*** (,010)	-0.040*** (,004)	0.018*** (,006)	0.091*** (,014)
GDP growth	0.001* (,001)	-0,0001 (,001)	0.001*** (,0)	0,00005 (,001)	-0.003*** (,001)
Developed	-0,007 (,011)	0.029** (,013)	-0,005 (,006)	-0,003 (,008)	-0.058*** (,018)
Rating	-0.005*** (,001)	-0.011*** (,002)	-0.002*** (,001)	-0.003*** (,001)	-0.005** (,002)
Size*Resource firm	-0.015*** (,003)	-0.015*** (,003)	-0,001 (,001)	-0.012*** (,003)	-0.017*** (,005)
Tangibility*Resource firm	-0,035 (,037)	-0,032 (,039)		-0.073*** (,025)	0,058 (,067)
Profitability*Resource firm	0,058 (,055)	0.176*** (,066)	0,039 (,036)	0,009 (,030)	0,022 (,078)
Constant	0.150*** (,037)	0.392*** (,046)	0.128*** (,015)	0,028 (,027)	0.418*** (,061)
Observations	14,457	14,261	16,620	16,457	14,457
R <sup>2</sup>	0,20	0,34	0,23	0,30	0,39

Notes: Robust standard errors clustered by firm below coefficient in parenthesis. Year and industry dummies included in all regressions.

\*p<0.1; \*\*p<0.05; \*\*\*p<0.01. Dependent variables: "Book leverage"– Total long- and short-term interest bearing debt to total assets; "Market leverage"– Total long- and short-term interest bearing debt to market value of the firm; "St debt"– Short-term interest bearing debt to total assets; "Lt debt"– Long-term interest bearing debt to total assets; "Maturity"– Long-term debt/total debt. One period lagged values of independent variables are used.

Independent variables: "Size"– Natural logarithm of assets in US dollars, millions; "Tangibility"– Fixed assets to total assets; "Profitability"– Cash from operations to total assets; "Resource firm"– Binary variable for 1=resource firm; "Resource country"– Binary variable with 1=Resource-dependent country; "Corruption"– Corruption, high value indicates more corrupt; "CPI"– Consumer price inflation, %, year-on-year; "Concentration"– The share of assets of the three largest banks of total bank assets; "Private credit"– Domestic credit to private sector, % of GDP; "Market activity"– Stock market turnover, % of GDP; "Common law"– Binary variable with 1=common law legal origins; "GDP growth"– Annual real GDP growth rate, %; "Developed"– Binary variable with 1=developed country; "Deposit insurance"– Binary variable for deposit insurance with 1=deposit insurance scheme; "Profit tax"– Profit tax, % of commercial profits; "Rating"– S&P country credit rating in numeric scale. Independent variables "Tangibility", "Market-to-Book", "Private Credit", "Market activity" and "Concentration" removed from the regressions when the coefficient is not statistically significant at 10% level due to large amount of missing observations.

<sup>4</sup> Regression results for 2007 and the regression results excluding one-by-one United States, Indonesia, Thailand and China are available on request.

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We test the interaction of resource firm indicator with firm size, tangibility and profitability with the results presented in Table 6. Larger resource firms have less debt and shorter maturity debt than smaller resource firms. More profitable resource firms have a higher level of market leverage. When the coefficient for the size variable and the resource firm-size interaction term are summed up, size does not seem to be associated with higher leverage for resource firms. This finding directly contradicts the very clear result in the earlier literature of a positive correlation between firm size and leverage (Frank and Goyal, 2009). As our results could reflect a strong positive correlation between size and profitability of resource firms, we test for this. While the correlation is higher in case of resource firms than all firms in our data presented in Table 2, the Pearson correlation coefficient of 0.18 it is not high enough to disturb the result by multicollinearity. We also find no evidence that investment intensity of resource firms declines significantly with size.

Our results suggest that firms domiciled in resource-dependent countries have less debt, especially short-term debt. This could, of course, be due to the fact that, even when industry fixed effects are controlled for in our regressions, resource firms and firms closely linked to resources in general take on less debt which steers the average financial structure of the resource-dependent country where resource firms play a big role.

There are many challenges in finding the right control group when seeking additional evidence that location in a resource-dependent country affects the capital structure of a firm. Many industries such as transportation and certain types of manufacturing are likely to be closely linked to resource firms in resource-dependent countries. Such close relations could affect access to finance for such firms.

We limit the sample to two consumer sectors in the data: Consumer Staples and Consumer Discretionary. We expect the consumer sectors to be less linked to resource sector than many other industries. Consumer sectors are not likely to be involved with mineral extraction supply chains, and even if the consumer sectors serve the employees of resource firms, the resource sector is not usually a major employer in a country.<sup>5</sup> Moreover, this control group is sufficiently large (7,541 firm-year observations, of which 1,236 are from resource-dependent countries). The average debt maturity for these firms is 0.48 and book leverage is 0.23, so these firms have less debt and the debt has shorter maturity than that of non-resource firms in general (see

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<sup>5</sup> Employment data from the International Labour Organization database for Australia, Chile, Colombia, Egypt, Kazakhstan, Norway, Peru, Russia, Saudi Arabia, South Africa, United Arab Emirates and Venezuela show that, on average, mining and quarrying activities account for 1.5% of total employment.

Table 3). Again, the results in Table 7 suggest that overall leverage is lower for firms in countries where mineral exports play a pronounced role.

Table 7 Firms in consumer sectors

	<i>Dependent variable:</i>				
	Book leverage	Market leverage	Short term debt	Long term debt	Maturity
Size	0.013*** (,003)	0.009** (,004)	-0,002 (,002)	0.014*** (,002)	0.041*** (,004)
Tangibility	0.124*** (,027)	0.171*** (,030)	0,009 (,016)	0.123*** (,020)	0.288*** (,040)
Profitability	-0.355*** (,049)	-0.645*** (,071)	-0.236*** (,031)	-0.146*** (,028)	-0.185*** (,055)
Resource country	-0.060*** (,016)	-0.056*** (,019)	-0.030** (,012)	-0.026** (,011)	0,024 (,031)
Private credit		0.042** (,017)	0.038*** (,011)	-0.019** (,009)	-0.054*** (,021)
Market activity		-0.037*** (,011)	-0.009* (,005)		
Concentration	-0.083*** (,022)	-0.101*** (,031)	-0.032* (,018)	-0.065*** (,015)	-0.189*** (,035)
Deposit insurance	-0,02 (,019)	-0,01 (,022)	-0.033** (,014)	0,007 (,011)	0,042 (,031)
Corruption	-0.053*** (,013)	-0.087*** (,019)	-0.021** (,010)	-0.037*** (,009)	-0.109*** (,023)
CPI	0.003** (,001)	0.004*** (,002)	0.005*** (,001)	-0.002* (,001)	-0.006*** (,002)
Profit tax	0,056 (,035)	0,027 (,040)	-0,015 (,019)	0.081*** (,028)	0.231*** (,057)
Common law	-0.026* (,015)	-0.057*** (,021)	-0.062*** (,010)	0.037*** (,011)	0.154*** (,023)
GDP growth	-0,001 (,001)	-0,002 (,001)	0,001 (,001)	-0.002** (,001)	-0.005*** (,002)
Developed	-0,004 (,016)	0,011 (,023)	-0.019* (,011)	0,01 (,012)	-0,019 (,031)
Rating	-0.009*** (,002)	-0.016*** (,003)	-0.004*** (,002)	-0.005*** (,002)	-0.008** (,003)
Constant	0.307*** (,055)	0.511*** (,075)	0.228*** (,042)	0.088** (,038)	0.274*** (,092)
Observations	5,483	4,641	4,927	5,342	5,342
R <sup>2</sup>	0,16	0,28	0,21	0,28	0,38

Notes: Robust standard errors clustered by firm below coefficient in parenthesis. Year and industry dummies included in all regressions. \*p<0.1; \*\*p<0.05; \*\*\*p<0.01. Dependent variables: "Book leverage"– Total long- and short-term interest bearing debt to total assets; "Market leverage"– Total long- and short-term interest bearing debt to market value of the firm; "St debt"– Short-term interest bearing debt to total assets; "Lt debt"– Long-term interest bearing debt to total assets; "Maturity"– Long-term debt/total debt. One period lagged values of independent variables are used. Independent variables: "Size"– Natural logarithm of assets in US dollars, millions; "Tangibility"– Fixed assets to total assets; "Profitability"– Cash from operations to total assets; "Resource country"– Binary variable with 1=Resource-dependent country; "Corruption"– Corruption, high value indicates more corrupt, "CPI"– Consumer price inflation, %, year-on-year; "Concentration"– The share of assets of the three largest banks of total bank assets; "Private credit"– Domestic credit to private sector, % of GDP; "Market activity"– Stock market turnover, % of GDP; "Common law"– Binary variable with 1=common law legal origins; "GDP growth"– Annual real GDP growth rate, %; "Developed"– Binary variable with 1=developed country; "Deposit insurance"– Binary variable for deposit insurance with 1=deposit insurance scheme; "Profit tax"– Profit tax, % of commercial profits; "Rating"– S&P country credit rating in numeric scale. Independent variables "Tangibility", "Market-to-Book", "Private Credit", "Market activity" and "Concentration" removed from the regressions when the coefficient is not statistically significant at 10% level due to large amount of missing observations.

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We cannot rule out that the link between being domiciled in resource-dependent country and differences in capital structure are due to some omitted variable. However, we control for many of the variables the previous literature has shown important in determining firm capital structure. Moreover, mineral resources can be considered as an initial factor endowment of a country. Consequently, other country-specific factors are not necessarily independent of its natural resources. The earlier literature has found many institutional factors causing challenges for economic development in resource-dependent economies such as poor governance and rent-seeking behavior (Bardhan, 1997) and low levels of education (Gylfason, 2001).

Resource-dependence might be endogenous to the level of economic development (see e.g. Frankel, 2010) as high resource-dependence could lead to underdevelopment of other sectors. However, our sample resource-dependent countries do not show lower levels of economic development measured in terms of GDP.

Thus, while reverse causality cannot be ruled out, we argue it is more likely that the financial infrastructure and firm capital structure are organized on the basis of the factor endowments in the economy and not that resource dependence emerges *because* of the financial sector structure. We also use lagged values of independent variables to reduce the risk for contemporaneous correlation between independent variables and the error term.

We encounter a significant survival bias as our sample includes only listed firms included in the main equity index of a given country. Even so, we would expect our results to be weaker than when smaller firms are included, because larger firms are less constrained by the practices of the domestic banking sector.

Whether the finding of less debt, especially shorter maturity debt is due to the fact that financial sector in resource dependent countries does not provide services that firms need, or due to the idea that certain types of firms thrive in resource-dependent countries, our results suggest that a major sector in the country might steer the economy in a direction unfavorable for firms needing different services. Being domiciled in resource-dependent country seems to be a previously undetected country-specific determinant for capital structure. In particular, short-term debt is used by emerging industries, so the unavailability of financial services might hamper the rise of new businesses and exacerbate the resource curse.

## 5 Conclusions

Our hypothesis is that financial services in countries with large resource sectors are organized to serve large resource firms at the expense of other firms that may have different financial needs. The lack of access to finance for small firms and firms in emerging industries hampers growth and exacerbates the effects of the resource curse.

We present empirical evidence that resource firms tend to have lower debt loads than other non-financial firms. This finding remains robust when several firm- and country-specific factors are introduced into our regressions. We also find evidence of longer debt maturity for resource firms. Our results also indicate that the level of leverage of the resource firms does not increase with firm size as it does for other firms.

Notably, firms in other sectors in resource-dependent countries exhibit capital structures similar to resource firms. Their overall leverage is lower. Short-term debt, in particular, is less commonly used in resource-dependent countries than in other countries. This suggests that the existence of a large resource sector might affect other industries through some financial channel. While we cannot verify whether the channel is through the financial sector or other unobserved institutional factors, it is clear that the simple fact of being located in a resource-dependent country affects the capital structure of a firm.

These results are hardly exhaustive. Data limitations prevent us from finding more detailed information on what kinds of firms or industries thrive or fail in resource-dependent economies. Moreover, we have only considered large listed firms included in the main equity index of each sample country. Such firms are survivors. They have grown and flourished in the given environment and are perhaps no longer restricted in their access to finance. Still, we observe that the capital structure of these firms is tilted towards the capital structure of the resource sector in resource-dependent countries. It would be therefore interesting to extend this study to small and mid-sized companies that are more likely to be affected negatively by a domestic financial sector geared to serving the needs of large resource firms.



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# Appendices

## Appendix 1 Equity indices included

<b>Country</b>	<b>Index in Bloomberg</b>	<b>Country</b>	<b>Index in Bloomberg</b>
1 Argentina	Argent Merval	37 Malaysia	FTSE Malay KLCI
2 Australia	ASX200	38 Mexico	MEX IPC
3 Austria	ATX Austria Trd	39 Mongolia	MSE top 20
4 Bahrain	Bahrain All Share	40 Namibia	FTSE/Namibia
5 Belgium	BEL 20 index	41 Netherlands	AEX-index
6 Botswana	Botswana Gab	42 New Zealand	NZX 50
7 Brazil	IBOVESPA	43 Nigeria	Nigeria SE All
8 Bulgaria	BSE Sofix	44 Norway	OBX Stock
9 Canada	TSX	45 Oman	Muscat SM 30
10 Chile	Chile SM Select	46 Pakistan	KARACHI 100
11 China	CSI300	47 Peru	Peru Lima Gen
12 Colombia	Colom COLCAP	48 Philippines	PSEi Philippine
13 Croatia	Zagreb CROBEX	49 Poland	WIG 20
14 Czech Republic	Prague SE index	50 Portugal	PSI General POR
15 Denmark	OMX Copenhagen 20	51 Qatar	QE index
16 Egypt	Egypt Hermes	52 Romania	Bucharest BET
17 Estonia	OMX Tallinn index	53 Russia	RTS Index
18 Finland	OMX Helsinki 25	54 Saudi Arabia	Tadawull
19 France	CAC 40 Index	55 Singapore	FTSE Straits Tim
20 Germany	DAX Index	56 Slovakia	Slovak Share Index
21 Ghana	GSE Comp	57 Slovenia	Slovenia Blue Chip
22 Greece	Athex Composite	58 South Africa	FTSE/JSE Africa Top 40
23 Hong Kong	Hang Seng	59 South Korea	KRX 100
24 Hungary	Budapest SE index	60 Spain	IBEX35 ESP
25 India	S&P BSE SENSEX 30	61 Sweden	OMX STKH30
26 Indonesia	Jakarta Comp	62 Switzerland	Swiss Market Index
27 Ireland	ISEQ Overall	63 Taiwan	Taiwan TAIEX
28 Israel	Tel Aviv 25	64 Tanzania	Tanzania all sh
29 Italy	FTSE MIB ITA	65 Thailand	SE Thai Index
30 Japan	Nikkei 225	66 Tunisia	Tunis SE
31 Kazakhstan	KASE	67 Turkey	BIST 100 Index
32 Kenya	Nairobi SE 20	68 Ukraine	PFTS Index
33 Kuwait	Kuwait SE Weighted	69 United Arab Emirates	DFM General Index
34 Latvia	OMX Riga index	70 United Kingdon	FTSE 100 Index
35 Lithuania	OMX Vilnius index	71 United States	S&P500
36 Luxembourg	LuxX	72 Venezuela	Venezuela SM
		73 Vietnam	Ho Chi Minh Stk

Index compositions as of November 2013

## Appendix 2 Data description and sources

Firm variables	Description	Source	Bloomberg code
Sector	Global Industry Classification Standard (GICS) by MSCI and Standard & Poor's including 10 sectors, 67 industries and 156 sub-industries	Bloomberg	GICS_SECTOR_NAME
Industry		Bloomberg	GICS_INDUSTY_NAME
Sub-industry		Bloomberg	GICS_SUB_INDUSTY_NAME
Country	Country of domicile	Bloomberg	COUNTRY_OF_DOMICILE
Assets	Total assets	Bloomberg	BS_TOT_ASSET
Market capitalization	Market capitalization	Bloomberg	HISTORICAL_MARKET_CAP
Long-term debt	All interest-bearing financial obligations that are not current	Bloomberg	BS_LT_BORROW
Short-term debt	Includes bank overdrafts, short-term debts and borrowings, repurchase agreements	Bloomberg	BS_ST_BORROW
Cash From Operations	Cash From Operations	Bloomberg	CF_CASH_FROM_OPER
Capital Expenditures	Capital Expenditures	Bloomberg	CAPITAL_EXPEND
Fixed assets	Property, plant and equipment	Bloomberg	ARD_PROPERTY_PLANT_EQUIP_NET
Value	Market capitalization + long and short term debt + preferred equity and minority interest	Bloomberg	HISTORICAL_MARKET_CAP+BS_LT_BORROW+BS_ST_BORROW+PREFERRED_EQUITY_&MINORITY_INT
Market-to-book	Value/Total assets	Bloomberg	
Size	Natural logarithm of Total asset in USD	Bloomberg/World DataBank	
Profitability	Cash From Operations/Total assets	Bloomberg	
Tangibility	Property, plant and equipment/Total assets	Bloomberg	
Book leverage	Total debt/Total assets		
Market leverage	Total debt/Value		
Country variables	Description	Source	
GDP USD	Gross domestic product in US dollars	World DataBank	
GDP lcu	Gross domestic product in local currency unit	World DataBank	
GDP per capita	Gross domestic product in US dollars per capita	World DataBank	
GDP growth	Annual GDP growth rate, %	World DataBank	
Developed	Binary variable with 1 indicating high-income economy by World Bank country rank in 2008	The World Bank country income classification	
CPI	Annual change in consumer price index, %	World DataBank	
Corruption	Corruption index by country ranking in standardized normal distribution higher values indicating less corrupt. We use inverted scale.	World DataBank	
Common law	Binary variable with 1 indicating common law legal origins	La Porta et al. (1999)	
Deposit insurance	Binary variable with 1 indicating that country has a deposit insurance	Demirguc-Kunt et al. (2005)	
Profit tax rate	Profit tax, % of commercial profits	World DataBank	
Bank concentration	Assets of three largest banks as a share of total commercial banking assets, %	World DataBank	
Private credit	Domestic credit to private sector, % of GDP	World DataBank	
Market activity	Stock market turnover, % of GDP	World DataBank	
Exchange rate	Exchange rate USD per local currency	World DataBank	
Fuel exports	Fuel exports, % of merchandise exports	World DataBank	
Metal exports	Ores and metals exports, % of merchandise exports	World DataBank	
Diamond exports	Diamond exports, % of merchandise exports	Central Statistics Office of Botswana, Ghana statistical service, Statistics Namibia	
Rating	Standard & Poors sovereign credit rating for 2011. We change it into numeric with best AAA rating at 21 and worst in our sample CC at value 5.	Standard & Poor's	

## Appendix 3 Variable means by country

		n	Book leverage	Market leverage	Maturity	Size	Tangibility	Profitability	Market-to-book	Mineral exports	Corruption	CPI	Concentration	Private credit	Market activity	Common law	GDP growth	Deposit insurance	Profit tax	GDP/cap. USD	Rating	Resource country
1	Argentina	55	0,23	0,33	0,66	7,76	0,54	0,15	1,00	0,12	0,45	9,23	0,56	0,13	0,01	0	4,6	1	1,09	11611,89	6	0
2	Australia	994	0,22	0,19	0,66	6,98	0,25	0,10	1,96	0,62	-2,01	2,69	0,86	1,23	0,88	1	2,82	0	0,48	55006,93	21	1
3	Austria	98	0,25	0,31	0,74	8,54	0,36	0,10	0,97	0,07	-1,67	2,21	0,59	1,16	0,15	0	1,03	1	0,51	48898,95	21	0
4	Bahrain	98	0,06	0,06	0,17	4,99	0,33	0,09	1,03	0,87	-0,30	2,46	0,86	0,66	0,03	0	4,64	1	0,14	21920,59	12	1
5	Belgium	81	0,28	0,29	0,73	8,86	0,27	0,09	1,41	0,13	-1,47	2,27	0,63	0,91	0,28	0	0,91	1	0,57	45855,86	18	0
6	Bermuda	19	0,46	0,43	0,92	8,85	0,36	0,06	1,12	0,06	-1,31		0,98		0,01	1	-1,9	1	0,41	88601,1	17	0
7	Botswana	59	0,11	0,05	0,44	3,39	0,40	0,20	2,30	0,73	-0,95	8,04	0,83	0,28		0	5,15	0	0,2	6305,7	14	1
8	Brazil	397	0,31	0,31	0,74	8,73	0,30	0,07	1,52	0,24	0,04	5,36	0,67	0,58	0,37	0	3,9	1	0,46	10408,74	12	0
9	Bulgaria	67	0,17	0,23	0,50	5,41	0,50	0,06	1,02	0,31	0,25	4,86	0,69	0,69	0,03	0	1,71	1	0,3	7107,11	12	0
10	Canada	1287	0,21	0,20	0,73	7,60	0,50	0,10	1,48	0,35	-1,99	1,70	0,68	1,25	0,90	1	1,54	1	0,3	48700,33	21	0
11	Chile	215	0,29	0,25	0,77	5,47	0,43	0,09	1,40	0,62	-1,44	3,19	0,52	1,00	0,20	0	4,09	1	0,26	12912,7	16	1
12	China	1749	0,25	0,19	0,32	7,74	0,39	0,07	2,42	0,03	0,52	3,40	0,30	1,24	1,12	0	9,77	0	0,45	4772,05	17	0
13	Colombia	59	0,20	0,18	0,78	7,99	0,30	0,08	1,26	0,60	0,33	3,87	0,85	0,44	0,08	0	4,53	1	0,79	6459,72	11	1
14	Croatia	134	0,28	0,39	0,51	6,09	0,46	0,06	0,93	0,18	0,00	2,97	0,64	0,68	0,03	0	-0,81	1	0,21	14105,49	11	0
15	Czech Republic	42	0,20	0,17	0,62	6,32	0,42	0,14	1,33	0,05	-0,26	2,63	0,62	0,51	0,12	0	0,89	1	0,51	20222,5	17	0
16	Denmark	97	0,24	0,18	0,77	8,13	0,24	0,14	2,25	0,10	-2,45	2,10	0,39	2,06		0	-0,49	1	0,28	59580,32	21	0
17	Egypt, Arab Rep.	166	0,19	0,21	0,43	6,09	0,38	0,08	1,33	0,41	0,60	11,00	0,64	0,35	0,26	0	4,31	0	0,43	2580,08	7	1
18	Estonia	82	0,28	0,33	0,63	5,00	0,36	0,09	1,03	0,17	-0,94	4,51	0,96	0,89		0	0,49	1	0,52	16863,92	17	0
19	Finland	147	0,23	0,27	0,69	8,56	0,26	0,09	1,22	0,14	-2,29	2,21	0,89	0,90		0	0,09	1	0,43	48956,88	21	0
20	France	224	0,24	0,31	0,73	10,67	0,22	0,08	0,93	0,07	-1,42	1,55	0,31	1,09	0,59	0	0,64	1	0,66	42376,58	21	0
21	Germany	175	0,27	0,33	0,73	10,69	0,23	0,08	1,07	0,05	-1,74	1,70	0,57	1,02	0,59	0	1,02	1	0,47	43797,51	21	0
22	Ghana	77	0,21	0,23	0,27	4,06	0,38	0,09	1,54	0,30	0,01	12,20	0,64	0,16	0,00	1	8,28	0	0,32	1423,36	6	0
23	Greece	338	0,29	0,44	0,51	6,53	0,39	0,05	0,85	0,35	0,05	2,40	1,00	1,08	0,17	0	-3,83	1	0,46	26742,64	1	0
24	Hong Kong SAR, China	143	0,25	0,25	0,71		0,33	0,09	1,49	0,13	-1,84	3,28	0,94	1,77	6,31	1	3,24	0	0,23	33677,13	21	0
25	Hungary	60	0,19	0,24	0,58	6,36	0,44	0,11	0,96	0,05	-0,34	4,90	0,82	0,63	0,17	0	-0,44	1	0,53	13663,62	10	0
26	India	176	0,20	0,17	0,62	8,85	0,27	0,14	2,50	0,23	0,50	9,57	0,26	0,49	0,58	1	7,3	1	0,44	1285,54	11	0
27	Indonesia	2240	0,26	0,28	0,40	2,95	0,38	0,07	1,41	0,39	0,67	5,98	0,29	0,31	0,14	0	5,84	1	0,39	2952,41	10	0
28	Ireland	274	0,21	0,22	0,62	6,51	0,22	0,06	1,44	0,02	-1,64	1,10	0,87	1,96	0,05	1	0,2	1	0,25	53666,34	13	0
29	Israel	111	0,34	0,28	0,65	7,15	0,27	0,14	1,82	0,02	-0,78	2,54	0,77	0,91	0,36	0	3,87	0	0,31	30832,28	16	0
30	Italy	171	0,31	0,35	0,69	9,32	0,29	0,09	1,15	0,06	-0,10	2,07	0,29	1,12	0,48	0	-1,05	1	0,69	37098,82	15	0
31	Japan	1350	0,28	0,36	0,58	9,35	0,32	0,07	0,89	0,05	-1,47	-0,09	0,95	1,80	0,98	0	0,46	1	0,41	40845,84	17	0
32	Kazakhstan	26	0,11	0,15	0,46	8,05	0,52	0,22	1,10	0,84	0,92	8,41	0,52	0,43	0,02	0	5,56	1	0,33	9967,61	13	1
33	Kenya	98	0,19	0,22	0,49	5,63	0,48	0,12	1,16	0,06	1,01	11,09	0,57	0,28	0,02	1	5,05	1	0,47	1028,69	7	0
34	Korea, Rep.	584	0,21	0,24	0,50	8,57	0,30	0,08	1,26	0,10	-0,46	2,92	0,51	1,39	1,45	0	3,48	1	0,33	22677,4	15	0
35	Kuwait	556	0,19	0,23	0,32	5,34	0,28	0,08	1,05	0,95	-0,23	5,11	0,90	0,68	0,17	0	2,29	0	0,11	45822,47	18	1
36	Latvia	171	0,20	0,36	0,39	3,39	0,44	0,05	0,53	0,10	-0,18	4,85	0,93	0,85		0	0,08	1	0,37	13732,31	10	0
37	Lithuania	145	0,24	0,35	0,45	5,55	0,51	0,09	0,83	0,24	-0,20	4,25	0,91	0,58		0	2,21	1	0,44	13680,97	12	0
38	Malaysia	138	0,23	0,16	0,71	8,49	0,41	0,16	2,28	0,20	-0,17	2,37	0,77	1,11	0,46	0	4,69	1	0,35	9344,33	14	0
39	Mexico	199	0,25	0,20	0,72	8,23	0,36	0,12	1,75	0,18	0,35	4,26	0,55	0,25	0,10	0	2,09	1	0,44	9276,85	12	0
40	Netherlands	128	0,28	0,25	0,80	9,53	0,24	0,10	1,17	0,15	-2,15	1,99	0,97	1,85	0,82	0	4,03	1	0,39	52079,9	21	0
41	New Zealand	211	0,23	0,22	0,74	6,50	0,41	0,09	1,59	0,09	-2,36	2,45	0,96	1,44	0,03	1	1,43	0	0,35	35292,23	18	0
42	Nigeria	577	0,18	0,22	0,25	3,93	0,45	0,08	1,47	0,89	1,05	10,73	0,73	0,21	0,03	0	5,98	1	0,4	2109,38	7	1
43	Norway	117	0,23	0,22	0,71	7,70	0,35	0,10	1,52	0,73	-2,09	1,88	0,92	0,49	0	0,99	1	0,41	93556,44	21	1	
44	Oman	104	0,20	0,20	0,36	5,51	0,39	0,13	1,44	0,84	-0,21	4,81	0,71	0,41	0,09	0	4,79	1	0,22	19904,41	15	1
45	Pakistan	439	0,24	0,28	0,38	5,45	0,42	0,10	1,22	0,06	0,97	11,81	0,89	0,21	0,15	1	3,11	0	0,39	1130,23	5	0
46	Peru	146	0,24	0,24	0,58	6,55	0,50	0,12	1,49	0,64	0,31	3,14	0,67	0,27	0,03	0	6,51	1	0,37	5170,54	12	1
47	Philippines	140	0,32	0,27	0,68	7,12	0,35	0,11	1,65	0,08	0,67	4,28	0,63	0,31	0,12	0	5,28	1	0,46	2193,37	9	0
48	Poland	81	0,14	0,20	0,59	8,48	0,52	0,12	0,93	0,09	-0,42	3,15	0,48	0,50	0,14	0	3,56	1	0,42	12881,95	14	0
49	Portugal	259	0,43	0,57	0,62	7,04	0,29	0,04	0,83	0,10	-0,99	1,77	0,70	1,74	0,25	0	-0,72	1	0,42	22665,28	11	0
50	Qatar	66	0,30	0,26	0,72	7,53	0,36	0,08	1,40	0,89	-1,25	3,74	0,87	0,42	0,21	0	12,65	0	0,11	80995,52	18	1
51	Romania	24	0,15	0,25	0,67	7,17	0,63	0,11	0,91	0,11	0,20	5,64	0,67	0,43	0,01	0	1,77	1	0,45	8858,46	10	0
52	Russian Federation	264	0,25	0,29	0,61	7,79	0,55	0,13	1,21	0,73	1,03	8,82	0,14	0,45	0,42	0	2,68	1	0,43	11755,36	12	1
53	Saudi Arabia	660	0,22	0,17	0,44	6,23	0,48	0,10	1,87	0,89	0,09	5,18	0,54	0,39	0,75	0	5,53	0	0,15	20568,45	17	1
54	Singapore	109	0,22	0,17	0,64	8,85	0,28	0,11	1,51	0,18	-2,19	3,46	0,91	1,04	1,26	1	5,72	0	0,22	47034,86	21	0
55	Slovak Republic	30	0,14	0,27	0,52	5,93	0,48	0,04	0,64	0,08	-0,19	2,60	0,87	0,43	0,00	0	2,73	1	0,49	17324,99	16	0
56	Slovenia	35	0,31	0,45	0,61	7,66	0,52	0,09	0,95	0,09	-0,88	2,59	0,71	0,84	0,02	0	0,08	1	0,34	24288,74	17	0
57	South Africa	181	0,18	0,14	0,66	8,11	0,38	0,16	1,90	0,40	-0,05	6,59	0,99	1,47	0,68	1	2,51	0	0,32	6836,64	13	1
58	Spain	176	0,35	0,39	0,70	9,57	0,32	0,09	1,20	0,09	-1,00	2,20	0,80	1,94	0,92	0	-0,62	1	0,52	31572,59	17	0
59	Sweden	147	0,26	0,22	0,73	9,02	0,22	0,12	1,62	0,12	-2,27	1,45	0,43	1,27		0	1,04	1	0,53	54909,39	21	0
60	Switzerland	161	0,21	0,16	0,70	9,58	0,22	0,12	1,70	0,07	-2,13	0,39	0,44	1,60	1,61	0	1,71	1	0,29	76388,7	21	0
61	Tanzania	20	0,05	0,04	0,36	4,90	0,60	0,30	1,48	0,26	0,62	10,15	0,53	0,12		1	6,67	1	0,44	754,68		

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