Misallocation, Property Rights, and Access to Finance: Evidence from Within and Across Africa*

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Abstract

We utilize establishment-level survey data from the World Bank to answer two questions: What is the extent of capital misallocation within African countries and why does misallocation vary across these countries? We quantify the extent of capital misallocation across 4500 firms within 21 African countries, using four different methodologies. Our results show that misallocation is more severe in African countries than in any other developing country. Interest rates can be as high as 40 percent while the marginal product of capital can be as high as 1300 percent with a very high mean of about 70, indicating that firms could produce significantly more with even a small increase in capital. We show that firms that have less access to finance have higher levels of return on capital. Small, young and privately owned firms also have higher levels of return since these are the firms who face more severe obstacles that hinder their access to finance. We further present evidence that country variation in the strength of property rights and legal system, which eases the financing obstacles of firms, also explain the variation in the extent of misallocation across our African countries.

Keywords: Misallocation, Firms, Investor Rights, Financing Obstacles, MPK

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1 Introduction

A number of recent studies argue that misallocation of resources across firms is an important cause of underdevelopment. If domestic capital markets are functioning well in a country the marginal product of capital for each firm equals market interest rate. If firms instead borrow at different interest rates, maybe due to different access to informal financial markets or due to political connections, the marginal product of capital will differ across firms; i.e., capital is misallocated. Alfaro et al. (2008), Banerjee and Duflo (2005), Bartelsman et al. (2009), Hsieh and Klenow (2009), Restuccia and Rogerson (2008) all provide evidence of misallocation in different countries and show that misallocation of resources can explain a big fraction of the TFP-differences between poor and rich countries.

We ask two questions in this paper: What is the extent of capital misallocation within African countries and why does misallocation vary across these countries? We quantify the extent of capital misallocation across 4500 firms within 21 African countries in 2005 and 2006, utilizing firm-level data from the World Bank Productivity and Investment Climate Survey. This is a unique survey of establishments undertaken as part of a major World Bank initiative between 1999 and 2007 in 80 developed and developing countries around the world. The main purpose of the survey was to identify obstacles to firm performance and growth, hence the survey not only asks questions on firm characteristics and outcomes but also contains many questions on the perceived severity of obstacles such as crime, infrastructure, and financing constraints. Having firms' own perception on the degree of financing constraints is a big advantage of our data set, since the literature mostly infers financing constraints from companies financial statements using different modeling and econometric techniques due to lack of these direct measures.[1] Another advantage of our dataset is that it has information on small and large as well as listed and private firms and hence allows to control for many important firm characteristics. To the best of our knowledge, there is no systematic study undertaken which calculates the extent of misallocation and its determinants for Africa using comparable firm-level data from many countries.

We show that firms with limited access to finance have higher returns on capital which is consistent with misallocation in the sense of too little capital flowing to the more productive firms. We further present evidence that country-level variation in the strength of property rights and quality of the legal system helps explain the variation in misallocation across African countries.

[1] Beck, Demirguc-Kunt, and Maksimovic (2006) show that these self-perceived constraints actually bind and hurt firm growth.

Hence, we contribute to the recent debate on "What works in Africa? Once we calculate the extent of misallocation using different methodologies we can both explain the determinants of this misallocation at the firm level and also relate the country variation in the extent of this misallocation to the broader institutions, investment climate and the business environment in which firms are operating. This in turn helps us answer why certain countries have better allocation of capital across firms; i.e., we can identify relatively successful countries and suggest reasons behind their success.

In the literature, there are various approaches employed for calculating the extent of misallocation of capital across firms within a country. As stated above, one of the advantages of our data set is that it allows us to simply compare the interest rates firms are paying with the market interest rate. This is our starting point since we have data on the interest rates each firm pays on loans. We show that many firms borrow at rates up to 40-50 percent suggesting that firms have even higher marginal returns to capital.[2] We also compare the amount of physical collateral that firms need to post in order to borrow and show that there is a lot of variation both within and across countries in the collateral requirements.

Next, we calculate the marginal product of capital for each firm using firm-level output and capital stocks under the assumption that the production function is Cobb-Douglas (with parameters calibrated from the literature and assumed to be the same for all firms). Doing so reveals that the distribution of the marginal product of capital varies a lot within most of African countries. In addition these MPKs are very high, with country means of 100 percent. This is consistent with the findings of high borrowing rates but inconsistent with the country level MPK estimates of Caselli and Feyrer (2007). It is clear that MPKs are not equalized across firms and country level aggregate figures might mask this fact. We also calculate another measure for the marginal product of capital following Hsieh and Klenow (2009) and compare the distribution across countries.[3]

Once we calculate the extent of misallocation, we seek to explain both the firm-level determinants of differences in returns to capital and the variation in the extent of misallocation across countries. First, we show that firms that have less access to finance have higher levels of return on capital. Small, young, and privately owned firms have higher levels of return since these are the firms who face more severe obstacles that hinder their access to finance. Next, we show a strong

[2]Banerjee (2003) shows similar evidence for other developing countries. He also emphasizes that these rates must be the rates that firm actually pay since default is rare.

[3]We have also attempted a final approach, by estimating the correlation between productivity and size; see Alfaro et al. (2008) and Bartelsman et al. (2008); however, we did not find any clear patterns.

positive correlation between the extent of misallocation and broad institutional development such as weak property rights, corrupt legal systems, and ease of doing business across countries. We find a strong negative correlation between capital misallocation and variables that proxy property rights protection and the strength of legal system such as corruption, investor and shareholder protection and strength of legal rights.[4] We find a similar relation when we look at variables that are suggestive about the ease of doing business and investment climate in general, such as bureaucratic quality, and cost of starting a business.

The rest of the paper is structured as follows. Section 2 describes our data in detail. Section 3 presents preliminary results from our empirical analysis and Section 4 concludes.

2 Data

2.1 Productivity and Investment Climate Survey

The firm-level data comes from "The Productivity and Investment Climate Survey" of the World Bank, administered in roughly parallel fashion to enterprizes in 21 countries in Africa, mostly in face-to-face interviews. The data set provides a basis for making country comparisons of investment climate conditions, as well as comparisons of the severity of constraints affecting the firm and performing country-specific evaluations. It captures firm perceptions of key constraints in the business environment, perceptions that shape operational and investment decisions, as well as several quantitative indices of firm experience.

The first roll-out of surveys conducted in 13 countries, Burundi, Congo, Botswana, Angola, Guinea Bissau, Guinea Conakry, Namibia, Gambia, Mauritania, Swaziland, Tanzania, Uganda, and Rwanda, was done in 2006. In 2007, a second roll-out was conducted in 8 additional countries including South Africa, Mozambique, Zambia, Mali, Ghana, Senegal, Kenya, and Nigeria. Questionnaires of the two roll-outs are not systematically different, except that the second questionnaire generally is more detailed with more small questions.

The dataset has information on 12,752 establishments in 21 countries as the result of merging the first roll-out with the second. Enterprizes are divided into 3 size categories: small, medium, and large. Enterprizes with 5-19 employees are considered small, enterprizes with 20-99 employees are considered medium sized, and large sized enterprizes employ 100 people or more. Also, notice

[4] Johnson et al. (2002) find that weak property rights constitute a tighter constraint then access to finance in hindering firms' investment.

that enterprizes in micro sector are the ones in any category but having less than 5 permanent employees in the original dataset.

The Productivity and Investment Climate Survey consists of 4 sets of questionnaires which are particularly designed for following sectors: manufacturing, retail, residual (out of manufacturing and retail), and micro (also called informal sector). Each questionnaire has several sections in which detailed information is given. In the survey, 12,752 entrepreneurs provided general information of an enterprize including its legal status (e.g., proprietorship); the percentages owned by the largest share holder, private entities, foreign entities and government; sex and ethnic origin of the majority owner, level of education and experience of the top manager, when the firm was established and whether it was formally registered (Section A). It also provides information on sales and exports (section C), supplies and import (section D), capacity and innovation (section E), investment climate constraints (section F), infrastructure (G), conflict resolution/legal environment (section H), business-government relations (section I), labor regulation (section J), finance (section K) and productivity (section L).

The data was collected using similar survey sampling methodologies so that cross country comparisons can be made directly. One of the main objectives in establishing this database is to provide a wide set of measures of firms outcomes and structures for a large sample of firms, which are comparable across countries. The database is mainly a stratified sampling of firms out of a representative sample provided by the national statistical offices of the countries. If this is not available, stratification is done on a randomly drawn sample. Sample stratification is based on having a third of the data be represented by each size group: small, medium, and large. Representation of several sectors were also an objective.

Unfortunately, we only have detailed sampling methodology notes from 4 countries: South Africa, Mali, Zambia, and Senegal. The details are as follows:

- *South Africa:* The department of Trade and Industry Companies and Intellectual Property Registration Office provided a list of companies that contains 800,000 establishments. But this list is not satisfactory for the stratification purposes which target establishments in all size groups located in Johannesburg, Cape Town, Port Elizabeth and Durban in the industries of manufacturing, construction, retail and wholesale, hotels and restaurants, transport, storage and communications, computer and related activities. The survey draws a random sample of 9550 establishments out of these 800, 000 and contacted them. 40 percent of these contacts failed due to insufficient contact information. From the remaining 75 percent did not meet

the size criterion of at least 5 full time permanent employees. Remaining sample was 1439 establishments, of which 77 percent are small, 19 percent are medium and 4 percent are large. Out of these 706 sampled and 733 refused to participate. Also since 33.3 percent of size stratification is not met, WB changed the target to minimum 15 percent large firms.

- *Mali:* Stratification targets the establishments located in Bamako, Segou, Sikasso, and Mopti in the similar industries as the South Africa survey. This survey also sampled a selection of micro establishments (establishments with less than 5 full-time employees) from the above targeted universe, without stratification by industry. A satisfactory list of establishments was built with lists sourced from the World Bank composing 12344 establishments in the final sample.

- *Senegal:* Stratification targets the establishments located in Dakar, Kaolack, Saint-Louis, and Thies in the similar industries as the South Africa and Mali surveys. This survey also sampled a selection of micro establishments (establishments with less than 5 full-time employees) from the above targeted universe, without stratification by industry. A list of establishments was built with the lists sourced from L'Institut National de la Statisque du Senegai. The final sample is composed of 1733 establishments.

- *Zambia:* Stratification targets the establishments located in Lusaka, Kitwe, Ndola, and Livingstone in the similar industries as the South Africa, Mali, and Senegal surveys. This survey also sampled a selection of micro establishments (establishments with less than 5 full-time employees) from the above targeted universe, without stratification by industry. The sample was drawn from a master list obtained by compiling two different updates of a list of establishments provided by Central Statistical Office. The final sample is composed of 3336 establishments.

2.2 Questions on Obstacles

The main question on obstacles is as follows: Do you think the following present any obstacle to the current operations of your establishment? The answers range from No Obstacle, Minor Obstacle, Moderate Obstacle, Major Obstacle, Very Severe Obstacle. The categories are: Telecommunications, Electricity, Transportation, Access to land, Tax rates, Tax administration, Customs and Trade Regulations, Functioning of the courts, Labor Regulations, Inadequately educated workforce, Business licensing and Permits, Access to finance (availability and cost), Political instability,

Macroeconomic instability, Corruption, Crime, theft and disorder, Practices of competitors in the informal sector.

2.3 Construction of Misallocation Measures

The variables we use from the Investment Climate Survey to construct our measures of misallocation are annual interest rates, collateral, sales, capital stock at current replacement cost, net book value of capital stock, labor, total cost of materials and intermediate inputs and total cost of labor. Variables in domestic monetary values are converted into US dollars, using the annual exchange rates from World Development Indicator database.[5] We use these variables to construct marginal product of capital. The definitions as are as follows:

- *Annual Nominal Interest Rate:* For annual nominal interest rates, we directly use the information on the interest rates each firm paid on the loans they have borrowed.[6]
- *Annual Real Interest Rate:* To calculate real interest rates, we subtract average CPI between 2000–2004 from nominal rates. The values of CPI are obtained from IMF.
- *Collateral:* Collateral is defined as fixed assets such as land and buildings under ownership of the establishment and also machinery and equipment including movables.
- *Value added (Y):* Value added is constructed as total sales minus total cost of raw materials and intermediate goods used in the production.
- *Replacement cost value of Capital Stock (repK):* Coat of replacing all machinery and equipment with new machines.
- *Net Book Value of Capital Stock (netK):* End of year net book value of machinery, vehicles, equipment, land and buildings.
- *Labor (L):* We use the information on the total number of full-time permanent employees at the end of the year of survey to proxy labor used in the production process. Permanent workforce is defined as all paid employees that work 8 or more hours per day and that are

[5]We noticed that monetary values reported with domestic currency of Ghana are equal to the ones converted to US dollars. In order to fix that, we multiplied monetary values in domestic currency of Ghana by 0.00011 which is consistent with annual exchange rate of Ghana in 2006.

[6]The question is as follows: Does your establishment currently have a line of credit or loan from a financial institution? If so, what is the average annual interest rate?

contracted for a term of one or more fiscal years and/or have a guaranteed renewal of their employment contract.

- *Total Cost of Labor (wL):* Includes wages, salaries, and bonuses and social payments.
- *Total Capital Income (RK):* We multiply replacement cost of capital (repK) or net book value of capital (netK) with $R = 0.15$, the value used in Hsieh and Klenow (2009).

Using the above variables we calculate marginal product of capital for each establishment, i. Assuming a Cobb-Douglas production function with a priori imposed parameter, α, we calculate MPK in order to evaluate productivity differences. Using the same parameter we calculate the Hsieh-Klenow indicator which we label "HK." We chose α=1/3.

$$MPK1_i = \alpha \frac{Y_i}{K_i} \tag{1}$$

$$HK_i = \frac{\alpha}{1-\alpha} \frac{(wL)_i}{RK_i} \tag{2}$$

2.4 Sample Selection Criteria

We apply following sample selection criteria:

- We limit the firms to manufacturing firms only.
- We drop firms with missing information on our key variables such as value added, capital stock and labor.
- We drop firms with negative values of sales, capital stock, labor, total cost of raw materials and intermediate goods.
- We drop firms where replacement cost of capita stock is zero and where replacement cost is bigger than the net book value of capital.

Thus, our selection criteria reduces the number of firms in the final sample of 21 countries from 12752 to 5125. We work with two samples. total and baseline. The baseline sample omits Angola, Congo, Guinea-Bissau and Guinea-Conakry which have interest rate observation for less then 20 firms. We also cut 5% of the observations at both tails of the distribution of each MPKs.

This reduces us down to 4642 in the total sample and 4167 firms in the baseline sample. For our HK-index the same procedure yields a sample of 4645 firms.

2.5 Country-Level Data

Our country-level broad institution measures come from the ICRG and Doing Business databases. This first dataset provides a quantitative measure for the protection of property rights and the second one for the regulations for starting a business, and access to finance focusing on the credit markets. The variables that we will use from these database, which are country level measures, are: Corruption, Investment Profile, Protection of Investor Rights, Bureaucratic Quality, Starting a Business, Strength of Legal Rights Index, Ease of Shareholder Suits Index.

3 Empirical Analysis

3.1 The Extent of Capital Misallocation

If capital is equally available to borrowers, similar firms should be subject to similar requirements for granting of credit, including interest rates, collateral, covenants, etc.

We start by displaying a series of figures which throw light on some of these issue in various African countries. Figure 1 presents collateral, where collateral is defined as fixed assets such as land, buildings, and machines. While collateral requirements are common in developed countries, such countries also relies on credit reports and other sources of information that may allow promising projects to get financed even if collateral is not available. We, therefore, consider it to be detriment to efficient capital allocation if bank require a relatively high fraction of loans to be collateralized by physical assets. We find that Namibia, South Africa, Ghana, Swaziland, and Botswana are the 5 countries which demand the least physical collateral while Mauritania, Mali, Rwanda, Uganda, and Gambia tend to require the most physical collateral.

Figure 2 displays the mean and standard deviations of nominal interest rates for 17 countries, that we have data for these rates. This sample constitutes our baseline sample. We consider a low spread of interest rates to be an indicator of efficient capital allocation and we see that on this criterion Namibia scores highest followed by South Africa, Kenya, and Burundi while Gambia display the highest standard deviation of interest rates followed by Zambia, Mozambique, and Uganda. In Figure 3 we display Box-plots for the distribution of interest rates—such plots

will reveal if the standard deviations are mainly caused by outliers. There is a tendency for the distribution of interest rates to be caused by outliers in Uganda and Ghana, for with the spread from the 25th to 75th percentile is not much different from that of Burundi, but otherwise the ranking by interest rate variation seems fairly robust.

In Figure 4, we show real interest rates. There is no obvious optimal level for real interest rates but negative real rates, as found on average in Ghana and, in particular, Zambia are unlikely to sustainable and average real interest rates about 15 percent, as in Uganda, may be incompatible with high economic growth. Figure 5 shows the Box-plots for real interest rates and these reveal that almost all firms in Zambia paid negative real interest rates based on our inflation estimate.

Figures 7, and 8 display "blown-up versions" of the boxes for South Africa and Zambia in Figure 5. We plot the same distribution for Germany in Figure 6 in order to have a well-functioning developed country as a benchmark. We use data for Germany from the same survey of WB that is conducted for Germany. South Africa looks quite similar to Germany, indicating a well-functioning economy by this score. However, it is clear that the distribution of interest rates in Zambia looks quite different: there is much more variation and firms typically pay twice as high interest rates as firms in South Africa.

In Tables 1 and 2, we display descriptive statistics for the sample of all countries. Table 1 displays nominal and real interest rates and value added, labor, and capital (and ratios of these), and our measures of misallocation in dollar terms while Table 2 displays the same variables (except for interest rates) in log-dollar terms. Nominal interest rates have a mean of 15 with a standard deviation of 5 and exhibits low kurtosis, while real interest rates are more variable with a mean of 6.4 percent and a variance of about 7. Average value added is about 2.16 million dollars and the value added figures display very high kurtosis. Employment ranges from 2 to 5697 with a mean of 53 and a median of 15. Capital per worker averages about 37000 dollars but both capital and capital per worker display very high variance and kurtosis. Our estimates of marginal product of capital, MPK and the efficient index HK, both appear right-skewed with higher mean than median and high kurtosis. Our estimate of capital's share has a mean 25 percent (based on an assumed interest of 15 percent) while labor's share of value added has a mean of about 40 percent.[7] The HK-measure takes a theoretical value of unity under efficient allocation and the mean of about 4.8 indicates capital misallocation. The mean value is lower at 3 but still far from unity. From Table 2, it appears that most variables are close to following log-normal distributions with the

[7]In the present draft, we have not properly cleaned out electricity and water inputs from value added which depress the shares of labor and capital.

log-transformed variables having kurtosis close to the normal's value of 3. Only the worker share of value added displays excess kurtosis of 6 after log-transformation.

Table 3 displays nominal and real interest rates for each country separately, together with countries GDP per capita. Our inflation adjustments (the difference between real and nominal rates) ranges between close to zero and twenty percent. Countries such as Ghana and Mali have nominal interest rates of about 20 percent while their real interest rates are about 0 (actually about minus 5 for Mali). In some countries (Namibia, Rwanda, and South Africa) the distribution of interest rates show excess kurtosis while it in most other countries has normal kurtosis around 3. There are large average differences in real interest rates across countries with a high mean of 17 in Uganda and negative rates in Ghana and Mali—neither extreme is likely to be good for business, as negative rates likely are rationed while rates of 17 percent is way above developed world real interest rates.

Table 4 provides further descriptive statistics, mainly on the misallocation measures, country-by-country. We see that countries may have as little as 26 firms in the sample (Gambia) or as many as 853 (Nigeria). For almost all series, we find a mean that is significantly larger than the median indicating right skewness and all countries display excess kurtosis. By design all countries have firms with a low number of employees while the size of the largest firm in each country varies a lot from 75 in Guinea-Bissau to 5697 in South Africa. Median MPK is about 0.15 in Gambia, Mauritania, and Mozambique and a high 0.76 in Guinea-Conakry and 0.69 in Nigeria. While the Cobb-Douglas assumption is not likely to literally hold, such large marginal products—much larger than interest rates—indicates that firms have a hard time borrowing in order to raise capital. The HK-index is fairly close to unity in Botswana, Gambia, Kenya, Mauritania, Mozambique, Namibia, Rwanda, and Uganda but for most of these countries (the exceptions being Botswana, Kenya, Mauritania, Namibia, and Rwanda) have standard deviations of the HK-index above 5 indicating that resources are not so efficiently allocated after all. Only Botswana and Namibia's HK-indices do not exhibit high kurtosis so on this measure these two countries appear closest to efficiency.

Figures 9-12 show Box-Cox plots for the MPK and HK measures. We display for each measure plots with and without outliers and the countries are ordered according to the standard deviation of the respective measure in the descriptive statistics table. Figure 9, shows MPK distributions for each country. The visual impression is dominated by the outliers and on that score Mali, Kenya, Congo, Mauritania have fewest outliers while Guinea-Bissau and Angola have the most. Figure 10, without outliers, is easier to read, the the 25-75 percentile boxes are magnified, compared to the previous figure, and the countries with low variation are Mauritania (which also has a low mean),

Kenya, Mozambique, and Uganda. Nigeria, Guinea-Bissau, Guinea-Conakry, and Angola display high dispersion even after the outliers are removed.

Figure 11 displays the distribution of the HK-index including outliers while Figure 12 displays the distribution of the index when outliers are removed. The countries that appear to have the lowest dispersion in Figure 11 are Kenya, Namibia, and Botswana, with Angola displaying a large number of large outliers, while in Figure 12 the least dispersion is found for Kenya and Rwanda while Angola, Burundi, Nigeria and the Guineas have very large dispersions.

3.2 Misallocation, and Country-Level Institutions and Investment Climate

We next turn to the broader policy question of whether good institutions are relevant for the performance at the firm level. Our broad institutional variables basically capture protection of investor rights (corruption, shareholder and investor protection, legal rights), and general investment climate and ease of doing business (bureaucratic quality, cost of starting a business). These variables are quite correlated among themselves and we chose to show their correlations with different indicators of misallocation.

We first consider collateral requirements as an indicator of capital misallocation. Figure 13 shows that South Africa has lower misallocation by this indicator and has the lowest level of corruption while Mali has high corruption and very high collateral requirements. (The variable on the x-axis is no corruption from ICRG, hence higher this variable there is less corruption). A fitted line showing the connection between the two variable is clearly negative with t-statistic of -2.08. (Our sample is pretty short so the t-statistics may be somewhat noisy and we will not comment on them for each sub-figure.)

In Figure 14, we see a similar negative slope indication that countries with good investor protection (Botswana, South Africa, Namibia) correspond on average to countries with low collateral requirements. The investment profile variable is also from ICRG and captures the risk of expropriation hence a good investment profile means protection of the property rights of the investor. Figure 15, with bureaucratic quality on the X-axis looks very similar to the previous figure while Figure 16 has an opposite slope because the a "good" indicator for the cost of starting a business is a low value as found in South Africa, Botswana, Swaziland and Namibia. Figures 17 and 18 consider measures from Doing Business Database that proxy property rights. Again, we discover a strong negative correlation with the extent that these rights protected and the extent of misallocation.

Overall, it is clear that low collateral requirements correlate significantly with good institutions.

We also considered if the spread in the nominal interest rates paid by firms—where we take a low spread to be an indicator of less misallocation and hence well-functioning credit markets—is correlated with the same set of institutions. The picture is similar, hence we proceed with the firm-level determinants of the misallocation.

3.3 Misallocation and Access to Finance: Firm-Level Evidence

In this section, we investigate the role of various constraints faced by firms in explaining the extent of misallocation. We start by plotting histograms that show the firm-level distribution of answers for the question discussed in the data section. To review, the question is: Do you think the following present any obstacle to the current operations of your establishment? The categories are: Telecommunications, Electricity, Transportation, Access to land, Tax rates, Tax administration, Customs and Trade Regulations, Functioning of the courts, Labor Regulations, Inadequately educated workforce, Business licensing and Permits, Access to finance (availability and cost), Political instability, Macroeconomic instability, Corruption, Crime, theft and disorder, Practices of competitors in the informal sector. Since the answers range from No Obstacle, Minor Obstacle, Moderate Obstacle, Major Obstacle, Very Severe Obstacle, we grouped "major" and "most severe" categories together and plot them first. As it is clear from figure 19 the major two obstacle for all the countries are infrastructure (measured by electricity) and access to finance; 50 percent of the firms stated these as major/sever obstacles. Figure 20 tells the same story where we grouped all other obstacles together and 80 percent of the firms think these are not obstacles at all.

Figures 21-41 plot country by country version of figure 19. Although there is a lot of variation, it seems to be the case that in most countries, most firms state access to finance and electricity as the major obstacles. In fact countries like South Africa and Namibia, who seemed to have a more efficient allocation of capital based on our previous measure, seem to report fewer obstacles and obstacles more like crime instead of access to finance. Whereas countries such as Nigeria, Guinea-Bissau, Guinea-Conakry, and Angola, who scored poorly on our previous calculations report access to finance as the most important obstacle in general.

3.4 Regression Results

In Table 5 we use OLS-regressions to examine determinants of misallocation as measured by the Hsieh-Klenow index. The HK-index takes a high value in the case of capital distortions (too low

capital) and a negative value in the case of labor distortions (too little labor compensation). A natural first hypothesis is that limited access to finance leads to capital distortion and the estimated coefficient to "Access to Finance" in column (1) confirms this with a very high level of significance. The coefficient indicates that a firm that moves from, say, "no obstacle" to "minor" obstacle, will have 8 percent higher capital distortion (while moving from "no obstacle" to "very severe obstacle" increases capital distortions by about 36 percent).

Electricity problems have a positive effect on capital misallocation—presumably firms a less likely to by machines that need electricity, although the coefficient is smaller, at about 0.02, than that found for access to finance. The mixed bag of "Other Obstacles" has very large negative impact on the HK-index with a coefficient of –0.258. While a further study is need in order to pin down more details it is intuitive that labor markets regulations and lack of educated workers may lead to labor distortions.

In column (3), we add firm level controls. We see that financial distortions are lower for older firms, much larger for small firms, lower for government and foreign firms and possibly higher for exporting and listed firms—the latter two variable have large positive coefficients but neither is statistically significant. The inclusion of these controls have little impact on the estimated coefficients to the obstacles.

If we further include country dummies, we see a significant positive terms for exporters while the impact on the other controls is minor. However, adding country dummies cuts the estimated impacts of access to finance and other obstacles in half and renders the impact of lack of electricity insignificant. This impact on the estimated effect of obstacles are caused by correlations of the controls with the country dummies (for example, some countries have problems delivering electricity while others don't). Because, say, electricity is an important input in many production processes, it is likely that the coefficient to electricity, when no controls are included, provides the better measure but the fact that it is not robust to the country dummies allows for the possibility that access to electricity is picking up the impact of some other variable. If sector dummies are included, but not country dummies, we find that the sector dummies (compared to no-dummy situation in column (3)) has little effects on the other estimated coefficients, even if R-square increases significantly. The results when both country- and sector-dummies are included are quite similar to those with only country-dummies.

Table 6 repeats the regressions of the previous table using log-MPK as the dependent variable. We interpret a high value as capital market distortion and we find in column (1) that access

to finance is significantly correlated with capital markets distortions, although the effect is not nearly as significant as that found for the HK-index. For this measure, we find a stronger effect of electricity while the effect of other obstacles is negative—see column (3)—but smaller than found for the HK-index. Country-control lowers the estimated impact of access to finance while the other obstacles are estimated robustly to the controls. Inclusion of country-dummies turns all the obstacles measures insignificant which again reflects that many of the obstacles are high country-specific. Including sector- but not country-dummies renders the financial obstacles variable insignificant while "Others" and electricity obstacles remain significant at the 10 percent level. No surprisingly, all obstacles are insignificant when both country- and sector-dummies are included.

Finally, in Table 7, we use as the dependent variable, the within-country firm-by-firm interest rate spread ($|r_i - \overline{r}_c|$) (where r_i is the real interest rate paid by firm i and $\overline{r}_c$ is the average over the firms in country c). We find that access to finance is a highly significant predictor of the interest rate spread, electricity has no significant impact, while other obstacles have a somewhat mysterious negative impact on interest rate spreads. These results are robust to country-level controls but not to country dummies. Overall, the results are quite similar to those of Table 6, but notice that these measures are calculated in entirely different fashions: based on a parametric model assumption in Table 6 and based on direct answers in Table 7. The qualitative agreement between the results of these two tables lends credence to our interpretations.

4 Conclusion

To be written...

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Table 1: Descriptive Statistics

	Obs.	Mean	Std. Dev.	Min	Max	Median	Kurtosis
All Countries							
Nominal Interest Rate	1667	15.030	5.843	0	40	14	4.254
Real Interest Rate	1667	6.425	6.915	-23.219	32.867	6.745	4.956
Y	4642	2167978	54400000	672	3640000000	69098.11	4325.107
L	4642	52.736	185.758	2	5697	15	322.854
Y/L	4642	19883.81	449611.1	130.555	30300000	4285.714	4454.392
repK	4642	3613086	118000000	231.0536	8000000000	63700.79	4512.423
repK/L	4642	36833.23	1306243	35.77818	88900000	4285.714	4613.786
MPK	4642	0.738	1.015	0.014	13.318	0.385	23.461
HK-index	4645	4.033	6.567	0.042	125	1.884	61.849
RrepK/Y	4642	0.245	0.341	0.003	3.448	0.129	23.589
wL/Y	4642	0.398	0.228	0	3.75	0.377	14.455

Notes: See data section for detailed explanation of the variables.

Table 2: Descriptive Statistics in Logs

	Obs.	Mean	Std. Dev.	Min	Max	Median	Kurtosis
All Countries							
log Y	4642	11.442	2.070	6.510	22.015	11.143	3.168
log L	4642	2.953	1.166	0.693	8.647	2.708	3.989
log (Y/L)	4642	8.488	1.302	4.871	17.227	8.363	3.421
log repK	4642	11.290	2.409	5.442	22.802	11.061	2.893
log (repK/L)	4642	8.336	1.717	3.577	18.302	8.311	2.894
log MPK	4642	-0.946	1.155	-4.233	2.589	-0.954	2.662
log HK-index	4645	0.638	1.246	-3.153	4.828	0.633	2.591
log (RrepK/Y)	4642	-2.048	1.155	-5.584	1.237	-2.041	2.662
log (wL/Y)	4641	-1.124	0.724	-6.542	1.321	-0.975	6.038

Notes: See data section for detailed explanation of the variables.

Table 3: Descriptive Statistics of Annual Loan Rates by Country

	Obs.	Mean	Std. Dev.	Min	Max	Median	Kurtosis
Botswana	($8557.67)						
Nominal Interest Rate	91	14.111	4.613	0	19.5	16	2.995
Real Interest Rate	91	6.245	4.613	-7.865	11.632	8.134	2.995
Burundi	($651.23)						
Nominal Interest Rate	91	19.730	3.201	7	25	19	4.037
Real Interest Rate	91	9.480	3.201	-3.249	14.750	8.75	4.037
Gambia	($1386.22)						
Nominal Interest Rate	26	20.734	10.357	1	40	25	2.102
Real Interest Rate	26	11.846	10.357	-7.888	31.111	16.111	2.102
Ghana	($1549.43)						
Nominal Interest Rate	100	20.828	5.735	1.5	30	21	4.083
Real Interest Rate	100	-1.614	5.735	-20.942	7.557	-1.44	4.083
Kenya	($2044.53)						
Nominal Interest Rate	292	13.777	2.929	3	20	14	3.92
Real Interest Rate	292	5.953	2.929	-4.823	12.176	6.176	3.92
Mali	($1285.96)						
Nominal Interest Rate	84	18.436	9.342	0	36	18	2.164
Real Interest Rate	84	-4.782	9.342	-23.219	12.780	-5.219	2.164
Mauritania	($2040.93)						
Nominal Interest Rate	40	15.492	5.472	5	27	16	2.749
Real Interest Rate	40	11.238	5.472	0.745	22.745	11.745	2.749
Mozambique	($2098.38)						
Nominal Interest Rate	77	19.980	8.076	0	40	20	3.104
Real Interest Rate	77	7.364	8.076	-12.616	27.383	7.383	3.104
Namibia	($5888.91)						
Nominal Interest Rate	81	11.912	2.105	2	18	12	9.042
Real Interest Rate	81	3.7177	2.105	-6.195	9.804	3.804	9.042

	Obs.	Mean	Std. Dev.	Min	Max	Median	Kurtosis
Nigeria	($2176.58)						
Nominal Interest Rate	93	13.274	5.798	3	30	12	2.769
Real Interest Rate	93	-0.603	5.798	-10.877	16.122	-1.877	2.769
Rwanda	($1115.72)						
Nominal Interest Rate	54	14.421	4.101	0	18	16	7.652
Real Interest Rate	54	10.255	4.101	-4.166	13.833	11.833	7.652
Senegal	($1871.1)						
Nominal Interest Rate	68	11.358	3.478	2	18	12	2.871
Real Interest Rate	68	10.055	3.478	0.696	16.696	10.696	2.871
South Africa	($9978.64)						
Nominal Interest Rate	287	12.3	2.48	0.5	19	12	6.028
Real Interest Rate	287	6.769	2.48	-5.031	13.468	6.468	6.028
Swaziland	($7094)						
Nominal Interest Rate	54	12.431	4.225	2.5	23	12	3.239
Real Interest Rate	54	3.066	4.225	-6.865	13.634	2.634	3.239
Tanzania	($859.44)						
Nominal Interest Rate	91	13.624	5.355	0	25	12	2.729
Real Interest Rate	91	10.502	5.355	-3.121	21.878	8.878	2.729
Uganda	($1168.78)						
Nominal Interest Rate	92	20.24	7.191	2.5	36	21	3.305
Real Interest Rate	92	17.107	7.191	-0.632	32.867	17.867	3.305
Zambia	($1900.98)						
Nominal Interest Rate	46	13.026	3.646	6	20	13.5	2.282
Real Interest Rate	46	12.006	3.646	4.98	18.980	12.48	2.282

Notes: Here, descriptive statistics of annual loan rates are tabulated for the countries in baseline sample. The baseline sample omits Angola, Congo, Guinea-Bissau and Guinea-Conakry which have interest rate observations for less than 20. Values of real GDP per capita (constant prices) that are shown in parentheses are obtained from Penn World Table.

Table 4: Descriptive Statistics for Misallocation by Country

	Obs.	Mean	Std. Dev.	Min	Max	Median	Kurtosis
Angola							
Y	177	112416.4	208096.4	8620.689	2229885	67340.23	66.051
L	177	15.344	15.798	5	120	11	27.965
Y/L	177	7552.314	9913.911	1371.921	110114.9	5233.779	68.354
repK	177	121746.8	373112.6	344.827	4770115	48850.57	137.753
repK/L	177	7581.597	11412.04	68.965	103448.3	3831.418	32.154
MPK	177	1.326	2.021	0.058	11	0.453	9.213
HK-index	177	10.783	19.165	0.32	125	3	14.457
RrepK/Y	177	0.170	0.182	0.004	0.858	0.110	5.869
wL/Y	177	0.511	0.201	0.014	.963	0.520	2.478
Botswana							
Y	91	736700	1416641	6000	9200000	180000	18.061
L	91	47.670	72.0507	5	450	15	16.845
Y/L	91	18621.8	38825.51	700	342857.2	9600	55.092
repK	91	916848.9	1856986	5000	12000000	240000	18.2201
repK/L	91	19750.61	28918.83	800	193548.4	8743.922	17.527
MPK	91	0.634	0.872	0.038	4	0.258	8.357
HK-index	93	2.147	1.976	0.24	7.5	1.35	3.703
RrepK/Y	91	0.280	0.310	0.012	1.285	0.193	5.967
wL/Y	91	0.389	0.323	0.055	1.846	0.327	8.282
Burundi							
Y	91	125231	307389.2	901.109	2110141	18484.29	24.165
L	91	22.615	28.983	5	150	9	8.209
Y/L	91	3580.554	6209.556	180.221	52963.84	1940.551	45.469
repK	91	282886.8	741738.8	231.053	5545287	23105.36	32.063
repK/L	91	7206.333	13075.02	38.508	92421.45	2464.572	22.306
MPK	91	0.852	1.152	0.023	6.527	0.4206	10.824
HK-index	90	5.737	8.209	0.149	43.2	2.366	10.131
RrepK/Y	91	0.345	0.493	0.007	2.121	0.118	6.413
wL/Y	91	0.435	0.231	0.071	1.230	0.382	3.548
Congo							
Y	134	124938	246190.3	3972.996	1898735	41888.19	25.244
L	134	25.858	36.045	5	200	14	14.779
Y/L	134	4332.342	5423.618	567.5709	36156.7	2509.946	17.398
repK	134	135233.7	472059.1	1054.852	4746835	31645.57	71.823
repK/L	134	4144.367	7944.477	210.9705	67811.93	2109.705	38.115
MPK	134	0.588	0.459	0.078	2.098	0.425	4.160
HK-index	134	2.961	2.237	0.36	12.272	2.427	5.073
RrepK/Y	134	0.150	0.120	0.023	0.636	0.117	6.351
wL/Y	134	0.389	0.215	0.035	1.8	0.371	15.051
Gambia							
Y	26	166019.3	441922.9	4655.172	2126608	19827.59	16.5004
L	26	26.653	33.38	5	170	18.5	14.466
Y/L	26	3209.58	4016.712	258.6207	14198.78	1302.956	4.619
repK	26	524996	2014170	362.069	10300000	68965.52	23.506
repK/L	26	7606.191	13371.61	36.206	60851.93	2946.7	11.215
MPK	26	0.679	1.0062	0.034	4.285	0.178	7.495
HK-index	26	5.046	9.397	0.161	40.476	1.025	9.265
RrepK/Y	26	0.375	0.389	0.011	1.442	0.282	3.909
wL/Y	26	0.410	0.232	0.125	1.062	0.340	3.335

	Obs.	Mean	Std. Dev.	Min	Max	Median	Kurtosis
Ghana							
Y	263	421864.8	2517790	1870	31100000	21230	108.695
L	263	47.300	204.487	5	3000	12	168.807
Y/L	263	3890.316	7184.291	233.75	59777.14	1320	27.132
repK	263	977754.1	9681212	275	153000000	11550	232.037
repK/L	263	3508.851	7884.695	53.103	57828.57	880	23.697
MPK	263	0.868	0.927	0.067	5	.566	7.985
HK-index	263	4.758	4.762	0.271	25.714	3	7.215
RrepK/Y	263	0.142	0.145	0.01	0.735	0.088	6.671
wL/Y	263	0.452	0.242	0.016	1.144	0.439	2.633
Guinea-Bissau							
Y	42	45552.11	64665.25	2612.903	364326.4	23913.09	15.759
L	42	14.428	12.891	5	75	10	13.895
Y/L	42	3121.768	3049.474	522.5807	17077.8	2213.789	11.979
repK	42	54957.25	85091.05	284.63	379506.6	26755.22	9.124
repK/L	42	4036.823	5929.719	56.925	34155.6	1846.932	16.99
MPK	42	1.138	1.766	0.043	9.75	0.417	14.73
HK-index	42	7.387	10.42	0.25	45	2.927	6.195
RrepK/Y	42	0.220	0.292	0.005	1.153	0.12	6.237
wL/Y	42	0.476	0.228	0.052	1.056	0.469	3.109
Guinea-Conakry							
Y	122	296756.8	1920881	1756.312	16500000	12074.64	60.750
L	122	21.172	61.321	5	600	8	67.870
Y/L	122	4265.838	10765.46	190.351	92229.69	1493.322	45.773
repK	122	358693.3	2397959	411.635	20600000	5845.294	60.3018
repK/L	122	3580.247	12105.37	43.566	98008.46	717.1606	40.056
MPK	122	1.420	1.798	0.088	7.619	0.756	6.585
HK-index	122	5.705	7.561	0.144	44.833	2.806	14.006
RrepK/Y	122	0.117	0.125	0.006	.564	0.066	5.307
wL/Y	122	0.329	0.199	0.018	0.805	0.293	2.215
Kenya							
Y	357	2284467	8413209	3472.222	139000000	526388.9	198.999
L	357	122.479	254.165	5	2500	48	34.556
Y/L	357	20564.66	36923.42	130.555	417055.1	10072.88	60.912
repK	357	3834589	20100000	1083.333	347000000	694444.4	242.996
repK/L	357	28225.83	48765.53	86.805	555555.6	15096.62	52.878
MPK	357	0.396	0.425	0.047	2.633	0.25	9.723
HK-index	357	1.383	1.518	0.136	7.5	0.785	7.626
RrepK/Y	357	0.273	0.229	0.018	1.059	0.2	4.42
wL/Y	357	0.294	0.214	0.011	1.388	0.242	6.576
Mali							
Y	270	115812.8	424035.7	2103.25	4312574	20038.24	56.928
L	270	17.614	34.1006	5	350	8	50.146
Y/L	270	4153.732	6679.896	414.276	68833.65	2294.455	47.020
repK	270	155317.9	894172.3	956.022	14000000	22944.55	213.232
repK/L	270	5299.215	13232.45	159.337	191204.6	2549.395	147.515
MPK	270	0.473	0.410	0.065	2.019	0.331	5.405
HK-index	270	2.69	2.599	0.281	12	1.762	5.233
RrepK/Y	270	0.203	0.165	0.024	0.761	0.150	4.634
wL/Y	270	0.405	0.189	0.021	0.874	.420	2.208
Mauritania							
Y	71	304995.2	709286.5	2255.639	4511278	56390.98	20.6207
L	71	30.309	48.326	5	276	14	14.623
Y/L	71	6674.7	5970.004	451.127	27110.6	4511.278	5.411
repK	71	891326.2	1861569	1804.511	9398496	109022.6	11.754
repK/L	71	21084.71	30088.25	360.9023	150375.9	9398.496	10.385
MPK	71	0.351	0.459	0.019	2	0.155	6.794
HK-index	72	2.161	2.983	0.1	15	0.814	8.741
RrepK/Y	71	0.495	0.564	0.025	2.571	0.322	6.496
wL/Y	71	0.422	0.177	0.081	0.999	0.464	3.137

	Obs.	Mean	Std. Dev.	Min	Max	Median	Kurtosis
Mozambique							
Y	305	13300000	209000000	672	3640000000	29864.56	297.538
L	305	24.957	41.318	5	358	10	31.144
Y/L	305	119339.9	1750194	134.4	30300000	2422.667	293.185
repK	305	27900000	459000000	400	8000000000	75200	301.491
repK/L	305	315334.1	5092010	53.333	88900000	5000	302.142
MPK	305	0.551	0.928	0.0145	5.966	0.178	12.819
HK-index	305	2.927	5.404	0.084	35.03	0.941	17.51
RrepK/Y	305	0.552	0.692	0.008	3.448	0.279	7.313
wL/Y	305	0.436	0.228	0.002	1.064	0.429	2.318
Namibia							
Y	81	1909375	4827500	15000	33500000	333333.3	25.748
L	81	57.543	140.53	2	1100	20	39.923
Y/L	81	28244.14	34681.53	2083.333	246031.8	18750	21.906
repK	81	2531837	7652089	10000	50000000	366666.7	25.005
repK/L	81	33429.97	47634.03	1666.667	291005.3	17182.13	16.817
MPK	81	0.545	0.564	0.064	2.893	0.314	7.295
HK-index	84	1.905	1.526	0.162	6	1.366	2.928
RrepK/Y	81	0.214	0.188	0.017	0.773	.159	3.889
wL/Y	81	0.351	0.434	0	3.75	0.281	47.673
Nigeria							
Y	853	228341.7	1361059	2480.62	31000000	34108.53	349.332
L	853	22.939	38.739	5	700	12	121.328
Y/L	853	5119.344	9869.905	339.892	177187.2	2842.377	150.98
repK	853	157147.9	618832.4	348.837	7751938	15503.88	67.085
repK/L	853	3440.527	6393.051	35.778	61663.14	1291.99	24.986
MPK	853	1.123	1.176	0.084	6.6	0.690	8.565
HK-index	853	6.253	6.941	0.375	37.6	3.826	2.227
RrepK/Y	853	0.105	0.106	0.007	0.589	0.072	7.415
wL/Y	853	0.411	0.221	0.0125	1.520	0.38	4.015
Rwanda							
Y	54	1115679	4138143	3884.319	30100000	98237.05	46.33
L	54	77.777	145.360	5	685	23.5	11.637
Y/L	54	10714.07	17657.14	537.634	91508.36	4616.061	14.097
repK	54	2680766	11300000	1612.903	80600000	268817.2	43.239
repK/L	54	24969.07	37894.55	230.414	200770.9	9196.378	11.272
MPK	54	0.412	0.555	0.017	3.270	0.227	14.450
HK-index	54	2.174	3.279	0.042	15.555	0.975	8.006
RrepK/Y	54	0.475	0.570	0.015	2.80034	0.220	7.439
wL/Y	54	0.361	0.218	0.054	.875	0.311	2.358
Senegal							
Y	235	676972	3324678	5678.776	42100000	35891.01	108.080
L	235	38.165	182.2401	5	2665	10	185.653
Y/L	235	8171.494	11633.83	653.282	76481.84	3395.411	12.335
repK	235	815718.9	3846095	956.022	38200000	38240.92	57.012
repK/L	235	10296.87	24185.9	159.337	273149.4	3824.092	68.278
MPK	235	0.635	0.648	0.058	3.333	0.408	6.942
HK-index	234	3.591	3.955	0.231	20	2	5.975
RrepK/Y	235	0.198	0.196	0 .015	0.856	0.122	4.781
wL/Y	235	0.408	0.206	0.035	01.069	0.4	2.838

	Obs.	Mean	Std. Dev.	Min	Max	Median	Kurtosis
South Africa							
Y	612	5633490	21000000	10714.29	286000000	710714.3	90.618
L	612	108.704	342.662	5	5697	30	144.602
Y/L	612	36821.4	49800	1016.807	478468.9	20833.33	24.882
repK	612	7453967	28800000	2142.857	429000000	671428.6	117.7637
repK/L	612	53104.64	108057.4	428.5714	1253133	19920.63	48.19028
MPK	612	0.618	0.736	0.035	4.111	.333	8.779
HK-index	614	3.791	4.632	0.183	25	2	8.597
RrepK/Y	612	0.245	0.263	0.0121	1.408	0.15	6.271
wL/Y	612	0.424	0.175	0.062	0.945	.416	2.786
Swaziland							
Y	54	1280711	1684701	37333.33	6666667	536875.3	5.107
L	54	183.518	431.415	5	3000	57.5	35.105
Y/L	54	16242.72	23484.12	1555.556	142857.1	9138.237	17.620
repK	54	1568185	3373182	10000	20000000	333333.3	18.557
repK/L	54	15107.34	20767.3	236.9281	76923.08	5897.436	5.288
MPK	54	0.906	1.182	0.057	6.666	0.548	12.338
HK-index	54	3.55	4.008	0.162	18.571	1.752	7.294
RrepK/Y	54	0.171	0.180	0.007	0.873	0.091	6.243
wL/Y	54	0.354	0.226	0.034	1.017	0.316	2.784
Tanzania							
Y	243	1551050	11000000	3542.958	168000000	86802.48	216.685
L	243	52.275	108.4152	5	1118	15	49.612
Y/L	243	12573.07	23834.13	333.628	220828.2	4769.367	39.006
repK	243	1877180	6206838	1736.05	70900000	177147.9	71.030
repK/L	243	22679.21	42574.07	62.592	416297.6	8176.058	40.1348
MPK	243	0.498	0.632	0.014	3.6	0.253	10.197
HK-index	243	2.045	3.058	0.053	15	0.685	8.114
RrepK/Y	243	0.406	0.563	0.013	3.362	0.197	10.698
wL/Y	243	0.311	0.229	0.006	1.023	0.266	2.668
Uganda							
Y	287	707068.1	3679162	1796.743	41300000	39303.76	77.297
L	287	51.923	246.869	5	4000	15	229.798
Y/L	287	8416.448	37997.67	230.675	616792.6	2433.09	230.761
repK	287	829618.1	4443735	561.482	63800000	56148.23	147.182
repK/L	287	11297.21	32810.28	56.148	427796.1	3743.215	103.875
MPK	287	0.556	1.117	0.027	13.318	0.239	68.115
HK-index	287	3.113	6.649	0.1	60	1.25	40.956
RrepK/Y	287	0.342	0.366	0.003	1.8	.2086.511	
wL/Y	287	0.429	0.262	0.001	2.011717	.4	9.874
Zambia							
Y	274	749864.5	2163809	1804.052	27300000	166527.9	88.825
L	274	59.189	115.491	5	1100	21.5	43.332
Y/L	274	11799.76	26496.4	190.952	388565.1	6387.419	152.017
repK	274	1124433	4384227	832.639	55500000	152650.6	97.995
repK/L	274	15479.38	43736.21	163.752	666111.6	6286.309	180.505
MPK	274	0.615	0.675	0.027	3.333	0.358	6.703
HK-index	271	2.562	3.05	0.125	15.08	1.416	7.417
RrepK/Y	274	0.246	0.292	0.015	1.8	0.139	9.24
wL/Y	274	0.327	0.194	0.022	1.240	0.3	3.889

Notes: See data section for detailed explanation of the variables.

Table 5: Firm-Level Determinants of Misallocation

Dependent variable: Log HK-index	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Access to Finance	0.089***	0.083***	0.111***	0.082***	0.048**	0.075***	0.039**
	(0.011)	(0.012)	(0.012)	(0.013)	(0.020)	(0.012)	(0.017)
Electricity		0.021*	0.050***	0.039***	-0.021	0.037	-0.019
		(0.013)	(0.013)	(0.013)	(0.019)	(0.030)	(0.018)
Other Obstacles			-0.258***	-0.213***	-0.097**	-0.196***	-0.088**
			(0.029)	(0.030)	(0.041)	(0.048)	(0.041)
Age				-0.006***	-0.002	-0.006***	-0.002
				(0.001)	(0.002)	(0.001)	(0.002)
Small				0.186***	0.117*	0.083	0.001
				(0.041)	(0.060)	(0.080)	(0.052)
Government				-0.010***	-0.008***	-0.009***	-0.006**
				(0.002)	(0.002)	(0.000)	(0.002)
Foreign				-0.003***	-0.001***	-0.002***	-0.001**
				(0.000)	(0.000)	(0.000)	(0.000)
Export				0.112	0.231***	0.064	0.165**
				(0.112)	(0.077)	(0.141)	(0.074)
Listed				0.215	0.188	0.279	0.254
				(0.174)	(0.202)	(0.288)	(0.199)
Constant	0.363***	0.305***	0.638***	0.678***	0.819***	0.541***	0.635***
	(0.039)	(0.052)	(0.064)	(0.071)	(0.084)	(0.063)	(0.075)
Country Dummies	no	no	no	no	yes	no	yes
Industry Dummies	no	no	no	no	no	yes	yes
R^2	0.0127	0.0133	0.0291	0.0527	0.1837	0.0857	0.2144
Obs.	4636	4636	4636	4519	4519	4519	4519

Notes: Access to finance, Electricity and Other Obstacles are the responses to the question "Do you think that .... presents any obstacle to the current operations of your establishment?" Answers vary between 1 (no obstacle), 2 (minor obstacle), 3 (moderate obstacle), 4 (major obstacle) and 5 (very severe). Other Obstacles is the average of the answers of the same question regarding "Telecommunications," "Transportation," "Access to land," "Tax rates," "Tax administration," "Customs and Trade regulations," "Courts," "Labor regulations," "Inadequately educated workforce," "Business licensing and Permits," "Political instability," "Corruption," "Macroeconomic instability," "Crime, theft and disorder," and "Practices of competitors in the informal sector." Age is the number of years from the date of the firm incorporation to the end year of survey. Small indicates firms employ 5 to 19 employees. Government indicates firms with government ownership. Foreign indicates firms are firms with foreign ownership. Export indicates firms with percentage of direct exports to total sales greater than 50. Listed firms are firms that are listed on a stock exchange. Robust standard errors are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Table 6: Firm-Level Determinants of Misallocation

Dependent variable: Log MPK	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Access to Finance	0.039***	0.027**	0.042***	0.024**	0.001	0.018	-0.003
	(0.0107)	(0.011)	(0.011)	(0.012)	(0.020)	(0.010)	(0.019)
Electricity		0.044***	0.058***	0.054***	-0.014	0.049*	-0.013
		(0.012)	(0.012)	(0.012)	(0.019)	(0.027)	(0.018)
Others			-0.131***	-0.100***	-0.060	-0.082*	-0.050
			(0.027)	(0.028)	(0.039)	(0.042)	(0.037)
Age				-0.006***	-0.003**	-0.006***	-0.003**
				(0.001)	(0.001)	(0.001)	(0.001)
Small				0.126***	0.072*	0.069	0.012
				(0.038)	(0.038)	(0.062)	(0.033)
Government				-0.009***	-0.008***	-0.007***	-0.007***
				(0.002)	(0.001)	(0.000)	(0.001)
Foreign				-0.001*	0.0001	-.0009*	0.0003
				(0.000)	(0.0004)	(0.0004)	(0.0004)
Export				0.084	0.157	0.058	0.125
				(0.106)	(0.109)	(0.121)	(0.112)
Listed				0.234	0.212	0.276	0.254
				(0.198)	(0.168)	(0.337)	(0.172)
Constant	-1.069***	-1.190***	-1.022***	-0.991***	-0.920***	-1.048***	-1.022***
	(0.036)	(0.049)	(0.061)	(0.068)	(0.088)	(0.070)	(0.073)
Country Dummies	no	no	no	no	yes	no	yes
Industry Dummies	no	no	no	no	no	yes	yes
R^2	0.0029	0.0058	0.0106	0.0266	0.1430	0.0448	0.1565
Obs.	4633	4633	4633	4514	4514	4514	4514

Notes: Access to finance, Electricity and Other Obstacles are the responses to the question "Do you think that .... presents any obstacle to the current operations of your establishment?" Answers vary between 1 (no obstacle), 2 (minor obstacle), 3 (moderate obstacle), 4 (major obstacle) and 5 (very severe). Other Obstacles is the average of the answers of the same question regarding "Telecommunications," "Transportation," "Access to land," "Tax rates," "Tax administration," "Customs and Trade regulations," "Courts," "Labor regulations," "Inadequately educated workforce," "Business licensing and Permits," "Political instability," "Corruption," "Macroeconomic instability," "Crime, theft and disorder," and "Practices of competitors in the informal sector." Age is the number of years from the date of the firm incorporation to the end year of survey. Small indicates firms employ 5 to 19 employees. Government indicates firms with government ownership. Foreign indicates firms are firms with foreign ownership. Export indicates firms with percentage of direct exports to total sales greater than 50. Listed firms are firms that are listed on a stock exchange. Robust standard errors are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Table 7: Firm-Level Determinants of Misallocation

Dependent variable: Interest Rate Spread	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Access to Finance	0.251***	0.280***	0.338***	0.367***	0.068	0.370***	0.075
	(0.068)	(0.071)	(0.072)	(0.077)	(0.063)	(0.087)	(0.063)
Electricity		-0.106	-0.034	-0.029	-0.093	-0.018	-0.097
		(0.084)	(0.090)	(0.091)	(0.128)	(0.096)	(0.133)
Others			-0.428***	-0.481***	0.014	-0.527**	-0.001
			(0.158)	(0.159)	(0.186)	(0.165)	(0.191)
Age				-0.481	0.0007	-0.005	0.001
				(0.006)	(0.003)	(0.005)	(0.004)
Small				-0.105	0.110	-0.195	0.042
				(0.252)	(0.325)	(0.213)	(0.333)
Government				0.019	0.009	0.017	0.008
				(0.012)	(0.006)	(0.014)	(0.005)
Foreign				0.008	0.000	0.009**	0.001
				(0.003)	(0.003)	(0.003)	(0.003)
Export				-0.114	0.065	-0.101	0.100
				(0.468)	(0.481)	(0.367)	(0.480)
Listed				1.147	0.373	0.940	0.295
				(0.945)	(1.012)	(0.552)	(1.027)
Constant	2.554***	2.828***	3.362***	3.381***	1.673***	3.540***	1.661***
	(0.203)	(0.326)	(0.388)	(0.416)	(0.462)	(0.700)	(0.512)
Country Dummies	no	no	no	no	yes	no	yes
Industry Dummies	no	no	no	no	no	yes	yes
R^2	0.0123	0.0142	0.0209	0.0340	0.3006	0.0581	0.3107
Obs.	999	999	999	979	979	979	979

Notes: Access to finance, Electricity and Other Obstacles are the responses to the question "Do you think that .... presents any obstacle to the current operations of your establishment?" Answers vary between 1 (no obstacle), 2 (minor obstacle), 3 (moderate obstacle), 4 (major obstacle) and 5 (very severe). Other Obstacles is the average of the answers of the same question regarding "Telecommunications," "Transportation," "Access to land," "Tax rates," "Tax administration," "Customs and Trade regulations," "Courts," "Labor regulations," "Inadequately educated workforce," "Business licensing and Permits," "Political instability," "Corruption," "Macroeconomic instability," "Crime, theft and disorder," and "Practices of competitors in the informal sector." Age is the number of years from the date of the firm incorporation to the end year of survey. Small indicates firms employ 5 to 19 employees. Government indicates firms with government ownership. Foreign indicates firms are firms with foreign ownership. Export indicates firms with percentage of direct exports to total sales greater than 50. Listed firms are firms that are listed on a stock exchange. Robust standard errors are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Figure 1: Collateral Requirement in African Countries

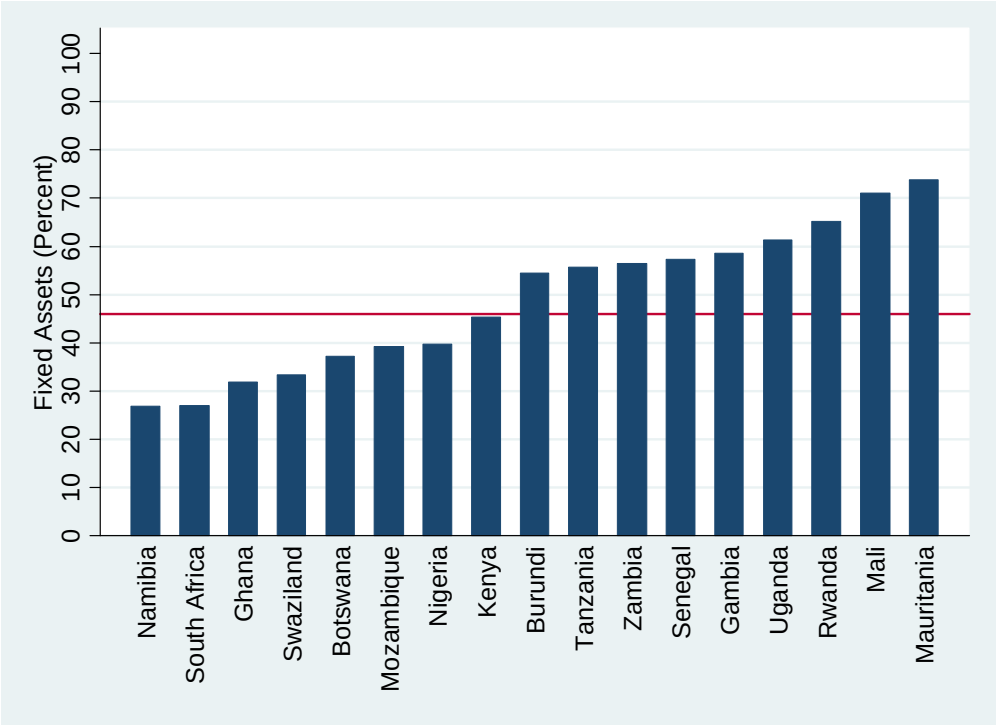

Figure 2: Nominal Interest Rates in African Countries

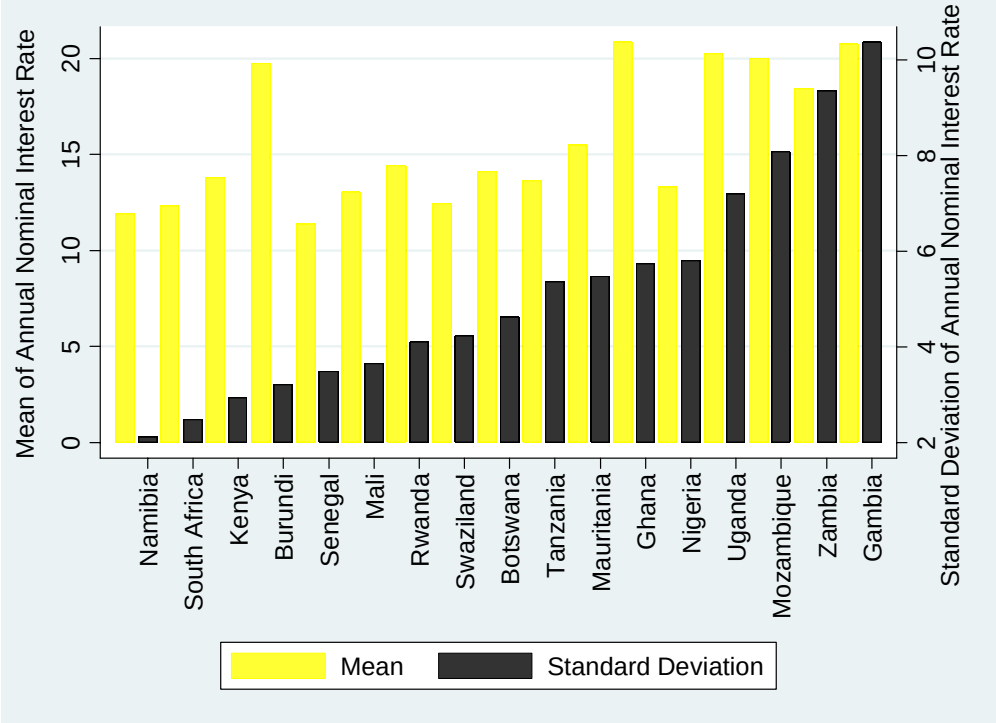

Figure 3: Distribution of Nominal Interest Rates in African Countries

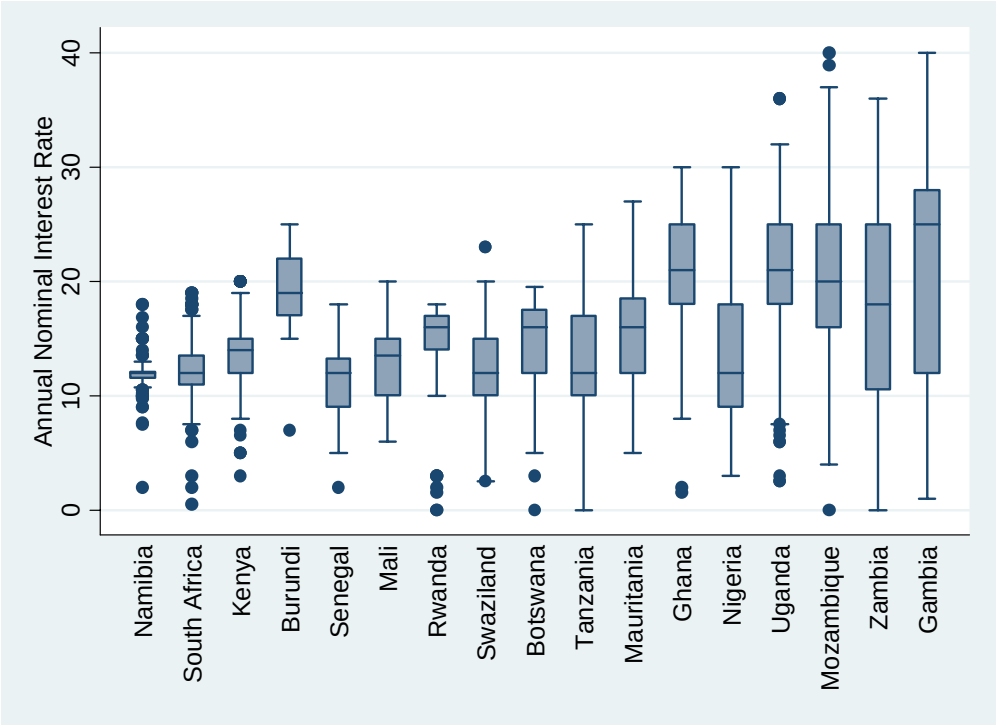

Figure 4: Real Interest Rates in African Countries

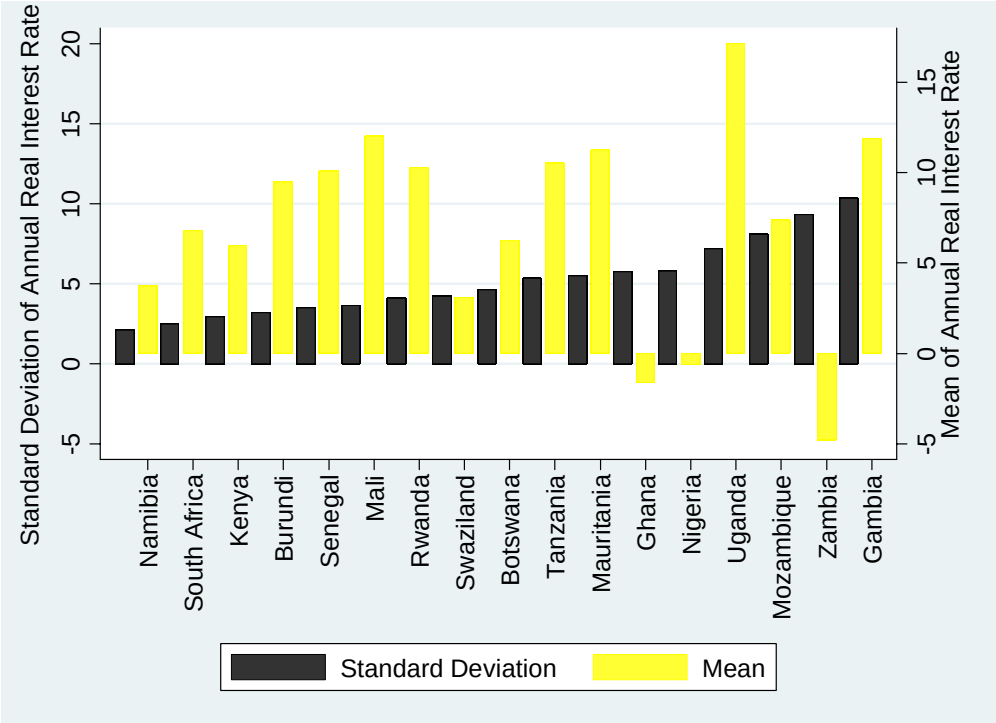

Figure 5: Distribution of Real Interest Rates in African Countries

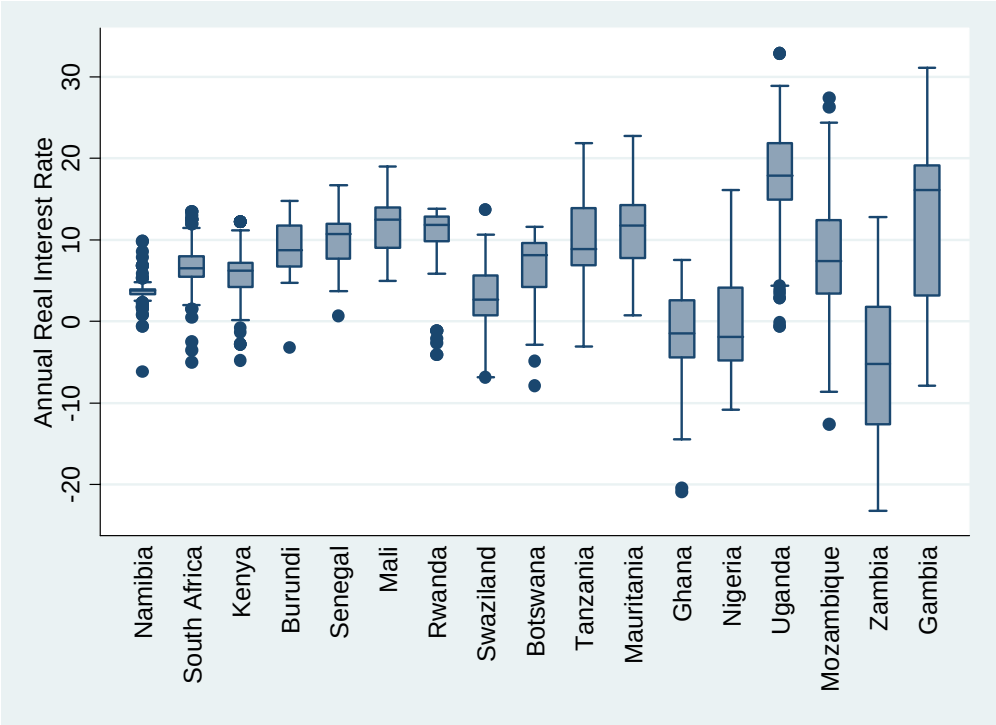

Figure 6: Distribution of Real Interest Rates in Germany

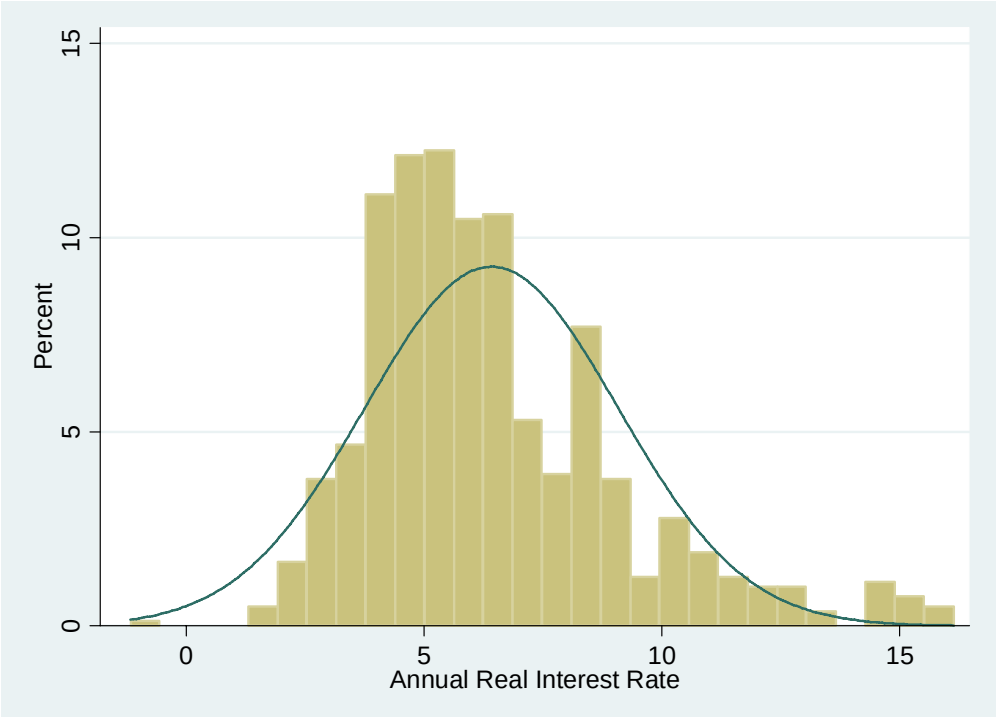

Figure 7: Distribution of Real Interest Rates in South Africa

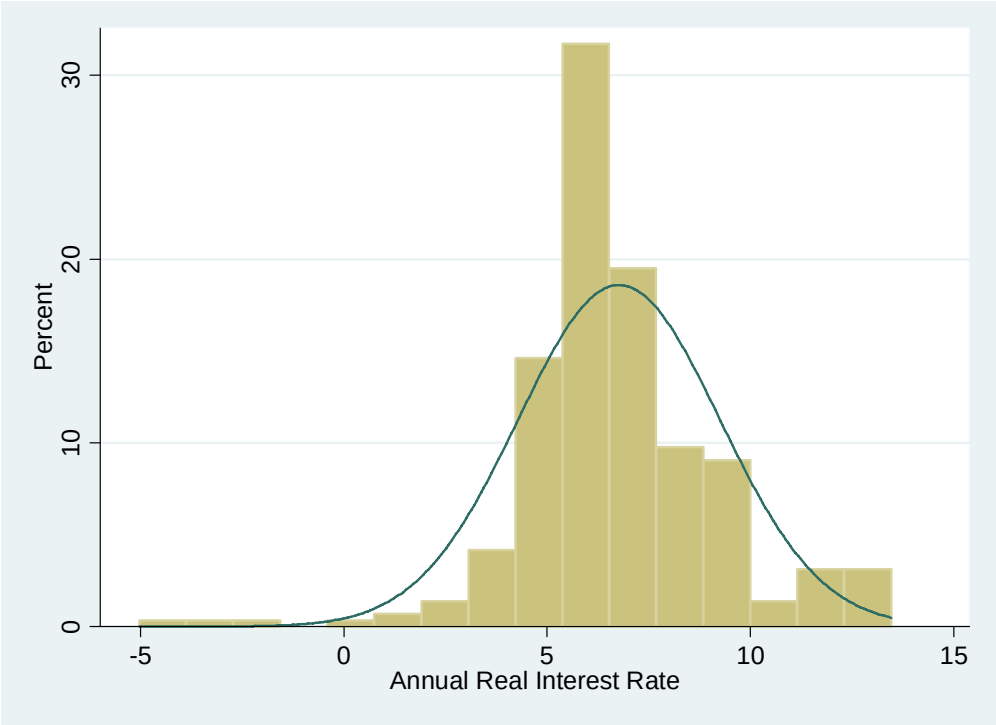

Figure 8: Distribution of Real Interest Rates in Zambia

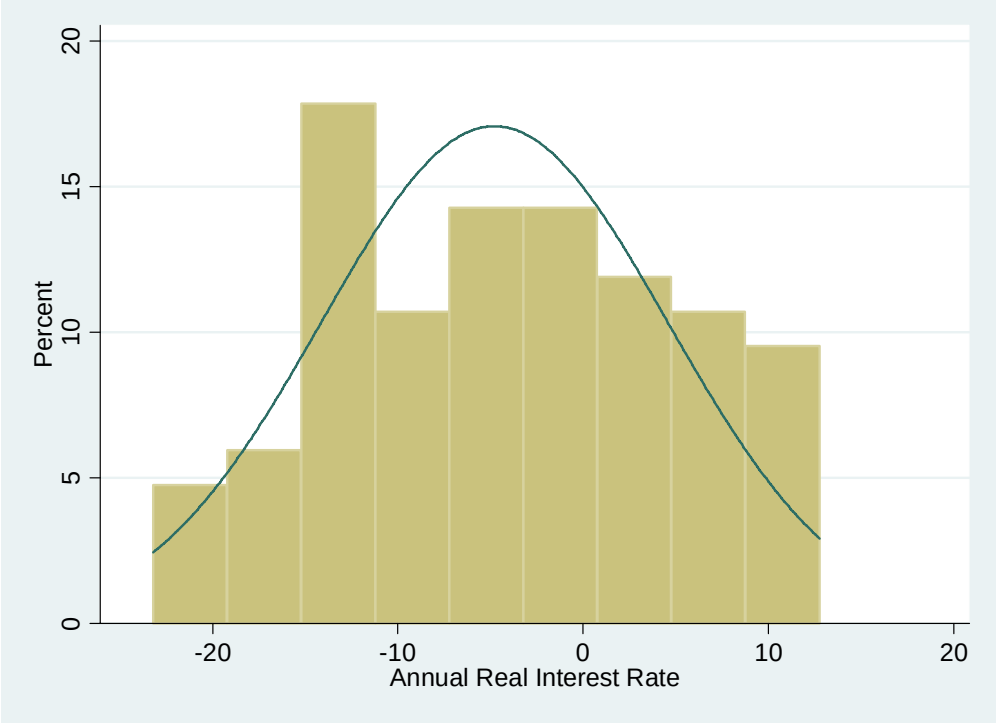

Figure 9: Distribution of MPK in African Countries

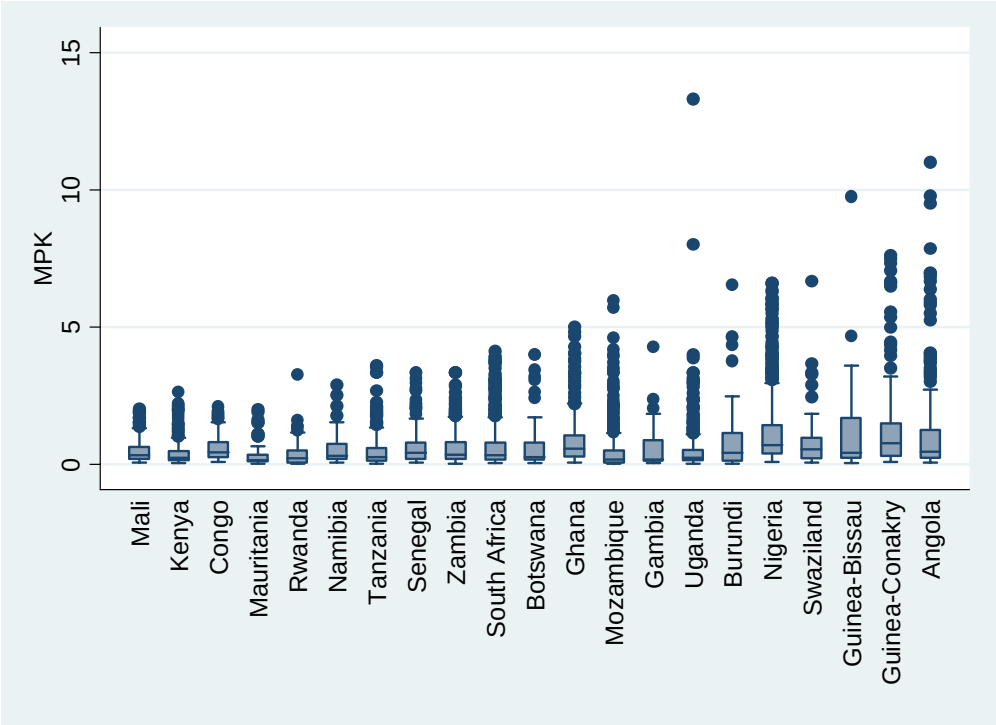

Figure 10: Distribution of MPK in African Countries (no outliers)

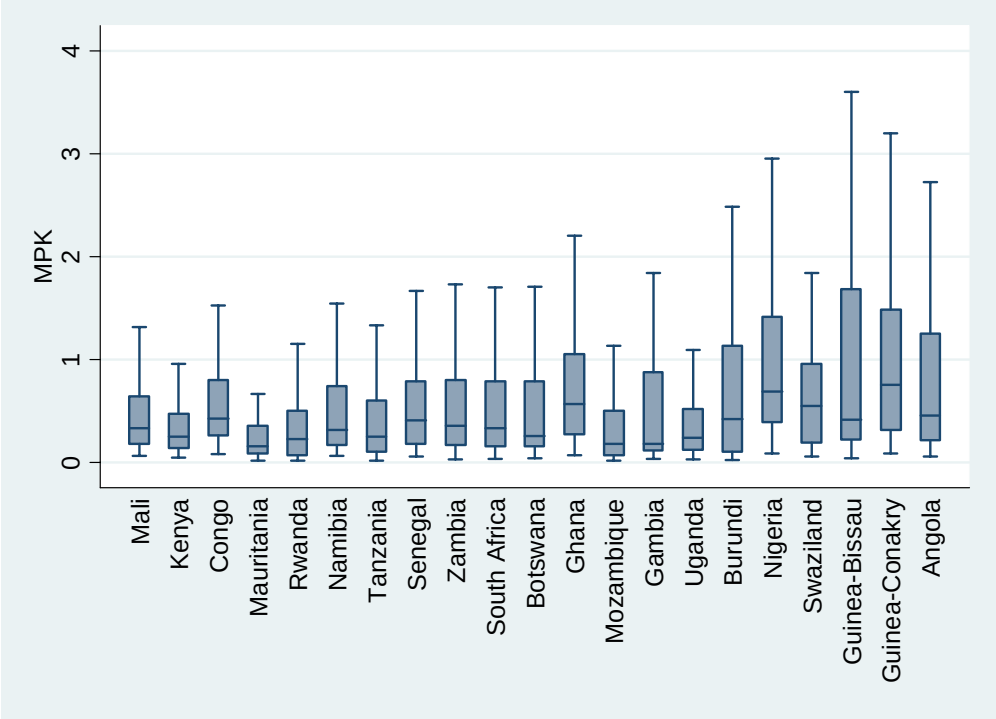

Figure 11: Distribution of HK-index in African Countries

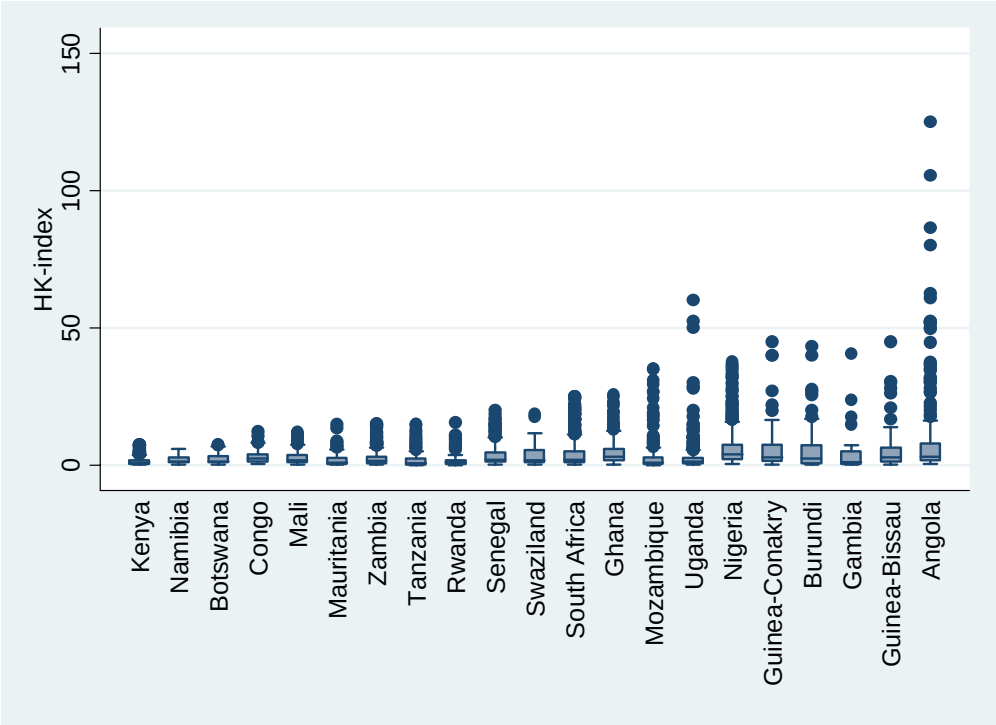

Figure 12: Distribution of HK-index in African Countries (no outliers)

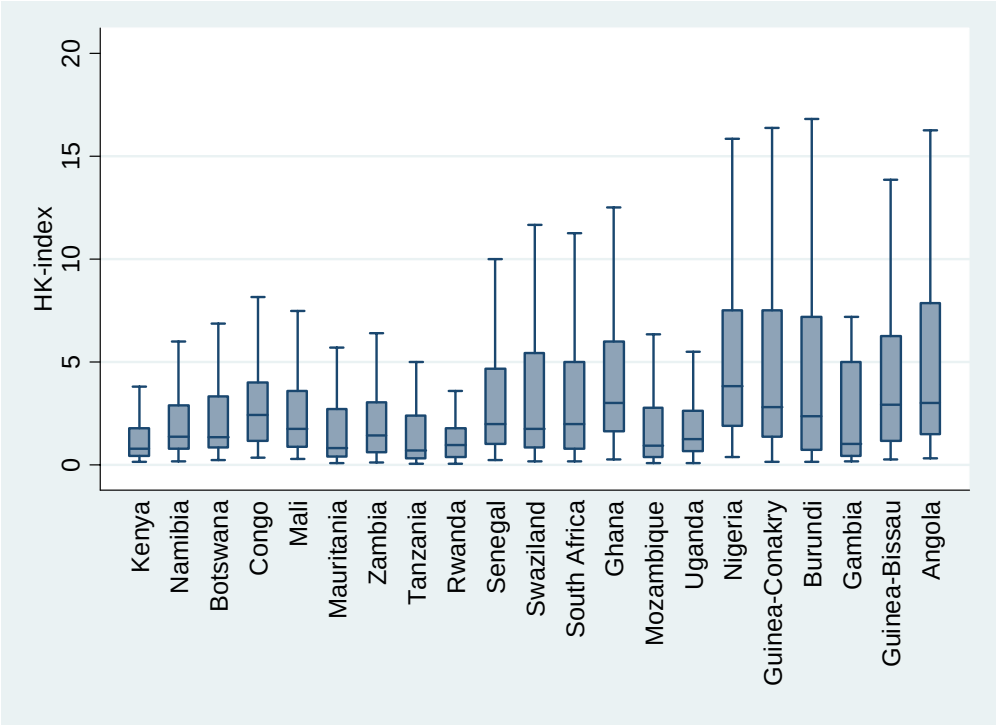

Figure 13: Misallocation vs Corruption in African Countries

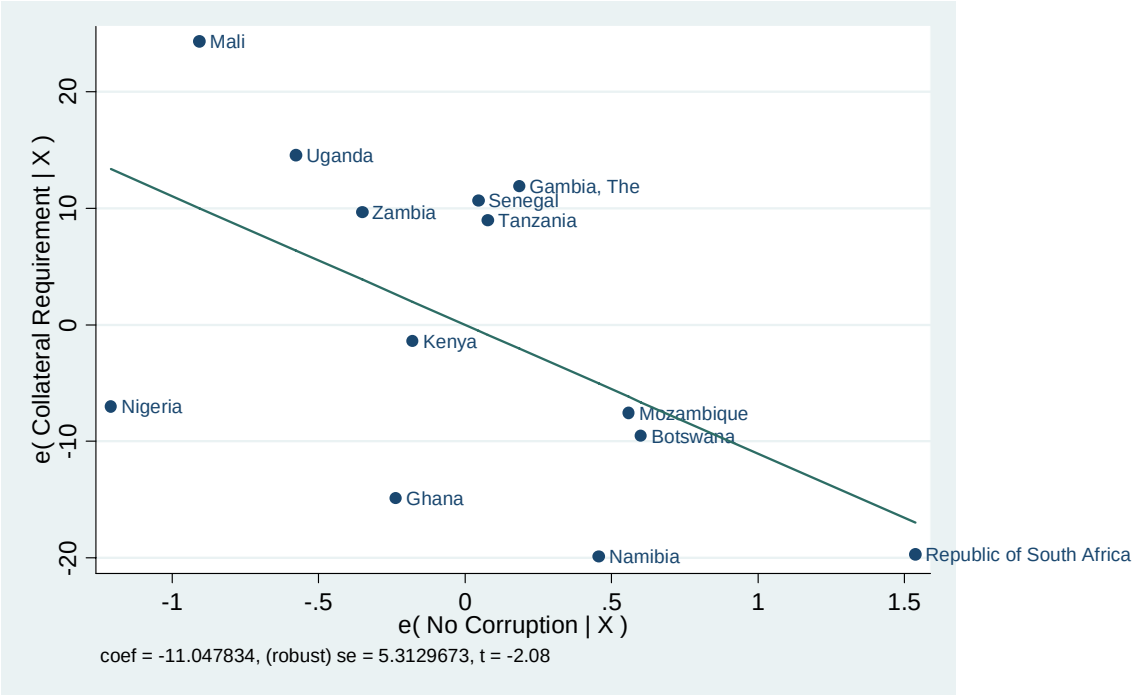

Figure 14: Misallocation vs Investor Protection in African Countries

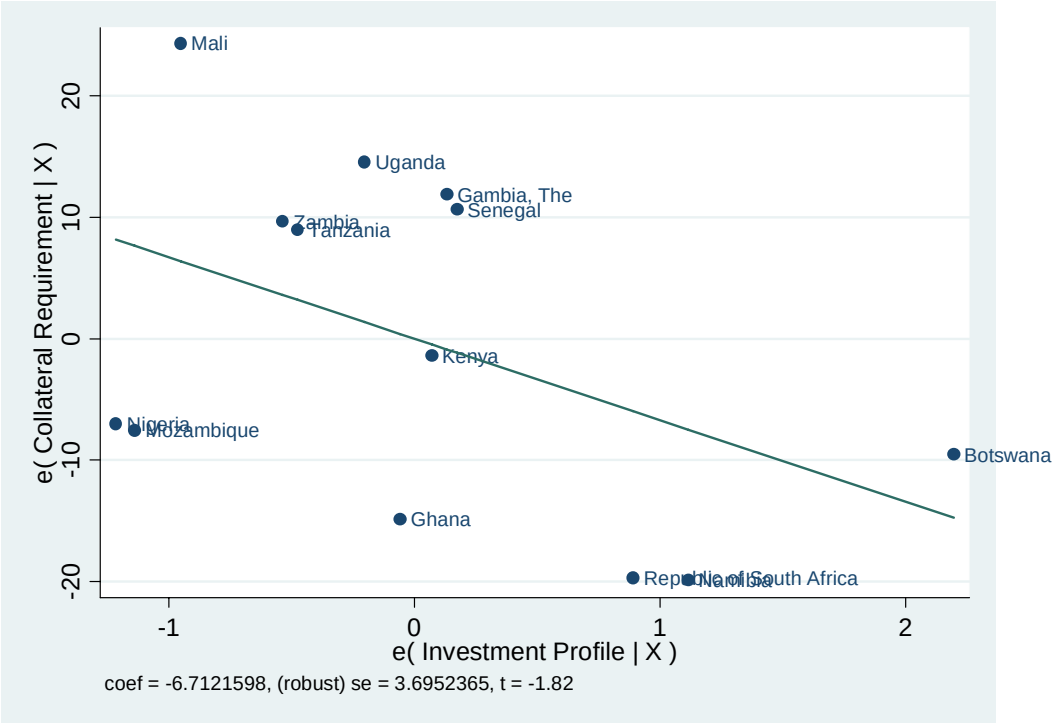

Figure 15: Misallocation vs Investment Climate in African Countries

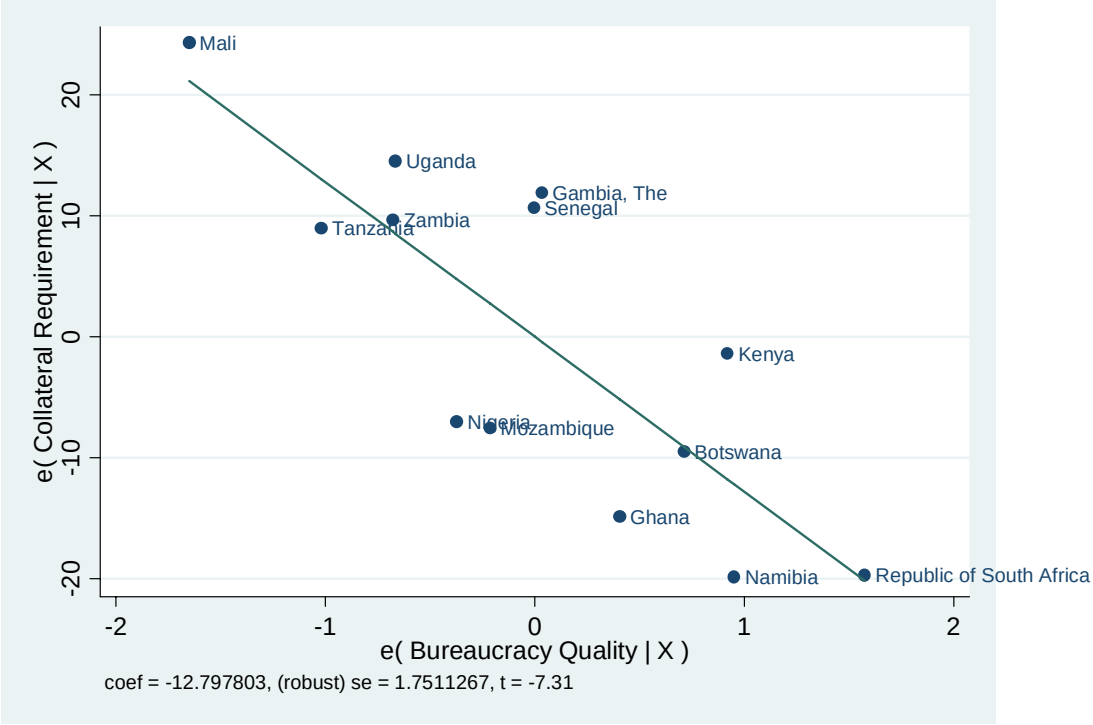

Figure 16: Misallocation vs Starting a Business in African Countries

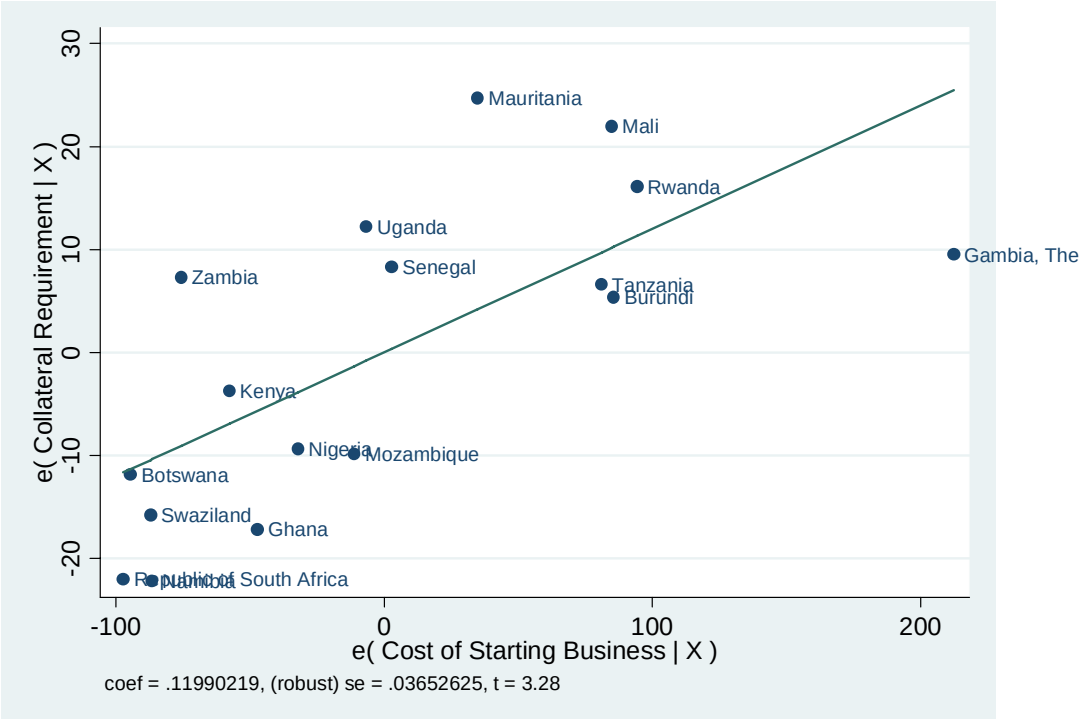

Figure 17: Misallocation vs Legal Rights in African Countries

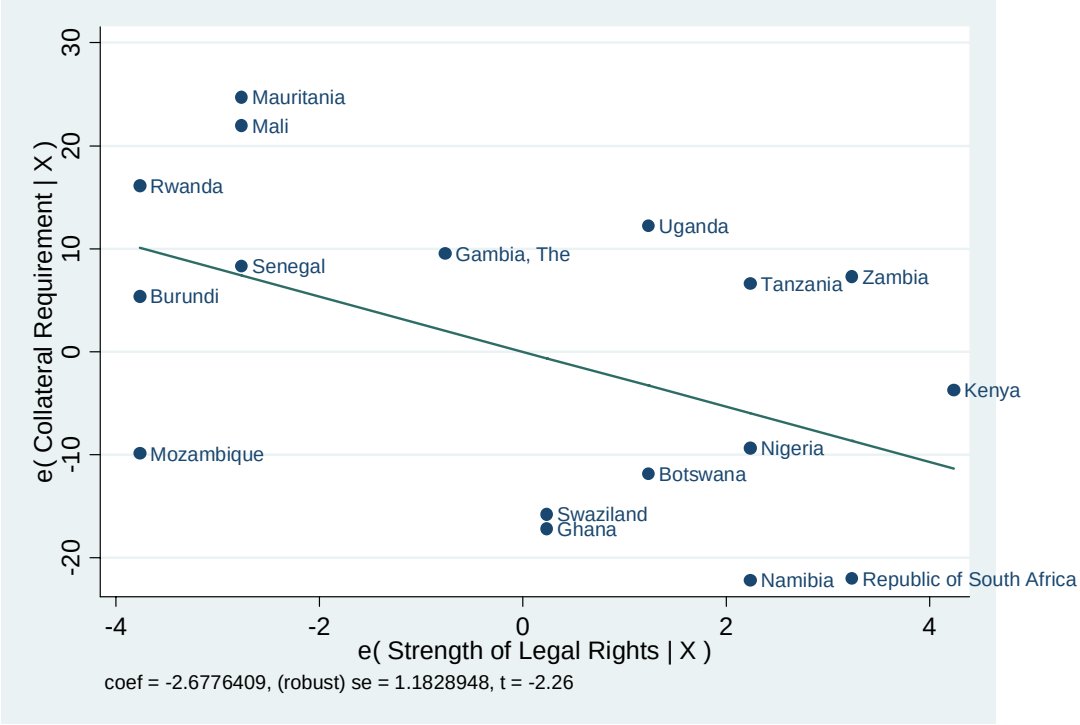

Figure 18: Misallocation vs Shareholder Rights in African Countries

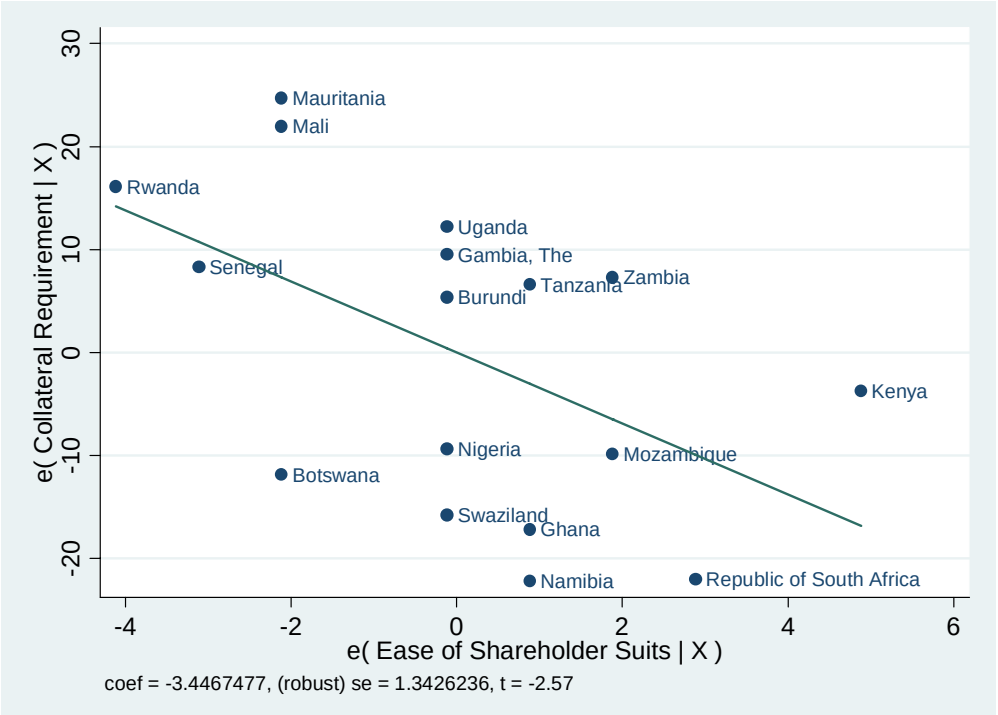

Figure 19: Major Obstacle for Firms in Africa

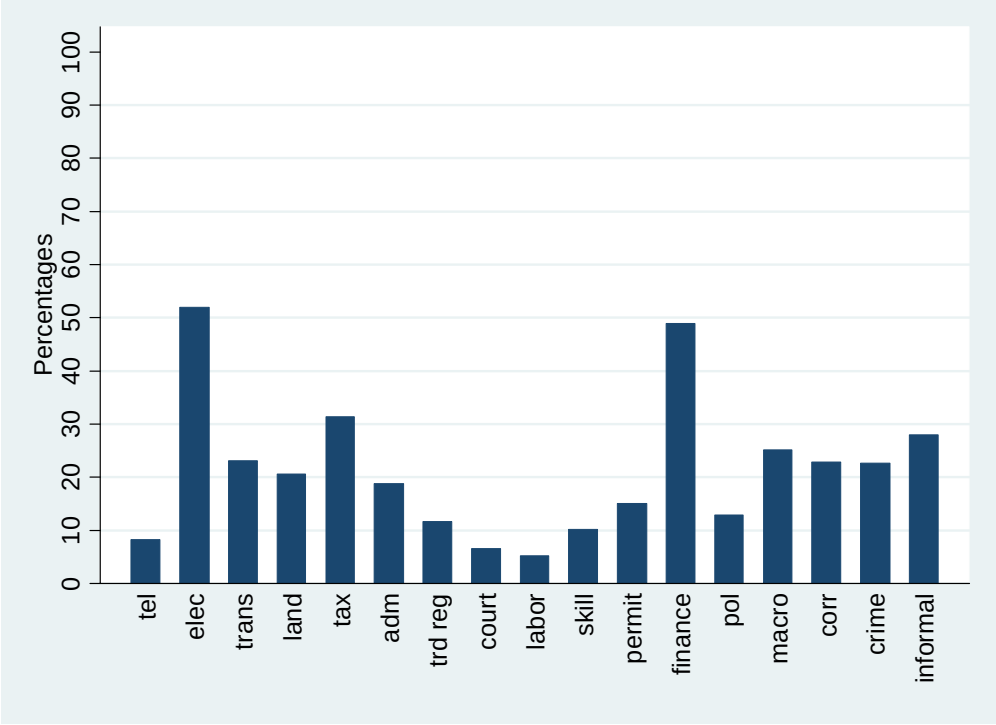

Figure 20: Severity of Main Obstacles

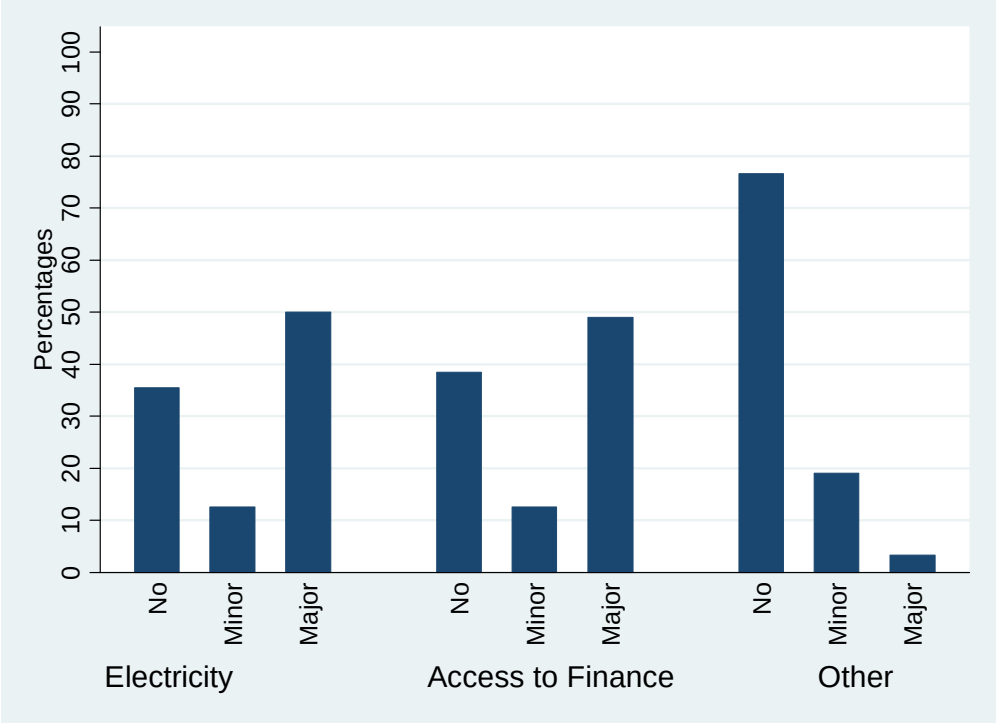

Figure 21: Angola

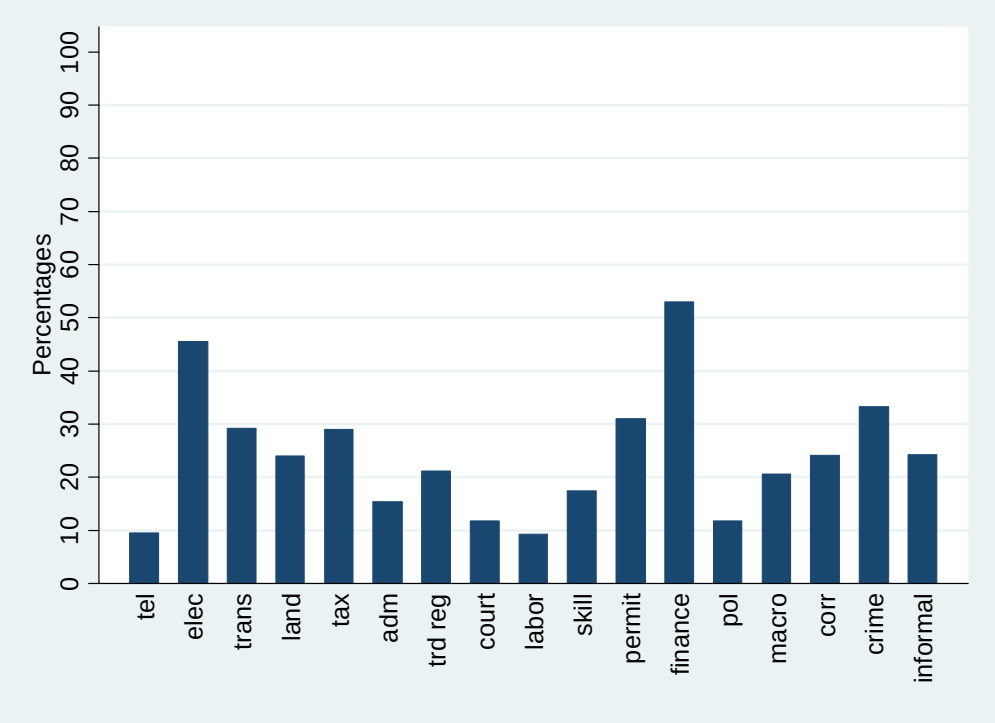

Figure 22: Bostwana

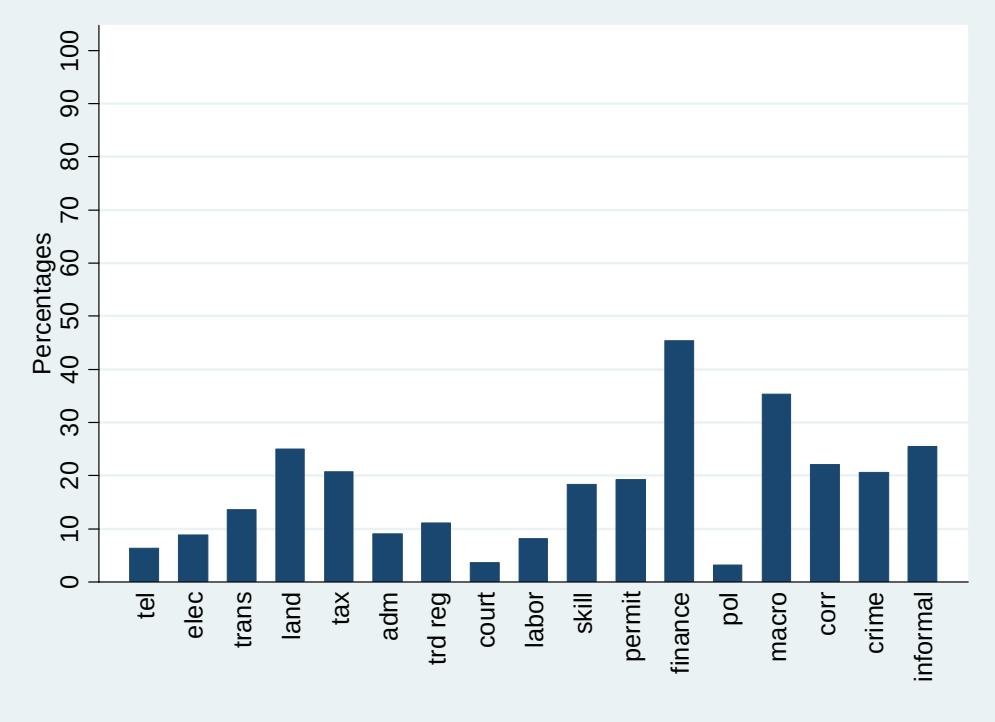

Figure 23: Burundi

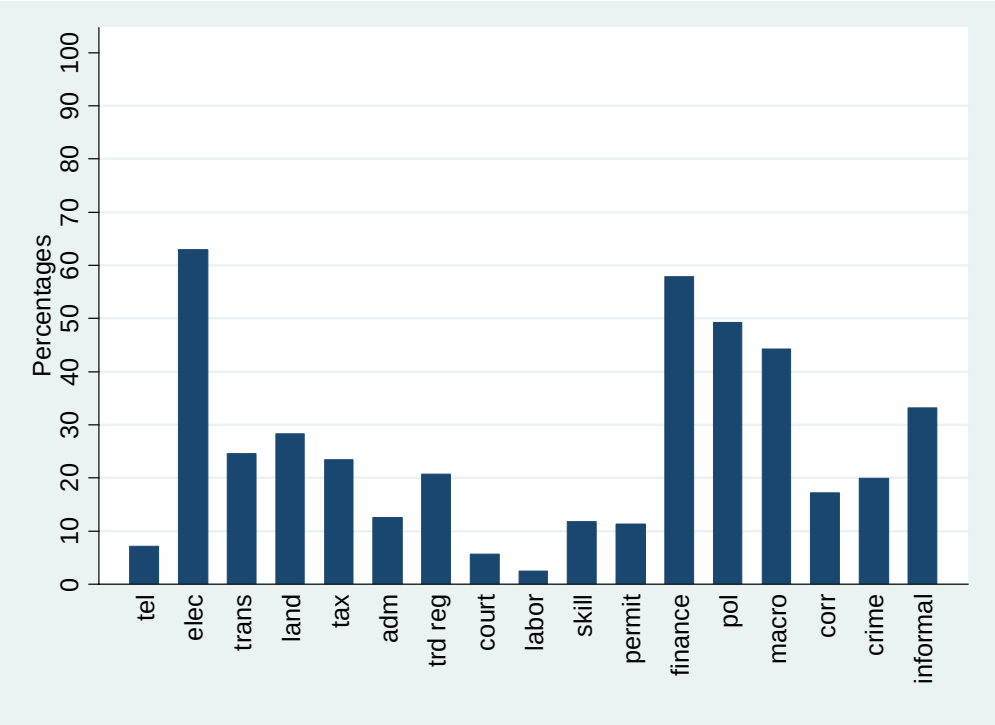

Figure 24: Congo

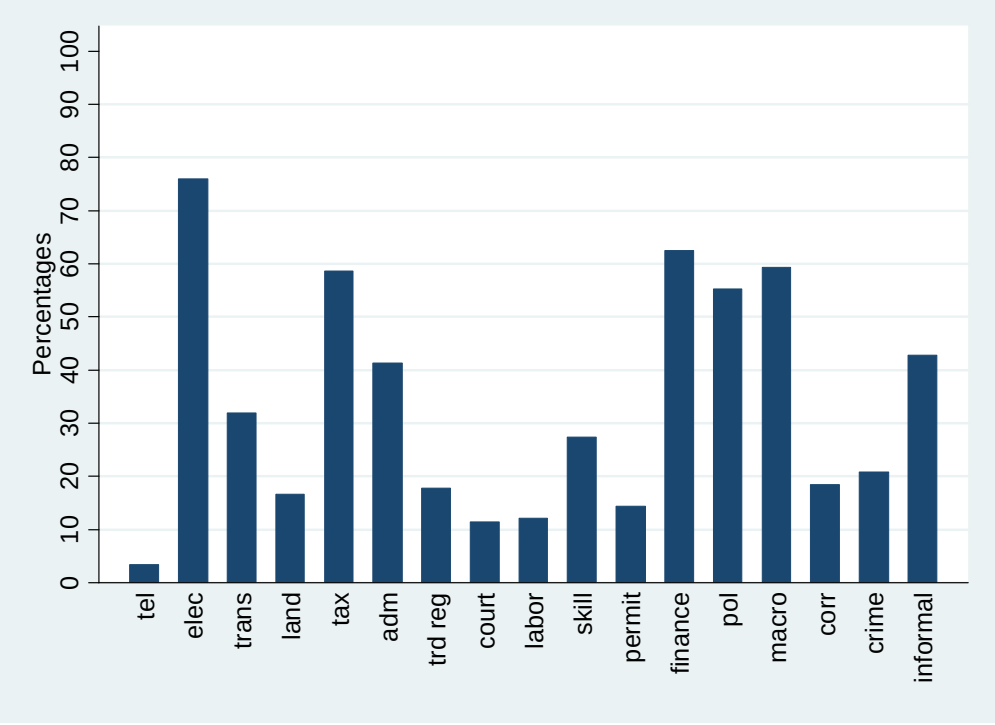

Figure 25: Gambia

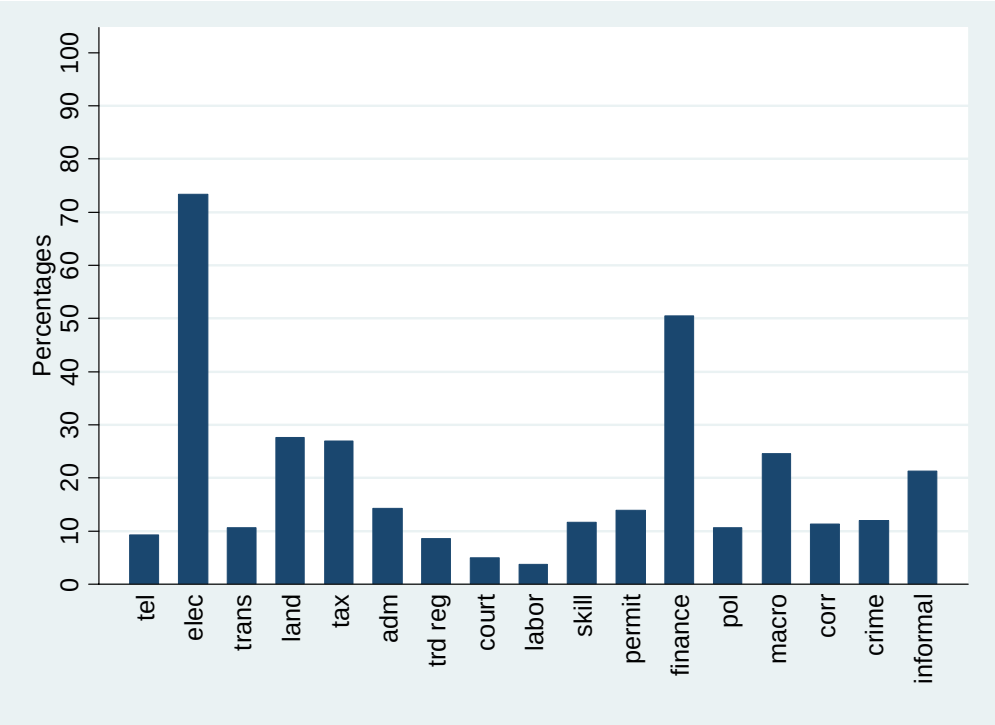

Figure 26: Guinea-Bissau

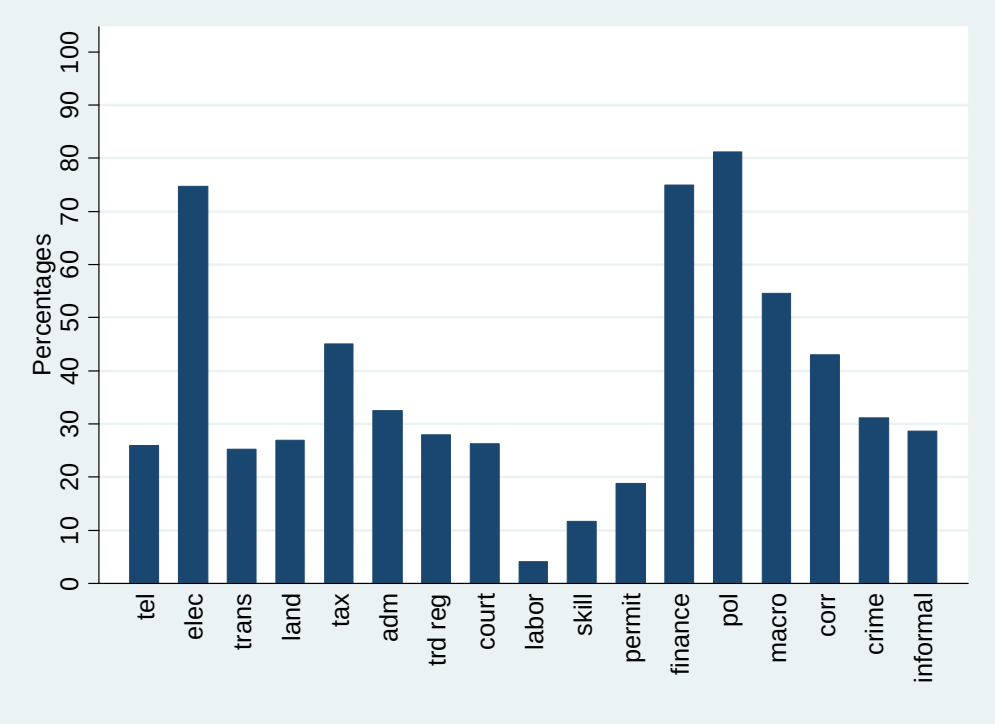

Figure 27: Guinea-Conakry

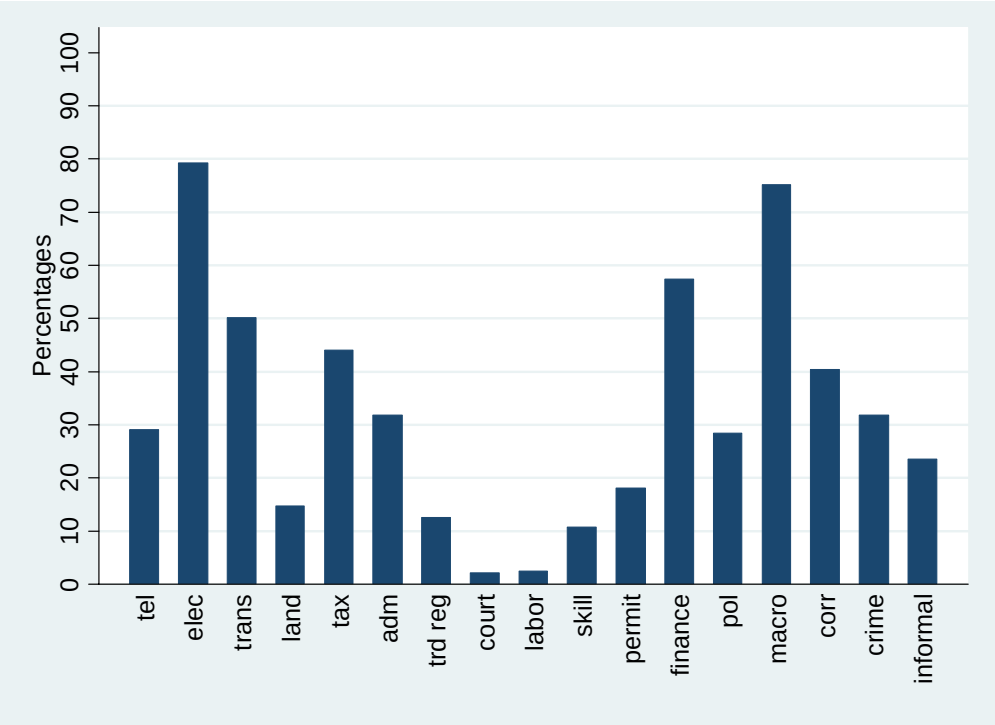

Figure 28: Mauritania

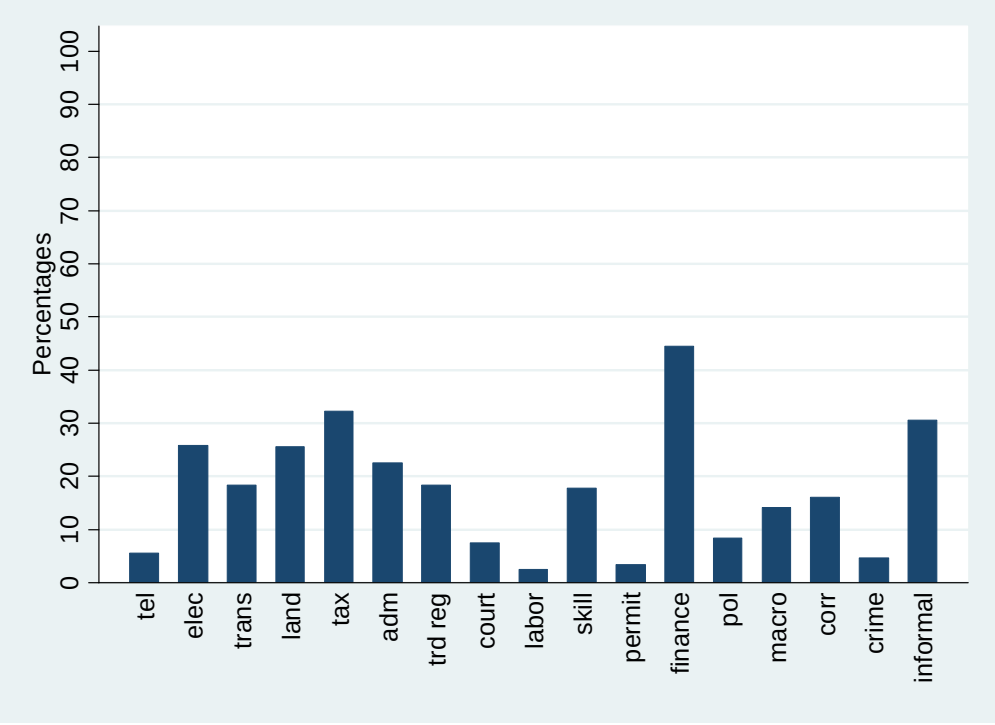

Figure 29: Namibia

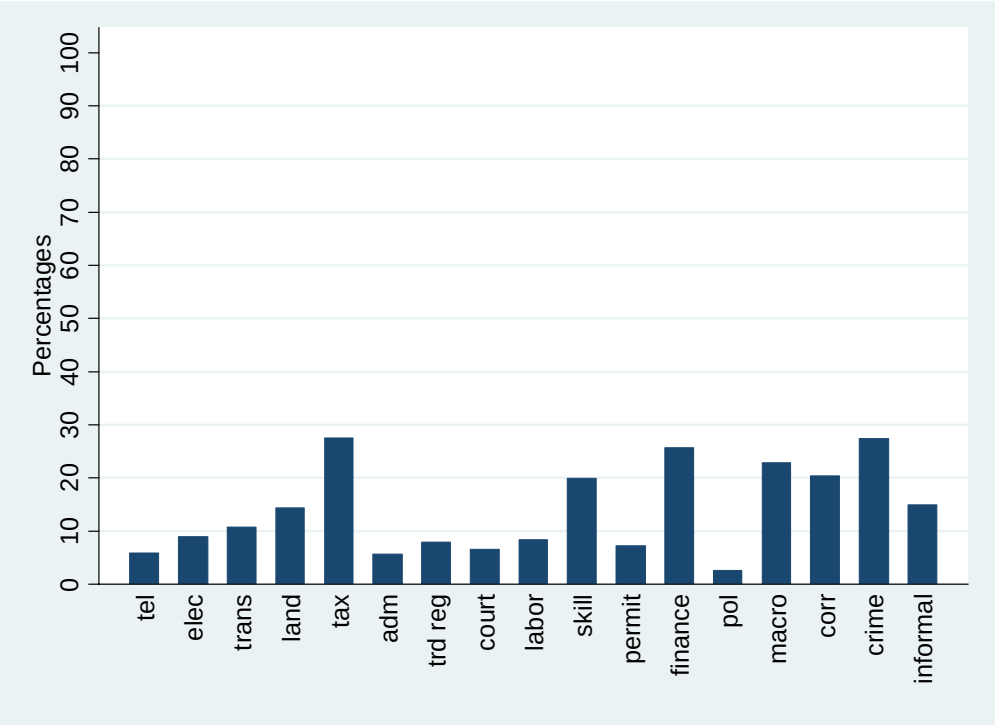

Figure 30: Rwanda

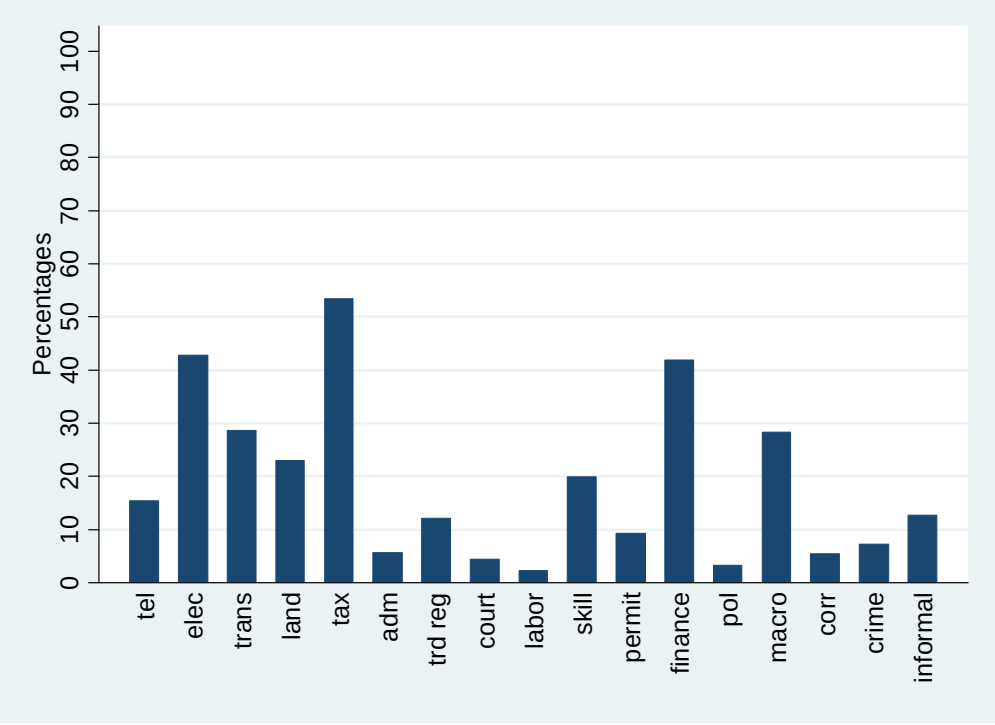

Figure 31: Swaziland

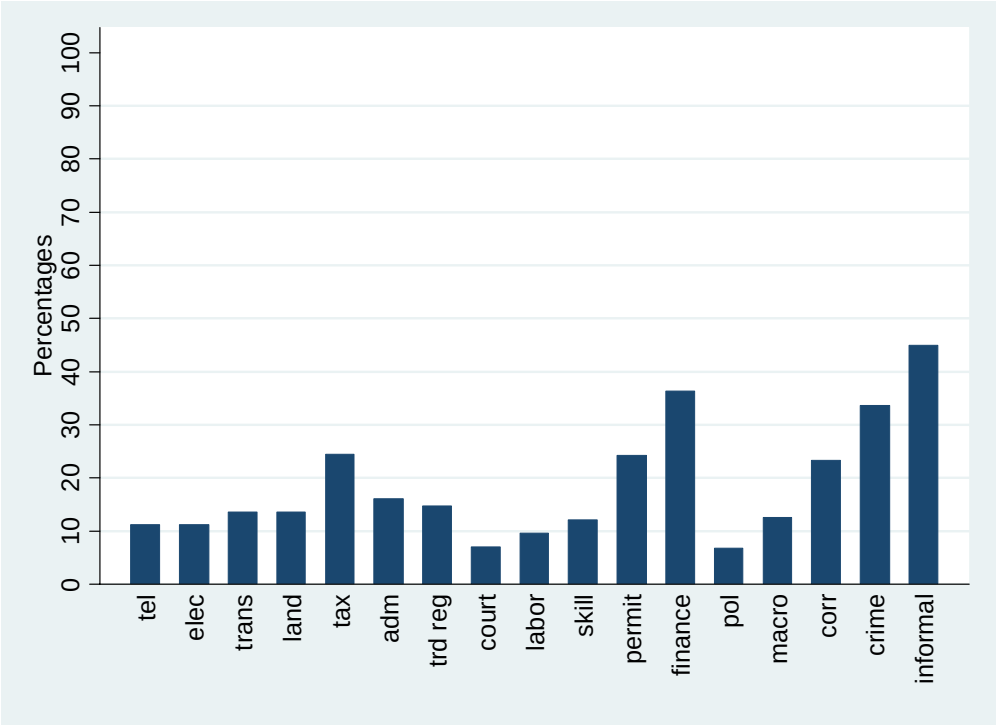

Figure 32: Tanzania

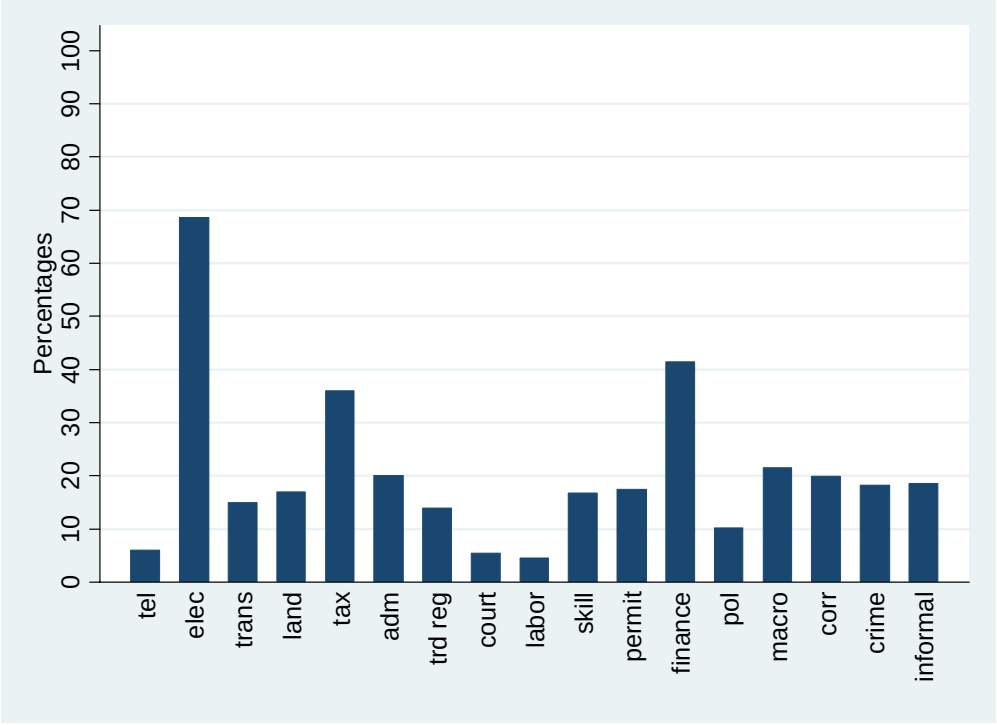

Figure 33: Uganda

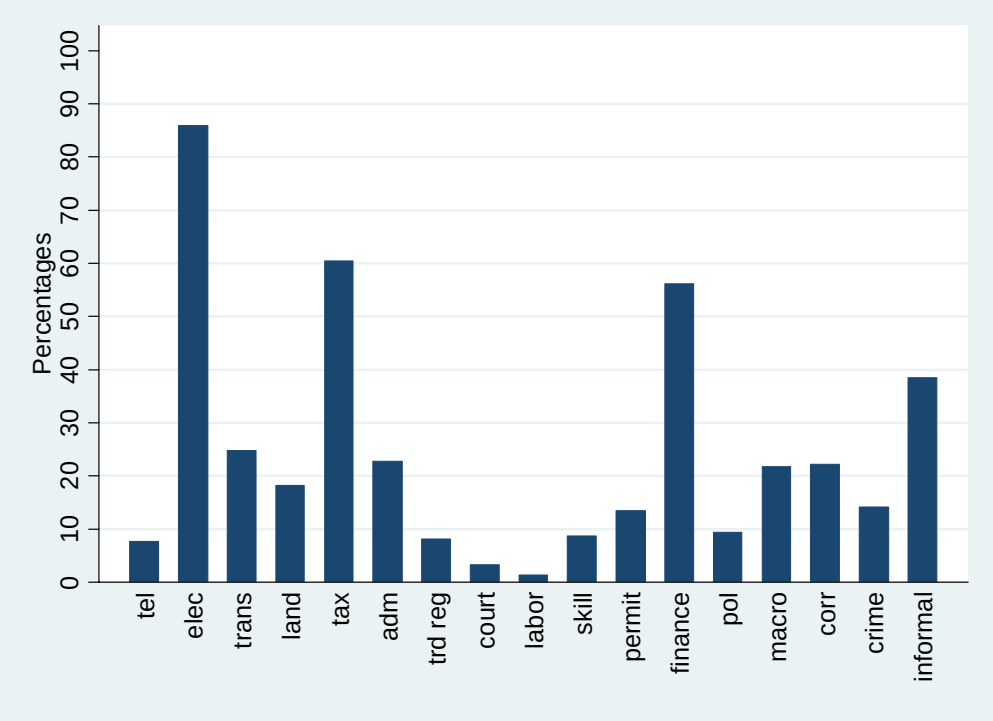

Figure 34: Kenya

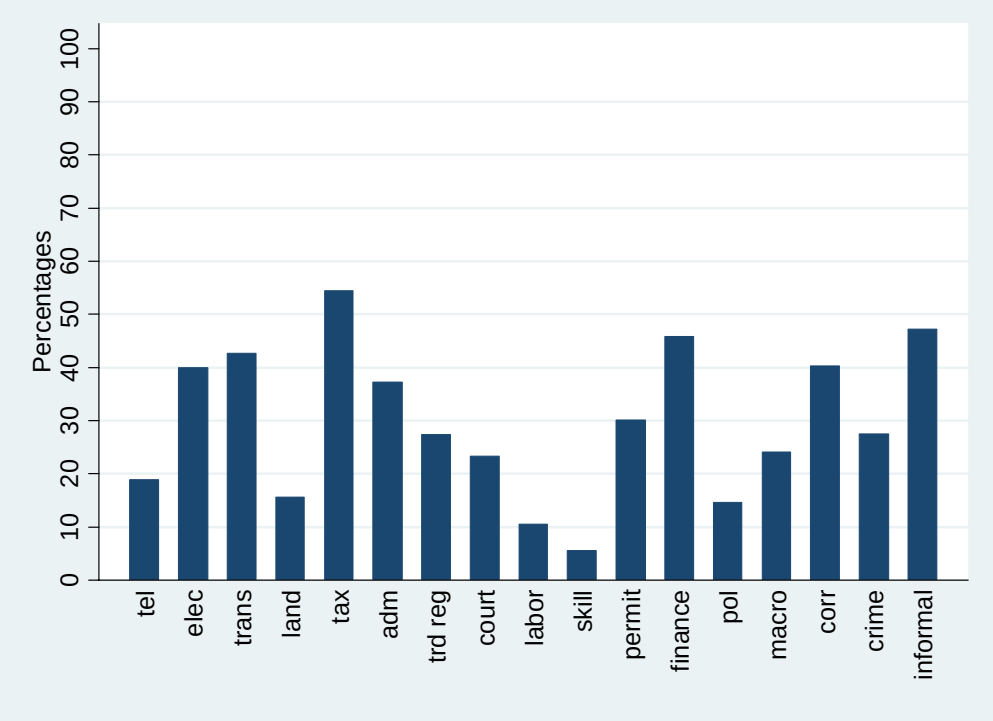

Figure 35: South Africa

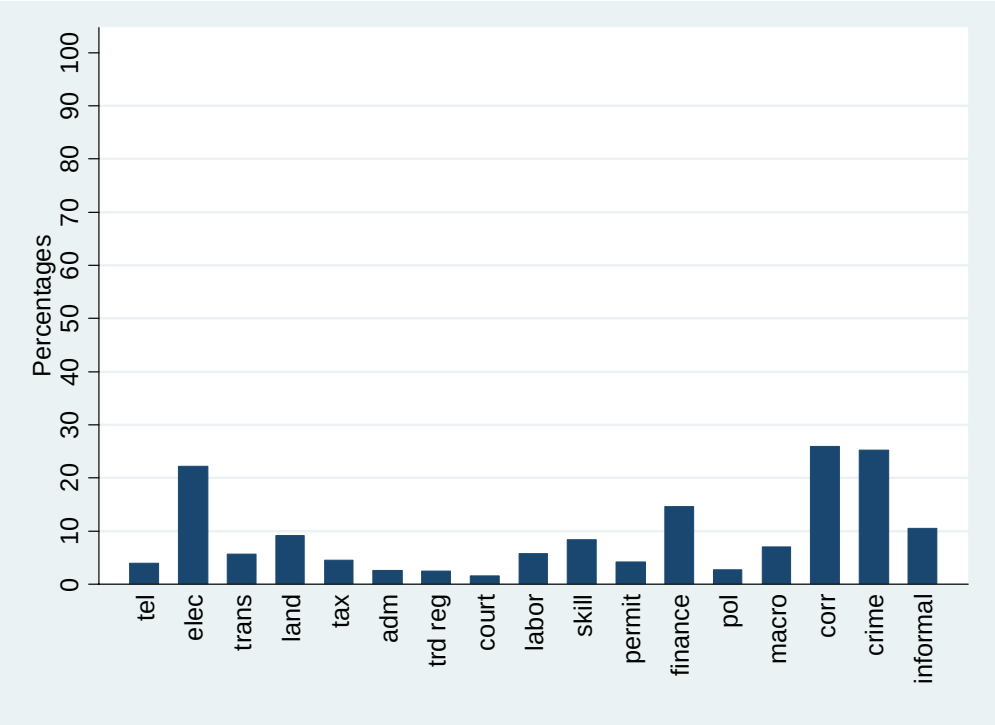

Figure 36: Ghana

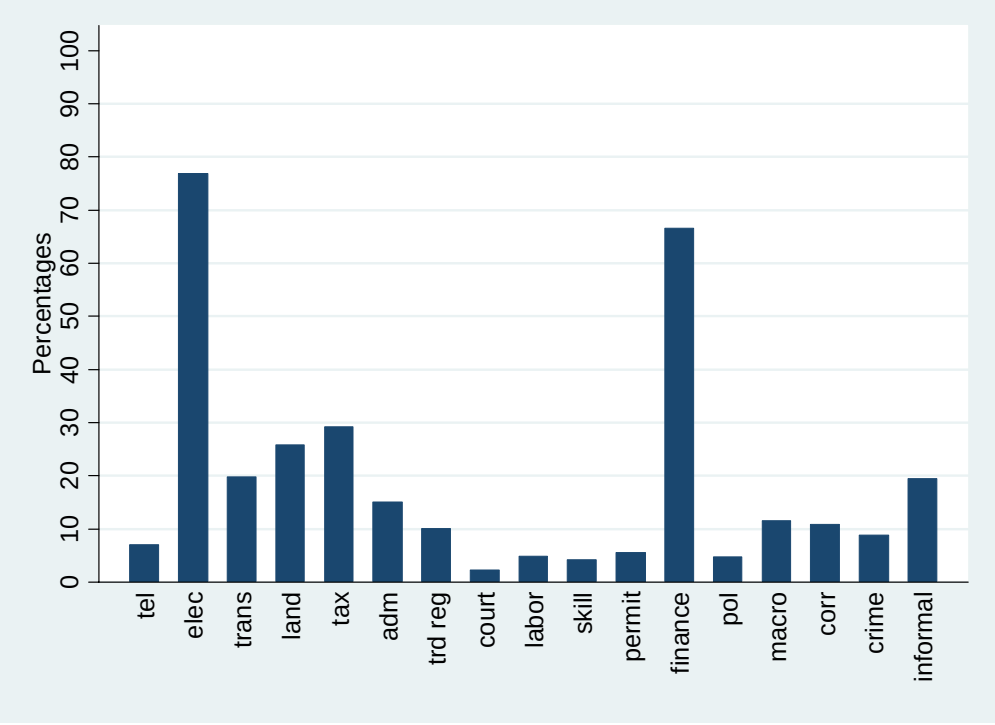

Figure 37: Mozambique

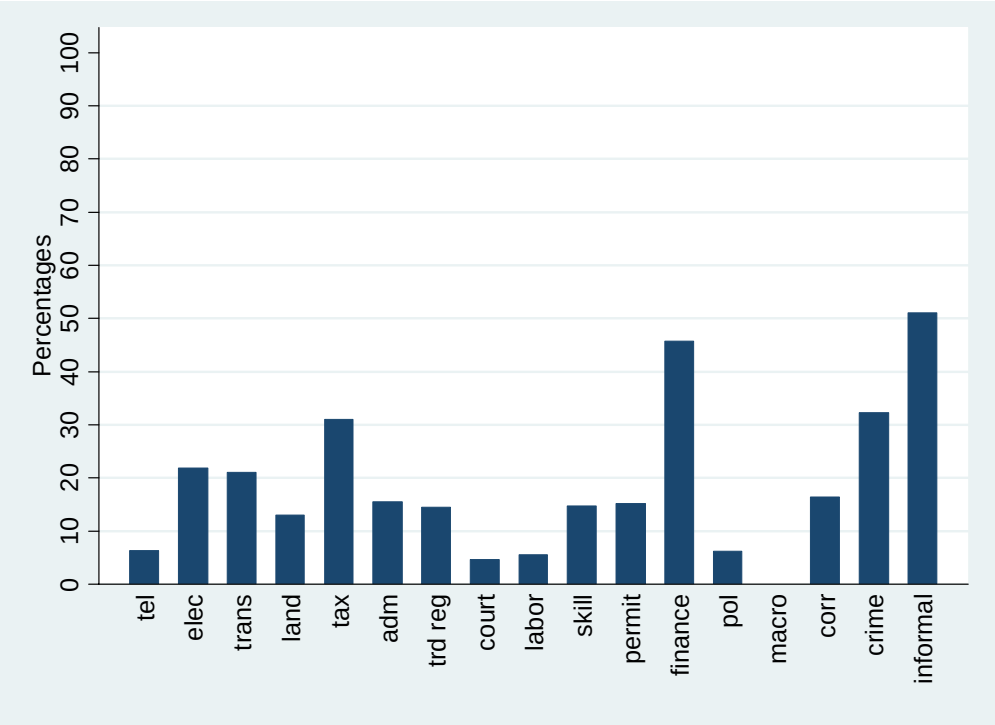

Figure 38: Nigeria

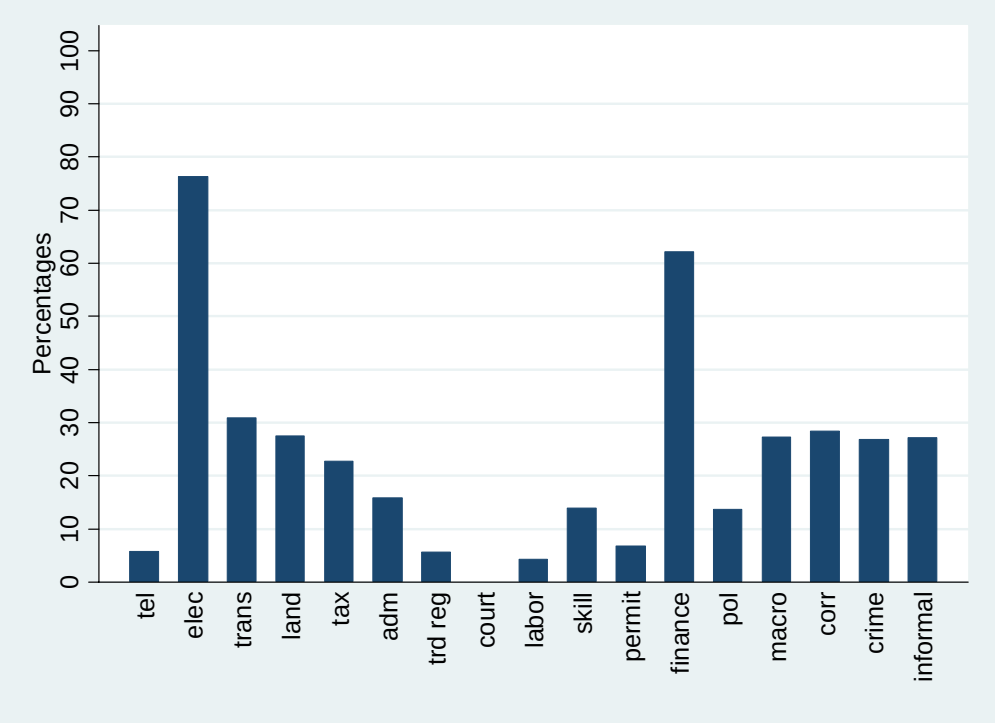

Figure 39: Zambia

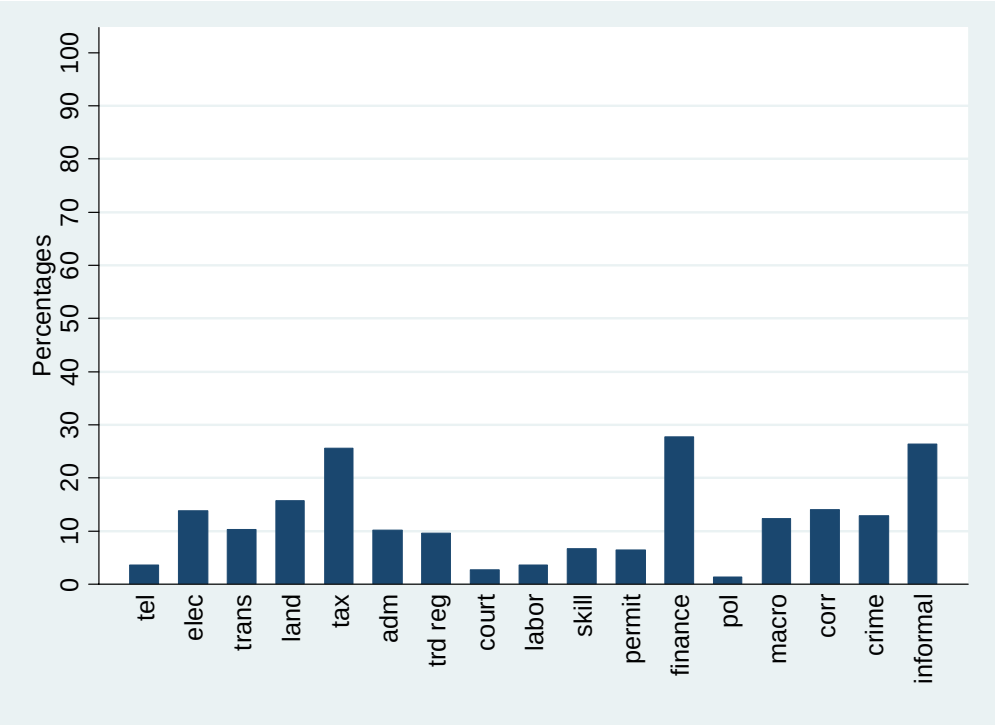

Figure 40: Mali

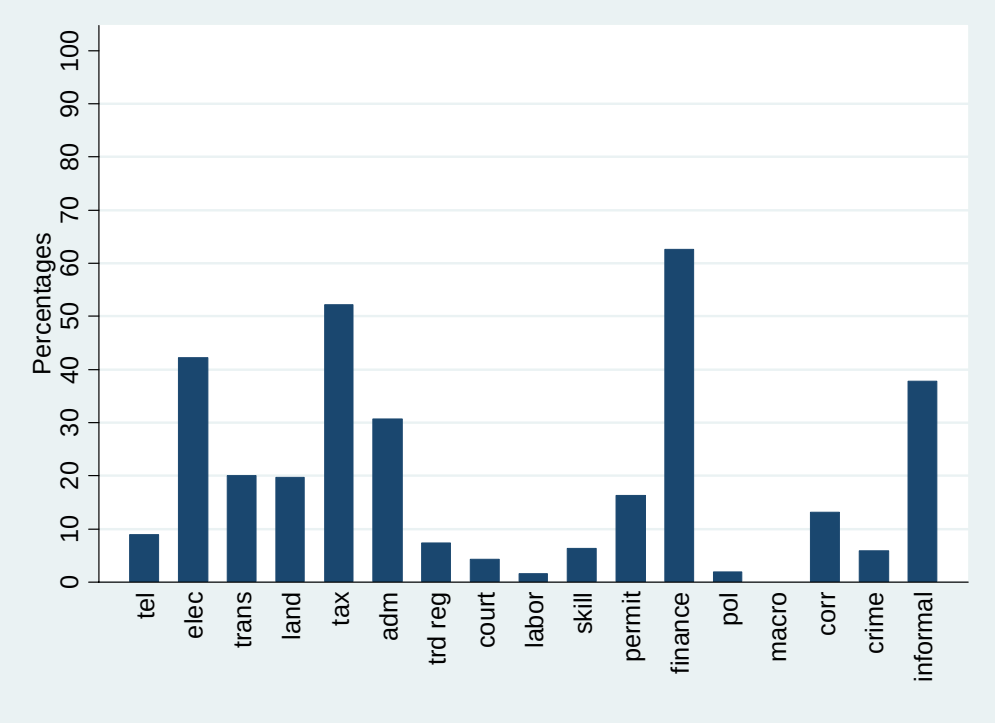

Figure 41: Senegal