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Financial Regulation and Government Revenue

The Effects of a Policy Change in Ethiopia

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Abstract

Financial regulation affects government revenue whenever it imposes both the mandatory quantity and price of government bonds. This paper studies a banking regulation adopted by the National Bank of Ethiopia in April 2011, which forces all private banks to purchase a fixed negative-yield government bond in proportion to private sector lending. Having access to monthly bank balance sheets, a survey of branch costs and public finances documentation, the effect of the policy on government revenue can be tracked. This is compared to three plausible revenue-generating alternatives: raising funds at competitive rates on international markets; distorting the private lending of the state-owned bank; and raising new deposits through additional branches of the state-owned bank. Three main results emerge: the government revenue gain is moderate (1.5–2.6 percent of the tax revenue); banks comply with the policy and amass more safe assets; banks' profit growth slows without turning negative (from 10 percent to 2 percent).

Financial Regulation and Government Revenue: The Effects of a Policy Change in Ethiopia[*]

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1 Introduction

Financial regulation policies which promote, or impose, the purchase of government bonds give rise to a fiscal policy dimension. Reinhart and Rogoff (2009) and Reinhart, Reinhart, and Rogoff (2012) find historically that even if in principle "macroprudential regulation need not be the same as financial repression, [...] one can often be a prelude to the other". In this paper we investigate two core questions relating to these issues. (1) How much government revenue can financial regulation produce? (2) Through which channel does financial regulation generate government revenue? We show that the revenue gains can be moderate, using as a specific piece of regulation in Ethiopia as a case study, and highlight that lower bank profitability is the channel through which government revenue is created.

A sizable body of literature has calculated the government revenue gains from macroprudential regulation, or financial repression, adopting a variety of methods: the most popular uses a weighted spread between foreign and domestic interest rates (Giovannini and De Melo 1993), while others consider the presence of large reserve requirements combined with an inflation tax (Fischer 1982; Brock 1989; Agénor and Montiel 2008). Such a line of research has provided considerable insight into government intervention in financial markets across countries and, implicitly, into countries' financial development. However, most of these estimates rely on a direct link between government policies and the main aggregates (i.e., the foreign-domestic spread, actual reserve requirements), which cannot be tested because of various identification concerns. This makes the revenue gain calculation unclear, as the policy may not actually induce any real change in the economy. For example, a country may impose large reserve requirements because of budgetary pressures during an increase in systemic risk (i.e., an international debt crisis, a recession). However, such requirements may not bind as banks might already have been holding substantial reserves anyway. For this reason, assuming that reserve requirements are policy-driven, then some revenue calculation is still feasible, while in practice these policies have no direct effect on revenue. Analogously, the spread between foreign and domestic interest rates can largely be attributed to household preferences for domestic investment, in line with the Feldstein–Horioka puzzle (Feldstein and Horioka 1980), rather than regulation. Therefore, while most of the literature relies on cross-country analysis and assumed linkages, we take a more direct path.

We advance this literature and contribute to the calculation of government revenue gains by tracking the micro-level evidence through which financial regulation leads to government revenue gains. We propose a direct calculation of such savings based on credible counterfactuals. In this paper, we focus on a specific case study: the introduction of a financial regulation policy in April 2011 by the National Bank of Ethiopia (NBE) on all private banks. This regulation is ideal for the purpose of our study for a variety of reasons. First, the policy was announced and implemented with short notice (in mid-March 2011 and April 2011, respectively) and banks were largely surprised by this. Second, the magnitude of the regulation was substantial, as it imposed the purchase of 0.27 bonds issued by the central bank (NBE bills) for every unit of loans extended to the private sector. Third, banks would not be willing to hold these bills in absence of the regulation, because these present a fixed nominal rate of 3% and deliver an effective negative net return[1]. Therefore, both the regulated mandatory quantity of bond purchase and their price are fixed.

By having access to data on monthly balance sheets of all Ethiopian banks, to a disaggregated survey of branch installation costs, and to annual reports, we are able to verify how the policy affects bank behavior and to calculate the government revenue gains induced by the policy. This paper advances this body of literature through two fundamental innovations. First, we provide a country-specific government revenue calculation based on a clear policy, for which we can verify its effect on the regulated entity (banks and their balance sheets) and calculate the revenue gains. Secondly, we benchmark this policy against three alternative and credible ways of raising revenue through the banking system. Despite methodological changes, our results are essentially in line with the literature[2], however rather than a macroeconomic approach we follow a micro-oriented calculation as suggested by Siegel (1981).

We find that this policy creates a moderate revenue gain: depending on the counterfactual scenarios, such gain lies between 1.5% and 2.6% of the total tax revenue (this corresponds to 20% of all Personal Income Tax revenue in Ethiopia). In addition, we track the mechanism through which revenue is generated, and verify that diminished bank profits is the only aggregate affected, with an

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[1]In fact, while on the asset side each NBE Bill provides a 3% remuneration, the core liability of Ethiopian banks (deposits) are remunerated, on average, at 5.5% and at least 5% by law. Therefore every NBE Bill delivers to the bank a net negative return between 2% and 2.5%.

[2]In fact, in Appendix D we show that our results are consistent with the methodologically alternative calculations of the financial repression revenue introduced by Giovannini and De Melo (1993).

undetectable pass-through on borrowers or depositors[3]. At the same time, we observe that banks comply with the policy by purchasing the NBE bills as prescribed and increasing their overall safe asset holding. The quantitative effects on bank profitability are sizeable: bank profit growth declines from a 10% yearly rate pre-policy to a 2% post policy.[4] Therefore, overall, while we do not take a clear stance in favor of or against the policy, our results provide robust evidence on the relation between financial regulation and government revenue generation, showing that lowering bank profits is the channel through which this takes place.

In Section 2, we present an essential review of the literature on this topic. In Sections 3 and 4, we introduce and discuss the Ethiopian financial sector and the regulation policy. Finally, in Section 5, we offer some concluding remarks.

2   Literature Review

The literature on financial repression dates back to McKinnon (1973) and Shaw (1973), who coined the term "repression" for policies that distort the allocation of capital by draining financial resources toward the government. These authors were mostly describing the phenomena behind financial repression and relating them to liberalization, in a context in which centralized economies were the alternative economic system. Specifically, financial repression is defined through policies that depress the deposit rate and, consequently, the aggregate amount of savings.

Giovannini and De Melo (1993) moved the attention of this literature from a descriptive approach to revenue calculation. They exploited the spread between foreign and domestic interest rates in a sample of 24 countries to calculate the government revenue from financial regulation and showed that these can be sizable: on average, 2% of GDP or 9% of total government revenue. Using as a comparison the work of Fischer (1982), who calculated the inflation-led seigniorage revenue from mandatory bank requirements, Giovannini and De Melo established a parallel between the two and found these alternative revenue sources to be equivalent in magnitude. An analogous exercise has

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[3]In a companion paper (Limodio and Strobbe 2016), we have shown that, counterintuitively, deposit and lending rates do not respond to the policy and the aggregate level of deposits and loans do not decline, while banks start to expand because of the additional safety provided by the policy.

[4]The desirability of this result is ambiguous in terms of welfare, given that the Ethiopian banking sector registers an exceptional profitability: the local average returns on equity stand firmly at 55% (IMF 2013), above the African (30%; IMF 2013) and Western (5%; Schildbach and Wenzel 2013) averages.

been performed by Brock (1984, 1989), and recently Agénor and Montiel (2008), who also focus on the gains generated by imposing large reserve requirements and an inflation tax. In terms of optimality of financial repression and seigniorage taxes, Bacchetta and Caminal (1992) analyze the effect of financial integration for countries relying on the taxation of their domestic financial system. They relate financial liberalization to reserve ratios, inflation rates, and government debt, and propose a model to explain the setting of the optimal seigniorage tax. Their findings show that liberalization can be detrimental for welfare under some conditions and that reserve ratios can be increased prior to liberalization, this results recall the assessment of Sussman (1991). A similar conclusion is achieved by Mourmouras and Russell (1992), whom consider a the role of optimal reserve requirements rather than a direct taxation of the banking system to finance government expenditure. On an analogous line, Espinosa-Vega (1995) shows that the introduction of a traditional multiple reserve requirement be both welfare enhancing and inflation minimizing compared to a single reserve requirement regulation.

Two papers document the experience of two leading Asian countries – South Korea and China – which implemented substantial financial regulation policies in their key years of growth. Demetriades and Luintel (2001) provide empirical evidence on the effects of financial restraints on South Korean financial development. In an essential theoretical model, they show a positive association between financial development and the degree of state control over the banking system, and a positive relation between financial development and mild repression of lending rates. These results are validated in their empirical analysis, in support of a role for financial regulation policies. Huang and Wang (2011) examine the impact of financial repression on economic growth during China's reform period. They document the existence of an inverse U-shaped relation between financial repression and growth in the Chinese experience: positive for low levels and negative for higher levels.

On a finer historical basis, Reinhart and Sbrancia (2011) provide a comprehensive account of the main financial regulation tools and their application in the last century, focusing especially on calculating the "financial repression tax" in a case where the government both caps the interest rates and creates a "captive" domestic audience for its debt. Reinhart, Kirkegaard, and Sbrancia (2011) document the resurgence of financial repression in the wake of the 2007–2009 financial crises and the accompanying surge in public debts in advanced economies. Their conclusions point to financial repression being particularly successful in liquidating debts when accompanied by a steady dose of

inflation.

In exploring this policy, we participate in the debate on the tools for public debt reduction and promote a moderate degree of financial regulation as a viable solution. A body of recent literature (e.g., Aizenman and Marion 2011; Cochrane 2011; Davig, Leeper, and Walker 2011) supports the view that inflation will emerge as a consequence of fiscal imbalances and will be the long-term solution to lowering public debt. However, Hilscher, Raviv, and Reis (2015) conclude that financial regulation, or regulation coupled with inflation, can be more effective to lower the real value of public debt, in line with Reinhart, Kirkegaard, and Sbrancia (2011). They find that forcing banks to hold a special lower-yielding bond may be a solution, which is analogous to the policy under study in this paper. Concerning this case study, we show that the revenue gains of such policies can be moderate, while the costs on the banking sector may be negligible in terms of profitability and intermediation.

3   Ethiopian Banks and Policy Change

In this section, we present the effects of a new financial regulation on banks and verify their behavioral response to the policy. As discussed in the introduction, this is key to establishing a direct link between bond purchase and the regulation, which then permits us to calculate the government revenue gains. We exploit the introduction of a significant policy change in the Ethiopian financial sector that occurred in March 2011, when the NBE issued a directive requiring all private commercial banks to hold 27% of new loan disbursements in negative-yield NBE bills. This policy can be described as a typical macroprudential regulation measure because it imposes safe asset purchase. At the same time, this also creates a "regulation tax" on banks, given that the average deposit remuneration is 5.5% (National Bank of Ethiopia 2012), with a legal minimum of 5%, which implies that on each NBE bill, banks lose a net 2–2.5%. In essential terms, this policy regulates both the mandatory quantity of purchased bills (27% of new loans) and their price.

The relevant aspect of studying the so-called 27% rule is given by the unique nature of this shock, because it was unexpected, it was announced less than a month before implementation, and it was large, with banks mobilizing a large part of their assets in response to the policy. In another paper on the same policy, Limodio and Strobbe (2016) show that this safe-asset policy leads to a substantial balance-sheet expansion and provides a clear theoretical underpinning and identification of the effect.

In this section, we discuss three issues that are useful in our accounting exercise:

1. compliance – banks responded by purchasing NBE bills as prescribed by the regulation (Table 1);

2. safety – overall safe asset purchase increased one-to-one with the NBE bill purchase (Table 2 and Figure 1);

3. profitability – banks' profit growth slowed down, but did not turn negative (Table 3 and Figure 2).

Compliance

In this subsection, we show that banks started to purchase this bond in proportion to lending (0.27 : 1) as prescribed by the regulation. For this task, we use the monthly bank balance-sheet information and present a simple fixed effect regression, highlighting that the policy had an actual effect on the behavior of private banks. For this reason, we use the volume of NBE bills purchased by bank i in month m and year y,

$$NBE\ Bills_{imy} = a + b \cdot Policy_{my} \times Lending_{imy} + \iota_i + \iota_m + \iota_y + \epsilon_{imy}, \tag{1}$$

and regress it over a dummy variable taking unit value after April 2011, $Policy_{my}$, interacted with the monthly bank-specific volume of lending, $Lending_{imy}$, and bank, month, and year fixed effects. The null hypothesis of this test is $b = 0.27$, given the 27% rule. In the presentation of the main results, we exploit a variety of variations by including and excluding certain sets of fixed effects. Under no circumstances can we reject that banks start purchasing the government bonds as prescribed by the regulation.

In Table 1, we report the results of regression (1) for the whole variation in column (1). We exploit only within-bank variation by including only bank fixed effects in column (2), and then by removing year-specific shocks in column (3) and month-specific shocks in column (4). Finally, we replace the last two with non-parametric effects for every month of every year in column (5). Though the point estimates move slightly across these estimations, the null hypothesis $b = 0.27$ can never be

rejected and therefore it cannot be dismissed that compliance indeed took place. In Appendix A, we also present two other estimations in which we slightly change the main regression model, and the results are indeed unchanged. To verify also graphically that compliance occurred, in Appendix B we provide a figure showing the average balance-sheet composition across months and we verify the NBE bill purchase after April 2011.

Table 1: Regulation and Compliance: Monthly Variation (Million Real Birr)
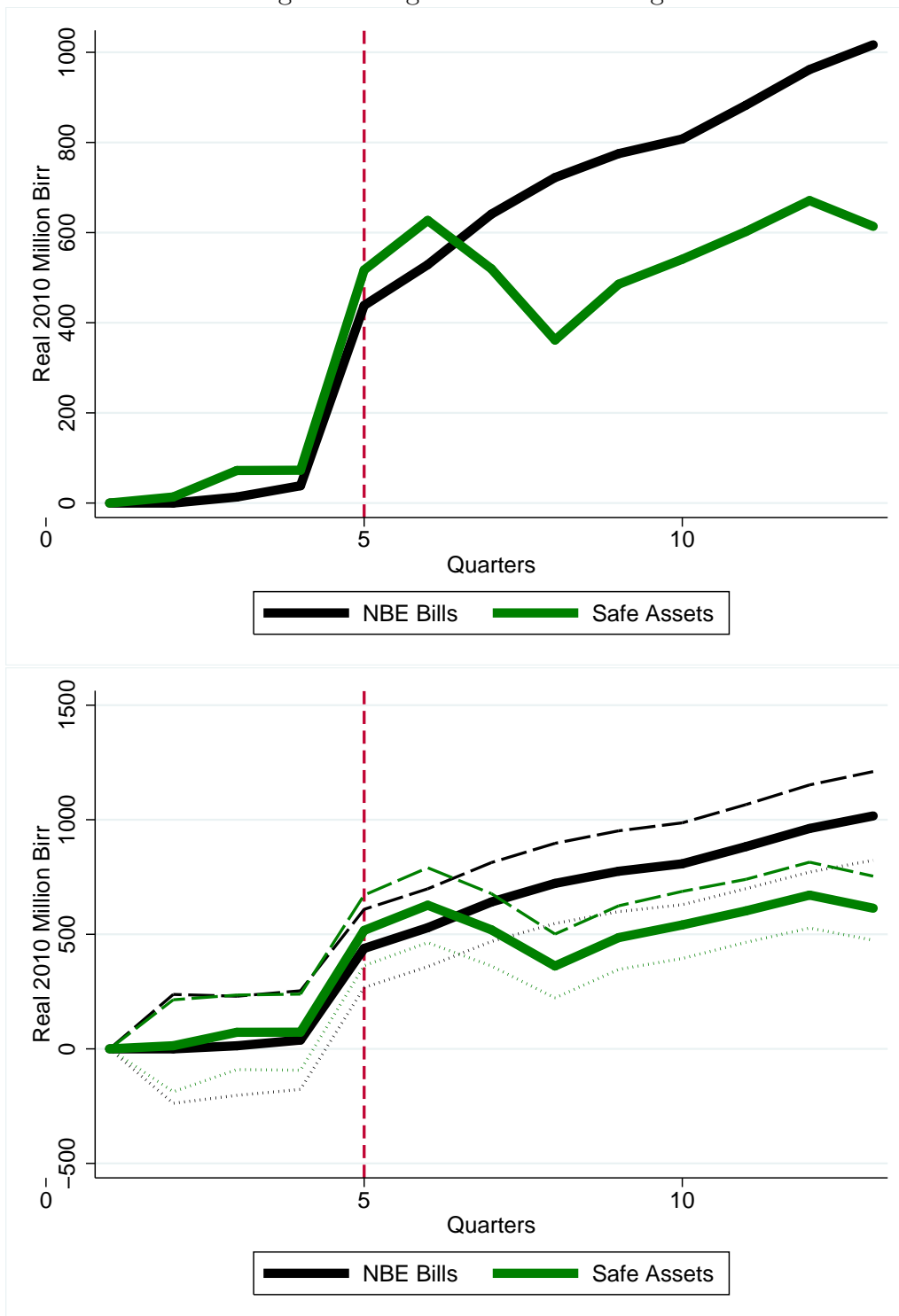
Variable	NBE Bills (Real Birr)				
	(1)	(2)	(3)	(4)	(5)
Lending × Policy	0.263***	0.274***	0.251***	0.248***	0.254***
	(0.00752)	(0.00689)	(0.00868)	(0.00902)	(0.00976)
Bank FE		Yes	Yes	Yes	Yes
Year FE			Yes	Yes	
Month FE				Yes	
Non-Param. Month FE					Yes
Obs.	538	538	538	538	538
Number of banks	14	14	14	14	14
Adjusted R^2	0.889	0.950	0.959	0.959	0.959
Mean Dep. Var.	501.9	501.9	501.9	501.9	501.9
SD Dep. Var.	616.6	616.6	616.6	616.6	616.6

Note: This table reports OLS estimates. The unit of observation is bank level. Robust standard errors are in parentheses. NBE Bills is the amount of bills issued by the NBE in million birr, and is a continuous variable. Its mean and standard deviation are reported in the final two rows. The quantity of NBE Bills is regressed on "Lending × Policy", which is the interaction between Private Lending (in million birr) and a continuous variable, and the Policy dummy, taking unit value from April 2011 onward. In Tables A1 and A2, we also include the respective variables Lending and Policy as well as their interaction, without statistically detectable changes in the coefficient. The null hypothesis is that this coefficient is 0.27, as prescribed by the NBE directive, and we cannot reject this. In column (1) we exploit all variation. In column (2) we exploit only within-bank by introducing bank fixed effects. In columns (3) and (4) we also add year and month fixed effects, respectively. In column (5) we remove parametric month and year fixed effects and replace them with non-parametric effects for each month of each year (non-param. month FE). Appendix A reports an additional test of this null hypothesis including more indicators. All quantities are in millions of real birr, at their 2010 value. The adjusted R^2 of these regressions is also reported. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Safety and Profitability

In this short subsection, we show that the regulation had two consequences: 1) an increase in the purchase of NBE bills; 2) an increase in the overall quantity of safe assets held by banks (i.e., cash, other liquid assets, government bonds, bank-to-bank deposits, central bank reserves). This is important, because unless banks change their actual asset allocation, then it may be argued that this policy overall generates only a change in safe asset composition (i.e., less cash and more government

Figure 1: Regulation and Lending

Note: This figure reports the average evolution of monthly NBE bills (in black) and safe assets (in green) for all Ethiopian private banks between January 2010 and December 2013. The red vertical dashed line shows the introduction of the financial regulation policy, which forces banks to buy a negative yield government bond for every unit of private lending. The lower panel reports also the 95% confidence interval around these lines, using dashed and dotted lines. All quantities are in millions of real birr, at their 2010 value.

Figure 2: Regulation and Profitability

Note: This figure reports the evolution of yearly profits for all Ethiopian banks between 2009 and December 2013. The red vertical dashed line shows the introduction of the financial regulation policy, which forces banks to buy a negative yield government bond for every unit of private lending. The dashed and dotted lines indicate the 95% confidence intervals. All quantities are in millions of real birr, at their 2010 value.

bonds). This, in turn, would classify this policy as a simple tax, rather a regulation altering the safe asset holding of banks.

To verify this, we exploit all available time series information and regress the two main variables (NBE Bills and Safe Assets) over all consecutive quarterly dummies (13 available) and bank fixed effects, as shown:

$$v_{it} = \alpha + \sum_t \beta_t \iota_t + \sum_i \gamma_i \iota_i + \epsilon_{it}. \tag{2}$$

In equation (2), the variable v_{it} (NBE Bills or Safe Assets) indicates the quantity of variable v for bank i in quarter t, and is regressed over quarterly dummies, ι_t, and bank fixed effects, ι_i. The former effects describe the average evolution of these variables over time, while the latter report the average quantity of specific assets held by a specific bank. The coefficients β_t from equation (2) are reported in Table 2 and plotted in Figure 1. By inspecting both, we can verify that with the introduction

Table 2: Regulation and Safe Assets: Quarterly Variation (Million Real Birr)

Variable	(1) NBE Bills (Real Birr)	(2) Safe Assets (Real Birr)
Pre-Policy		
Quarter 2	0.1	13.56
	(120.9)	(102.1)
Quarter 3	13.44	72.27
	(110.1)	(82.79)
Quarter 4	38.41	72.81
	(109.4)	(84.50)
Post-Policy		
Quarter 5	438.4***	517.0***
	(86.86)	(78.39)
Quarter 6	528.8***	627.1***
	(86.43)	(83.19)
Quarter 7	640.9***	519.6***
	(87.63)	(80.38)
Quarter 8	722.1***	361.7***
	(89.03)	(70.95)
Quarter 9	775.2***	485.5***
	(89.77)	(70.64)
Quarter 10	807.8***	540.9***
	(90.90)	(74.51)
Quarter 11	882.6***	602.3***
	(93.36)	(70.02)
Quarter 12	961.8***	671.1***
	(96.78)	(73.13)
Quarter 13	1,017***	613.9***
	(98.51)	(71.19)
Bank FE	Yes	Yes
Observations	538	538
Adjusted R^2	0.791	0.945
Mean Dep. Var.	501.9	1261
SD Dep. Var.	616.6	1062

Note: This table reports OLS estimates. The unit of observation is bank level and bank fixed effects are included. Robust standard errors are in parentheses. NBE Bills is the amount of bills issued by the NBE in million birr, and it is a continuous variable. Safe Assets aggregate at bank level the following assets: liquid cash, government bonds, NBE bills, bank-to-bank deposits, and voluntary reserves at the NBE. Their mean and standard deviation are reported in the final two rows. In columns (1) and (2), we regress the quantity of NBE bills and Safe assets, respectively, over a series of quarterly dummies, which fully describe the sample. These variables catch the average evolution of the accumulation of NBE bills and safe assets across the quarters. It is clear that as the policy is introduced in April 2011, which falls in Quarter 5, both NBE bills and safe assets start to markedly increase. As Figure 1 shows, this increase is close to being one-to-one. All quantities are in million of real birr, at their 2010 value. The adjusted R^2 of these regressions is also reported. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Table 3: Regulation and Profits: Yearly Variation (Million Real Birr)

Variable	Pre-Tax Bank Profits (Real Birr)	
	Pre-Policy	
Year 2009	110.3***	(35.68)
Year 2010	137.6***	(32.98)
Year 2011	164.5***	(36.15)
	Post-Policy	
Year 2012	172.2***	(34.53)
Year 2013	179.5***	(33.08)
Bank FE	Yes	
Observations	52	
Adjusted R^2	0.904	
Mean Dep. Var.	126.2	
SD Dep. Var.	96.42	

Note: This table reports OLS estimates. The unit of observation is bank level and bank fixed effects are included. Robust standard errors are in parentheses. Profits are extracted from banks' individual annual profits and are reported in their before-tax expression in million birr; it is a continuous variable. The mean and standard deviation are reported in the final two rows. We regress over the available years to verify the average profit evolution in the banking industry, which (as expected) markedly declines after 2011. All quantities are in millions of real birr, at their 2010 value. The adjusted R^2 of these regressions is also reported. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

of the policy, the amount of NBE bills (in black) went from zero to roughly 500 million birr in April 2011 and kept growing steadily afterwards. At the same time, safe assets (which include NBE bills) increased one-to-one with this variable. This shows that the policy was successful in leading Ethiopian banks to become safer with the introduction of the policy, and banks did not substitute away from one type of liquidity (bank-to-bank deposits, cash, etc.) to NBE bills, but rather increased the overall aggregate.

Last but not least, we have referred to this policy as a macroprudential regulation as well as a "financial regulation tax". Indeed, we find that bank profitability suffers in the aftermath of this. For this purpose, we collect data from bank annual reports and run a similar regression to equation (2):

$$v_{iy} = \alpha + \sum_y \beta_y \iota_y + \sum \gamma_i \iota_i + \epsilon_{iy}. \tag{3}$$

The difference is that while balance-sheet variables (NBE bills, safe assets) are measured monthly, the profits are only measured yearly. Analogously to the previous subsection, we report the coefficients β_y of equation (3) in Table 3 and plot the yearly coefficients in Figure 2. By inspecting both elements,

it emerges that the growth of profits significantly slowed as the policy came into existence. Between 2009 and 2011, profits grew by 11% yearly and this collapses to 2% between 2011 and 2013. Therefore, there is some evidence linking the policy to a decline in profit accumulation, without turning this negative.

4   Government Revenue and Policy Change

The regulation implemented by the NBE has been successful in establishing a market for NBE bills and in forcing the 14 local banks to comply with this new rule. In this section, we calculate the revenue gains from this, in line with the financial repression literature. At the end of the 2012 fiscal year, treated banks amassed a total of 13.976,75 million birr of NBE bills, corresponding to 702.43 million US dollars (USD). This number is in line with what media and the IMF reported.[5] How can we account for the revenue gains of this policy?

The objectives of the policy are twofold: to promote long-run investment and to enhance bank safety. Both objectives seem to be extremely difficult to quantify and they expose us to faulty predictions. Similarly, in a full welfare analysis, we would also need to account for the benefits and costs of this initiative: weighing the effect on firms and households, against government gains and bank performance. However, at the current stage, this would require considerable assumptions that we are not going to make. More modestly, we follow the government revenue literature and focus on accounting the savings on the interest rate relative to other policies. For this purpose, we need to propose alternative scenarios of how these funds could be raised and to establish their cost. The following three scenarios are considered.

1. Borrowing from international financial markets. In this scenario, the Ethiopian government sells its bonds at competitive international prices.

2. Diverting private lending from the Commercial Bank of Ethiopia (CBE). With this policy, the Ethiopian government forces the largest bank, owned by the government, to replace private lending with government bonds.

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[5]See the article "Ethiopian Central-Bank Order May Mean More T-Bills, Less Lending" by William Davison, Bloomberg, February 26, 2013, available at http://www.bloomberg.com/news/2013-02-26/ethiopian-central-bank-order-may-mean-more-t-bills-less-lending.html.

3. Raising new deposits through the CBE. This would imply expanding the branch infrastructure and would dedicate all new resources to funding the government.

In the following subsections, we describe the three alternative revenue scenarios, and we estimate their cost and the revenue gains. In general, we find that imposing the NBE bill purchase on private banks generates a moderate revenue for the government, around 11–19% of the deficit and 1.5–2.6% of tax revenue, considering their respective 2011 levels of 8.220,19 and 58.980,8 million birr (National Bank of Ethiopia 2012).

In order to offer a comparison with the literature, in Appendix D we propose a calculation of the government revenue from financial repression, following the methodology introduced by Giovannini and De Melo (1993). Though their approach relies on national accounts, rather than bank balance sheets, we find that our results are consistent in terms of sign and magnitude. Beyond being a useful check of our methodology, we find this result to be useful in linking the macro approach on government revenue with the richer micro approach we employ in this paper.

4.1 Borrowing from International Financial Markets

Ethiopia stopped borrowing from international financial markets after the 1991–1999 years of debt restructuring and relief (Borensztein and Panizza 2008). After the recent decade of exceptional growth and development, in December 2014 it issued its first internationally traded sovereign bonds, which were favorably received and priced at 6.625%.[6] This is a comfortingly low rate, provided that only in May 2014, Ethiopia was assigned its first sovereign rating by Moody's.[7] and that this was a B1 rating, indicating it as a speculative trade with a high risk of insolvency.

The rating and first rate provide a useful benchmark for a counterfactual analysis, so that we can provide a few scenarios on rates that Ethiopia needs to charge in order to replace the 27% rule with international bonds. It is also useful to refer to the experience of its two neighboring countries, Kenya and Uganda, who also enjoy a B1 valuation from Moody's and have been successfully issuing sovereign debt bonds on international financial markets over the last five years.

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[6]Refer to the *Financial Times* article "Investors pile into Ethiopia's \$1bn debut debt sale," by Javier Blas, December 4, 2014 (http://www.ft.com/intl/cms/s/0/0efe83f2-7bbb-11e4-a695-00144feabdc0.html#axzz3pUUOSsou).

[7]Refer to the *Financial Times* article "Ethiopia receives first sovereign rating," by Javier Blas and Katrina Manson, May 12, 2014 (http://www.ft.com/cms/s/0/cb3a02ee-d9c7-11e3-b3e3-00144feabdc0.html#axzz3Cl8WopSH).

- Kenya remunerated its 91-days Treasury Bills between 8 and 20% in the last auctions, held between June and July 2014, with an average of 9.5%.[8]

- Uganda, analogously, priced its 91-days Treasury bills at 9.5% in the auction of 25 June 2014.[9]

Therefore, considering Ethiopia's first bond price as a lower bound and the Kenya/Uganda rates as a plausible counterfactual, we can infer that a likely rate for its alternative bond, priced competitively on financial markets, would be 9.5%, with the following range [5%,14%] as observed by auctions for Kenya and Uganda. This provides a simple reference against which to measure the revenue gains:

$$Gain = (R_I - R_G) \cdot G.$$

Here, $R_I = 9.5\%$ (or 6% and 12% in the lower and upper bound cases, respectively) would be the price charged on international markets, $R_G = 3\%$ the current NBE bill remuneration, and G the volume of NBE bills. Overall, this gain totals 908.49 million birr per year (43 million USD), between 279.5 and 1537.4 depending on the possible interest rate range, which accounts for 11% of the deficit or 1.5% of tax revenue.

4.2 Diverting Private Lending from the Commercial Bank of Ethiopia

The CBE is the largest Ethiopian commercial bank and one of the largest in Africa. It has more than 800 branches, seven million account holders, and 18,000 employees: its assets at the end of the 2011 fiscal year amounted to 226.338 million birr, equivalent to 11.372 million USD. It is owned by the Ministry of the Economy and is a grand contributor to government public finances, its mission being to "realize stakeholders' needs through enhanced financial intermediation globally and supporting national development priorities".[10] In fact, after the NBE and the Development Bank of Ethiopia, it is the largest bank holding government bonds, with 3% of the total; as a reference, all other banks combined hold less than 1% (Ministry of Finance and Economic Development 2012).

From the CBE balance sheet for July 2012, we can see that the CBE holds no NBE bills, but

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[8]Refer to the Central Bank of Kenya Treasury Bills Average Rates at https://www.centralbank.go.ke/index.php/treasury-bill/91-days.

[9]Refer to the Results of the Treasury Bills Auctions by the Bank of Uganda https://www.bou.or.ug/bou/collateral/tbills_forms/2014/Jun/resultstbill_922.html.

[10]Refer to the CBE web site for more information, http://www.combanketh.et/AboutUs/CompanyProfile.aspx

Table 4: A Cost–Benefit Analysis of Diverting CBE Lending

Asset	Million Birr	Average Rate	Upper Bound	Lower Bound
Panel A: Current Partial Asset Allocation				
(1) Government bonds	2.414,03	1.5%		
(2) Private sector lending	20.365,69	12%	7.5%	16.25%
(3) NBE Bills	0	3%		
(4) Partial revenue		2.480,09	1.563,63	3.345,63
Panel B: Counterfactual Partial Asset Allocation				
(5) Government bonds	2.414,03	1.5%		
(6) Private sector lending	6.388,94	12%	7.5%	16.25%
(7) NBE Bills	13.976,75	3%		
(8) Partial revenue		1.222,18	934,67	1.493,71
Panel C: Counterfactual Revenue				
(9) Revenue		−1.257,91	−628,96	−1.851,92

Note: This table reports the cost–benefit analysis of diverting private sector lending from the CBE to the purchase of NBE bills. For simplicity, in all panels, we only report a partial balance sheet, which includes only three assets: private sector lending, NBE bills, and Treasury bills. Panel A reports the current composition of the balance sheet, Panel B shows the balance sheet under the assumption that CBE needs to buy all NBE bills using private sector lending resources, and Panel C reports the counterfactual revenue of this exercise.

government bonds for 2.414,029 and private sector lending for 20.365,691 million birr, with the remaining funds dispersed in other assets. In this subsection, we propose a simple counterfactual exercise, in which we calculate the revenue of the CBE when some of its private lending assets are redirected to the purchase of the 13.976,75 million birr of NBE bills imposed on private banks.

From official documentation (Ministry of Finance and Economic Development 2012; National Bank of Ethiopia 2012), we know the average interest rate on all assets reported in the third column of Table 4. Therefore, we can simulate this alternative scenario. In so doing, we are ignoring the cost of liquidating private lending and considering the cost of this measure to be negligible for single firms and aggregate economy. In Panel A, we report the current partial asset allocation between government bonds, private sector lending, and NBE bills. Regarding the returns of this assets, while government bonds and NBE bills present a fixed return of 1.5% and 3% respectively, official authorities report the interest rate on private sector lending for its average, for both upper and lower bounds. For this reason, we can also propose in this case a range of estimates for the CBE revenue. In order to be rigorous, we define the calculated revenue as "partial", because we are focusing on a subset of CBE assets. In Panel B, we present the experiment in which we fund the NBE bill amount with private sector lending and recalculate the partial revenue. Panel C presents the counterfactual

profit difference, which is not partial as we are keeping all other objects constant: in the average interest case, forcing the CBE to purchase NBE bills and give up private lending would impose 1.257,91 million birr of losses per year (59.8 million USD), in the range between 628,96 and 1.851,92.

Considering losses on the CBE as missing yearly revenue on the Treasury, then we can see that this policy would be, on average, more expensive than emitting competitive bonds on financial markets, which would cost 908.49 million birr per year. Specifically, the gains from this initiative correspond to 15% of the deficit or 2% of tax revenue in 2011.

4.3   Raising New Deposits through the Commercial Bank of Ethiopia

In the previous subsection, we considered funding the purchase of 13.976,75 million birr of NBE bills by moving CBE's assets away from private sector lending – hence an asset reallocation measure. In this subsection, we study a liability expansion scenario, through which we simulate the CBE costs of raising fresh 13.976,75 million birr of deposits, used to fund the NBE purchase.

By the end of the 2012 fiscal year (July), the additional total collected in deposits in Ethiopian banks compared to 2011 amounted to 46,475.2 million birr, mobilized by 302 new branches. Therefore, we consider the average deposit collection per new CBE branch as the total average deposit collected per branch by the whole banking sector (i.e., 153.9 million birr). This plausibly overestimates the amount of newly collected deposits per branch, for at least two reasons. First, in the extensive margin of deposit mobilization (new branches) we are also including the intensive margin (more deposits from existing branches). Secondly, branch allocation may begin from the deposit-rich areas and then be expanded to poorer areas. However, for the purpose of this exercise, this implies an underestimation of the costs of deposit collection, leading to a lower bound on our estimate. Given the average deposit collection per branch, CBE would need to install 91 new branches to cover the new asset.

What is the cost of installing a new branch in Ethiopia? This figure clearly depends on a variety of factors, and in order to obtain an average figure, we interviewed all Ethiopian private sector banks and had access to data on their branch installation costs. In the course of this discussion, there emerged an average figure of 300,000 birr per month (14,000 USD), ranging between 100,000 and 500,000 birr depending on location, local labor market, services offered, transport infrastructure, security expenses, and several other factors. However, 300,000 birr per month is the closest empirical

analogue to our reference because it catches all costs, including rents, local wages, utility bills, equipment, and so on. As well as interviewing banks, we tested the plausibility of this number by using the annual report data and inferred branch costs. In Appendix C, we present a detailed exercise, which backs out the average cost of a branch from the yearly operational expenses of the CBE between 2006 and 2012. In line with interviews with private sector banks, we obtain an average cost of a branch of 303,000 birr. Given that the minimum business-lifecycle of a branch is five years to collect the peak deposit from a location, this makes the average total cost of branch 18 million birr (ranging between 6 and 30), and equivalent to 900,000 USD. Therefore the total cost of opening 91 new branches is 1,638 million birr (ranging between 546 and 2,730).

Similarly to the previous case, we can calculate the revenue gains on the Ethiopian Treasury, by subtracting the NBE bill interest payment from this liability expansion measure. This overall cost is composed of two components: a fixed cost, the installation of 91 new branches, BI; and a variable cost, which is the net loss incurred by the CBE on collecting 13.976,75 million birr of deposits remunerated at an average rate of 5.4% and their use for NBE bill purchase, which only give a 3% fixed return. Therefore, the final gain can be written as follows

$$Gain = BI + (R_D - R_G)G - R_G G = 1,638 + 335.5 - 419.3,$$

which places the revenue gains of introducing the NBE bills at 1,554.2 million birr (between 462.2 and 2,646.2). Overall, this gain is 24% higher than the previous gain and makes the savings of this measure 19% of the deficit and 2.6% of tax revenue.

5 Concluding Remarks

In this paper, we show that the government revenue gains of a specific piece of financial regulation in Ethiopia (the 27% NBE bill regulation) are moderate and that lower bank profits are the channel through which this revenue is created. In order to benchmark the government savings of imposing safe asset purchase on banks, we rely on three credible counterfactuals: 1) issuing a bond competitively priced on international capital markets; 2) raising revenue by diverting resources from the state-owned bank; 3) forcing the state-owned bank to raise new deposits and fund the same bond. Our

calculations highlight that such savings lie between 1.5% and 2.6% of the tax revenue and between 11% and 19% of the primary deficit. Differently from the previous macro-oriented literature, we are able to track the effect of the policy by having access to monthly bank balance sheets and by verifying the bank mechanics behind the policy change. Specifically we observe that banks comply with the policy and start purchasing these new bonds as prescribed. This leads to an increase in safe asset holding, enhancing the banking system safety, and it also slows down year-on-year profit growth from 11% to 2%, in a context where banks' return on equity lies at 55%.

We believe our results are important and encourage additional research on the linkages between financial regulation and government revenue, especially on a variety of issues that are fundamental in several countries (i.e., optimality, welfare trade-offs, implementation, etc.). Indeed, we strongly believe there is generally insufficient empirical evidence on which policies low-income countries should pursue to boost financial systems and which trade-offs are encountered in their implementation.

References

Agénor, Pierre-Richard, and Peter J. Montiel. (2008). "Development macroeconomics". Princeton University Press.

Aizenman, Joshua, and Nancy Marion. (2011). "Using inflation to erode the US public debt." Journal of Macroeconomics 33, no. 4 : 524-541.

Bacchetta, Philippe, and Ramon Caminal. (1992). "Optimal seigniorage and financial liberalization." Journal of International Money and Finance 11, no. 6: 518-538.

Borensztein, Eduardo, and Ugo Panizza. (2009). "The costs of sovereign default." IMF Staff Papers: 683-741.

Brock, Philip L. (1984)."Inflationary finance in an open economy." Journal of Monetary Economics 14, no. 1: 37-53.

Brock, Philip L. (1989). "Reserve requirements and the inflation tax." Journal of Money, Credit and Banking 21, no. 1: 106-121.

Cochrane, John H. (2011). "Understanding policy in the great recession: Some unpleasant fiscal arithmetic." European Economic Review 55, no. 1: 2-30.

Davig, Troy, Eric M. Leeper, and Todd B. Walker. (2011). "Inflation and the fiscal limit." European Economic Review 55, no. 1: 31-47.

Demetriades, Panicos O., and Kul B. Luintel. (2001). "Financial restraints in the South Korean miracle." Journal of Development Economics 64, no. 2: 459-479.

Espinosa-Vega, Marco A. (1995). "Multiple reserve requirements." Journal of Money, Credit and Banking 27, no. 3 : 762-776.

Feldstein, Martin, and Charles Horioka. (1979). "Domestic Savings and International Capital Flows." Economic Journal 90, no. 358.

Fischer, Stanley. (1982). "Seigniorage and the Case for a National Money." The Journal of Political Economy : 295-313.

Giovannini, Alberto, and Martha de Melo. (1993). "Government Revenue from Financial Repression." American Economic Review 83, no. 4 : 953-63. 953–963.

Hilscher, Jens, Alon Raviv, and Ricardo Reis. (2014). Inflating away the public debt? An empirical assessment. No. w20339. National Bureau of Economic Research.

Huang, Yiping, and Xun Wang. (2011). "Does Financial Repression Inhibit or Facilitate Economic Growth? A Case Study of Chinese Reform Experience*." Oxford Bulletin of Economics and Statistics 73, no. 6: 833-855.

International Monetary Fund. (2013). "The Federal Democratic Republic of Ethiopia, 2013 Article IV Consultation," IMF Country Report No. 13/308 (October 2013).

Limodio, Nicola and Francesco Strobbe, F. (2016) "The Development Impact of Financial Regulation: Evidence from Ethiopia and Antebellum USA," Mimeo.

McKinnon, Roland I., (1973). *Money and Capital in Economic Development* (Washington, DC: Brookings Institution Press).

Ministry of Finance and Economic Development. (2012). Ethiopia's Medium Term Debt Management Strategy (2013–2017) (Addis Ababa, Ethiopia: MOFED, October 2012). Available at https://www.wdronline.worldbank.org/handle/10986/17637.

Mourmouras, Alex, and Steven Russell. (1992). "Optimal reserve requirements, deposit taxation, and the demand for money." Journal of Monetary Economics 30, no. 1 : 129-142.

National Bank of Ethiopia. (2012). Annual Report 2011–2012 (Addis Ababa, Ethiopia: NBE, 2012).

Reinhart, Carmen M., and Kenneth Rogoff. (2009). *This Time is Different: Eight Centuries of Financial Folly* (Princeton, NJ: Princeton University Press).

Reinhart, Carmen M., and Belen M. Sbrancia. (2011). "The Liquidation of Government Debt," NBER Working Paper No. w16893 (Cambridge, MA: National Bureau of Economic Research).

Reinhart, Carmen M., Jacob F. Kirkegaard, and M. Belen Sbrancia. (2011). "Financial repression redux." Finance and Development : 22-26.

Reinhart, Carmen M., Vincent R. Reinhart, and Kenneth S. Rogoff. (2012). "Public debt overhangs: advanced-economy episodes since 1800." The Journal of Economic Perspectives 26, no. 3 : 69-86.

Schildbach, Jan, and Claudius Wenzel. (2013). "Bank Performance in the US and Europe: An Ocean Apart," in *Current Issues – Global Financial Markets*, DB Research, Deutsche Bank.

Siegel, Jeremy J. (1981). "Inflation, bank profits, and government seigniorage." The American Economic Review 71, no. 2 : 352-355.

Shaw, Edward S. (1973). *Financial Deepening in Economic Development* (New York: Oxford University Press).

Sussman, Oren. (1991). "Macroeconomic effects of a tax on bond interest rates," *Journal of Money, Credit and Banking*, 23(3), pp.352-366.

Appendix A: Compliance

Table A1: Regulation and Compliance: Monthly Variation (Million Real Birr)

Variable	NBE Bills (Real Birr)				
	(1)	(2)	(3)	(4)	(5)
Lending × Policy	0.258***	0.273***	0.256***	0.255***	0.254***
	(0.00879)	(0.00992)	(0.00951)	(0.00959)	(0.00976)
Policy	42.91***	2.290	-51.93**	-96.10***	166.9***
	(15.06)	(18.25)	(25.90)	(29.10)	(61.66)
Bank FE		Yes	Yes	Yes	Yes
Year FE			Yes	Yes	
Month FE				Yes	
Non-Param. Month FE					Yes
Observations	538	538	538	538	538
Number of banks	14	14	14	14	14
Adjusted R^2	0.890	0.950	0.959	0.960	0.959
Mean Dep. Var.	501.9	501.9	501.9	501.9	501.9
SD Dep. Var.	616.6	616.6	616.6	616.6	616.6

Note: This table reports OLS estimates. The unit of observation is bank level. Robust standard errors are in parentheses. NBE Bills is the amount of bills issued by the NBE in million birr, and it is a continuous variable. Its mean and standard deviation are reported in the final two rows. The quantity of NBE Bills is regressed on "Lending × Policy", which is the interaction between Private Lending (in million birr) and a continuous variable, and the Policy dummy, taking unit value from April 2011 onward. We also report the Policy dummy per se. The null hypothesis is that this coefficient is 0.27, as prescribed by the NBE directive, and we cannot reject this. In column (1) we exploit all variation, and in column (2) only within-bank by introducing bank fixed effects. In columns (3) and (4) we also add year and month FE, respectively. In column (5) we remove parametric month and year FE and replace these with non-parametric effects for each month of each year (non-param. month FE). The adjusted R^2 of these regressions is also reported. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.
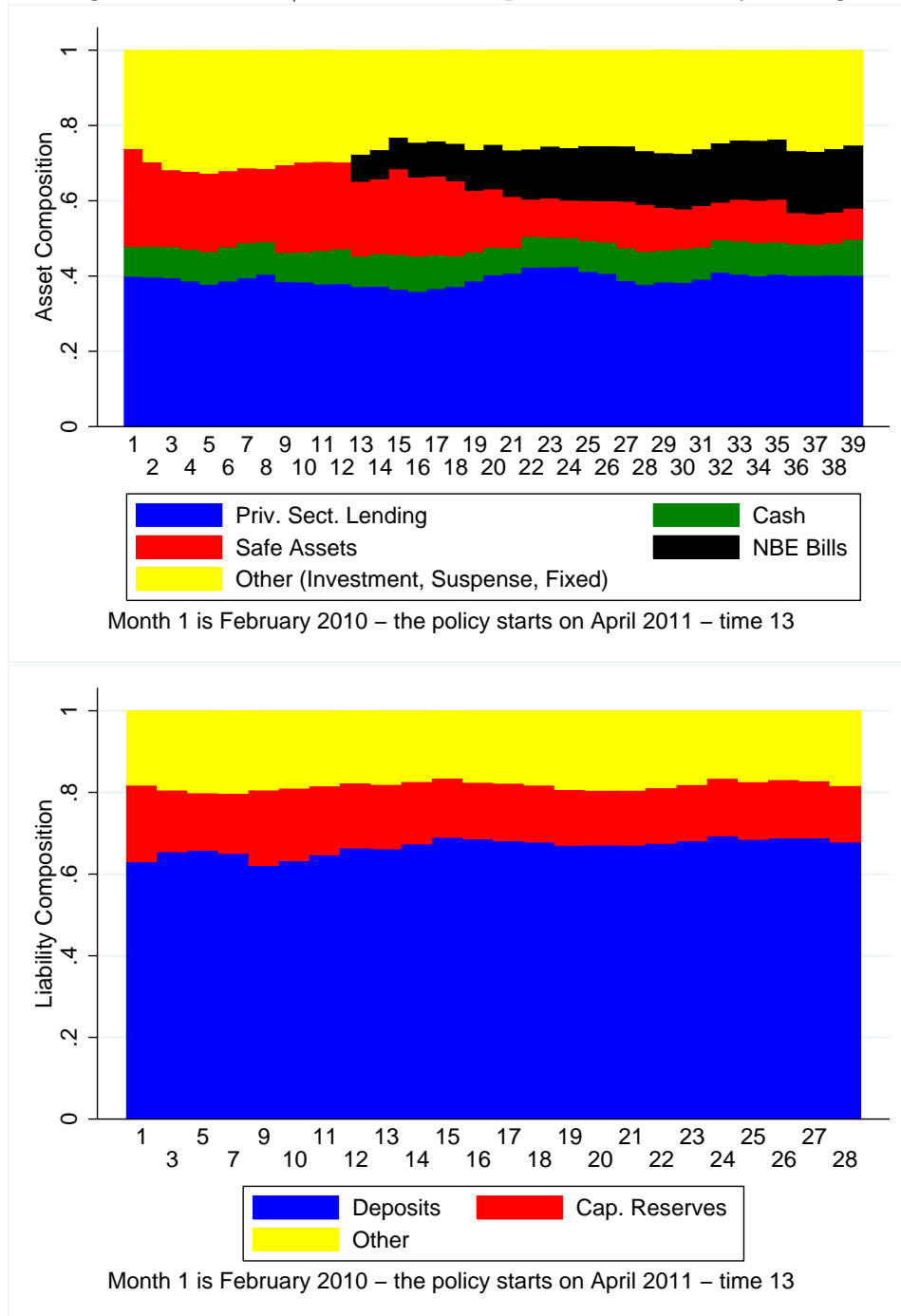
Table A2: Regulation and Compliance: Monthly Variation (Million Real Birr)

Variable	NBE Bills (Real Birr)				
	(1)	(2)	(3)	(4)	(5)
Lending × Policy	0.270***	0.224***	0.232***	0.232***	0.231***
	(0.00845)	(0.0112)	(0.0103)	(0.0104)	(0.0104)
Policy	15.59	28.54*	-19.98	-63.86**	128.8**
	(15.18)	(16.44)	(24.67)	(28.90)	(64.06)
Lending	-0.0158***	0.250***	0.142***	0.139***	0.142***
	(0.00407)	(0.0352)	(0.0405)	(0.0432)	(0.0425)
Bank FE		Yes	Yes	Yes	Yes
Year FE			Yes	Yes	
Month FE				Yes	
Non-Param. Month FE					Yes
Observations	538	538	538	538	538
Number of banks	14	14	14	14	14
Adjusted R^2	0.890	0.957	0.961	0.961	0.960
Mean Dep. Var.	501.9	501.9	501.9	501.9	501.9
SD Dep. Var.	616.6	616.6	616.6	616.6	616.6

Note: This table reports OLS estimates. The unit of observation is bank level. Robust standard errors are in parentheses. NBE Bills is the amount of bills issued by the NBE in million birr, and it is a continuous variable. Its mean and standard deviation are reported in the final two rows. The quantity of NBE Bills is regressed on "Lending × Policy", which is the interaction between Private Lending (in million birr) and a continuous variable, and the Policy dummy, taking unit value from April 2011 onward. We also report the variable Lending and Policy per se. The null hypothesis is that this coefficient is 0.27, as prescribed by the NBE directive, and we cannot reject this. In column (1) we exploit all variation, and in column (2) only within-bank by introducing bank fixed effects. In columns (3) and (4) we also add year and month FE, respectively. In column (5) we remove parametric month and year FE and replace these with non-parametric effects for each month of each year (non-param. month FE). The adjusted R^2 of these regressions is also reported. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Appendix B: Balance-Sheet Composition and Policy Change

Figure B1: Assets/Liabilities Composition and Policy Change

Note: This figure reports the average balance-sheet composition on the assets (upper panel) and liabilities (lower panel) of an Ethiopian bank for the period between January 2010 (Time 1) and February 2013 (Time 38). The policy change occurs at Time 16.

Appendix C: Branch Cost and Annual Reports Calculation

In this section, we provide an estimate of the cost to the CBE of opening a new branch, based on interviews about the variables affecting branch cost and on historical data available available through the CBE's annual reports from the years 2006 and 2012.

The annual reports provide an informative breakdown of the non-interest expenses of CBE, as well as the exact number of branches operated by the bank. Thus, based on the data provided by the annual reports, we can calculate an approximation of the cost of opening a new branch. We find this cost by using the difference in those yearly expenses attributable to branches, net of depreciation of existing branches, and by dividing this number by the count of new branches opened over the years in consideration. This should provide us with an approximation of the mean cost of opening a new branch.

Nonetheless, we cannot simply use the total bank expenses in a given year, because not all bank non-interest expenses are required for opening a new branch. Therefore, we have to use only those expenses that bank executives indicate as core in calculating branch opening costs, such as salaries and employee benefits, depreciation, postage and telecommunication, occupancy expenses, stationery and office supplies, travel costs, service charge, motor vehicle running costs, legal and consultancy fees, repairs and maintenance, insurance, water and electricity, board fees, land and building tax, and electronic data processing.
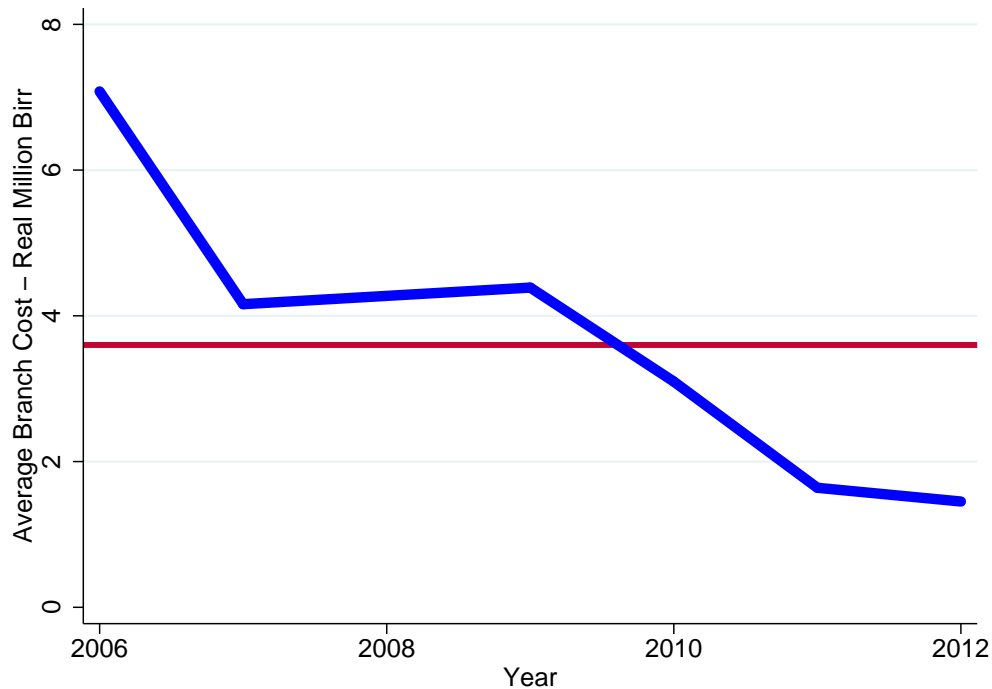
The calculation of a branch cost is rather essential. The sum of the previous selected expenses is produced for each year (net of depreciation) and we attribute to the average cost of a branch the difference between the cost of two years divided by the number of newly installed branches, as follows:

$$Average\ Branch\ Cost_t = \frac{Overall\ Branch\ Cost_t - Overall\ Branch\ Cost_{t-1}}{Number\ of\ New\ Branches_t}.$$

In order to render the nominal average cost comparable across years, we divide this figure by a price index. Clearly, this calculation presents a few large assumptions: 1) there are no branch cost externalities; 2) geographic disparities are omitted; 3) with the exception of inflation and depreciation, we are assigning all costs to branches.

Such a calculation delivers an average cost of branch opening in 2010 of 3.636.490,481 birr, with a standard deviation of 2.085.257,38 birr, which means 303.040,9 birr per month. By considering Figure C1, which reports the evolution of the CBE average branch cost over years, we can see that this has been markedly declining over time.

Figure C1: CBE Branch Cost over Time

Note: This figure reports the evolution of the yearly average branch cost for the CBE between 2006 and 2012, as described in the text. The red horizontal line reports the average over the whole period, 3.6 million birr, which corresponds to roughly 300,000 birr per month; this was confirmed in anonymous interviews with bank executives. All figures are in real 2010 birr.

Appendix D: Alternative Calculation of the Financial Repression Revenue

In this appendix, we explore an alternative calculation of the government revenue gains, re-proposing the method of Giovannini and De Melo (1993), henceforth GdM, and offer a calculation for Ethiopia between 2004 and 2013. As stated in the introduction, this methodology is useful because it permits to understand the state of local financial markets and assess the extent of government intervention. We find that the GdM financial repression indicator shows a marked increase in 2011, when the

regulation policy is introduced, and the magnitudes of its change (18 million USD) corresponds to the numbers presented in Section 4. Furthermore, because the GdM indicator is calculated using data from national accounts rather than bank level indicators, we believe this is a solid check of our main results.

First, we present the calculation of the GdM financial repression indicator. Then we show the evolution of this indicator between 2004 and 2013, and we discuss the parallel with the numbers shown in Section 4.

Calculating Financial Repression in Ethiopia

In this subsection, we explain in detail the methodology adopted and refer to all the available data sources, which are published and available. To be consistent with GdM, we keep their coding for each variable. The starting point is $INTP\$$, which defines the total dollar interest payments in USD and is found in the *International Debt Statistics Database* published by the World Bank. Secondly, $INTA\$$ indicates the change in interest arrears, as reported to the World Bank *Debtor Reporting System*. With $DOD\$$ we indicate the average annual dollar debt outstanding, which is available through the *International Debt Statistics Database* published by the World Bank.

At this stage, we can calculate the nominal effective dollar interest rate in year t, $EFFINT\$(t)$, where $DOD\$(t)$ indicates dollar debt outstanding at the end of year t,

$$EFFINT\$(t) = \frac{[INTP\$(t) + INTA\$(t)]}{\{[DOD\$(t-1) + DOD\$(t)]/2\}};$$

this is the first benchmark indicator to be used in our analysis.

In line with the previous section, we define $INTP$ to be the same as $INTP\$$, but in birr, taken as a percentage of the average domestic debt outstanding; this is available through the *Government Finance Statistics* of the International Monetary Fund (IMF). Similarly DOD refers to the total domestic debt outstanding and disbursed expressed in domestic currency, using the same source. Therefore, analogously to $EFFINT\$(t)$, we can define $EFFINT(t)$ as the nominal effective domestic

interest rate in year t through

$$EFFINT(t) = \frac{INTP(t)}{\{[DOD(t-1) + DOD(t)]/2\}}.$$

Finally, we can find the data on the average annual stock of domestic debt through the Annual Reports of the NBE in 2004–2012, which we indicate for brevity as $AASDD$. We calculate the government revenue from financial repression, as GdM shows,

$$GRFR(t) = [EFFINT\$(t) - EFFINT(t)] * AASDD,$$

which can be simply thought of as the savings in government revenue emerging from the difference between international and local rates on debt. This is conceptually in line with the results of Section 4.1.
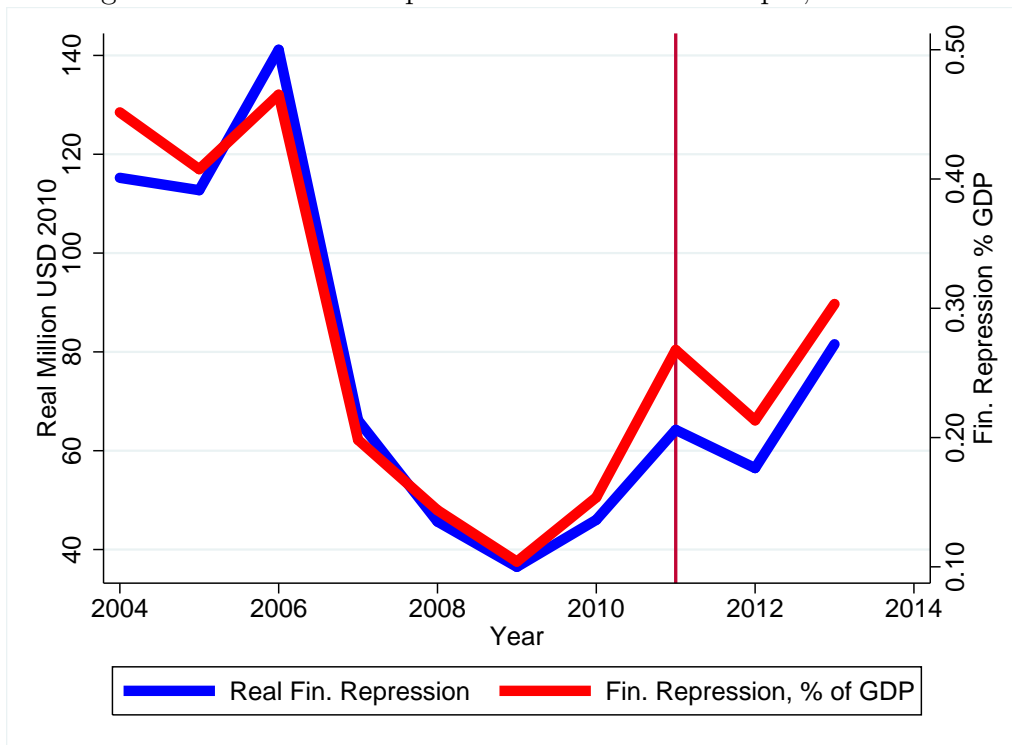
Financial Repression between 2004 and 2013

Once the GdM financial repression indicator is calculated, it is interesting to show its evolution over time and whether the 27% financial regulation rule is detected in this. Figure D1 presents both the aggregate real figure and the figure standardized by GDP over the whole available period. Three interesting facts emerge:

1. the financial repression revenue in Ethiopia is very low, between 0.1% and 0.5% of GDP, compared the average across country of 2% in GdM;

2. this indicator of financial repression declines substantially between 2006 and 2010, both in level and relative to GDP;

3. there appears to be a substantial increase in revenue after 2011.

Though not conclusive, we believe that the first fact may be due to the relatively small size of the Ethiopian financial system, which records as few as one branch for 62,000 (NBE 2012), though this has been growing steadily in the last few years. The second may be due to a mild internal financial liberalization introduced between 2006 and 2010.

Figure D1: Financial Repression Revenue in Ethiopia, 2004–2013

Note: This figure reports the evolution of the financial repression revenue calculated through the GdM method for Ethiopia between 2004 and 2013. The aggregate real figure in constant 2010 million USD is available on the left axis (reported in blue), while the figure relative to GDP is expressed on the right axis (in red). The policy was introduced in 2011, as shown by the red vertical line.

However, the third fact is consistent with our finding on the 27% rule. In fact, from our calculation, the increase in financial repression revenue under the GdM method between 2011 and 2010 is estimated to be 18 million USD: in Section 4.1, we proposed a point estimate of 43 million USD in a range between 13.3 and 73.1 million USD. For this reason, though in presence of a different set of databases and a conceptual tool, we find an overall agreement between the two measures.