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BANK CREDIT ALLOCATION BY SECTOR: CAUSES AND EFFECTS ON ECONOMIC GROWTH IN HAITI

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RESUMEN

Este estudio evalúa la asignación de los préstamos bancarios entre industrias en Haití en el período 200-2015 y produce evidencia que confirma lo siguiente: (1) Las participaciones de cada industria en el total de crédito son relativamente rígidas, a pesar de las cambiantes condiciones sectoriales y de precios relativos; (2) Consistente con lo anterior, los ejercicios econométricos demuestran que estas participaciones no están gobernadas por el desempeño reciente del sector, creando dudas sobre la eficiencia de esas carteras de préstamos; y (3) Como resultado de intensas restricciones financieras, la expansión del crédito aparece como un motor significativo del crecimiento sectorial. Del análisis emergen diversas recomendaciones de política.

Clasificación JEL: O47, O16

Palabras claves: Crecimiento económico, sistema bancario, Haití.

ABSTRACT

This study assesses the allocation of bank loans across industries in Haiti over the period 2000-2015 and produces fresh evidence supporting the following claims: (1) Credit shares by industry appear to be sticky over time in spite of changing industry-specific conditions and sharp relative price changes; (2) Consistent with the previous finding, econometric exercises confirm that loan portfolio allocations are not governed by recent sector performance, casting doubts about the efficiency of loan portfolios; (3) As a result of intense financial constraints, credit expansion seems to be a major driver of industry growth. Several policy recommendations emerge from the study.

JEL Classification: O47, O16

Keywords: Economic growth, banking system, Haiti.

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I. Introduction

A broad consensus has built up since the early 1990s around the positive role of credit on economic growth, at least at low levels of financial development and under suitable institutional conditions. Featuring one of the least developed banking systems in the world, Haiti stands as a natural candidate to expect credit to become a vital growth engine[1].

This background makes all the more striking the lack of applied research on the sectoral allocation and the effects of private credit on Haiti´s economic performance. As a matter of fact, credit allocation patterns and consequences have been scarcely investigated even for more advanced economies. This study seeks to fill this gap by exploiting for the first time a novel database on credit allocation by industry to produce evidence on the link between overall and sectoral credit and growth in Haiti over the period 2000-2015.

In particular, this document aims to address two research questions: a. How is private credit allocated across sectors in Haiti, and what explains such allocation? And b. Can a meaningful causal link be established between growth and credit by exploiting credit and productive sectoral information? Regarding

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[1] Of course, for this positive effect to be realized, a proper institutional and macroeconomic framework should be achieved and maintained. On the institutional front, it is required that creditor rights are protected and banks and other financial intermediaries are effectively supervised. In turn, a good macroeconomic management implies keeping under control the volatility of business cycles and the key relative prices, especially the real exchange rate, interest rate and wages. Lacking these conditions, a credit expansion may well become destabilizing in Haiti or any other economy.

the first question, it appears that loan portfolios, though diversified, are markedly sticky over time and do not seem to react much to available measures of sectoral risk and return. As for the second question, the econometric work reveals a causal impact of credit on growth at the sectoral level[2].

The paper is organized as follows. In Section 2 we describe trends on asset composition and loan portfolio allocation across industries in the Haitian banking system. In Section 3 we discuss the theoretical rationale behind bank decisions on loan allocation and we run some econometric exercises to check whether credit flows towards sectors displaying a better recent performance in terms of growth and stability. The core part of the paper, Section 4, tackles the question as to whether credit drives growth in Haiti, beginning with a critical review of the literature on finance and growth in the last quarter century and the severe econometric challenges facing this kind of studies. Subsequently, we adopt and adapt the widely influential Rajan and Zingales' (1998) methodology on finance-to-growth causality to the Haitian case. Some conclusions and policy recommendations close.

II. An Overall View of Asset and Loan Portfolio Composition of Haitian Banks

Little is known about how banks assign their loans across sectors in Haiti, and many other countries for that matter. This motivates this section on how Haitian banks have been allocated their loan portfolio in the last 16 years, as a preamble to the production of harder evidence on what determines and what effects such allocation has.

To start, Table 1 displays the stylized composition of total bank assets. Three facts stand out. First, based on World Bank data as of 2014, Haiti has a very shallow banking system, with private credit to GDP amounting to just 17.2%, only comparable with other low income countries (18.5%) and well below the levels of other Caribbean nations (40.2%), Latin America (50.6%) or high income OECD countries (122.6%). Institutional weaknesses and macroeconomic instability lie behind this anemic financial intermediation.

[2] As explained later, the methodology applied mitigates to a large extent the usual endogeneity concerns surrounding this relationship, even though it would require additional analysis before claiming that no endogeneity remains.

Table 1.
Banking System in Haiti: Asset and Credit Composition, 2000-2015
In % of total banking system assets, unless stated otherwise

Year	Liquidity	Credit to the Private Sector			Other Assets	Total Assets	Private Credit to GDP
		Total	Business	Consumption			
2000	37.6	36.0	25.9	10.0	26.4	100.0	15.5
2001	39.3	29.5	17.8	11.7	31.3	100.0	14.7
2002	38.9	31.4	17.9	13.5	29.7	100.0	17.6
2003	38.3	29.5	15.6	13.9	32.2	100.0	16.6
2004	41.5	26.7	15.3	11.4	31.8	100.0	14.2
2005	35.3	29.2	15.9	13.3	35.5	100.0	14.5
2006	34.7	28.1	18.0	10.0	37.2	100.0	13.6
2007	35.2	28.3	20.5	7.8	36.5	100.0	12.7
2008	35.4	26.7	18.5	8.2	37.9	100.0	13.8
2009	38.2	29.2	17.3	11.9	32.6	100.0	14.5
2010	44.3	21.3	8.9	12.5	34.3	100.0	14.0
2011	45.4	25.1	14.0	11.1	29.4	100.0	14.8
2012	41.8	30.4	20.1	10.3	27.8	100.0	18.8
2013	38.2	35.3	25.1	10.3	26.5	100.0	19.0
2014	36.6	36.2	23.8	12.4	27.2	100.0	19.9
2015	42.0	30.4	18.4	12.0	27.6	100.0	18.7
Mean 2000-2015	38.9	29.6	18.3	11.3	31.5	100.0	15.8
Mean 2000-2009	37.4	29.5	18.3	11.2	33.1	100.0	14.8
Mean 2010-2015	41.4	29.8	18.4	11.4	28.8	100.0	17.5

The second fact is that private credit represents just 29.6% of total assets on average for 2000-2015 without much change over the years. This implies that, for each dollar of funds (from depositors, bondholders and shareholders), only some 30 cents find their way into private credit[3]. The counterpart is the large liquidity ratio (38.9%) held by banks. In a country with one of the lowest levels of financial intermediation in the world one would have expected most of those

[3] For the sake of comparison, Chun, Kim and Ko (2012) show that loans account for 46.5% of total assets in a sample of 263 large banks from 23 advanced and emerging economies. As this article do not report individual countries´ values, a proper comparison of Haiti against other specific economies would require retrieving national Central Banks´ data. The same goes for other banking variables such as required and actual liquidity as well as the breakdown between commercial and household credit, even though in this case the information may be readily available for some countries.

resources to meet a presumably large excess demand for credit instead of sitting in the form of liquidity.

This situation hints at both weak supply of and demand for credit[4]. By heightening the default risk of most productive endeavors, Haiti's volatile and slow economic growth have discouraged the demand for funds by entrepreneurs as well as the willingness of banks to provide financing. In addition, supply is held back by the frail legal creditor rights in place, which makes debt collection in the event of default hard to enforce. More liquidity, despite its lower return vis-à-vis lending, makes for a suitable risk-mitigating buffer stock when banks and firms are reluctant to engage in lending. Last but not least, the regulatory liquidity requirements have been quite high in recent years (indeed well above 40% for both local and foreign currency deposits since 2015), which also explains the low share of credit in bank balance sheets.

The third and last fact highlighted in Table 1 is that household credit has remained around 11% of total assets and 38% of private credit, a lower proportion than the world average (45% according to Beck et al., 2012)[5].

At the interior of business credit, as shown by Table 2, credit to the services (or tertiary) sector accounts for a staggering 79.8% of total loans on average for 2000-2015. Taking the 2010 earthquake as a turning point for the Haitian economy, the same table shows that this participation has increased, from 78.3% in 2000-2009 up to 82.2% in 2010-2015. According to Table 3, Trade, Restaurants and Hotels appears as the main borrower within the services sector, concentrating 33.7% of all credit. Manufacturing (or secondary) sector takes an average 19.9%, with a declining share from 2000-2009 (21.3%) to 2010-2015 (17.6%). Natural Resources (or Primary Sector) grabs a mere 0.3% of total

[4] Notice that actual credit figures are market-clearing values that do not enable to separately observe supply and demand. For that purpose, one practical tool is to conduct surveys of credit supply (among banks) and demand (businesses and households). Unfortunately, this sort of survey data is not available for Haiti.

[5] There is no a definite answer to the question as to whether household or business credit is better for the economy. On the one hand, some argue to businesses are likely to spur physical investment and thus long-term growth prospects. On the other hand, household credit may indirectly boost investment by fueling product demand and thus the incentives of firms to invest. At the same time, household credit helps smooth consumption over time, improving household well-being and utility. On empirical grounds, Beck et al. (2012) find that long-term growth is associated with a larger fraction of business as opposed to household loans.

loans. Distinguishing tradables (Primary and Secondary Sector) from non-tradables (Services), the former have captured an average 20.2% against 79.8% for the latter[6].

Table 2.
Bank Credit Allocation, 2000-2015.
Primary/Secondary/Tertiary and Tradables/Non-Tradables

Year	**Primary Sector** (Natural Resources)	**Secondary Sector** (Manufacturing)	**Tertiary Sector** (Services)	**Tradables**	**Non Tradables**
	(1)	(2)	(3)	(4) = (1) + (2)	(5) = (3)
2000	0.03	25.32	74.65	25.35	74.65
2001	0.06	23.72	76.21	23.79	76.21
2002	0.08	22.27	77.65	22.35	77.65
2003	0.02	19.10	80.88	19.12	80.88
2004	0.01	22.17	77.81	22.19	77.81
2005	0.01	25.74	74.25	25.75	74.25
2006	0.03	25.55	74.42	25.58	74.42
2007	0.25	15.53	84.22	15.78	84.22
2008	3.24	15.01	81.75	18.25	81.75
2009	0.02	18.80	81.18	18.82	81.18
2010	0.02	18.84	81.13	18.87	81.13
2011	0.02	17.61	82.37	17.63	82.37
2012	0.18	16.62	83.20	16.80	83.20
2013	0.56	15.96	83.48	16.52	83.48
2014	0.15	18.40	81.45	18.55	81.45
2015	0.14	18.38	81.48	18.52	81.48
Mean 2000-2015	0.30	19.94	79.76	20.24	79.76
Mean 2000-2009	0.38	21.32	78.30	21.70	78.30
Mean 2010-2015	0.18	17.64	82.19	17.81	82.19

[6] Within Trade, Restaurants and Hotels, big hotels, in some cases owned by international chains, represent a special case, as they are classified as any other non-tradable activity even though they are a source of foreign currency brought by their foreign guests.

Table 3
Bank Credit Allocation by Sector, 2000-2015

Year	Natural Resources	Manuf.	Electricity, Gas and Water	Constr.	Trade, Restaur. and Hotels	Transp. and Tel.	Other Services	*Herfindahl Index*
2000	0.03	25.3	1.9	5.0	41.5	0.8	25.5	*0.30*
2001	0.06	23.7	1.8	3.6	41.3	1.1	28.5	*0.31*
2002	0.08	22.3	2.7	3.5	41.3	1.3	28.9	*0.31*
2003	0.02	19.1	2.5	2.2	31.4	1.1	43.7	*0.33*
2004	0.01	22.2	2.3	2.0	39.6	1.6	32.2	*0.31*
2005	0.01	25.7	1.8	2.9	34.9	1.0	33.6	*0.30*
2006	0.03	25.6	1.2	7.1	31.2	2.5	32.4	*0.27*
2007	0.25	15.5	2.5	8.7	32.2	5.3	35.5	*0.26*
2008	3.24	15.0	4.9	8.5	29.7	5.6	33.1	*0.23*
2009	0.02	18.8	6.0	4.2	32.5	3.7	34.8	*0.27*
2010	0.02	18.8	7.5	3.9	31.0	4.9	33.9	*0.26*
2011	0.02	17.6	7.1	4.8	32.3	6.9	31.4	*0.25*
2012	0.18	16.6	11.2	4.2	31.7	4.7	31.4	*0.24*
2013	0.56	16.0	12.1	6.0	28.6	6.6	30.2	*0.22*
2014	0.15	18.4	7.6	6.3	31.3	4.1	32.2	*0.25*
2015	0.14	18.4	4.0	8.2	29.2	3.6	36.4	*0.26*
Mean								
2000-2015	*0.30*	*19.9*	*4.8*	*5.1*	*33.7*	*3.4*	*32.7*	*0.27*
2000-2009	*0.38*	*21.3*	*2.8*	*4.8*	*35.6*	*2.4*	*32.8*	*0.29*
2010-2015	*0.18*	*17.6*	*8.3*	*5.5*	*30.7*	*5.1*	*32.6*	*0.25*

All in all, as attested by the industry shares over time, the loan structure by industry has not changed much over 2000-2015, a phenomenon that raises the question as to how responsive credit allocations are to varying sectoral conditions in terms of asymmetric shocks and relative price changes.[7] This central question will be dealt with in Section 3 next. Also worth mentioning, the Herfindahl index presented in the last column of Table 3 indicates a reasonably high loan portfolio diversification, an asset in light of the volatile Haitian economic environment.[8] The index has averaged 0.27 over 2000-2015, even dropping from 0.29 to 0.25 between 2000-2009 and 2010-2015.

[7] By no means this qualification implies that no change has taken place in sectoral shares. In fact, some sectors have dropped, like Manufacturing and Trade, Restaurants and Hotels, and others have expanded, like Electricity, Gas and Water and Transportation and Telecommunications. However, these changes do not seem to have altered the overall picture.

[8] The Herfindahl Index equals the sum of squared shares, ranging between 0 and 1, with the latter value implying full concentration in one sector. Just as a digression, notice that high diversification, meaning a Herfindahl index well below 1, is not necessarily equivalent to efficient

Finally, Table 4 compares the value added (VA) originated by each sector with their participation in total credit. A credit-to-VA higher (lower) than one indicates that a sector is over- (under-) represented in bank loan portfolios[9]. Based on this simple indicator, Electricity, Gas and Water is the most over-represented industry (ratio of 8.9), followed by Manufacturing (2.2). On the contrary, Natural Resources appears to be highly under-represented (0.007), with Transportation and Telecommunications taking the second place (0.5).

Table 4
Share of Sectoral Credit to Share of Sectoral Value Added, 2000-2015

Sector/Year	2000			2005			2010			2015		
	VA	Credit	***Credit to VA***	VA	Credit	***Credit to VA***	VA	Credit	***Credit to VA***	VA	Credit	***Credit to VA***
Natural Resources	27.3	0.03	***0.001***	26.4	0.01	***0.000***	25.3	0.02	***0.001***	20.9	0.14	***0.007***
Manuf.	7.8	25.3	***3.2***	8.0	25.7	***3.2***	7.0	18.8	***2.7***	8.2	18.4	***2.2***
Elect., Gas and Water	0.7	1.9	***2.9***	0.6	1.8	***3.0***	0.5	7.5	***14.0***	0.5	4.0	***8.9***
Constr.	7.5	5.0	***0.7***	7.9	2.9	***0.4***	8.9	3.9	***0.4***	10.5	8.2	***0.8***
Trade, Rest. and Hotels	27.0	41.5	***1.5***	27.1	34.9	***1.3***	27.5	31.0	***1.1***	29.1	29.2	***1.0***
Transp. and Telecom.	5.9	0.8	***0.1***	6.5	1.0	***0.2***	7.3	4.9	***0.7***	7.6	3.6	***0.5***
Other Services	23.8	25.5	***1.1***	23.4	33.6	***1.4***	23.5	33.9	***1.4***	23.2	36.4	***1.6***
Total	*100*	*100*		*100*	*100*		*100*	*100*		*100*	*100*	

III. Explaining Sectoral Allocation of Credit in Haiti

Having examined the bank loan portfolio composition of Haitian banks, this section aims to explain the observed allocations. At first glance, banks should lend more to those sectors exhibiting a higher expected growth and a lower expected volatility. Nevertheless, the basic principles of financial portfolio

diversification, meaning a high return/low variance of the overall portfolio, especially in the face of negative shocks.

[9] Of course, as explained in the next section, there is no technical reason to expect a ratio around one, as credit should not be allocated on the basis of a sector size but on its projected risk and return.

construction are not directly applicable to bank loan portfolios, where liquidity and imperfect information aspects gain particular relevance. For one, loans constitute long-term commitments and hence exit via trading is severely limited. Secondly, banks are affected by the well-known problems of adverse selection (that is, distinguishing high and low risk loan applicants) and moral hazard (that is, the borrower's incentives to lean toward risky projects or refuse to honor their obligations).

As usual, multiple and often contradictory theoretical positions can be found about how banks allocate credit across sectors (see Wurgler, 2000, and Bebczuk and Sangiacomo, 2007). As stated above, the standard view would be that any profit-maximizing and risk-minimizing bank should prioritize in its portfolio the more dynamic and stable sectors. But bank behavior depends on other factors that may turn loan portfolios less or not at all responsive to mere risk-and-return conditions. In the first place, owing to asymmetric information, there might be steep learning costs (and risks) from entering new lending markets and taking previously unknown borrowers. As long as bank managers and shareholders perceived no risk-adjusted gains from making such kind of move, they would prefer sticking to their traditional clientele.

Related to this, some scholars refer to the "lazy banks" hypothesis, positing that banks try to minimize their costs (and managers their effort) by substituting proper borrower screening with collateral and other credit enhancements (see Manove, Padilla and Pagano, 2001). Under this behavioral trait, banks would be even more reluctant to navigate uncharted waters. In the second place, recent observed sector performance may not be a reliable indication of future performance, especially in volatile economies. The same goes for price signals that, when persistent, may lead to portfolio shifts. For instance, a real devaluation should encourage banks to increase their loan share of tradables at the expense of non-tradables, but if markets expect a reversion of the real exchange rate to previous levels in the near future, banks would not act on this signal[10]. Thirdly, credit allocation is driven not only by the supply but also the demand for credit. If growing sectors are able to generate retained earnings, their need for credit may be low no matter how willing banks are to serve them.

[10] Assessing the Argentine banking system, Bebczuk and Galindo (2008) observe that the ratio of tradable to non-tradable loans did not change around the mega-devaluation of 2002, a behavior they attribute to the uncertainty about future levels of the real exchange rate.

Finally, loan portfolio stickiness can very well explain by related lending. When unregulated or weakly enforced, as it is the case in Haiti, banks may direct their loanable funds towards firms belonging to the same economic group regardless of their prospects and probability of default.

A first, exploratory look at the data appears in Table 5, displaying the mean, standard deviation (SD) and their ratio for each productive sector, accompanied by the respective credit share and its change, with annual data for 2000-2015. A quick test on the link between sector performance and credit access is that sectors with a higher mean and less volatile growth (that is, a higher mean-to-SD ratio) should have experienced a greater increase in their credit share. Table 5 definitely rejects this belief. For example, the sector with the highest mean-to-SD (1.2), Construction, has seen its credit share grow by just 2.8 p.p. (from 4% in 2000-2002 up to 6.8% in 2013-2015), whereas Electricity, Gas and Water, the sector with the next to worst mean-to-SD ratio (0.1) expanded its participation in total loans by 5.8 p.p. (from 2.1% to 7.9%).

Table 5

Loan Portfolio and Value Added Performance by Sector, 2000-2015

In Descending Order by Mean-to-SD of VA Growth

Sector	Value Added Growth 2000-2015			Credit Share		
	Mean	SD	*Mean/SD*	2000-2002	2013-2015	*Change*
Construction	3.9	3.3	***1.2***	4.0	6.8	***2.8***
Transport. and Telecom.	3.1	4.5	***0.7***	1.0	4.8	***3.7***
Other Services	1.2	2.2	***0.6***	27.6	32.9	***5.3***
Trade, Rest. and Hotels	2.0	4.0	***0.5***	41.4	29.7	***-11.7***
Manufacturing	1.8	6.4	***0.3***	23.8	17.6	***-6.2***
Elect., Gas and Water	1.1	16.2	***0.1***	2.1	7.9	***5.8***
Natural Resources	-0.6	3.5	***-0.2***	0.1	0.3	***0.2***

The econometric exercise in Table 6 boasts a panel regression for our 7-sector, 15-year sample looking to explain the interannual change in the sectoral loan share in year t as a function of the mean and the standard deviation over

three years (t to t-2) of the value added real growth[11]. Neither variable enters significantly, supporting the preliminary evidence about the overall stickiness of loan portfolios to sector-specific conditions. Things do not vary much when we replaced, in Table 7, the mean and standard deviation individual regressors with their ratio.

Table 6

Explaining sectoral credit allocation (I): Industry-level approach

Fixed Effects Estimation, Annual Data for 2000-2015

Explanatory Variables	(1)	(2)	(3)	(4)
Mean (VA real growth, t to t-2)	0.0260	0.0487	-0.0983	-0.0948
	[0.0424]	[0.0447]	[0.121]	[0.0492]
Std. Dev. (VA real growth, t to t-2)	0.106	0.162	-0.0363	0.0258
	[0.0959]	[0.102]	[0.0803]	[0.117]
Share in loan portfolio (%) (t-1)	-0.527***	-0.530***	-0.601***	-0.604***
	[0.121]	[0.134]	[0.134]	[0.137]
Constant	6.960**	6.784**	9.817***	10.08***
	[1.885]	[1.969]	[2.374]	[2.079]
Observations	105	105	90	90
R-squared	0.312	0.323	0.335	0.347
# Industries	7	7	6	6
Industry fixed effects	Yes	Yes	Yes	Yes
Year Fixed Effects	No	Yes	No	Yes

Robust standard errors in brackets.
*** p<0.01, ** p<0.05, * p<0.1.

All equations also include the lagged portfolio share (as opposed to its change) to check whether banks tend to gradually concentrate their lending towards the sectors they have more exposure to and thus know more or, on the contrary, they strive to keep a diversified portfolio and avoid excessive

[11] While to some extent arbitrary, the choice of this 3-year window obeys to the belief that banks would not make these decisions based on the most recent observation only, thus wasting potentially valuable information about medium term trends, and neither would they use much longer windows, as information way into the past may be increasingly relevant in making forward-looking decisions. Preliminary regressions with other time windows did not change the main conclusions.

concentration in some sectors[12]. The strongly negative and significant coefficient lends credibility to the latter view, which in turn is consistent with the relatively stable portfolio shares unveiled in the previous section and the low and slightly diminishing Herfindahl index.

Table 7

Explaining sectoral credit allocation (II): Industry-level approach

Fixed Effects Estimation, Annual Data for 2000-2015

Explanatory Variables	(1)	(2)	(3)	(4)
Mean/Std. Dev. (VA real growth, t to t-2)	-0.0960	-0.139	-0.106	-0.134
	[0.0872]	[0.0771]	[0.0959]	[0.0873]
Share in loan portfolio (%) (t-1)	-0.531***	-0.535***	-0.601***	-0.609***
	[0.131]	[0.139]	[0.130]	[0.142]
Constant	7.720***	7.677**	9.674***	10.04***
	[1.891]	[2.105]	[2.087]	[2.239]
Observations	105	105	90	90
R-squared	0.301	0.305	0.340	0.356
# Industries	7	7	6	6
Industry fixed effects	Yes	Yes	Yes	Yes
Year Fixed Effects	No	Yes	No	Yes

Robust standard errors in brackets.
*** p<0.01, ** p<0.05, * p<0.1.

To close this section, in Table 8 we run a regression for the same dependent variable to identify macroeconomic factors affecting the change in portfolio share at individual industry level using quarterly data[13]. Our main hypothesis is that real devaluations should encourage banks to shift their loan portfolios towards tradable vis-à-vis non-tradable industries, as the former would become

[12] When holding a heavy non-performing loan portfolio, instead of reducing, banks may have perverse incentives to increase lending to those poorly performing sectors so as to assist them in surmounting their situation or to postpone the recording of losses in banks' books.

[13] We cannot combine the micro and macro approach in a single panel regression because portfolio shares add to one, so the effect of macroeconomic variables would be neutralized when stacking the overall loan portfolio. For example, assuming that the loan portfolio consists of sectors A and B, if the RER caused an increase in the share of sector A and a decrease of sector B, the estimated coefficient on the RER would probably be non-significant as a result of those opposing effects. Notice that we are using quarterly data here, which are not available for our annual panel regressions.

more profitable and less prone to default[14]. In all, we unearth weak and hardly reliable evidence in favor of this relationship, which is significantly verified at 5% only for Manufacturing (with the expected positive sign) and Construction (negative). Moreover, the economic effect is small: a 10% real devaluation would increase the Manufacturing share in just 0.92 percentage point and would diminish that of Construction in 0.27 pp. Given the macroeconomic nature of the exercise, we also wanted to check, without imposing any particular prior, whether aggregate economic activity influences the loan portfolio composition. Once again, we were unable to detect any significant effect at 5%. On the contrary, as in Table 5, the lagged portfolio share enters negatively and significantly in all cases.

Table 8

Explaining sectoral credit allocation: Macro-level approach

OLS Estimation, Quarterly Data for 2000.Q1-2015.Q4

Explanatory Variables	Natural Resources	Manuf.	Elect., Gas and Water	Constr.	Trade, Rest. and Hotels	Transp. and Tel.	Other Services
Real exchange rate (mean, t to t-2)	0.250	9.189**	-2.468	-2.731**	16.19*	-5.012	-5.908
	[1.019]	*[4.364]*	*[1.666]*	*[1.250]*	*[8.695]*	*[3.246]*	*[5.475]*
% Credit allocation (t-1)	-0.569**	-0.408***	-0.115	-0.287**	-0.525**	-0.386**	-0.784***
	[0.228]	*[0.137]*	*[0.0781]*	*[0.124]*	*[0.209]*	*[0.160]*	*[0.220]*
Aggregate real growth (mean, t to t-2)	0.00494	-0.00416	-0.0128*	-0.0170*	-0.0210	0.000636	0.0333*
	[0.00622]	*[0.0114]*	*[0.00763]*	*[0.0101]*	*[0.0190]*	*[0.00511]*	*[0.0172]*
Constant	0.164	5.235***	1.414	2.373***	12.77***	2.928**	27.09***
	[0.310]	*[1.782]*	*[0.859]*	*[0.828]*	*[4.785]*	*[1.450]*	*[8.102]*
Method	*OLS*	*OLS*	*OLS*	*OLS*	*OLS*	*OLS*	*OLS*
Observations	61	61	61	61	61	61	61
R-squared	0.288	0.215	0.078	0.159	0.311	0.196	0.515

Robust standard errors in brackets.
*** p<0.01, ** p<0.05, * p<0.1.

[14] Although this linear nexus between the RER and the tradable/non-tradable performance will be qualified later on in the paper, the fact remains that most analysts, within and outside the banking system, expect it to be true.

IV. The Effects of Credit on Economic Growth in Haiti: A Sectoral Approach

In sheer contrast to the countless papers on the effects of aggregate credit on aggregate growth, little to none effort has been put into linking sectoral credit and growth[15]. In this section, we will explore this issue, building on the scarce existing literature, in the context of Haiti. But first things first, we need to frame this analysis within the broader academic and policy debate around the impact of credit on economic growth.

The causal link between financial development and economic growth remains a highly divisive issue in the academic literature. Prominent economists such as Joan Robinson, in the 1950s, and Robert Lucas, in the 1980s, voiced their skeptical view about any role of finance on growth, contending instead that financial development is just a byproduct of economic development. Then, since the early 1990s a new breed of theoretical and empirical studies forcefully pushed forward the notion that credit was a vital engine of growth (see Levine, 2005). In recent years, in particular in the wake of the 2008 financial deepening on growth (see Panizza, 2013, and Cecchetti and Kharroubi, 2015).[16]

This disconcerting and dynamic debate stems from the fact that causality, unlike basic correlation, is hard to establish. At any rate, we may observe two variables moving in tandem, but that does not provide information on which one causes a change in the other, or whether both are being shifted by a third common driver –the age-old chicken and egg story. Furthermore, in the present case, strong conceptual arguments exist to support either causality nexus. In favor of the credit-to-growth position, researchers underscore the role of the financial system in alleviating intermediation costs and informational barriers

[15] The sectoral allocation of credit has mostly been scrutinized in relation to the pros and cons of diversification on bank profitability and risk, which is beyond the scope of our study. Examples of these empirical applications are Acharya, Hasan and Saunders (2006) for Italy, Bebczuk and Galindo (2008) for Argentina, Jahn, Memmel and Pfingsten (2013) for Germany, and Borensztein and Lee (1999) for South Korea. A worth mentioning exception is Wurgler (2000), who finds evidence on a positive link between the efficiency of investment (measured by the elasticity of sectoral investment to sectoral value added growth) and overall financial development.

[16] Even though we do not elaborate on this, it must be noted that scholars and other experts alike acknowledge that macroeconomic stability and a proper institutional framework are preconditions needed to ensure a positive social outcome from a deeper, crisis-free banking system.

between creditors and borrowers paving the way for a more cost-efficient and socially productive allocation of saving. On the opposite camp, scholars claim that the propensity to save may very well explain both financial development (as part of saving is channeled towards the financial system) and economic growth (as saving affects investment, which in turn fosters growth)[17].

At the empirical level, considerable effort has been put into finding sensible instrumental variables to deal with this potential two-way causality and the ensuing endogeneity bias (see Beck, 2009, for a survey on finance-and-growth econometrics). Possibly the most widely accepted method to tackle this issue is the one proposed by Rajan and Zingales (1998) and adopted by leading subsequent studies (e.g., Cecchetti and Kharroubi, op.cit.)[18]. Departing from the usual macro-level data analysis, their identification strategy hinges on the sensible hypothesis that productive sectors that are more dependent on external finance (i.e., funds provided by outsiders, as opposed to internal funding via retained earnings) should benefit more from an overall credit expansion than sectors that are less dependent on such resources.

To clearly highlight the underpinnings of this approach, it is helpful to write the stylized version of a typical growth panel regression:

$$GDP\ Growth_{j,t} = \alpha + \beta\ (Private\ Credit/GDP)_t + \delta_j + \delta_t + \gamma Z_{j,t} + \varepsilon_{j,t}$$

[17] We may be unable to claim causality from credit to growth even when credit temporally precedes growth, that is, when credit expands in period t and the economy grows in t+1, after controlling for other growth-promoting factors. This time precedence may result from the fact that financial intermediaries anticipate future growth and start lending based on such good prospects, but credit itself is not the ultimate cause of growth –which would materialize with or without credit- but a mere leading indicator.

[18] In light of the typical scarcity of external instruments with the desirable properties, another popular but still controversial procedure has been the use of internal instruments (lagged values of regressors in levels and differences) through a Generalized Method of Moments estimation. Among the caveats of this technique are, among others, the marked sensitivity of the estimates to the chosen lag structure of the instrument set and the required long time series dimension of the dataset, a binding constraint for our present application. The endogeneity caveat has also been tackled by building dynamic general equilibrium models in the so-called quantitative macroeconomics literature (see for instance Buera and Shin, 2013).

where the variables δ stand for country (j) and time (t) fixed effects to control for unobservable heterogeneity, and Z is a vector of other time- and country-variant GDP growth drivers.

The main pitfall of this specification is that reverse causality from growth to credit would imply endogeneity, thus rendering the estimated coefficient upward bias. To avoid overestimating the effect of credit on growth, Rajan and Zingales (op.cit.) propose the following general framework:

$$Sector\ Growth_{i,j,t} = \alpha + \beta\ [EFDI \times (Private\ Credit/GDP)_t] + \delta_i + \delta_j + \delta_t + \gamma Z_{j,t} + \varepsilon_{i,j,t}$$

where the subscript i denotes industry or sector, and *EFDI* stands for external financial dependence index. The novelty lies, first, in the choice of an industry-level (as opposite to aggregate or macro-level) dependent variable and, second, a reformulation of the credit regressor. As stated above, the hypothesis is that an expansion of aggregate credit (*Private Credit/GDP*) would disproportionately boost the growth of the more financially dependent sectors. The underlying assumption is that these sectors have a larger unmet demand for bank credit and other external funding sources, and hence the greater availability of credit should relax such financial constraints and foster industry's growth[19].

Measuring financial dependence is not a trivial matter, though. In their multicountry study, Rajan and Zingales (op.cit.) proxy it by the ratio between physical investment minus cash flow (or internal funds) to physical investment, that is, the fraction of physical investment that is financed with external funds in listed U.S. firms, under the assumption that the U.S. is the closest to a frictionless (or perfect) financial market, and so businesses are able to use the optimal amount of external funds. Different sectors may exhibit different financing needs depending for instance on how intensive they are in physical

[19] As mentioned earlier, the growth-enhancing influence of the banking system relies on its ability to provide funding to the most promising sectors. The traditional literature, based on aggregate credit and growth data, is not well equipped to produce evidence on this. This is another reason to employ industry-level data.

capital and how long the typical product cycle is between launching the project and the actual generation of revenues[20].

Domestic financial dependence in each country, say Haiti, may still suffer from endogeneity, as firms in a particular industry may be using little external funding just because they suffer a financial constraint. In such a case, more credit would entail a change in financial dependence, making the latter an endogenous variable and thus a poor indicator of true or intrinsic financial dependence.

Taking the United States as a benchmark would provide, according to these authors, not only an optimal benchmark to assess financial dependence but would also ensure exogeneity, as this index cannot be suspected of being affected by industry or aggregate growth in countries other than the U.S.. By a similar token, growth in individual industries (as opposed to aggregate growth) should not spur aggregate credit growth.

While an undeniably ingenious procedure, we believe, in line with Balta and Nikolov (2013) and Auguste, Bebczuk and Sanchez (2013), some serious caveats weaken the index chosen by Rajan and Zingales (op.cit.), namely:

(a) It is a flow-based (as opposed to a stock-based) measure, and as such it may display high variability over time, which is at odds with the assumed stability of the index[21]. Investment, cash flow and external funding tend to substantially change over the business cycle and as a result of macroeconomic shocks;

(b) The U.S. financial market, despite being highly developed, is far from frictionless according to the available evidence, meaning that its choice as the optimal benchmark is not obvious.[22] This body of empirical work suggests that

[20] The firm age composition in the industry may also affect the index, as younger firms are likely to be more reliant on external funds than older and consolidated establishments, where investment needs diminish and a steady stream of revenue exist.

[21] An illustrative example on the contrast between stock and flow is the trajectory of private credit in the United States around the 2008 financial crisis. Between the third quarter of 2007 and the same period of 2008, the flow of credit was positive (+3.9%), but it turned negative (-3.3%) in the next year, entailing a major change in the financial dependence index, as defined in the text. For the private sector as a whole, it means a downright change from a positive to a negative index. Nevertheless, the stock of credit to GDP remained positive and largely stable at around 195% of GDP, thus providing a more dependable structural or true financial dependence.

[22] Among others, Kadapakkam, Kumar and Riddick (1998) produce evidence on financial constraints among listed American firms, while Fan, Titman and Twite (2012) show that the ratio

we cannot be sure that firms worldwide would ideally target the same degree of financial dependence as their American counterparts, which are also subjected to financial constraints, even though of a lesser intensity than in less developed economies. Furthermore, the index is constructed on the basis of listed American firms (only a minor proportion of all firms) in each sector and for a particular set of years in the 1980s, making for a less than fully representative and updated benchmark; and

(c) The index is only calculated for the U.S., assuming as valid, without any evidence at all, the notion that financial dependence is higher and optimal in the U.S. vis-à-vis other economies. In fact, for this methodology to be legitimate, it should be true that for any given industry j, financial dependence is higher in the benchmark country (the U.S. or another country with a well-developed financial system) than in the countries included in the sample (in our case, Haiti).

In order to overcome these pitfalls, our present study will employ the debt-to-value added ratio as the measure of financial dependence, taking several European countries as a benchmark, borrowing data from BACH (2016)[23]. The first reason behind the adoption of the stock of outstanding debt (as opposed to the annual flow used in the original index) constitutes a more stable proxy for the use of external funds. Equally important, this index can be reproduced for Haiti for the same industries and years as in Europe, enabling a more fruitful comparison and interpretation that will exploited in our statistical analysis[24].

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of financial debt to assets in this country is among the lowest in their sample of 39 developed and emerging economies.

[23] BACH – *Bank for the Accounts of Companies Harmonized* - is a database containing harmonized annual accounts statistics of European non-financial enterprises. The country sample comprises Austria, Belgium, Czech Republic, France, Germany, Italy, Poland, Portugal, Slovakia and Spain, covering at least 10 financial years over the period 2000-2014, including 66 major items of the balance sheet and the income statement, with a breakdown by business sector (2 digits NACE rev.2).

[24] The original Rajan and Zingales (RZ)' index requires detailed balance sheet data by company that is not available in Haiti. The only indicator of financial dependence by industry that be computed for Haiti is credit to value added. Outstanding credit by sector comes from the main dataset used in this study and provided by the Banque de la Republique d'Haiti (BRH), whereas value added by sector comes from the National Accounts System administered by the Institute Haitien de Statistique et d'Informatique (IHSI). Based on the raw data from BACH, we were able to construct the same indicator for the same sectors for the above panel of European data.

The choice of Europe was determined by the availability of a broad sample of countries (10) and years (2000-2014) for a highly representative sample of listed and non-listed firms. While a highly developed financial market, the average from this European panel is likely to mitigate measurement errors that may stem from the consideration of a single country (the U.S.), outdated figures and a non-representative set of listed companies[25].

Table 9 displays the financial dependence index (credit-to-value added) for both Haiti and Europe over the period 2000-2014. The data appears to meet the desirable requirements, i.e.:

(i) Consistent with the relative development of the financial system, in every single year the financial dependence is notoriously higher in Europe than in Haiti. Comparing mean values, the European ratio exceeds that of Haiti by a factor of 1.9 in Manufacturing, 3.1 in Other Services, 5.3 in Trade, Restaurants and Hotels, 7.4 in Transportation and Telecommunications and 9.8 in Construction. In Natural Resources, due to the low level of credit directed to this sector, the difference is 777 times. The only exception is Electricity, Gas and Water, where financial dependence is 1.36 for Haiti and 0.82 for Europe. The gap in favor of Haiti started in 2008 (1.46 against 0.96) and deepened since 2012, reaching a maximum of 3.94 (compared to 0.96 in Europe) in 2014. The surge in financial dependence in later years is most likely explained by the quest to tackle, through additional bank loans, the structural infrastructure deficit in the country, in turn aggravated by the devastating 2010 earthquake; and

(ii) In both groups, values are reasonably stable over time, with a coefficient of variation (a scale-free dispersion measure equal to the standard deviation divided by the mean) well below one in all sectors but Natural Resources and

[25] Despite these criticisms, it would be nice to replicate the regressions using the original RZ index. Unfortunately, it is not possible to do so because RZ´s level of sectoral disaggregation is quite higher to the one available for this study. Simple averages of RZ sectors would not do the trick either. In order to reconstruct the index (or, equivalently, weighted averages) for Haiti´s sectors would require access to the U.S. sectoral raw data. Also important to notice is that the results that follow in the text do not seem to be affected by the exclusion of specific sectors (for example, construction, whose behavior might have been affected by public policies in the face of the 2010 earthquake). The same applies to the set of countries and years included in the Europe-based financial dependence index. For example, we redid all regressions only keeping Denmark, as this country displays the highest credit-to-GDP ratio among those countries, and so should be a priori the least hit by financial constraints. No substantial conclusion varied as a result of this change.

Electricity, Gas and Water in Haiti, where the statistic exceeds one. These two outliers are easily explained by the facts depicted in (i): in the former case, the relatively high coefficient of variation obeys to the extremely low mean value, whereas in the latter the explanation has to do with the remarkable increase in credit support for infrastructure expansion and reconstruction in recent years[26].

Just to recap, the dependent variable in the following fixed-effects panel estimation is the average annual growth of real value added by industry j. The latter seek to control for unobserved heterogeneity across sectors and over time[27]. The main estimations, including the baseline specification as well as several robustness checks, appear in Table 10. As shown in the first row, our variable of interest -Europe's financial dependence index (measured by the median over 2000-2014) interacted with the credit-to-GDP ratio- delivers in most cases a positive, statistically significant and stable estimate.

In regression (1), the only controls are industry fixed effects (not reported in the table for the sake of brevity). Regression (2) adds year fixed effects. Despite being all non-significant but one, these time effects suppress the explanatory power of the above interaction term and even reverse its sign, so we have tried various alternative control sets[28]. In column (3) we include the lagged level of value added, intended to (unsuccessfully) capture any conditional convergence –sectors with a larger initial production and presumably capital stock should subsequently grow less than other sectors due to the diminishing marginal productivity of capital.

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[26] Some noticeable changes are observed in Europe in 2014 for some sectors. No clear explanation can be offered for such movements. Just in case these changes unduly influence the econometric findings, we have run in unreported tables all the regressions once again, without detecting any important variation in the estimated coefficients value or significance.

[27] As customary in this literature, in order to smooth out potential cyclical effects and allow for a lagged response of production to credit, the dependent variable is the average growth in a three-year period over period t through t-2. Also building on previous contributions, in light of the nature of the data (that are clearly drawn from a non-random distribution but constitute the universe and not just a sample of credit and value added), we are applying a panel estimation with fixed effects. The lack of any other information at the industry-level, such as employment, investment and other accounting indicators, makes the need for fixed effects all the more pressing.

[28] It is not clear why these time effects have such powerful effect on our variable of interest. Although the database at hand do not enable to further explore the ultimate causes, this certainly should be in the research agenda for future extensions.

Regression (4) eliminates the Electricity, Gas and Water sector as a result of its peculiar behavior in terms of credit and negative shocks. Regression (5) reinstates some of the year effects, in particular those corresponding to 2001, 2004 and 2010, that is, the years in which the Haitian experienced negative growth during the whole period 2000-2014. Finally, regression (6) picks up time-variant effects common to all industries –hence a good substitute of year effects- by including the U.S. GDP growth rate[29]. For our purposes, the key conclusion is that our variable of interest seems for the most part resilient to these stress tests[30].

In terms of economic significance, the estimated effect is also noteworthy, and confirms the prior that the sectors more dependent on external funding seem to benefit relatively more from an expansion of aggregate credit. Based on the estimated coefficient in regression (1), if Private Credit to GDP increased from the current 17% to 20%, Transportation and Telecommunications –the least financially dependent sector- would see its average annual growth increase by 0.43 percentage points. Conversely, Natural Resources, the sector with the highest financial dependence, would increase its growth by 1.3 percentage points[31].

While maintaining the same control sets as in Table 10, Table 11 adopts a different definition for our variable of interest, by replacing average Credit/VA in Europe by the difference in average Credit/VA between Europe and Haiti – what we can call *relative* (as opposed to the previous *absolute*) financial dependence. The justification for this change -a novelty in this literature- is to check whether the impact of financial development on industry growth depends

[29] This alternative is justified by the presumption that time-variant external conditions, especially in the U.S., have an overwhelming impact on all sectors at the same time. At odds with the belief that U.S. growth exerts a positive impact on Haiti's growth, our regressions yield a negative coefficient, yet significant at 10% or downright non-significant. This curious result may be related to the short time period and the extraordinary shocks that have hit each of these economies, such as the 2008 crisis in the U.S. and the 2010 earthquake in Haiti, which might have transitorily break the economic correlation between both countries.

[30] In unreported regressions, the broader sector breakdown from Table 12 next was used. The coefficient of interest turned out to be positive and even larger, but statistically non-significant.

[31] These numbers emerge from the following calculation: $0.337 \times [0.4293 \times (20 - 17)] = 0.433$ for Transportation and Telecommunications, and $0.337 \times [1.2848 \times (20 - 17)] = 1.299$ for Natural Resources. The financial dependence index corresponds, as in the estimation, to the median over 2000-2014.

not only on the optimal degree of financial dependence but also on distance between it and the industry's own actual financial dependence.[32] A priori, the greater the distance, the more binding the financial constraint, and therefore the more impact a given overall credit expansion should have on industry growth. In the limit, if an industry has already the same financial dependence as the optimal benchmark, changes in credit should not affect their growth.

Table 9
Financial Dependence (Credit-to-Value Added) by Industry
Haiti and 10 European Countries, 2000-2014

Year	Natural Resources		Manuf.		Elect., Gas and Water		Constr.		Trade, Rest. and Hotels		Transp. and Telecom.		Other Services	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
2000	0.0001	1.20	0.36	0.47	0.31	0.70	0.073	0.61	0.17	0.68	0.015	0.39	0.12	0.53
2001	0.0002	1.07	0.27	0.51	0.33	0.80	0.042	0.58	0.13	0.70	0.016	0.48	0.11	0.49
2002	0.0003	1.07	0.25	0.48	0.51	0.64	0.041	0.57	0.13	0.69	0.019	0.48	0.11	0.49
2003	0.0001	1.25	0.29	0.56	0.61	0.77	0.034	0.59	0.14	0.71	0.021	0.45	0.23	0.48
2004	0.0000	1.13	0.24	0.54	0.35	0.73	0.022	0.55	0.13	0.68	0.022	0.33	0.12	0.49
2005	0.0000	1.28	0.30	0.51	0.28	0.69	0.034	0.56	0.12	0.72	0.014	0.43	0.13	0.49
2006	0.0001	1.36	0.30	0.55	0.24	0.65	0.085	0.53	0.11	0.71	0.036	0.43	0.13	0.46
2007	0.0010	1.39	0.21	0.59	0.62	0.76	0.117	0.64	0.12	0.74	0.082	0.42	0.16	0.49
2008	0.0161	1.28	0.23	0.52	1.46	0.96	0.122	0.47	0.12	0.69	0.090	0.42	0.16	0.47
2009	0.0001	1.47	0.29	0.61	1.46	0.96	0.061	0.60	0.14	0.77	0.061	0.44	0.18	0.46
2010	0.0001	1.37	0.28	0.50	1.44	0.94	0.045	0.59	0.12	0.73	0.068	0.42	0.15	0.53
2011	0.0001	1.44	0.27	0.48	1.28	0.86	0.062	0.65	0.14	0.76	0.103	0.44	0.16	0.52
2012	0.0012	1.34	0.30	0.47	3.40	0.93	0.065	0.76	0.17	0.78	0.092	0.41	0.20	0.47
2013	0.0039	1.35	0.32	0.48	4.12	0.94	0.095	0.78	0.16	0.75	0.138	0.38	0.21	0.53
2014	0.0013	1.13	0.32	0.62	3.94	0.96	0.059	0.87	0.15	0.64	0.094	0.52	0.19	0.53
Mean	*0.0016*	*1.27*	*0.28*	*0.53*	*1.36*	*0.82*	*0.064*	*0.62*	*0.14*	*0.72*	*0.058*	*0.43*	*0.16*	*0.50*
Median	*0.0001*	*1.28*	*0.29*	*0.51*	*0.62*	*0.80*	*0.061*	*0.59*	*0.13*	*0.71*	*0.061*	*0.43*	*0.16*	*0.49*
Std. Dev.	*0.0041*	*0.13*	*0.04*	*0.05*	*1.36*	*0.12*	*0.030*	*0.11*	*0.02*	*0.04*	*0.040*	*0.05*	*0.04*	*0.03*
Coef. Var.	*2.5077*	*0.10*	*0.14*	*0.09*	*1.00*	*0.15*	*0.470*	*0.17*	*0.14*	*0.05*	*0.696*	*0.11*	*0.24*	*0.05*

Source: Own elaboration based on BRH, IHSI and BACH (2016).

[32] Earlier, we argued that the actual financial dependence (not that of benchmarks like the U.S. or Europe) presents some caveats as a regressor. However, the new variable is not the actual financial dependence but the difference between the optimal and the actual value, which is a whole different variable.

Table 10

Industry Growth and (Absolute) Financial Dependence

Panel Estimation with Fixed Effects. Annual Data for 7 Industries over 2000-2015

Explanatory Variables	(1)	(2)	(3)	(4)	(5)	(6)
(Credit/VA)(j)* (Credit / GDP)(t)	0.337**	-0.00121	0.341**	0.359**	0.308**	0.334**
	[0.0968]	*[0.563]*	*[0.0970]*	*[0.114]*	*[0.0989]*	*[0.101]*
Lagged VA (j, t-1)			-0.000106		-2.40e-05	-0.000287
			[0.00155]		*[0.00167]*	*[0.00168]*
US GDP Growth (t)						-0.228*
						[0.110]
Dummy 2001					-0.392	
					[2.273]	
Dummy 2004					-0.754	
					[1.341]	
Dummy 2010					0.0562	
					[1.791]	
Constant	-1.878	2.853	-1.722	-1.704	-1.451	-0.865
	[1.048]	*[4.456]*	*[2.811]*	*[1.228]*	*[2.897]*	*[3.069]*
Observations	112	112	112	96	112	112
R Squared	0.048	0.163	0.048	0.154	0.050	0.056
# Industries	7	7	7	6	7	7
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	No	Yes	No	No	Yes (some)	No

Robust standard errors in brackets.
*** p<0.01, ** p<0.05, * p<0.1.

Based on Table 11, the estimated coefficients do not vary much relative as those uncovered in the regressions from Table 10, but the economic effect of a given credit change is not the same as before. Take the case of Manufacturing, the sector with the shortest distance between the median financial dependence in Europe (0.51) and Haiti (0.29). Under the estimation displayed in column 1, Table 10, a change of Credit/GDP from 17% to 20% would increase its growth by 0.52 percentage points, against 0.23 under the estimation of column 1, Table 11[33]. This reformulation does not invalidate, though, the central message of the baseline regressions in Table 10: with the modified regressor, the growth impact for Transportation and Telecommunications would fall to 0.37 down from the

[33] These values are calculated as follows: 0.337 × [0.5145 × (20 – 17)] = 0.5201 under the standard estimation (Table 10), and 0.337 × [(0.5145-0.2864) × (20 – 17)] = 0.2306 in the case of Table 11.

previous 0.43, and would remain almost identical (1.29) for Natural Resources, as this sector has an extremely low actual financial dependence in Haiti, and thus the credit effect would be at its maximum.

A major issue in the Haitian economy is the impact of the strong real appreciation of the gourde since the early 1990s, motivated by massive flows of worker remittances and unilateral transfers from abroad. Katz (2015) argues that the decline in Haiti's GDP per capita is to a great extent explained by such currency appreciation, which has undermined competitiveness in the tradable sector within the manufacturing sector.

Having said that, the relationship between industry growth and the RER cannot be signed as easily due to the disparate effects of a real devaluation (see Bebczuk, Galindo and Panizza, 2010). In a small and open economy, a real devaluation should be most potent in an export-oriented sector with low requirements of imported inputs (and no foreign debt), as in this case the producer may be able to grab the full benefit from the change in relative prices and would also be able to channel the additional production overseas. Conversely, if the sector does not export much but instead sells mostly in the local market, has a high demand for imported productive factors (and/or bears a high foreign debt), the net profit effect for the producer may turn out negative, in which case a real devaluation will become growth-stifling. This negative outcome results not only from the higher costs of foreign inputs and foreign debt payments but also from the lack of exports and the reliance on the domestic market. At the same time that the devaluation improves producer's profitability, it worsens the local consumers' purchasing power, determining in some cases that tradable sales would drop rather than increase due to weak internal demand –a phenomenon associated to the so-called contractionary devaluation hypothesis. In sum, the effect of a devaluation is ambiguous a priori.

To delve into the empirics of this question, and since the impact of the real exchange rate (RER) may differ across specific tradable industries, we make use of a breakdown of six activities at the interior of the manufacturing sector (Food and Beverage, Wood, Chemical, Textiles, Paper and Printing, and Other). Table 12 expands on Tables 10 and 11 by adding a new set of regressors. For each manufacturing subsector, a dummy variable was created, and such dummy variable was interacted with the RER. A positive coefficient would indicate that a real gourde appreciation (devaluation) is associated with a lower (higher) value added growth, consistent with the prior that tradable activities thrive with

a higher RER and vice versa. Following the previous econometric formulation, the new regression takes the form:

$$Sector\ Growth_{i,j,t} = \alpha + \beta\ [EFDI \times (Private\ Credit/GDP)_t] + \delta_i + \delta_i \times RER + \delta_j + \delta_t + \gamma Z_{j,t} + \varepsilon_{i,j,t}$$

where RER stands for the real exchange rate.

First of all, we repeat previous exercises by including the same control set and, alternatively, the absolute and the relative financial dependence. In this case, financial dependence remains positive with an even higher value than before, but it is not statistically significant as a result of strong heteroskedasticity in this sample[34].

The discussion in previous paragraphs helps interpret the diverging effects of the RER on the performance of manufacturing subsectors. First of all, let us notice that all subsectors identified here, save Textiles, are net importers and only export a minor share -between 0% and 7%- of their total production (see Cicowiez, 2015). Textiles, on the contrary, devotes 58% of its production to international markets and so, even with an import-to-production ratio of 25%, it stands as the sole net exporter in the group. This is likely behind the positive devaluation impact unveiled in all specifications. The opposite case is Food and Beverages, with a negative and significant coefficient, arguably explained by a combination of net imports and a high elasticity of domestic demand (especially by low-income households). Among the other subsectors, we find non-significant effects on Wood and Chemical and a positive and significant one on Paper and Printing and the residual category Other Manufacturing.

In regressions (5) and (6) we go back to the overall manufacturing sector, obtaining a negative and significant effect. A general lesson to draw is that a reversion of the secular gourde appreciation may bring multiple and hard-to-anticipate effects, with both winners and losers not only on the productive but also the income distribution front.

[34] A Wald test was run that rejected the null hypothesis of homoskedasticity. For inference purposes, in the face of heteroskedasticity, robust standard errors must be used, as done in our regressions, instead of OLS errors -if the latter are used, financial dependence would stay significant at 1% in most specifications in Table 11.

Table 12
Manufacturing Growth and Real Exchange Rate
Panel Estimation with Fixed Effects. Annual Data over 2000-2015

Explanatory Variables	(1)	(2)	(3)	(4)	(5)	(6)
Food and Beverage Dummy × RER	-67.96***	-62.36***	-74.96***	-67.57***		
	[16.50]	*[15.34]*	*[10.36]*	*[9.837]*		
Wood Products Dummy × RER	20.32	15.80	30.66	28.91		
	[20.08]	*[19.23]*	*[23.54]*	*[24.40]*		
Chemical Products Dummy × RER	-3.143	-3.386	-9.455	-5.804		
	[12.46]	*[11.74]*	*[7.226]*	*[7.117]*		
Textiles Dummy × RER	74.28***	67.06***	76.82***	74.74***		
	[14.42]	*[15.24]*	*[14.07]*	*[16.32]*		
Other Manufacturing Dummy × RER	73.72***	74.64***	56.84***	63.10***		
	[10.97]	*[10.26]*	*[0.196]*	*[3.186]*		
Paper and Printing Dummy × RER	63.19***	62.66***	59.95***	62.87***		
	[12.60]	*[11.91]*	*[9.135]*	*[9.106]*		
(Overall) Manuf. Dummy × RER					*-9.198****	*-8.512****
					[0.678]	*[0.798]*
(Credit/VA)(j)* (Credit / GDP)(t)	0.767	0.499	1.061	0.863	0.318**	0.319**
	[0.509]	*[0.505]*	*[0.615]*	*[0.663]*	*[0.0876]*	*[0.0896]*
Lagged VA (j, t-1)		0.00776		0.00461		-0.000324
		[0.00565]		*[0.00548]*		*[0.00167]*
US GDP Growth (t)		-0.548*		-0.541*		-0.208
		[0.262]		*[0.267]*		*[0.111]*
Constant	-8.348	-12.46	-7.496	-10.20	-1.262	-0.293
	[6.924]	*[7.594]*	*[5.556]*	*[6.100]*	*[0.980]*	*[3.103]*
Observations	156	156	156	156	112	112
R Squared	0.177	0.213	0.211	0.237	0.058	0.064
# Industries	13	13	13	13	7	7
Financial Dependence	Absolute	Absolute	Relative	Relative	Absolute	Absolute
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	No	No	No	No	No	No

Robust standard errors in brackets.
*** p<0.01, ** p<0.05, * p<0.1.

V. Conclusions

The present study has examined sectoral credit allocation in the Haitian banking system over the period 2000-2015 and produced fresh evidence on the link between credit and growth at the sectoral level, exploiting for the first time a dataset administered by the *Banque de la Republique d'Haiti* (BRH).

The main conclusions from our empirical analysis are: (1) While the loan portfolio looks diversified across sectors, credit shares by industry appear to be sticky over time in spite of changing industry-specific conditions and sharp relative price changes, in particular the real exchange rate; (2) Consistent with the previous finding, econometric exercises confirm that loan portfolio allocations are not governed by recent sector performance, casting doubts about the efficiency of loan portfolios; (3) The majority of productive sectors in Haiti seem to suffer from intense financial constraints, as shown by the low use of bank debt compared to advanced economies; and (4) Based on an endogeneity-mitigating methodology, overall credit expansion seems to be a major driver of industry growth.

The chief policy prescription emerging from the analysis is that efforts to stimulate financial intermediation in Haiti should be strengthened, which in turn would require a profound institutional upgrade –in particular, better and more effective creditor legal rights and well-functioning credit registers- coupled with more stable economic conditions. A profuse body of work over the last two decades has produced compelling evidence on the benefits of these institutional improvements in terms of financial deepening (see Djankov, McLeish and Shleifer, 2007).

Equally important, in light of the apparent growth and welfare implications of financial intermediation, more granular data is necessary to evaluate bank decisions at the time of allocating portfolios. For instance, while sectoral data represents a valuable step forward compared to aggregate data, detailed balance sheet and credit information for individual businesses would be greatly welcome. This sort of data would enable to assert whether the current loan distribution is efficient, in the sense that the most promising and dynamic sectors are being rewarded with more access to credit under acceptable conditions of amount, maturity, interest rate and collateral. If that is not the case, corrective policy measures would be in order, led by public banks or through other financial assistance programs. At any rate, these interventions should be carefully designed and monitored, including periodic cost-benefit and impact evaluation analyses.

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