ECONOMICS

Working Paper Series

No. 11-2021

Credit Creation, Economic Progress and the Saturation Effect: A Sector Level Analysis

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Abstract:

We investigate the effect of cr
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and the significance of credit impulse (or
of up to 95 countries covering the period
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agriculture and services. We also find ev
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unbundled effects of household and non
added in manufacturing and services are
not find any effect of credit impulse.

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growth in real value added is indeed non-linear conditional on the level of development (saturation effect)? Third, to what extent the effects are homogeneous across different types of credit (households and non-financial corporations)? Fourth, what effect credit impulse (or new credit creation) has on growth? Recall that credit impulse is defined as the change in credit (or new credit issued) as a percentage of GDP.

Using a sample of up to 95 countries covering the period 1970 to 2017, we find that private credit has strong positive effects on manufacturing value added in a linear specification after accounting for mean reversion using lagged manufacturing value added (or the lagged dependent variable) as a control. Agriculture and services value added appears to remain unaffected in a linear specification. In a non-linear specification involving an interaction term between value added and private credit, we find evidence of credit saturation effect across all three sectors even though the effect is noticeably weaker for agriculture. The unbundled effects of household and non-financial corporation credit on value added in manufacturing and services are statistically significant. Even though curious, such effects should be interpreted with caution due to small sample size. The lat2.295 Td [(nat [(l)-2[.001 Tw

group (CCEMG) estimator, which is an improvement over the dynamic generalized method of moments (GMM) estimator commonly used in the literature. The MG and CCEMG estimators successfully address the challenge of cross-sectional dependence ensuring estimate precision and reliability. More on this in section 3.

Literature on finance and growth is not new and has a long history. Bagehot (1873) stress the crucial role of finance in resource allocation and growth promotion. Hicks (1969) identifies liquidity transformation and large fixed capital formation as the linchpin of industrial revolution in Britain. Schumpeter (1911) highlights the importance of financial intermediaries in stimulating creative destruction. Patrick (1966) separates the role of finance into 'supply-leading' and 'demand-following' phenomena. The former is characterized by a transfer of resources from the low-return traditional sector to the high-return modern sector (Gurley and Shaw, 1955; Goldsmith, 1969; McKinnon, 1973) whereas the latter highlights the role of elevated demand for external finance from firms with the rapid expansion of economic activities (Robinson, 1952; Kuznets, 1955). Lucas (1988) takes a contrarian position as he deems the role of finance in generating growth is often overstated. Needless to say,

Notable studies exploring heterogeneous effects of finance across levels of development include Deidda and Fattouh (2002), Rioja and Valev (2004a), and Huang and Lin (2009). Deidda and Fattouh (2002) find that the macro effect is only significant for high-income countries. In contrast, Huang and Lin (2009) report that the effect is positive and greater in magnitude in low income countries. Their result appears to confirm earlier findings by Rioja and Valev (2004a) that the strong positive effect in developing countries is primarily driven by capital accumulation whereas a weaker positive effect in developed countries is driven by productivity growth.

The overall positive effect of finance on growth appears to fade with new data covering the period 1990 to 2004 (e.g., Rousseau and Wachtel, 2011). This 'vanishing effect' is attributed to excessive credit creation and financial crisis. However, others attribute such effects to model misspecification (Arcand et al., 2015).

Latest analysis of non-linearity in the finance-growth nexus could be attributed to Arcand et al. (2015), Samargandi et al. (2015), and Rioja and Valev (2004b). Using parametric and semi-parametric modeling Arcand et al. (2015) estimate the threshold level of private sector credit to GDP ratio to be 80 to 120 percent of GDP beyond which further credit injection starts to erode growth. Samargandi et al. (2015) show that the relationship is non-monotonic and demonstrates an inverted-U shape in a sample of 52 middle-income countries. These results appear to confirm earlier findings of non-linearity in Rioja and Valev (2004b).

Note that none of the papers listed above examine the disaggregated effects of credit creation at the sector level. They also do not test non-linearity or the satiation effect at the sector level. The issue of credit impulse and unbundled credit also appears to be ignored by these studies. We set out to fill this void here.

The remainder of the paper is structured as follows: Section 2 discusses the data. Section 3 asks the following questions. First, what impact credit creation has on economic

First, such lending is more likely to have greater growth elasticity relative to directed lending from public-sector banks to state-owned enterprises. King and Levine (1993) and Arcand et al. (2015) note that this could be due to superior risk assessment and corporate control capacities of private firms and private financial institutions. Second, 'private credit to GDP ratio' also offers us the widest possible country and year coverage. Nevertheless, we also use alternative and diverse measures of credit. The diverse measures of credit are catalogued in section 2.2.

The GFDD is an extensive dataset of financial system covering 214 countries going back all the way to 1960. It was initially compiled by Beck et al. (2000) and was named the Financial Development and Structure Database but has been extended since by Cihak et al. (2012) to cover several additional variables. Our main variable PC_{it} is defined as 'private credit by deposit money banks (or domestic commercial banks) and other financial institutions to GDP' and is taken from the GFDD October 2019 update version. It includes the financial resources provided to the private sector by the abovementioned financial institutions. In particular, it is computed using the following formula.

$$PC_{it} = \frac{\left(\frac{\$PC_{it}}{CPI_{e,it}} + \frac{\$PC_{it-1}}{CPI_{e,it-1}} \right) / 2}{\frac{\$GDP_{it}}{CPI_{a,it}}} \quad (1)$$

represents the sample average reported in table 1.

Finally, for agriculture, Iceland in 1988 is the largest value added

$$'VA_{it} \quad ç_{t} \quad P\,VA_{it\ 1} \quad U_{PC}\,PC_{it} \quad \text{Æ}_{it} \quad *_{it} \qquad (2)$$

Where VA_{it} is the real value added measured in loc 0 Tw<T /Span 0 s(al)-1 (u)6 7t6 160.8425C7C

(1) 1 1

services.The sign of the elasticity estimate appears to reverse in agriculture indicating positive returns to credit in this sector. Overall, it is worthwhile noting that the difference and

associated marginal effects from the non-overlapping 5-year averages data structure is displayed in figure 1.

Table 3 presents estimates of models 2a and 3 using the mean group (MG) estimator. Note that the conventional panel data model estimation methods used earlier assume homogeneity of slope parameters and does not address cross-sectional dependence. We now move to panel data models that allow for heterogeneity in slope parameters across cross-sectional units. In particular, table 3 reports MG estimates assuming cross-sectional independence whereas tables 4 and 5 report dynamic CCEMG estimates that augment the models with cross-sectional averages to approximate cross-sectional dependence.

Table 3 consists of eight columns. Columns 1-4 presents results without the interaction term and with/without control variables such as trade openness and government consumption, whereas columns 5-8 presents the results with the interaction term. Panel A, columns 1 – 3 builds up the model whereas column 4 presents the full specification. Column 4 shows that financial development measured by private credit expansion has positive effect on manufacturing value added. However, no effect is observed in services and agriculture as is revealed by column 4, panels B and C.

Columns 5-8 reports estimates from non-linear models with the interaction. Column 8 presents

The credit satiation effect is uniform across all three sectors but it appears to be the strongest

added threshold of 244.70 US dollars. The effects on services and agriculture value added are not significant.

What is the economic significance of the manufacturing value added result? The partial effect of a 1 percentage point increase in private credit on manufacturing value added is given by $\frac{\partial MVA_{it}}{\partial PC_{it}} = \beta_{PC} + \beta_{MVA\_PC} MVA_{it-1} = 4.966 - 0.902 MVA_{it-1}$. In order to compute the

columns 5-8 focus on a balanced sample of 65 countries covering the time period 1990 to 2017. Note the tradeoff between country and time coverage in a balanced panel. As is apparent in panels A-C in table 6, we fail to find any statistically significant effect of credit impulse on growth in manufacturing, services and agriculture. We speculate that this could be due to the fundamental difference in the data generating process. Credit impulse could be a superior predictor of short-term fluctuations in aggregate monthly or quarterly GDP. Such short-term variation is likely smoothed out in annual GDP thus dampening the effects of credit impulse. It could also be the case that credit impulse is relatively unimportant at the sector level.

5 Credit and Growth: Households and Corporations

Next, we examine potential heterogeneous effects of household and financial corporation

located above the value-added per capita threshold would decrease manufacturing value added per capita by 11.59 US dollars. We also find that household and financial corporation credit expansion is largely beneficial for manufacturing and services in countries where the initial stock of credit is below the threshold. No such effect is observed for agriculture. We also do not find any effect of credit impulse on sectoral growth. Our key contribution is the estimation of the sectoral effects of credit creation. To the best of our knowledge, these results are new and adds significant value to the literature.

Even though cross-national studies may not adequately address internal validity challenges, below the bknow[(a)1 (g)2 (ric)1 (u)7 (27 (n doe)4 (l)]TJrg 7t)[(W)4ly(e)-1

Unlike the positive effects of credit in manufacturing and services the effects on agriculture appears to be mild or absent. This could be due to the non-commercialised nature of agriculture and limited market integration in the majority of countries in our sample. This is not to say that credit expansion is futile in agriculture. On the contrary, market reforms in agriculture coupled with credit injection could transform the agricultural landscape in a majority of these countries. Rather than a sanctuary for surplus labour and a drag on growth, with the aid of adequate policies agriculture could transform itself into an engine of growth.

Appendices

A1. Data Coverage by Countries and Years

#	Country	Country Code	Yearly obs.	#	Country	Country code	Yearly obs.
1	Algeria	DZA	45	49	Japan	JPN	48
2	Argentina	ARG	41	50	Jordan	JOR	42
3	Armenia	ARM	26	51	Kazakhstan	KAZ	25
4	Australia	AUS	48	52	Kenya	KEN	48
5	Austria	AUT	46	53	Kuwait	KWT	44
6	Azerbaijan	AZE	26	54	Lebanon	LBN	29
7							

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Table 3: Credit Creation and Sectoral Growth: Mean Group Estimates

Dependent variable: Sectoral value added	(1) MG	(2) MG	(3) MG	(4) MG	(5) MG	(6) MG	(7) MG	(8) MG
				Panel A: Manufacturing sector				
	0.901***	0.850***	0.877***	0.823***	0.970***	0.900**	0.951***	0.894***
	(0.012)	(0.014)	(0.014)	(0.015)	(0.037)	(0.040)	(0.044)	(0.045)
	0.054*	0.044	0.101**	0.098**	2.946***	2.563**	3.014***	2.677***
	(0.030)	(0.033)	(0.043)	(0.047)	(1.065)	(1.030)	(1.096)	(0.940)
					-0.540**	-0.478**	-0.548**	-0.462**
					(0.233)	(0.227)	(0.236)	(0.181)

Table 5: Credit Creation and Sectoral Growth: Dynamic CCEMG Estimates using Balanced Panels

Dependent variable:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Sectoral value added	Dynamic CCEMG	Dynamic CCEMG	Dynamic CCEMG	Dynamic CCEMG	Dynamic CCEMG	Dynamic CCEMG		

Table 6: Credit Impulse and Sectoral Growth: Dynamic CCEMG Estimates using Balanced Panels

Dependent variable:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Sectoral value added	Dynamic CCEMG	Dynamic CCEMG	Dynamic CCEMG	Dynamic CCEMG	Dynamic CCEMG	Dynamic CCEMG	Dynamic CCEMG	Dynamic CCEMG
Panel A: Manufacturing sector								
	0.789***	0.787***	0.756***	0.745***	0.530***	0.455***	0.466***	0.310***
	(0.025)	(0.024)						

Table 8: Corporation Credit and Sectoral Growth: Homogenous Panel Estimates using non-overlapping 5-year averages

Dependent variable:	(1)