Firm Leverage and Boom-Bust Cycles

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Abstract

This paper explores the dynamic relationship between firm debt and real outcomes using data from 24 European economies over the period of 2000-2018. Based on macro data, it shows that a rise in credit to firms is associated with an increase in employment growth in the short-term, but employment growth declines in the medium-term. This pattern remains similar, even when the changes in credit to households are accounted for. Next, using data from a large sample of firms from ORBIS, it shows that firm leverage buildups predict similar boom-bust cycles in employment growth: Firms with a larger increase in leverage experience a boost in employment growth in the short-term, followed by a decline in employment growth in the medium-term. Relatedly, the volatility of employment growth increases in the aftermath of firm leverage buildups. Finally, this paper provides suggestive evidence on the role of a financial channel in the relationship between firm leverage buildups and employment growth. The results show that a rise in firm leverage is associated with heightened pressures in firm balance sheet. Consistently, boom-bust growth cycles in the aftermath of firm leverage buildups are not limited to employment growth, but are also pronounced for investment. Moreover, the medium-term decline in firm employment growth as predicted by leverage buildups becomes larger if aggregate financial conditions tighten. The findings are in favor of "lean against the wind" approach in policy making.

Introduction

- A rapidly growing empirical literature on leverage cycles finds that leverage expansions are associated with boom-bust cycles in real outcomes at macro-level (Gourinchas and Obstfeld 2012, Schularick and Taylor 2012, Jorda et al. 2013).
- This study focuses on the dynamic relationship between leverage and economic activity at the firm-level based on a large sample of European firms from the ORBIS database during the last two decades.
    - In the short-term, an increase in leverage can relax financial constraints, allow firms to expand production, thereby contributing to economic activity.
    - In the medium-term, however, higher leverage raises balance sheet risks such as debt overhang, increases financial vulnerabilities, and tightens financial constraints (Bernanke Gertler 1989, Kiyotaki and Moore 1997, Bernanke et al. 1999).

Stylized Facts

Figure 1: Aggregate credit and employment dynamics

Employment growth differential in the indicated 3-year periods across country-year observations with high versus low increase in outstanding credit to firms (as share of GDP) between t-3 and t.

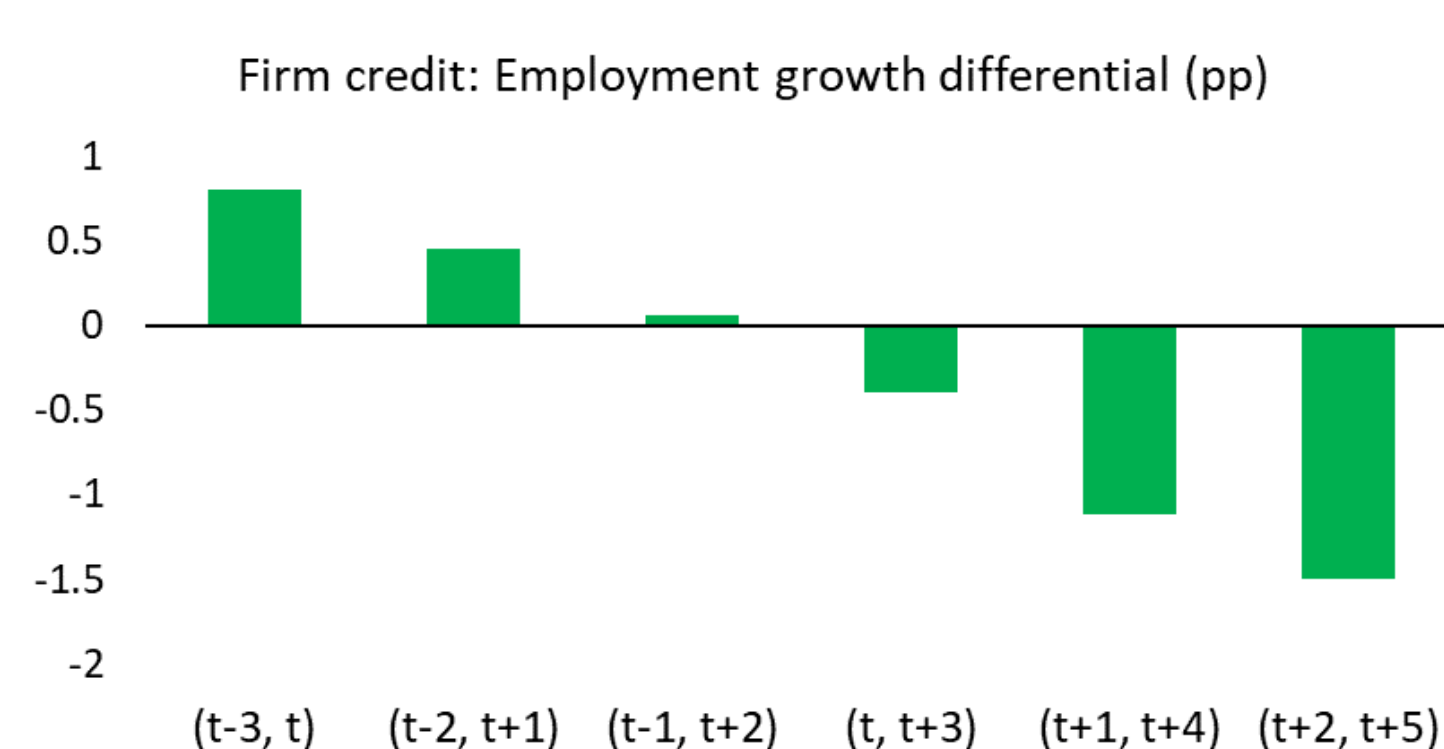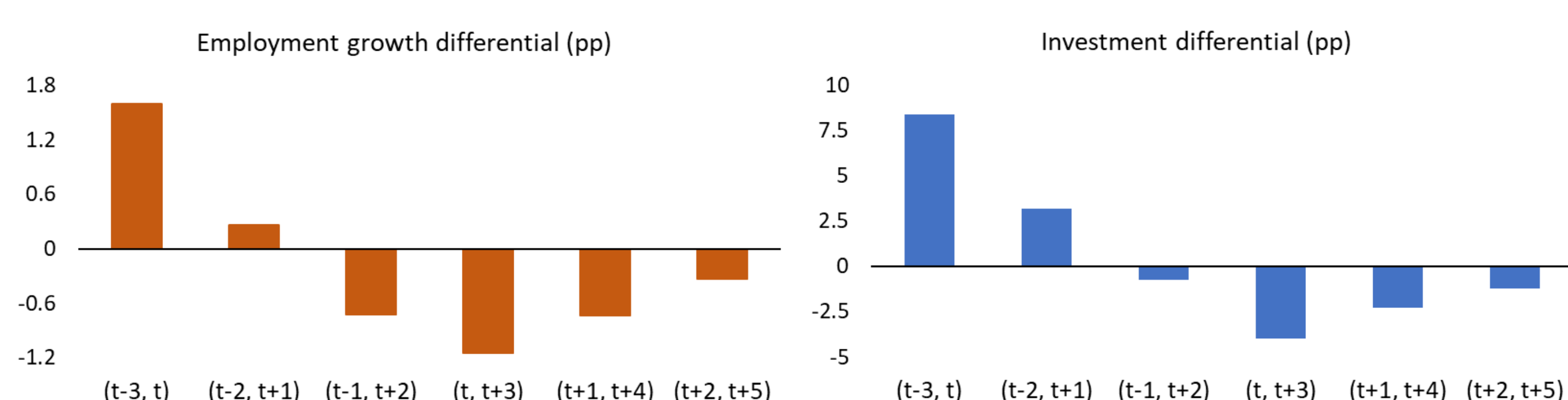Firm credit: Employment growth differential (pp)

Figure 2: Firm leverage buildups, employment growth and investment

Employment growth (investment rate) differential in the indicated 3-year periods across firm-year observations with high versus low increase in leverage between t-3 and t.

Employment growth differential (pp)

Investment differential (pp)

Methodology

Panel regressions with fixed effects, 3-year sliding windows in line with Mian et al. (2017) and Giroud and Mueller (2021) for 6 periods, $p = 0, 1, \dots, 5$:

- **Macro-level** where c: country, t: year, θ: fixed effects

$$\Delta \log(Employment)_{c,t}(t+p-3, t+p) = \alpha \Delta Firm\ credit_{c,t}(t-3, t) + \theta_c + \theta_t + \epsilon_{c,t}$$

- **Firm-level** where j: firm, c: country, i: 4-digit industry, t: year, θ: fixed effects

$$\Delta \log(Employment)_{j,t}(t+p-3, t+p) = \alpha \Delta Leverage_{j,t}(t-3, t) + \theta_j + \theta_{c,i,t} + \epsilon_{j,t}$$

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Baseline Results

Table 1: A rise in credit to firms is associated with boom-bust growth cycles in aggregate employment
(even after controlling for the dynamics of credit to households)

Variable	$\Delta log(Employment)_{c,t}$					
	$(t-3, t)$	$(t-2, t+1)$	$(t-1, t+2)$	$(t, t+3)$	$(t+1, t+4)$	$(t+2, t+5)$
$\Delta Firm\ credit_{c,t}(t-3,t)$	0.125***	0.042	-0.023	-0.090***	-0.123***	-0.128***
	(0.044)	(0.040)	(0.029)	(0.027)	(0.029)	(0.029)
$\Delta Household\ credit_{c,t}(t-3,t)$	-0.093**	-0.116***	-0.141***	-0.132***	-0.112***	-0.058
	(0.039)	(0.038)	(0.033)	(0.034)	(0.036)	(0.037)
Country F.E.s	Yes	Yes	Yes	Yes	Yes	Yes
Year F.E.s	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.534	0.522	0.569	0.641	0.686	0.671
Observations	341	318	295	272	249	225

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 2: Firm leverage buildups predict a boost in firm employment growth in the short-term, but a decline in the medium-term

Variable	$\Delta log(Employment)_{j,t}$					
	$(t-3, t)$	$(t-2, t+1)$	$(t-1, t+2)$	$(t, t+3)$	$(t+1, t+4)$	$(t+2, t+5)$
$\Delta Leverage_{j,t}(t-3,t)$	0.025***	-0.030***	-0.055***	-0.058***	-0.025***	-0.003***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Firm F.E.s	Yes	Yes	Yes	Yes	Yes	Yes
Country-industry-year F.E.s	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.359	0.383	0.389	0.386	0.404	0.419
Observations	15,716,519	11,232,556	9,345,424	8,346,025	6,407,734	5,142,150

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 3: Firm leverage buildups are followed by an increase the volatility of employment growth

Variable	$Volatility(\Delta log(Employment)_{j,t})$					
	$(t-3, t)$	$(t-2, t+1)$	$(t-1, t+2)$	$(t, t+3)$	$(t+1, t+4)$	$(t+2, t+5)$
$\Delta Leverage_{j,t}(t-3,t)$	0.008***	0.013***	0.012***	0.009***	0.006***	0.002***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)
Firm F.E.s	Yes	Yes	Yes	Yes	Yes	Yes
Country-industry-year F.E.s	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.473	0.492	0.504	0.517	0.537	0.549
Observations	15,716,519	11,232,556	9,345,424	8,346,025	6,407,734	5,142,150

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Role of Financial Constraints

Table 4: Firm leverage buildups are associated with a lower in debt service ratio in the short-term, but it becomes higher in the medium-term

Variable	$DSR_{j,t+p}$					
	$p = 0$	$p = 1$	$p = 2$	$p = 3$	$p = 4$	$p = 5$
$\Delta Leverage_{j,t}(t-3,t)$	-0.054***	0.039***	0.042***	0.035***	0.032***	0.029***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Firm F.E.s	Yes	Yes	Yes	Yes	Yes	Yes
Country-industry-year F.E.s	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.341	0.350	0.357	0.366	0.373	0.384
Observations	11,315,551	8,942,349	7,439,465	6,209,817	5,086,982	4,179,399

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 5: Boom-bust cycles in the aftermath of firm leverage buildups are also pronounced in investment

Variable	$\Delta log(Fixed\ assets)_{j,t}$					
	$(t-3, t)$	$(t-2, t+1)$	$(t-1, t+2)$	$(t, t+3)$	$(t+1, t+4)$	$(t+2, t+5)$
$\Delta Leverage_{j,t}(t-3,t)$	0.227***	0.042***	-0.077***	-0.173***	-0.081***	-0.029***
	(0.004)	(0.003)	(0.002)	(0.003)	(0.003)	(0.003)
Firm F.E.s	Yes	Yes	Yes	Yes	Yes	Yes
Country-industry-year F.E.s	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.385	0.399	0.395	0.390	0.406	0.417
Observations	14,221,120	10,297,566	8,583,413	7,644,734	5,874,540	4,706,550

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 6: The medium-term decline in firm employment growth as predicted by leverage buildups becomes larger, if aggregate financial conditions tighten

Variable	$\Delta log(Employment)_{j,t}$				
	$(t-2, t+1)$	$(t-1, t+2)$	$(t, t+3)$	$(t+1, t+4)$	$(t+2, t+5)$
$\Delta Leverage_{j,t}(t-3,t)$	-0.058***	-0.070***	-0.069***	-0.022***	-0.013***
	(0.004)	(0.003)	(0.003)	(0.004)	(0.004)
$\Delta Leverage_{j,t}(t-3,t) \times X_{c,t}^p$	-0.007***	-0.004***	-0.003***	-0.001**	-0.001*
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Firm F.E.s	Yes	Yes	Yes	Yes	Yes
Country-industry-year F.E.s	Yes	Yes	Yes	Yes	Yes
R-squared	0.401	0.402	0.409	0.422	0.435
Observations	10,300,308	8,577,800	7,237,410	5,645,906	4,498,481

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

$X_{c,t}^p$: Average forecast errors of long-term interest rates (as a proxy for the surprise component of financial tightening in a country) during each period p.

Conclusions and Implications

- Leverage buildups predict a boost in firm employment growth in the short-term, but employment growth declines in the medium-term.
- The results point to the role of financial constraints channel, i.e., the dynamics of debt service ratio and investment following firm leverage buildups, and the role of aggregate financial conditions.
- The findings are in favor of proactive policy measures to "lean against the wind of incipient credit booms" (Greenwood et al. 2022).

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