Role of Credit Markets on Performance of Non-Tradable and Tradable Sectors

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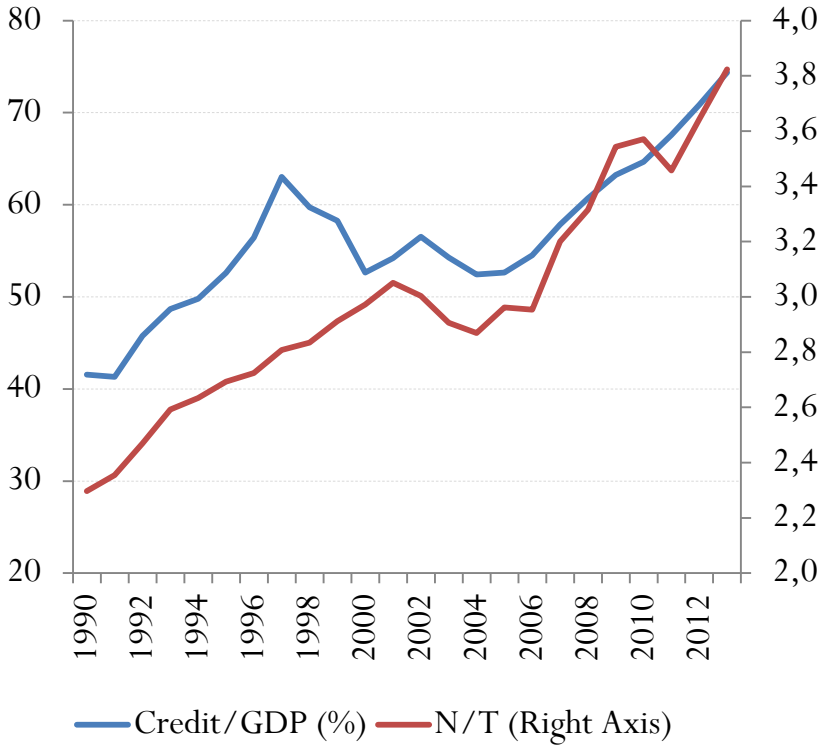
Outline

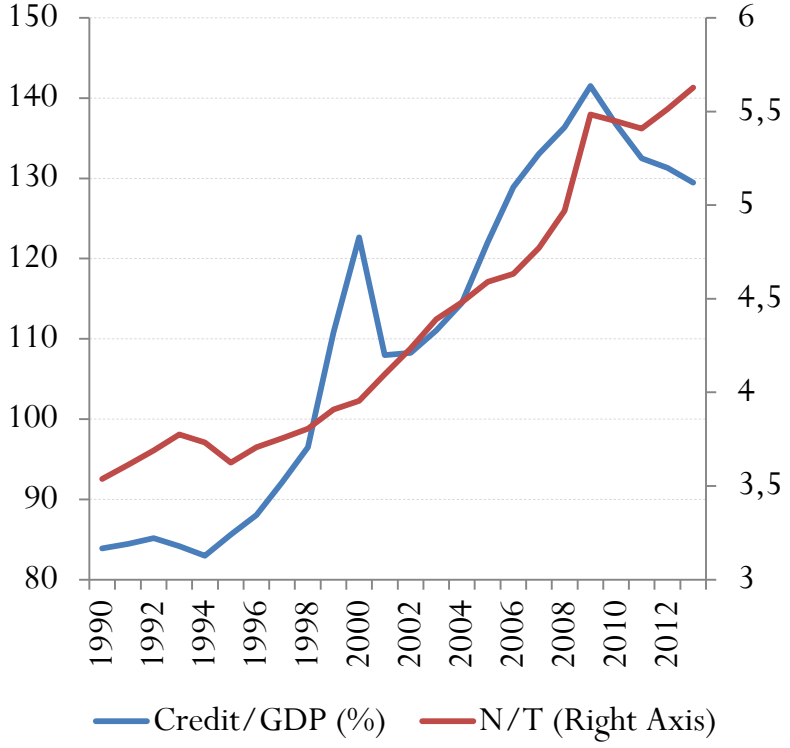
- Motivation of the Study and Literature Review
- Credit Market Developments and Non-Tradable/Tradable Transformation: Turkish Case
- Cross-Country Analysis
- Conclusion

Motivation of the Study

Private Sector Credit and N/T Ratio in Emerging Economies

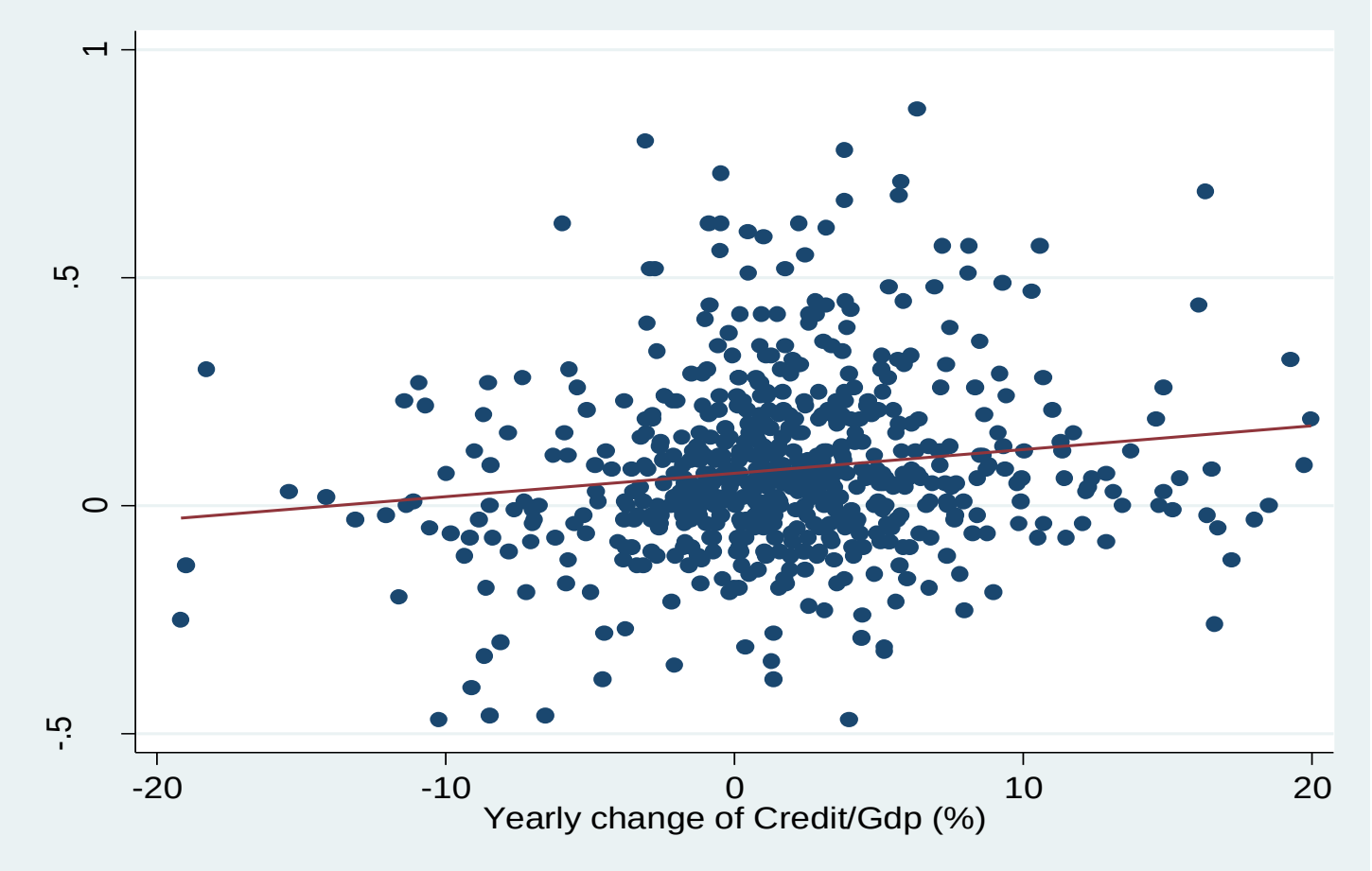


Private Sector Credit and N/T Ratio in Advanced Economies



Strong financial deepening since 1990, accompanied by an increase in N/T ratio (=Services/Manufacturing value added).

Motivation of the Study



Strong financial deepening since 1990, accompanied by an increase in N/T ratio (=Services/Manufacturing value added).

Could credit market developments be possible factor in N/T transformation?

Literature Review: Financial Development and Growth

- *King and Levine (1993, QJE):* Financial deepening (level) affects growth positively (period is 1960-1989).
- *Rajan and Zingales (1998, AER):* Sectors that are relatively in more need of external finance grow faster in countries with more-developed financial markets (level).
- Some controversies: results depend on the inflation level (*Rousseau and Watchel (2002, JIMF)*) or on the level of financial development (*Rioja and Valev (2004, JDE)*).
- *Rousseau and Watchel (2011, EI):* Positive relationship between financial deepening and growth disappears for 1990-2004 period. Financial crises are the main reason. Excluding crises, results weaken but still hold.
- *Ranciere, Tornell and Westermann (2008, QJE):* Countries that have experienced occasional financial crises have, on average, grown faster than countries with stable financial conditions. Mechanism: systemic risk taking mitigates financial bottlenecks and increases growth in countries with weak institutions. Systemic risk, however, also leads to occasional crises.

Literature Review: Financial Development and Growth

- *Arcan, Berkes and Panizza (2012, IMF):* Finance starts having a negative effect on output growth when credit to the private sector reaches 100% of GDP.
- *Cecchetti and Kharroubi (2012, BIS):* The level of financial development is good only up to a point, after which it becomes a drag on growth. *Cecchetti and Kharroubi (2015, BIS):* By disproportionately benefiting high collateral/low productivity projects, an exogenous increase in finance reduces total factor productivity growth.
- *Aeizenman, Jinjarak and Park (2015, NBER):* Looks at the relationship between financial depth (level) and output growth at sectoral level for 1996-2011 period. In whole sample of advanced and emerging countries, financial development negatively affects construction growth but no effect on services or manufacturing.
- Diekmann and Westermann (2012, FHR): Not the industrial sector, but transportation, agriculture and services benefited the most from the development of the banking sector in Germany during 1870-1912.

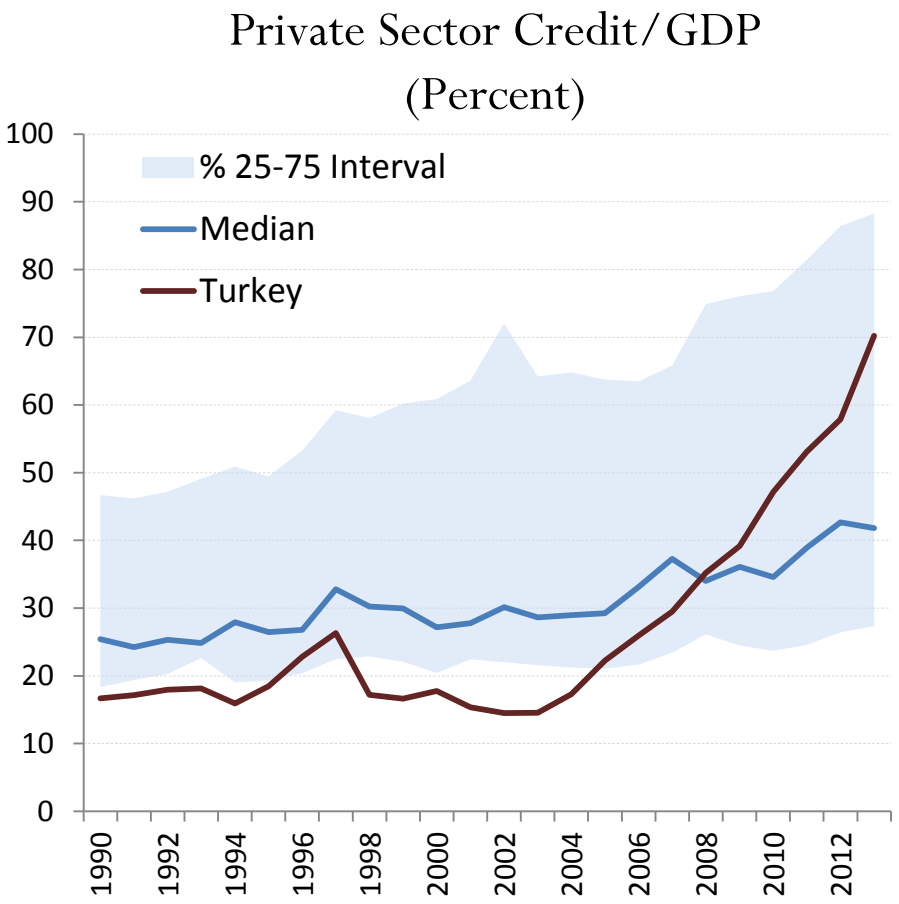
Literature Review: Financial Development and Growth

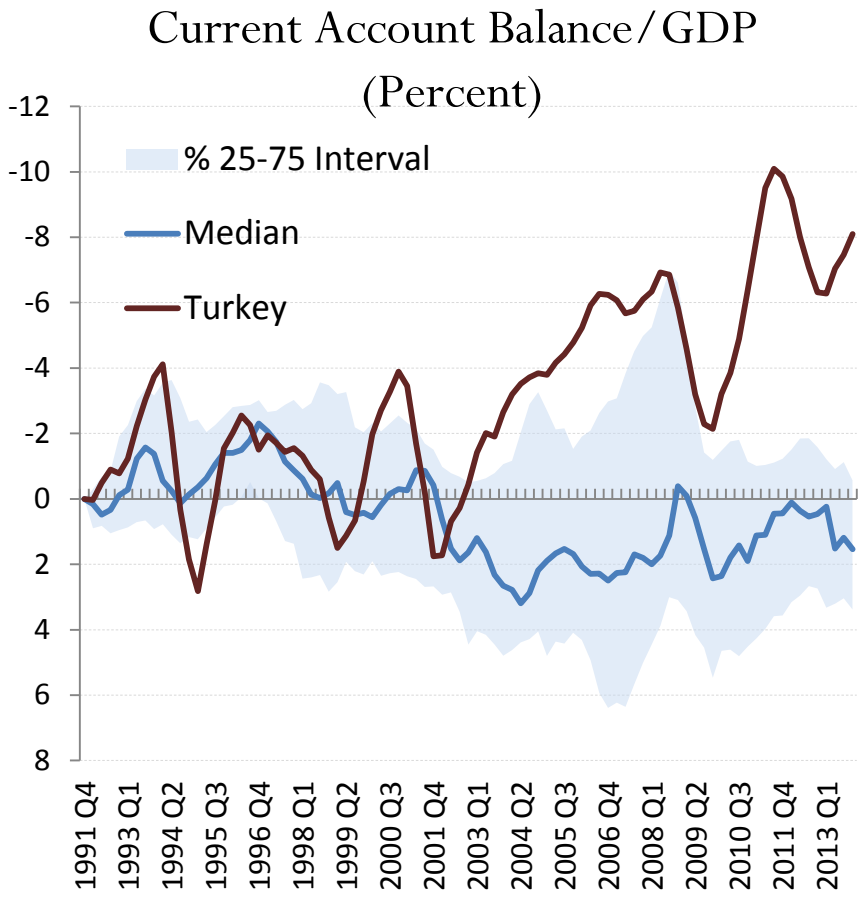
- *Tornell and Westermann (2002, IMF Staff Papers):* Investigate «boom-bust cycles» in middle income countries for 1980-1999. Show that during lending booms there is a real appreciation and the nontradables (N) sector grows faster than the tradables (T) sector. They argue that these comovements are generated by the interaction of two characteristics of financing typical of middle income countries: risky currency mismatch and *asymmetric financing opportunities* across the N- and T-sectors. *Tornell and Schnider (2004, ReStud)* models these channels.

- *Benigno, Converse and Fornaro (2015, CEPR):* Identify large capital inflow periods for 1980-2014 period and find that during episodes of large capital inflows capital and labor shift out of the manufacturing sector.

- *Our question:* Effect of credit growth normalized by GDP (flow) on sectoral output performance (N/T) and possible relation to real exchange rate. Possible externalities and policy implications.

Turkish Case:
Domestic and External Finance

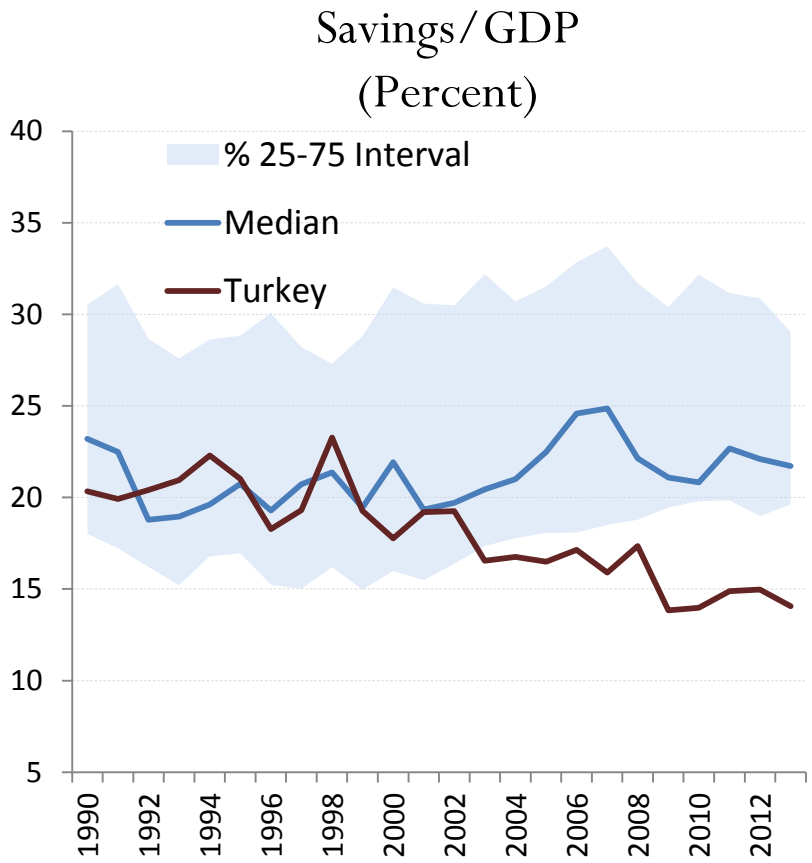


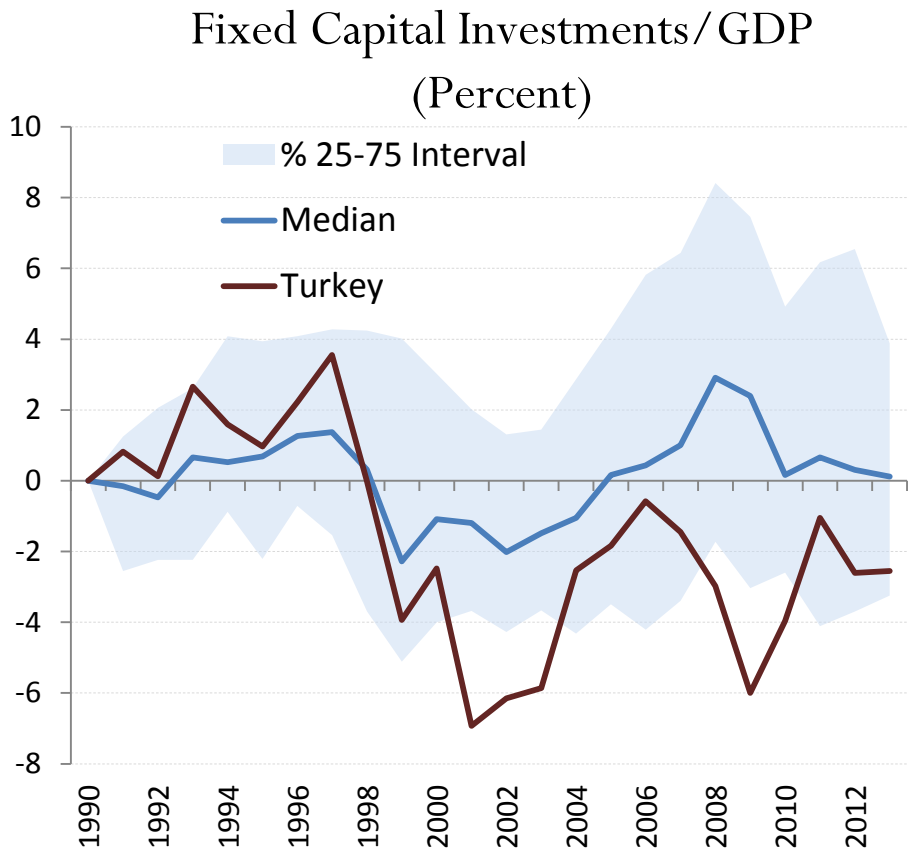


Private sector credit as a share of GDP showed sharp increase in 2000s and external financing rose significantly at the same time.

Source: World Bank, World Development Indicators Countries: Argentina, Bangladesh, Brazil, Chile, China, Colombia, Egypt, India, Iran, Korea, Malaysia, Mexico, Pakistan, Paraguay, Peru, Philippines, Poland, Thailand, Uruguay, Venezuela.

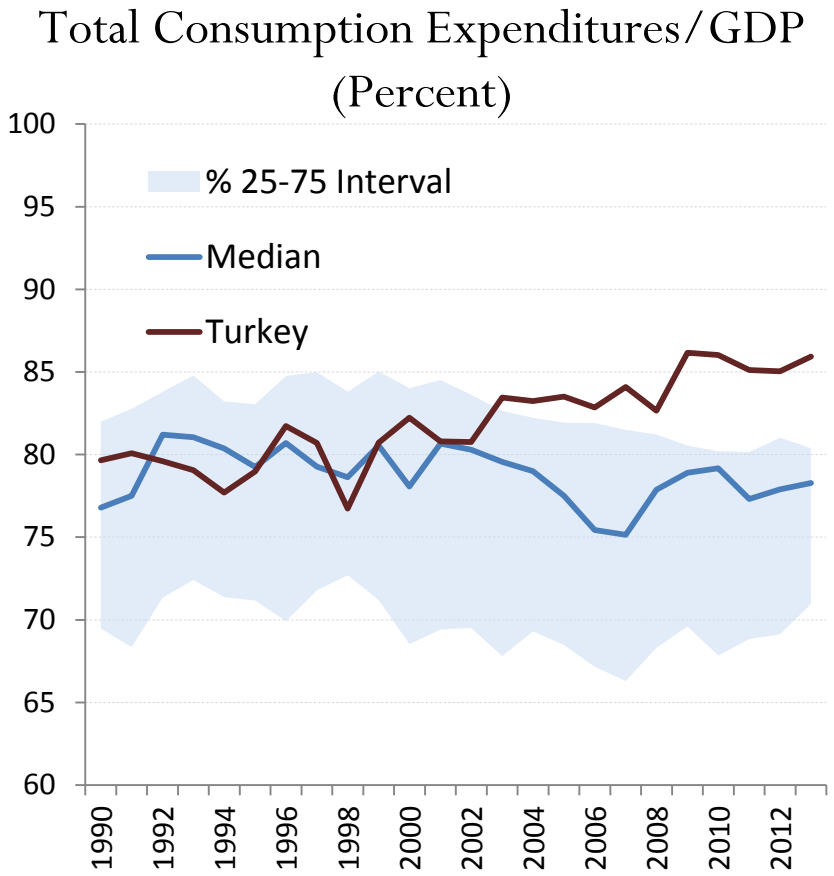
Turkish Case:
Savings and Investment

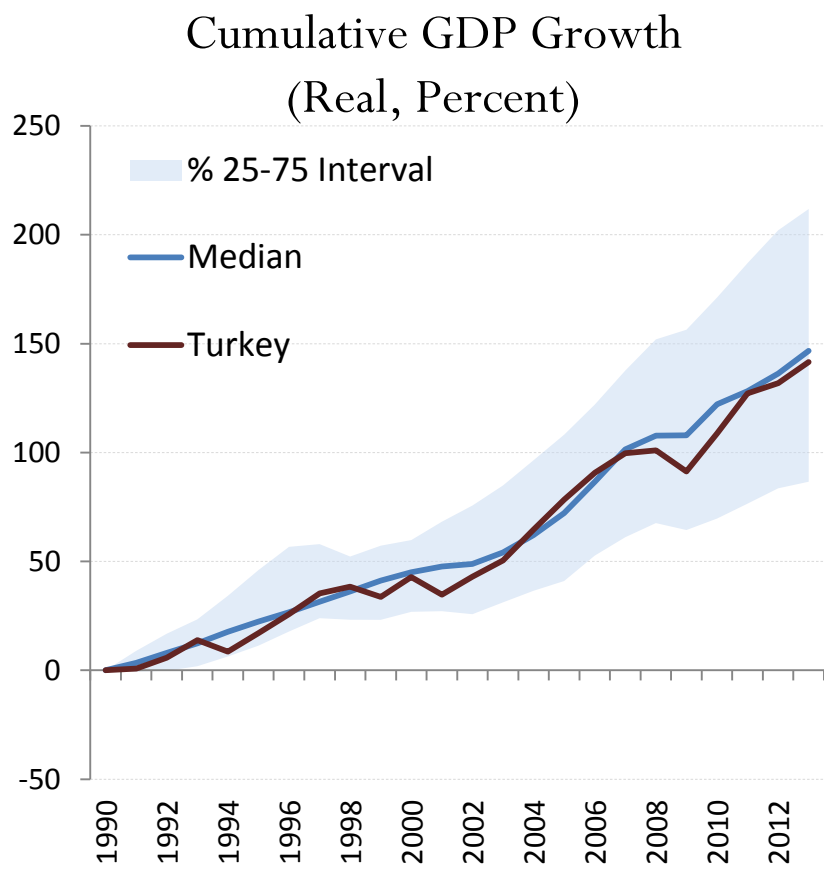




Domestic savings in the Turkish economy declined in 2000s in comparison to 1990s, and external savings were used to finance consumption more than investment.

Turkish Case: Consumption and Real GDP

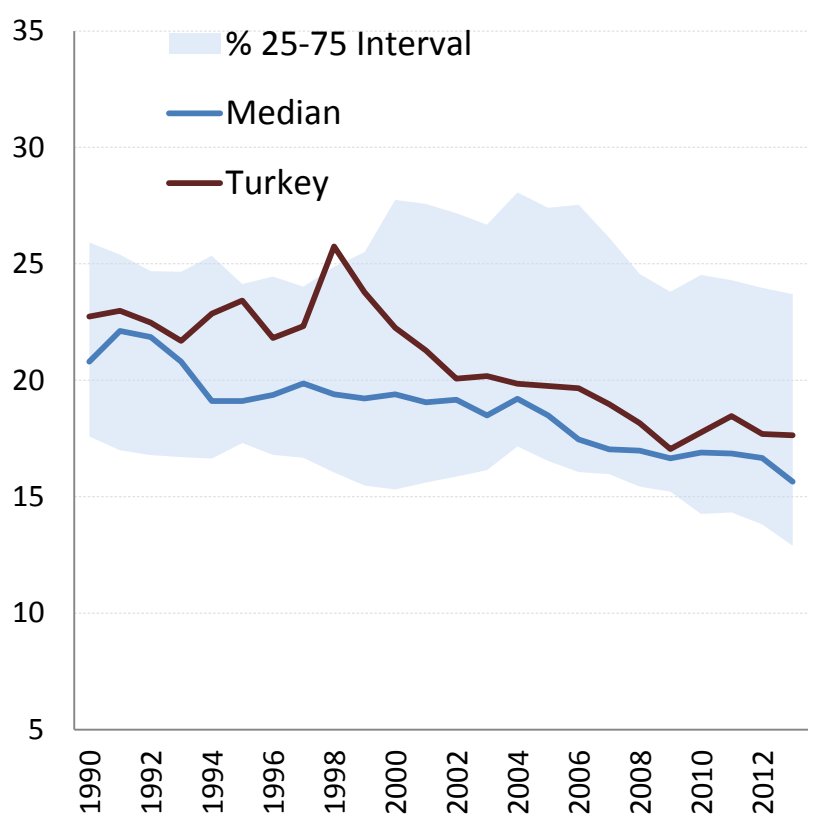




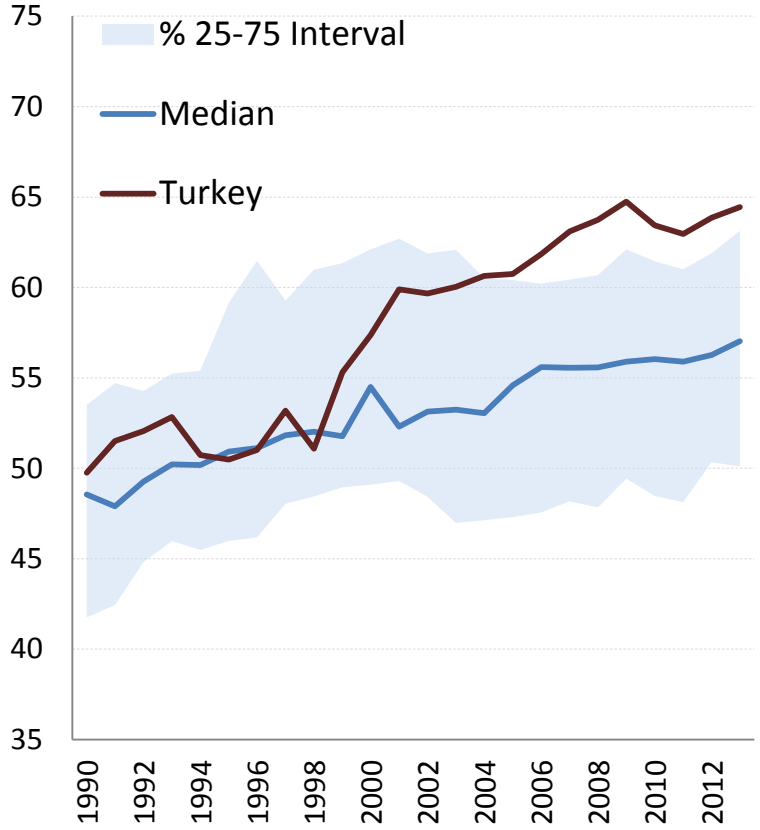
Growth performance of the Turkish economy has been similar with other emerging economies although Turkish economy utilized more external finance, especially during 2000s.

Turkish Case:
Shares of Services (N) and Manufacturing (T)

Value-Added in Manufacturing Sector/GDP (Percent)

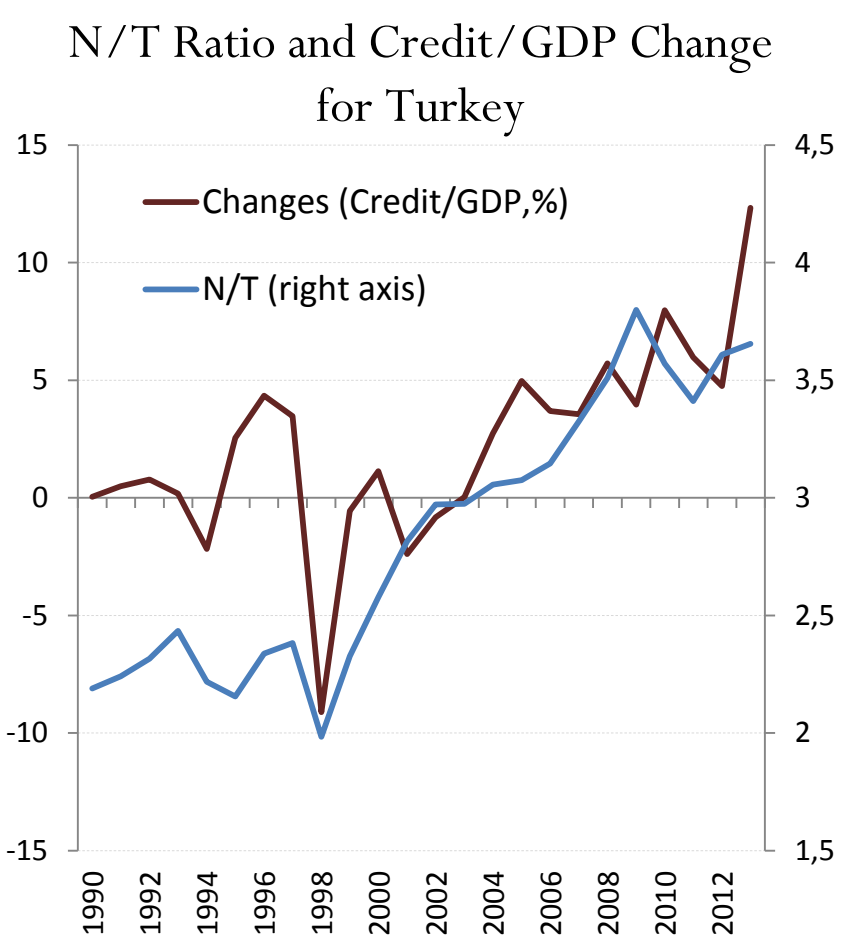


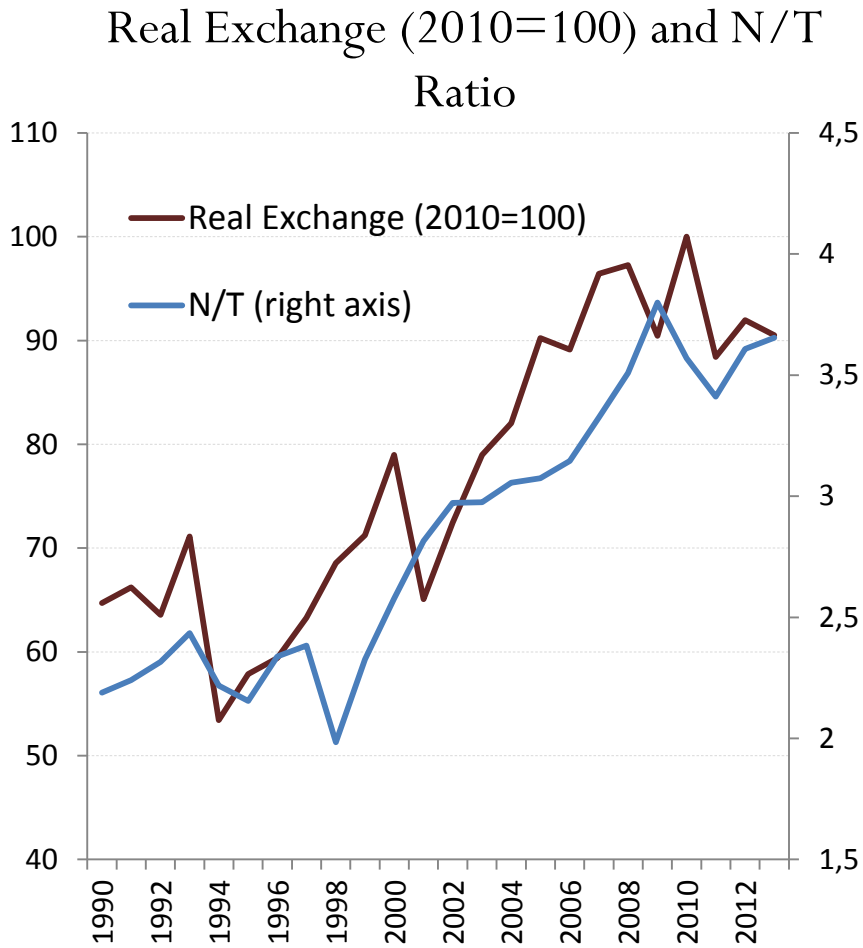
Value-Added in Services Sector/GDP (Percent)



- Share of services increased significantly in 2000s while share of manufacturing exhibited a decline.

Turkish Case:
N/T, Credit/GDP and Reel Exchange Rate





- N/T (=Services/Manufacturing Value Added) ratio is closely correlated with changes in Credit/GDP and real exchange rate.

A Possible Relationship Between N/T and Credit Growth

- *Hypothesis:* N-firms are more credit constrained
- If hypothesis holds, then N-firms would benefit more from credit growth, leading to an incrase in N/T.
- Therefore, rapid credit growth would *one of the* explanatory factors for the sectoral transformation in Turkish economy, namely an increase in share of N-sectors.
- Credit growth could possibly lead to real exchange rate appreciation as well (in emerging counries credit growth is highly correlated with capital flows) reinforcing the N/T effect.

Relationship Between N/T and Credit/GDP in Turkey

Table 1. Relationship between N/T Ratio and Credit and Real Exchange

Macro Data: Sample: 1990-2014
Dependent Variable: N/T Ratio (Value-Added in Services Sector/Value-Added in Manufacturing Sector Ratio)

	(1)	(2)	(3)	(4)
N/T Ratio (-1)	0.85***	0.93***	0.46***	0.54***
	(0.09)	(0.11)	(0.15)	(0.17)
(Credit/GDP) Change	0.023*	0.024*	0.023**	0.024**
	(0.013)	(0.013)	(0.010)	(0.011)
(Credit/GDP) Change (-1)		-0.019		-0.015
		(0.014)		(0.013)
Real Exchange			0.015***	0.015*
			(0.005)	(0.007)
Real Exchange (-1)				-0.0006
				(0.007)
Crisis Dummy	0.12	0.13	0.29**	0.30*
	(0.12)	(0.12)	(0.11)	(0.16)
Constant	0.41	0.23	0.29	0.18
	(0.24)	(0.28)	(0.20)	(0.25)
Adjusted R^2	0.90	0.90	0.93	0.93

Standard errors presented in parenthesis. *10%, **5%, and ***1% significance levels.
Crisis dummies used for1994, 2001 and 2009.

There is statistically significant relationship between N/T and Credit/GDP.

N/T and Credit Constraints

- In order to show the credit constraints in N and T sectors, CBRT sector accounts are used for 1989 and 2006. Industries as Tradable and Non-tradable sectors: 15 T-sector and 8 N-sectors.

- To test the financial frictions for the firms or sectors, we use two approaches: Tobin's Q / Accelerator and Euler Equation approaches.

- We follow *Fazzari, Hubbard and Peterson (1988, BPEA), Hubbard (1998, JEL)* and *Brown, Fazzari and Peterson (2009, JF)*.

- Tobin's Q / Accelerator Approach:

$$\frac{I_{i,t}}{K_{i,t-1}} = a_i + b_1 \frac{CS_{i,t}}{K_{i,t-1}} + b_2 \frac{CS_{i,t-1}}{K_{i,t-2}} + c \frac{CF_{i,t}}{K_{i,t-1}} + \varepsilon_{i,t}$$

- Euler Equation Approach:

$$\frac{I_{i,t+1}}{K_{i,t}} = \alpha_i + \beta_1 \frac{I_{i,t}}{K_{i,t-1}} + \beta_2 \left(\frac{I_{i,t}}{K_{i,t-1}} \right)^2 + \beta_3 \frac{CF_{i,t+1}}{K_{i,t}} + \beta_4 \frac{CF_{i,t}}{K_{i,t-1}} + \beta_5 \frac{S_{i,t+1}}{K_{i,t}} + \beta_6 \frac{S_{i,t}}{K_{i,t-1}} + \varepsilon_{i,t}$$

I: Investment, K: Capital Stock, CS: Change in Sales, S: Sales, CF: Cash Flow.

- Significant positive coefficient on CF as a sign of *credit constraint* and a violation of Modigliani-Miller perfect capital markets.

N/T and Credit Constraints: Estimation Results

Table 2: Panel Data Pooled Regression Results for Survey Data: *Accelerator* Approach

	Dependent Variable: I/K(-1)			
	FE	RE	FE	RE
CS/K(-1)	-0.0108*	-0.0169***	-0.0155**	-0.0205***
	(0.0065)	(0.0063)	(0.0071)	(0.0066)
CS(-1)/K(-2)			-0.0112*	-0.0174***
			(0.0066)	0.0062)
CF/K(-1)	0.1397***	0.1398***	0.1434***	0.1397***
	(0.0196)	(0.0183)	(0.0203)	(0.0191)
D* CF/K(-1)	0.1680***	0.1293***	0.1590***	0.1396***
	(0.0313)	(0.0246)	(0.0329)	(0.0260)
Constant	0.0426	0.0241	0.0404	0.0995***
	(0.0555)	(0.0551)	(0.0560)	(0.0357)
# of Obs.	650	650	602	602
R^2	0.29	0.30	0.30	0.31

* 10%, ** 5%, *** 1% Significance levels. D is a dummy variable defined as 1 for non-tradable sector and 0 for tradable sector.

Sectors are constrained financially.
N-sector is more intensively constrained.

N/T and Credit Constraints: Estimation Results

Table 3: Panel Data Pooled Regression Results for Survey Data: *Euler Equation* Approach

	Dependent Variable: I/K(-1)		
	FE	**RE**	**GMM**
I(-1)/K(-2)	0.06	0.100*	-0.013
	0.063	0.06	0.044
[I(-1)/K(-2)]²	-0.053	-0.005	-0.071**
	0.042	0.042	0.031
S/K(-1)	0.017	0.015	-0.027***
	0.012	0.013	0.005
S(-1)/K(-2)	-0.003	-0.018	0.019***
	0.007	0.011	0.005
CF/K(-1)	0.131***	0.143***	0.186***
	0.017	0.016	0.02
CF(-1)/K(-2)	-0.033*	-0.015	0.006
	0.017	0.016	0.021
D*CF/K(-1)	0.173***	0.153**	0.187***
	0.066	0.061	0.035
D*CF(-1)/K(-2)	0.064*	0.023	0.054
	0.034	0.031	0.037
Constant	-0.068	0.093	-0.007***
	0.07	0.062	0.002
# of Obs.	602	602	556

Sectors are constrained financially.

N-sector is more intensively constrained.

Findings and Possible Issues

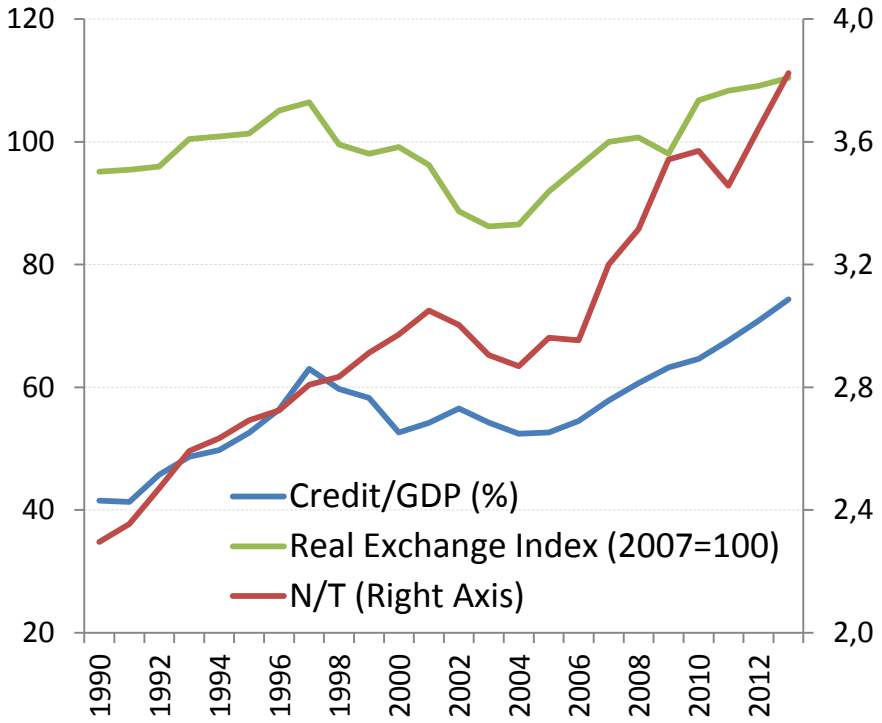
- Strong relationship between credit growth and N/T ratio in Turkey.
- Mechanism: differences in access to credit markets accross sectors. N-sector benefiting more from credit growth.
- Credit growth could possibly lead to real exchange rate appreciation as well, reinforcing the N/T increase.
- A possible *negative externality*: Credit growth moves resources (land, labor and capital) out from T to N and in the process relative prices adjust. *Pecuniary extarnalities* due to general equilibrium effects of real exchange appreciation, possibly leading to overborrowing in N-sector and as a result too much increase in N/T ratio.

Possible Issues

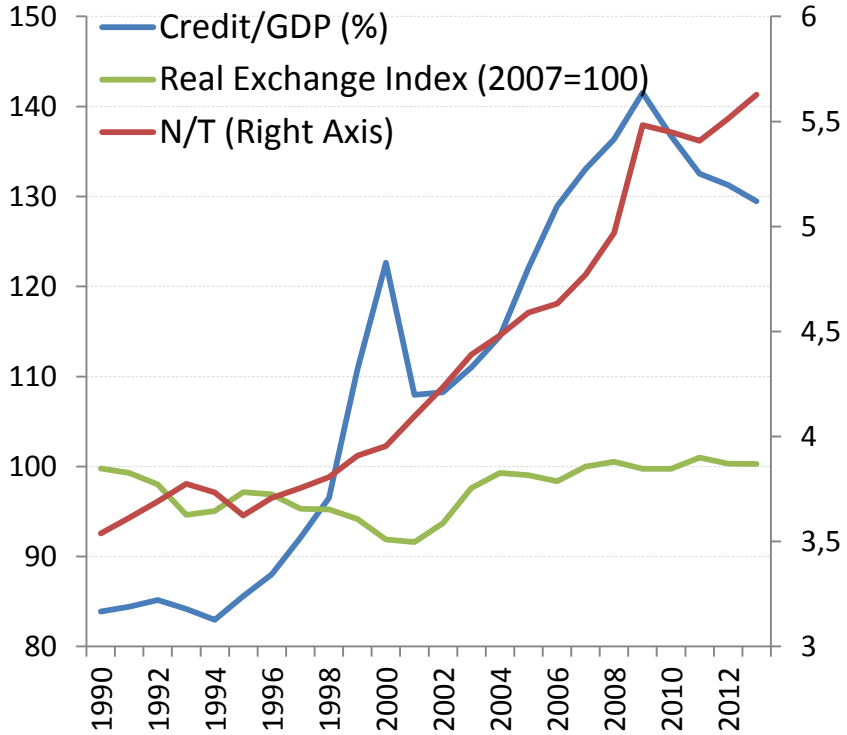
- Similar *overborrowing* problems due to financial frictions in Lorenzoni (2008, ReStud) and *pecuniary extarnalities* related to capital flows in Bianchi (2011, AER).
- With overborrowing in N-sector and too much movement of resources to this sector, *inefficient* allocation of resources to possibly less productive sector.
- Related real exchange rate misalignments also enforces this inefficient allocation. *McMillan, Rodrik and Verduzca-Callo (2014, WD)* show that these movements dampen aggregate productivity.
- Risk: Higher credit growth, but along with possibly rising inefficiencies and declining productivity leading to *debt overhang* and *growth slowdown* in the medium-to-long run.

Preliminary Cross-Country Panel Analysis
(32 countries: 18 advanced + 7 Asian EMs + 7 non-Asian EMs)

Private Sector Credit, N/T Ratio and Real Exchange in Emerging Economies



Private Sector Credit, N/T Ratio and Real Exchange in Advanced Economies



N/T ratio, Credit/GDP and real exchange follow similar cycles in emerging countries.

Source: World Bank, World Development Indicators, Real Exchange Index is Bruegel. Emerging Economies: Argentina, Brazil, Chile, China, Colombia, India, Indonesia, Korea, Malaysia, Mexico, Philippines, Thailand, Turkey, Uruguay. Advanced Economies: Australia, Austria, Canada, Denmark, Finland, France, Germany, Ireland, Italy, Japan, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, UK, US

Cross-Country Panel Analysis: Fixed Effects

Table 4: Cross-country Panel Regressions: *Fixed Effects*

Dependent Variable: N/T Ratio

	(1)	(2)	(3)	(4)
N/T Ratio (-1)	0.99***	0.99***	0.98***	0.99***
	(0.031)	(0.036)	(0.024)	(0.025)
(Credit/GDP) Change	0.51***	0.52***	0.41**	0.38***
	(0.14)	(0.14)	(0.16)	(0.14)
(Credit/GDP) Change (-1)		-0.03		0.03
		(0.12)		(0.14)
Real Exchange			0.30**	0.79***
			(0.12)	(0.11)
Real Exchange (-1)				-0.64***
				(0.22)
Adjusted R^2	0.983	0.983	0.983	0.985
Number of obs.	637	599	637	599
Crisis Dummy	Yes	Yes	Yes	Yes

There is statistically significant relationship between N/T and Credit/GDP.

Cross-Country Panel Analysis: Dynamic GMM

Table 5: Cross-country Panel Regressions: *Dynamic GMM*

Dependent Variable: N/T Ratio

	(1)	(2)	(3)	(4)
N/T Ratio (-1)	0.98***	0.96***	0.93***	0.96***
	(0.023)	(0.026)	(0.022)	(0.026)
(Credit/GDP) Change	0.71***	0.71***	0.43**	0.47**
	(0.21)	(0.24)	(0.20)	(0.22)
(Credit/GDP) Change (-1)		-0.69***		-0.36*
		(0.23)		(0.21)
Real Exchange			0.56***	0.82***
			(0.10)	(0.14)
Real Exchange (-1)				-0.63***
				(0.17)
Number of Inst.	78	74	100	94
Number of obs.	593	555	593	555
Crisis Dummy	Yes	Yes	Yes	Yes

There is statistically significant relationship between N/T and Credit/GDP.

Cross-Country Panel Analysis: Regional Effects

Table 6: Cross-country Panel Regressions: *Dynamic GMM*

Dependent Variable: N/T Ratio

	(1)	(2)	(3)	(4)
N/T Ratio (-1)	0.96***	0.94***	0.94***	0.93***
	(0.026)	(0.027)	(0.026)	(0.046)
(Credit/GDP) Change	0.47**	0.09	0.27	0.009
	(0.22)	(0.31)	(0.25)	(0.30)
(Credit/GDP) Change (-1)	-0.36*	-0.49*	-0.38	-0.12
	(0.21)	(0.20)	(0.25)	(0.30)
Real Exchange	0.82***	0.77***	0.85***	0.11**
	(0.14)	(0.13)	(0.13)	(0.13)
Real Exchange (-1)	-0.63***	-0.63***	-0.63***	0.03
	(0.17)	(0.16)	(0.16)	(0.04)
D*(Credit/GDP) Change		0.64*	0.95**	1.08**
		(0.40)	(0.47)	(0.48)
D*(Credit/GDP) Change (-1)		0.41	0.34	0.33
		(0.40)	(0.46)	(0.47)
Number of Inst.	94	114	114	108
Number of obs.	555	555	555	282
Crisis Dummy	Yes	Yes	Yes	Yes

D is the dummy for emerging countries for the wholes sample in equation (2), is the dummy for non-Asian emerging countries for the wholes sample in equation (3), and is the dummy for non-Asian emerging countries for the sample of emerging countries in equation (4).

Relationship between N/T and Credit/GDP comes from non-Asian EMs.

Cross-Country Panel Analysis: Further Analysis

- Preliminary results show that some emerging countries exhibit comovements of N/T ratio and change in Credit/GDP as well.
- Further analysis:
  - Extend the sample of countries.
  - Robustness of econometric methodologies.
  - If possible, use of cross-country micro data

Conclusion

- Strong relationship between credit growth and N/T ratio in Turkey.
- Along with the differences in access to credit markets accross sectors in Turkey, aggregate credit growth can raise the N/T ratio.
- Possible negative externalities and inefficient allocation of resources, leading to growth/productivity slowdown in future.
- Similar relationship between credit growth and N/T ratio is also found in non-Asian emerging countries.

Role of Credit Markets on Performance of Non-Tradable and Tradable Sectors

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