Climate Risk, Bank Lending and Monetary Policy

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Research questions

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   - do banks **committed** to environmental protection charge a higher lending premium on climate risk?
2. **Does monetary policy affect banks' pricing of climate risk?**
   - when monetary rates go up, which firms are more penalized in terms of higher interest rates?

Outline

1. Literature
2. Data
3. Results
4. Conclusions
5. Comparison with Serebriakova, Polzin, Sanders (2025)

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- Evidence that **security markets** price climate (esp. transition) risk
- Instead, for **credit markets** the evidence (limited to syndicated loans) is ambiguous as to whether banks price climate risk
- Also, no consensus on whether **banks committed to environmental policies** lend preferentially to low-emission firms
- No evidence on the **impact of MP** on the pricing of climate risk in bank loans

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Merging Anacredit loan and carbon emission data

- We draw monthly loan-level data from September 2018 to December 2022 from the AnaCredit database, covering all euro-area countries
- We merge these data with Refinitiv data for
  - firm-level current carbon (CO2 and CO2 equivalent)
  - the firm's commitment to reduce future emissions
- Firm commitment is associated with carbon emissions reduction according to Carbone et al. (2022) and Bolton and Kacperczyk (2023)

Data about bank commitment and monetary policy shocks

- We complement these data with:
  - information about banks' environmental commitment, by identifying signatories of a commitment letter in the context of the Science Based Targets initiative (SBTi)
  - a monthly time series of high-frequency monetary policy surprises from the Euro Area Monetary Policy Event-Study Database (EA-MPD)
    - interest rate changes in a 30-minute window around ECB press conferences, expressed on a monthly basis

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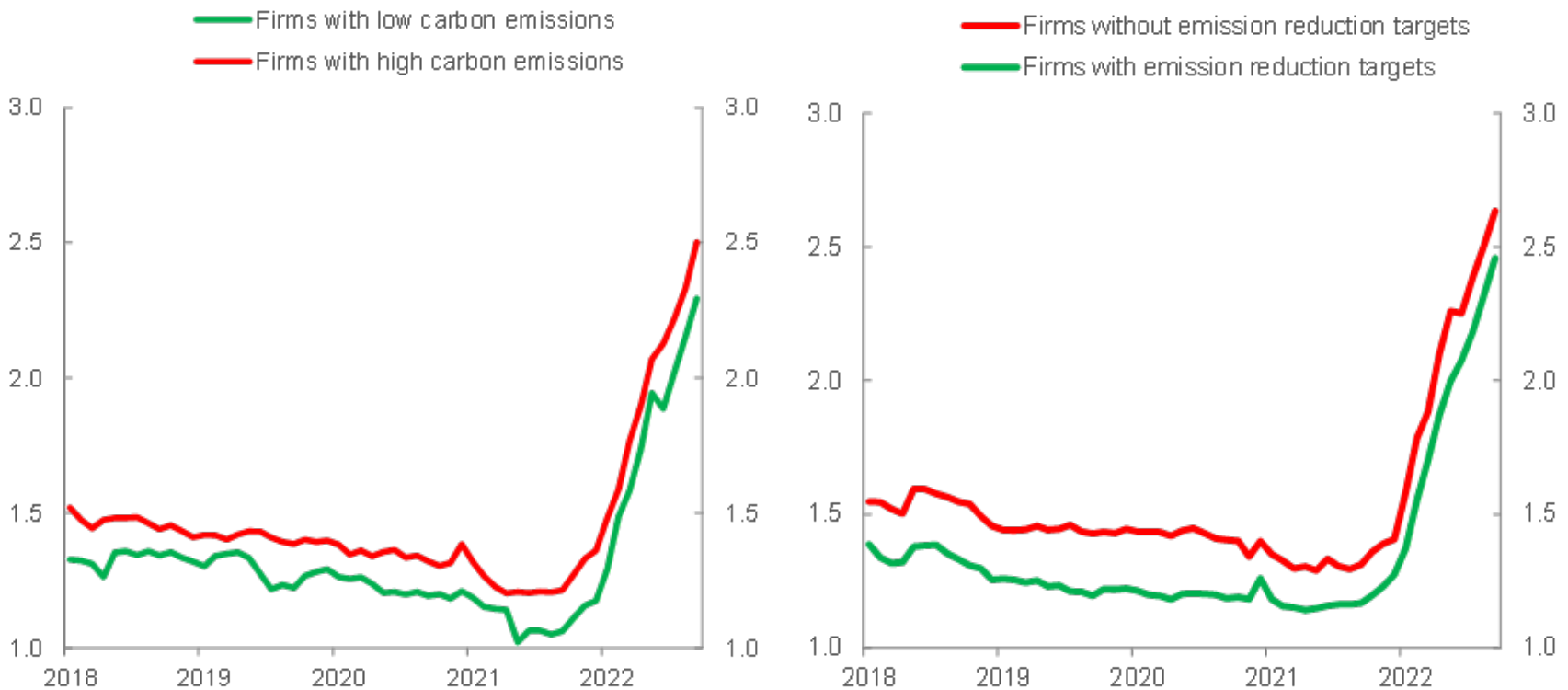
Bank pricing of climate risk: descriptive evidence



Bank pricing of climate risk: panel estimates

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$PD_{f,t}$	0.024***	0.017***	0.017***	0.026***	0.026***	0.005***	0.005***
	(0.0005)	(0.0006)	(0.0006)	(0.0008)	(0.0008)	(0.0006)	(0.0006)
$Carbon_{f,t}$	0.071***	0.020***	0.043***	0.019***	0.090***	0.033**	0.086***
	(0.0026)	(0.0061)	(0.0088)	(0.0066)	(0.0118)	(0.0169)	(0.0201)
$Target_{f,t}$	-0.103***	-0.067***	-0.068***	-0.067***	-0.078***	-0.034***	-0.034***
	(0.0024)	(0.0025)	(0.0026)	(0.0028)	(0.0032)	(0.0034)	(0.0034)
$Carbon_{f,t} \times$			-0.032***		-0.103***		-0.045***
$Target_{f,t}$			(0.008)		(0.0139)		(0.0086)
Fixed Effects:							
Bank	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time	Yes	Yes	Yes	-	-	Yes	Yes
ILS	-	Yes	Yes	-	-	-	-
ILS $\times$Time	-	-	-	Yes	Yes	-	-
Firm	-	-	-	-	-	Yes	Yes
Observations	306871	306788	306788	305401	305401	306864	306864
R^2	0.468	0.550	0.550	0.602	0.603	0.617	0.617

Economic significance, based on Column 1:

- 4 bp premium (5% of SD) for firms with high emissions (90^{th} percentile)
- 10 bp discount (13% of SD) for firms committed to reduce emissions
- 3 bp premium (4% of SD) on firms with high PD (90^{th} percentile)

Bank commitment & climate risk pricing: panel estimates

	(1)	(2)	(3)	(4)	(5)
$PD_{f,t}$	0.0248***	0.0176***	0.0270***	0.00512***	
	(0.000566)	(0.000627)	(0.000794)	(0.000660)	
$Carbon_{f,t}$	0.0414***	0.0313***	0.0815***	0.0823***	
	(0.00730)	(0.00907)	(0.0121)	(0.0200)	
$Target_{f,t}$	-0.0913***	-0.0591***	-0.0750***	-0.0238***	
	(0.00267)	(0.00267)	(0.00331)	(0.00340)	
$Commit_{b,t}$	0.241***	0.207***	0.0175	0.213***	0.0133
	(0.0247)	(0.0235)	(0.0223)	(0.0234)	(0.0210)
$Carbon_{f,t} \times Target_{f,t}$	0.0328***	-0.0229***	-0.0999***	-0.0394***	
	(0.00767)	(0.00796)	(0.0139)	(0.00852)	
$Commit_{b,t} \times PD_{f,t}$	-0.00669***	-0.00744***	-0.00772***	0.000438	0.00500***
	(0.00174)	(0.00151)	(0.00152)	(0.00149)	(0.00144)
$Commit_{b,t} \times Carbon_{f,t}$	0.0336***	0.0339***	0.0310***	0.00158	0.00907
	(0.0115)	(0.0115)	(0.00936)	(0.0124)	(0.0100)
$Commit_{b,t} \times Target_{f,t}$	-0.166***	-0.157***	-0.0572***	-0.163***	-0.0431***
	(0.0194)	(0.0203)	(0.0154)	(0.0205)	(0.0146)
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	-	Yes	-
ILS Fixed Effects	-	Yes	-	-	-
ILS × Time Effects	-	-	Yes	-	-
Firm Fixed Effects	-	-	-	Yes	-
Firm × Time Effects	-	-	-	-	Yes
Observations	306871	306788	305401	306864	303466
R-squared	0.469	0.551	0.603	0.618	0.694

Economic significance, based on Column 2: committed banks charge

- 16 bp (21% of SD) less than uncommitted banks in lending to firms with target
- 2 bp (3% of SD) more to firms with high emissions (90^{th} percentile)

Monetary policy & climate risk pricing: panel estimates

	(1)	(2)	(3)	(4)	(5)
$PD_{f,t}$	0.00777***	0.0242***	0.0168***	0.0261***	0.00540***
	(0.000724)	(0.000546)	(0.000593)	(0.000769)	(0.000643)
$Carbon_{f,t}$		0.0506***	0.0425***	0.0893***	0.0856***
		(0.00758)	(0.00885)	(0.0118)	(0.0201)
$Target_{f,t}$		-0.103***	-0.0688***	-0.0780***	-0.0349***
		(0.00252)	(0.00260)	(0.00323)	(0.00340)
$Carbon_{f,t} \times Target_{f,t}$		-0.0260***	-0.0308***	-0.102***	-0.0443***
		(0.00788)	(0.00806)	(0.0139)	(0.00862)
MP_t	0.0150***				
	(0.000876)				
$MP_t \times PD_{f,t}$	0.000263**	0.000399***	0.000348***	0.000340**	0.000274***
	(0.000118)	(0.000110)	(0.000105)	(0.000154)	(0.0000914)
$MP_t \times Carbon_{f,t}$		0.00111*	0.00107*	0.00233*	0.000990*
		(0.000673)	(0.000587)	(0.00138)	(0.000585)
$MP_t \times Target_{f,t}$		-0.00329***	-0.00205***	-0.000509	-0.00162***
		(0.000575)	(0.000554)	(0.000686)	(0.000528)
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	-	Yes	Yes	-	Yes
ILS Fixed Effects	-	-	Yes	-	-
ILS $\times$ Time Fixed Effects	-	-	-	Yes	-
Firm Fixed Effects	Yes	-	-	-	Yes
Observations	321331	306871	306788	305401	306864
R-squared	0.366	0.468	0.550	0.603	0.617

Impact effect of monetary policy shocks on loan premia

- Column 1: a 25 bp surprise increase in the policy rate results in a 35 bp increase in banks' credit spreads
- Column 3 (with bank, time and ILS effects): a 25 bp surprise increase in the policy rate results in
  - 1.4 additional rise in premia for high emitters (90^{th} percentile)
  - 5 bp smaller rise in premia for firms committed to lower emissions

But monetary policy acts with "long and variable lags"...

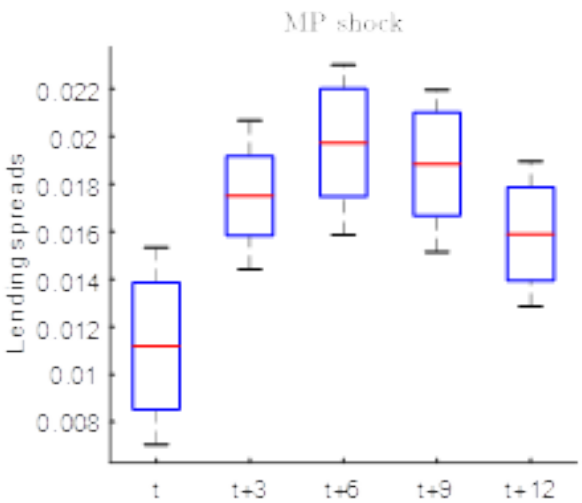
- Use local projection estimates to capture the dynamic effects:

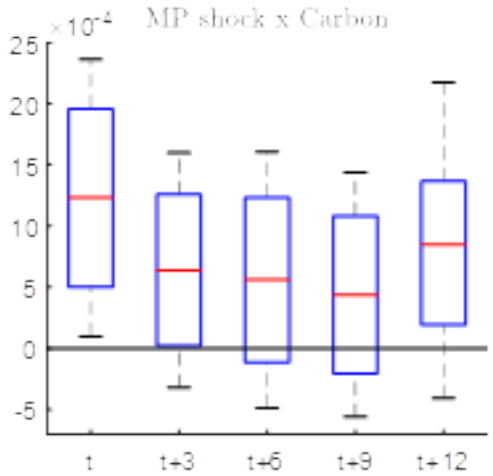
$$y_{b,f,t+h} = \lambda_{1h} MP_t + \lambda_{2h} MP_t \times Carbon_{f,t} + \lambda_{3h} MP_t \times Target_{f,t} + \theta_b + \epsilon_{f,b,t+h},$$

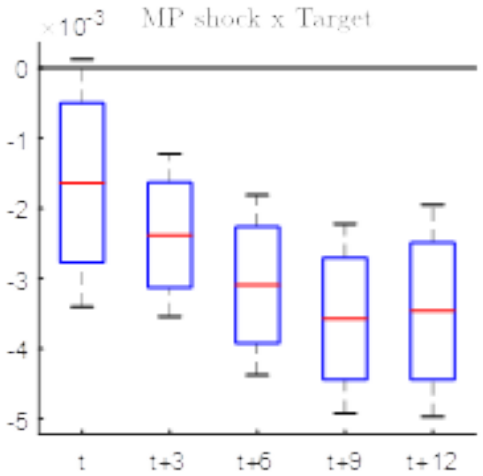
where the outcome variable $y_{b,f,t+h}$ is either the lending spread or the (logarithm of the) loan given by bank b to firm f between month t and month $t+h$; MP_t is the monetary policy shock; θ_b are bank fixed effects.

Dynamic effects of monetary policy on loan premia

- Local projection coefficient estimates at month 0, 3, 9 and 12
- Monetary tightening has initially small but gradually increasing effect on premia, slightly greater for high-emission firms, less so for committed ones:



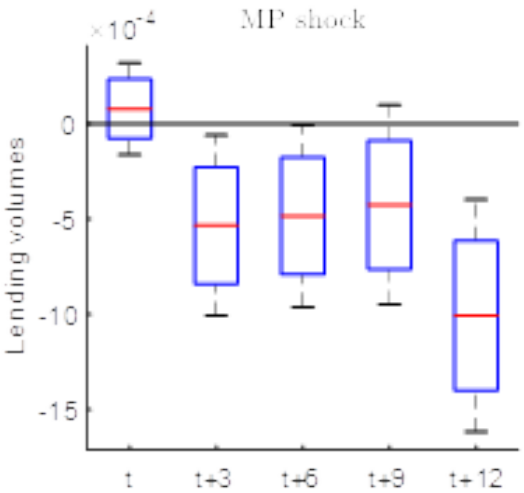


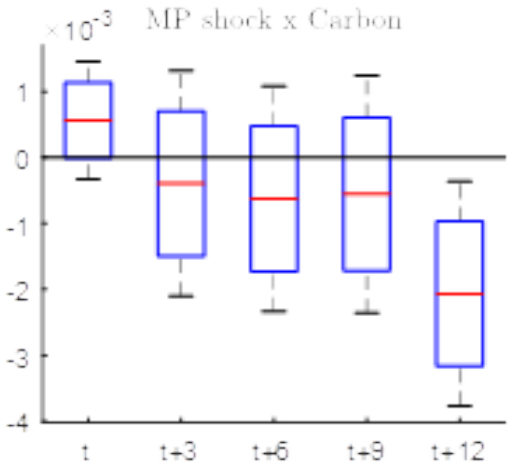


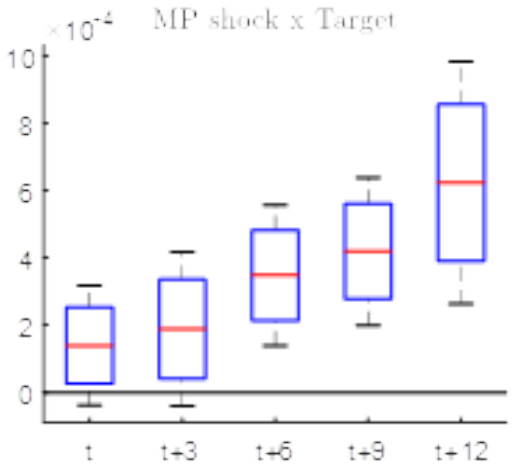
- 1st figure: 25 bp surprise tightening $\rightarrow$ 39 bp rise in premia after 12 months
- 2nd figure: additional 2 bp for high emitters (90th percentile)
- 3rd figure: 5 bp mitigation effect for committed firms, 9 bp after 12 months

Dynamic effects of monetary policy on loan volumes

- Local projection estimates are mirror images of those in previous slide
- Monetary tightening gradually reduces lending, more so for high-emission firms, less so for committed ones:







- 1st figure: 25 bp surprise tightening $\rightarrow$ negligible impact effect, gradual drop in lending by 2.5% after 12 months
- 2nd figure: additional 2.7% drop for high emitters after 12 months
- 3rd figure: 1.5% mitigation effect for committed firms after 12 months

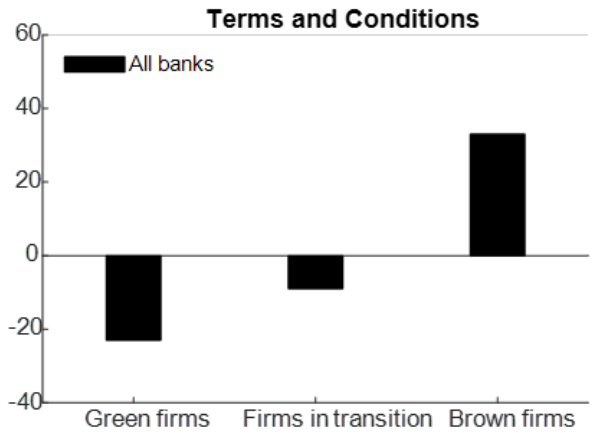
Robustness

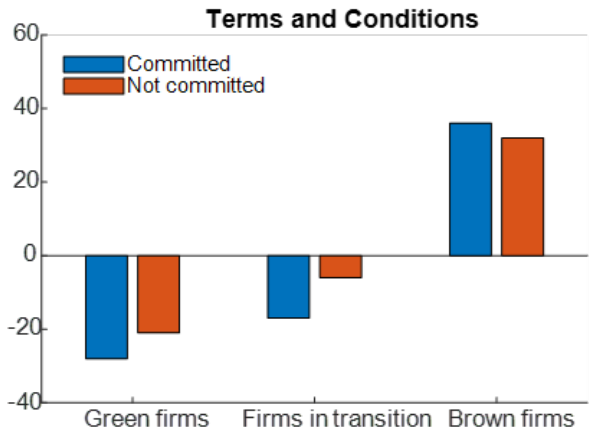
Similar results if we

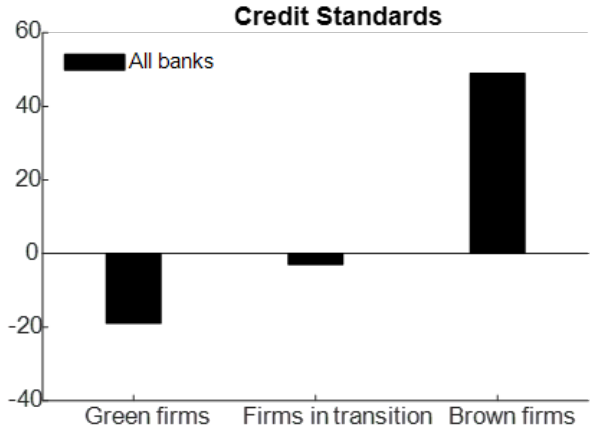
- abandon estimation on high frequency monetary policy shocks and do a diff-in-diff analysis around July 2022 when rates start to increase

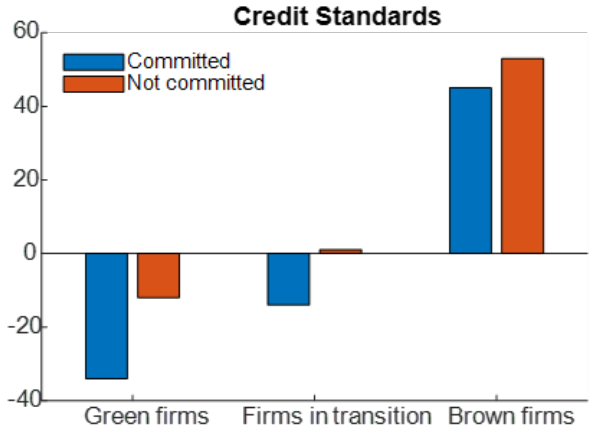
Survey evidence dovetails with previous results

- July 2023 BLS asked banks if in the previous year they changed their lending policies differently for "brown" firms, "green" firms and firms "in transition"
- Note: previous year had seen a large and persistent monetary tightening









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Conclusions

- Euro area banks price climate risk: they charge **higher rates to firms with larger emissions**, and **lower rates to firms that commit to green transition**
- Banks' commitment matters:**Committed banks** provide **cheaper loans to firms that commit** to decarbonization and **penalize** more **polluting firms**
- Climate risk-taking channel of monetary policy: **contractionary monetary policy** shocks lead to
  - **higher premia and lower volumes** to high emission firms
  - **mitigating** effects for **firms committed** to decarbonization
- Bottom line:
  - restrictive monetary policy increases the cost of credit to all firms...
  - ...but its contractionary effect is milder for firms with low emissions and those committed to reducing them

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Comparison with Serebriakova, Polzin, Sanders (2025)

- This paper looks at firm behaviour
- We examine with granular data bank behaviour, where banks consider climate a risk, and find evidence consistent with an ample literature on the risk-taking channel of MP, but we cannot say anything at the firm level
- Different time period: monthly data on 2018-2022 in my paper, yearly data on 2001-2021 in Serebriakova, Polzin, Sanders (2025)

Comparison with Serebriakova, Polzin, Sanders (2025)

- Complementary Evidence My results on bank risk-taking do not contradict firm-level findings. While banks may increase rates for green or brown-to-green firms *less* when rates go up, these firms could be more sensitive to the cost of capital (i) for transition investments.
- Financing Substitution Banks are not the sole source of finance. Other financiers (bond markets, private equity) might exhibit opposite behaviors, potentially substituting bank loans.
- Offsetting Channels Mechanisms other than the bank lending channel could operate in the opposite direction, potentially offsetting the aggregate effect on green investment.

Thank you!

Descriptive statistics

Variables	Observations	Mean	St. Dev.	p5	p10	p25	p50	p75	p90	p95
$Spread_{b,f,t}$	325,180	1.51	0.76	0.18	0.54	1.08	1.55	2.00	2.41	2.76
$PD_{f,t}$	442,469	0.96	3.49	0.07	0.09	0.15	0.26	0.50	1.18	2.48
$Carbon_{f,t}$	435,263	0.18	0.47	0.00	0.00	0.01	0.03	0.09	0.53	0.82
$Target_{f,t}$	453,231	0.58	0.49	0.00	0.00	0.00	1.00	1.00	1.00	1.00
$Commit_{b,t}$	453,231	0.11	0.31	0.00	0.00	0.00	0.00	0.00	1.00	1.00
MP_t (b.p.)	453,231	1.09	5.56	-1.53	-1.20	-0.53	0.00	0.06	4.21	14.14