

The Supplement to:
"Is There a Debt-threshold Effect on Output Growth?"

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Abstract

This document provides supplemental results for the paper Chudik, Mohaddes, Pesaran and Raissi (2015) "Is There a Debt-threshold Effect on Output Growth?", forthcoming in the Review of Economics and Statistics. It presents a complete set of Monte Carlo findings for the experiments outlined in the paper (Part A) and additional empirical findings (Part B).

Part A: Monte Carlo Results

1 Introduction

The Monte Carlo set-up is described in Section 3.2 of Chudik, Mohaddes, Pesaran, and Raissi (2015), hereafter CMPR, and covers 6 different experimental designs. For each design, the performance of the *Sup* and *Ave* tests of the threshold effects ($\varphi_1 = 0$ and/or $\varphi_2 = 0$), and the small sample performance of the filtered-pooled estimators of the threshold coefficients (φ_1 and/or φ_2) as well as the threshold level, τ , are investigated. DGPs outlined in CMPR imply the following probabilities and correlations:

	DGP1	DGP2	DGP3	DGP4	DGP5	DGP6
	($\varphi_1 = 0.01$)	($\varphi_1 = 0.01$)	($\varphi_1 = 0.01$)	($\varphi_1 = 0$)	($\varphi_1 = 0.01$)	($\varphi_1 = 0$)
	($\varphi_2 = 0$)	($\varphi_2 = 0$)	($\varphi_2 = 0$)	($\varphi_2 = 0.01$)	($\varphi_2 = 0$)	($\varphi_2 = 0$)
$P[g_1(d_{it}, \tau) = 1]$	37%	37%	37%	-	38%	41%
$P[g_2(d_{it}, \tau) = 1]$	-	-	-	23%	-	-
Correlation between $g_1(d_{it}, \tau)$ and e_{it}	39%	16%	17%	-	14%	27%
Correlation between $g_2(d_{it}, \tau)$ and e_{it}	-	-	-	27%	-	-
Correlation between f_{1t} and $g_1(d_{it}, \tau)$	-	-	-	-	0%	-17%
$E \lambda_1(\Psi_i) $	0	0.90	0.90	0.90	0.90	0
R^2 (output equation)	9%	50%	47%	51%	65%	50%

We refer the reader to CMPR for detailed description of the design and the objectives of these experiments. The next section presents the MC findings.

2 Monte Carlo Tables

Table 1: MC findings for Bias(x100) and RMSE(x100) of the estimation of φ_1 and τ in DGP1

	Pooled estimator				Fixed Effects estimator				Filtered Pooled estimator			
	Bias (x100)		RMSE (x100)		Bias (x100)		RMSE (x100)		Bias (x100)		RMSE (x100)	
(N,T)	46	100	46	100	46	100	46	100	46	100	46	100
φ_1 (true value = -0.01)												
40	1.5137	1.5117	1.5190	1.5152	1.5410	1.5415	1.5464	1.5450	0.0172	0.0065	0.1416	0.0962
100	1.5095	1.5091	1.5117	1.5105	1.5399	1.5395	1.5421	1.5409	0.0054	0.0011	0.0909	0.0614
τ (true value = 0.80)												
40	-74.36	-74.73	74.37	74.73	-74.52	-74.79	74.52	74.79	0.00	0.00	1.55	0.70
100	-74.77	-74.89	74.77	74.89	-74.80	-74.93	74.80	74.93	-0.02	0.00	0.61	0.25

Notes: Filtered pooled estimators are computed using $\mathbf{q}_{it} = (1, d_{it})'$ as the vector of filtering variables.

Table 2a: Rejection frequencies of tests of $\varphi_1 = 0$ in DGP1, computed based on the pooled estimator of φ_1

(N,T)	Rejection rates (x100):									
	<i>SupT</i>		<i>AveT</i>		$\mathcal{T}(0.2)$		$\mathcal{T}(0.5)$		$\mathcal{T}(0.9)$	
	46	100	46	100	46	100	46	100	46	100
	$\varphi_1 = -0.01$									
40	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
100	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
	$\varphi_1 = -0.009$									
40	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
100	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
	$\varphi_1 = -0.008$									
40	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
100	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
	$\varphi_1 = -0.007$									
40	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
100	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
	$\varphi_1 = -0.006$									
40	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
100	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
	$\varphi_1 = -0.005$									
40	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
100	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
	$\varphi_1 = -0.004$									
40	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
100	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
	$\varphi_1 = -0.003$									
40	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
100	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
	$\varphi_1 = -0.002$									
40	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
100	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
	$\varphi_1 = -0.001$									
40	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
100	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
	$\varphi_1 = 0$									
40	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
100	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
	$\varphi_1 = 0.001$									
40	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
100	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
	$\varphi_1 = 0.002$									
40	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
100	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
	$\varphi_1 = 0.003$									
40	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
100	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
	$\varphi_1 = 0.004$									
40	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
100	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
	$\varphi_1 = 0.005$									
40	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
100	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
	$\varphi_1 = 0.006$									
40	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
100	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
	$\varphi_1 = 0.007$									
40	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
100	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
	$\varphi_1 = 0.008$									
40	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
100	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
	$\varphi_1 = 0.009$									
40	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
100	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
	$\varphi_1 = 0.01$									
40	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
100	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Notes: *SupT* and *AveT* are *Sup* and *Ave*, *t*-tests of $\varphi_1 = 0$ in DGP1, with rejection frequencies computed at $\varphi_1 = -0.01, 0.009, \dots, 0.0, 0.001, \dots, 0.009, 0.01$. $\mathcal{T}(\tau)$ is the *t*-test of the threshold effect ($\varphi_1 = 0$) computed for three *a priori* selected values of τ , $\tau = 0.2, 0.5$ and 0.9 .

Table 2c: Rejection frequencies of tests of $\varphi_1 = 0$ in DGP1, computed based on the filtered pooled estimator of φ_1

(N,T)		Rejection rates ($\times 100$):									
		<i>SupT</i>		<i>AveT</i>		$\mathcal{T}(0.2)$		$\mathcal{T}(0.5)$		$\mathcal{T}(0.9)$	
		46	100	46	100	46	100	46	100	46	100
		$\varphi_1 = -0.01$									
40		100.00	100.00	99.95	100.00	77.85	98.05	24.25	46.25	99.90	100.00
100		100.00	100.00	100.00	100.00	99.30	100.00	49.30	83.65	100.00	100.00
		$\varphi_1 = -0.009$									
40		99.95	100.00	99.85	100.00	68.50	95.75	20.50	38.70	99.70	100.00
100		100.00	100.00	100.00	100.00	97.40	100.00	41.15	75.80	100.00	100.00
		$\varphi_1 = -0.008$									
40		99.75	100.00	99.50	100.00	61.80	89.90	17.00	33.50	98.90	100.00
100		100.00	100.00	100.00	100.00	92.85	99.90	32.90	68.95	100.00	100.00
		$\varphi_1 = -0.007$									
40		98.65	100.00	97.10	100.00	48.65	81.00	13.85	26.60	96.10	100.00
100		100.00	100.00	100.00	100.00	86.50	99.45	27.25	56.25	100.00	100.00
		$\varphi_1 = -0.006$									
40		94.70	100.00	90.55	99.75	38.45	68.30	12.50	20.40	89.20	99.75
100		100.00	100.00	100.00	100.00	74.10	97.10	21.75	43.30	99.85	100.00
		$\varphi_1 = -0.005$									
40		83.70	99.40	79.75	98.20	29.15	52.85	9.95	16.35	78.85	97.45
100		99.85	100.00	99.35	100.00	58.20	88.50	16.05	32.45	99.00	100.00
		$\varphi_1 = -0.004$									
40		62.30	93.40	61.35	90.65	20.40	37.85	8.80	13.20	59.05	89.35
100		96.70	100.00	94.05	100.00	41.70	74.85	12.60	22.95	92.70	99.85
		$\varphi_1 = -0.003$									
40		36.35	71.60	38.35	68.00	14.10	23.00	6.95	7.85	37.80	67.50
100		77.50	98.85	75.00	97.85	25.10	50.45	9.00	16.20	73.45	97.25
		$\varphi_1 = -0.002$									
40		18.70	35.25	19.90	37.40	9.85	13.25	6.35	7.00	20.60	38.25
100		39.45	75.10	40.05	72.90	14.00	24.70	7.10	9.85	40.25	70.90
		$\varphi_1 = -0.001$									
40		9.85	11.10	10.85	11.90	7.70	8.00	6.35	5.45	10.00	12.45
100		13.25	24.05	15.75	25.35	7.75	10.60	6.15	6.35	14.85	24.95
		$\varphi_1 = 0$ (size)									
40		6.30	5.00	6.10	5.60	5.35	4.85	5.40	6.10	4.45	4.80
100		5.30	5.50	5.45	6.35	6.00	6.05	4.50	5.45	5.55	6.15
		$\varphi_1 = 0.001$									
40		8.55	11.25	9.20	12.70	7.10	6.35	4.90	5.40	7.90	13.00
100		12.60	23.40	15.05	25.70	7.20	10.20	5.90	6.60	14.60	25.55
		$\varphi_1 = 0.002$									
40		16.10	34.65	18.30	37.25	9.30	13.60	5.00	6.70	18.05	36.75
100		39.65	76.45	40.95	73.50	13.50	26.25	6.35	9.70	40.60	72.50
		$\varphi_1 = 0.003$									
40		38.20	70.85	38.50	69.65	13.70	24.00	6.90	9.30	39.55	66.40
100		77.85	98.90	74.65	97.50	26.15	49.85	9.50	15.35	74.15	97.20
		$\varphi_1 = 0.004$									
40		61.35	94.35	60.15	91.70	19.70	36.45	8.70	11.15	58.75	90.70
100		96.85	100.00	93.75	99.95	43.05	73.65	12.85	22.80	93.30	100.00
		$\varphi_1 = 0.005$									
40		82.30	99.20	79.75	98.05	29.80	51.35	10.85	16.95	78.00	97.70
100		99.80	100.00	99.35	100.00	61.70	89.70	16.90	31.75	99.30	100.00
		$\varphi_1 = 0.006$									
40		94.70	100.00	92.30	99.95	39.45	68.10	12.85	21.40	91.50	99.90
100		100.00	100.00	99.90	100.00	75.60	97.05	24.35	41.55	99.95	100.00
		$\varphi_1 = 0.007$									
40		98.35	100.00	97.20	100.00	50.05	81.25	14.65	27.75	96.05	99.95
100		100.00	100.00	100.00	100.00	86.05	99.10	28.10	55.45	100.00	100.00
		$\varphi_1 = 0.008$									
40		99.80	100.00	99.30	100.00	59.45	88.80	17.20	31.55	99.00	100.00
100		100.00	100.00	100.00	100.00	93.75	99.95	35.20	66.10	100.00	100.00
		$\varphi_1 = 0.009$									
40		100.00	100.00	99.75	100.00	68.00	95.65	19.85	39.15	99.65	100.00
100		100.00	100.00	100.00	100.00	97.25	100.00	41.45	78.20	100.00	100.00
		$\varphi_1 = 0.01$									
40		100.00	100.00	100.00	100.00	78.05	98.40	23.85	46.45	100.00	100.00
100		100.00	100.00	100.00	100.00	98.80	100.00	50.15	83.90	100.00	100.00

Notes: Filtered pooled estimators are computed using $\mathbf{q}_{it} = (1, d_{it})'$ as the vector of filtering variables. See notes to Table 2a.

Table 3: MC findings for Bias(x100) and RMSE(x100) of the estimation of φ_1 and τ in DGP2

Filtered pooled estimator					
		Bias (x100)		RMSE (x100)	
(N,T)	40	100	40	100	
φ_1 (true value = -0.01)					
40	0.0310	0.0164	0.1434	0.0875	
100	0.0241	0.0145	0.0944	0.0570	
τ (true value = 0.80)					
40	-0.05	-0.01	1.06	0.40	
100	0.00	0.00	0.39	0.16	

Notes: Filtered pooled estimators are computed using $\mathbf{q}_{it} = (1, d_{it}, d_{i,t-1}, d_{i,t-2}, \Delta y_{i,t-1})'$ as the vector of filtering variables.

Table 4: Rejection frequencies of tests of $\varphi_1 = 0$ in DGP2, computed based on the filtered pooled estimator of φ_1

(N,T)		Rejection rates ($\times 100$):									
		<i>SupT</i>		<i>AveT</i>		$\mathcal{T}(0.2)$		$\mathcal{T}(0.5)$		$\mathcal{T}(0.9)$	
		46	100	46	100	46	100	46	100	46	100
		$\varphi_1 = -0.01$									
40		100.00	100.00	100.00	100.00	58.45	97.40	12.75	35.40	99.95	100.00
100		100.00	100.00	100.00	100.00	91.05	100.00	21.05	65.65	100.00	100.00
		$\varphi_1 = -0.009$									
40		100.00	100.00	99.95	100.00	52.50	93.50	11.35	29.65	99.65	100.00
100		100.00	100.00	100.00	100.00	86.10	99.95	17.05	59.20	100.00	100.00
		$\varphi_1 = -0.008$									
40		100.00	100.00	99.80	100.00	44.80	87.60	10.10	26.50	99.30	100.00
100		100.00	100.00	100.00	100.00	79.10	99.85	14.50	49.95	100.00	100.00
		$\varphi_1 = -0.007$									
40		99.35	100.00	98.00	100.00	37.25	79.50	10.50	22.30	95.80	100.00
100		100.00	100.00	100.00	100.00	67.10	99.15	13.55	41.35	100.00	100.00
		$\varphi_1 = -0.006$									
40		96.65	100.00	93.00	100.00	29.35	67.50	9.40	16.70	88.20	99.95
100		100.00	100.00	100.00	100.00	55.10	96.40	12.85	32.50	99.90	100.00
		$\varphi_1 = -0.005$									
40		88.85	99.95	83.70	99.40	23.90	53.95	9.30	13.80	77.65	99.45
100		99.90	100.00	99.45	100.00	45.55	88.60	11.80	25.10	98.40	100.00
		$\varphi_1 = -0.004$									
40		68.05	98.30	64.50	96.25	18.20	39.55	8.95	11.75	59.10	94.20
100		97.35	100.00	94.35	100.00	30.85	72.70	8.95	18.20	92.90	100.00
		$\varphi_1 = -0.003$									
40		45.65	84.95	44.25	81.35	12.70	26.00	6.75	9.10	39.90	76.95
100		84.50	99.65	80.05	99.10	21.00	49.00	9.20	14.00	75.25	98.55
		$\varphi_1 = -0.002$									
40		22.70	47.30	24.75	47.25	10.35	14.95	7.70	7.30	21.50	46.15
100		49.35	89.30	49.65	84.20	13.50	27.55	8.50	10.10	44.35	81.20
		$\varphi_1 = -0.001$									
40		11.95	13.80	12.60	16.30	6.90	8.00	7.95	6.10	11.30	15.30
100		19.10	31.40	20.10	32.55	9.45	11.00	7.80	7.45	17.50	31.80
		$\varphi_1 = 0$									
40		8.75	7.25	8.20	6.15	6.70	5.80	6.25	5.55	7.35	5.75
100		8.30	6.55	8.15	6.95	7.35	6.70	7.40	6.15	7.70	5.60
		$\varphi_1 = 0.001$									
40		11.95	15.15	12.45	17.15	8.20	7.70	7.25	5.75	11.30	15.60
100		16.95	30.40	18.95	31.95	9.40	11.55	7.25	6.65	16.40	30.00
		$\varphi_1 = 0.002$									
40		21.45	45.50	23.55	45.45	9.50	13.50	8.30	6.75	21.15	43.65
100		46.05	87.90	45.90	82.45	13.60	25.50	7.35	9.75	41.85	81.40
		$\varphi_1 = 0.003$									
40		42.05	83.75	42.80	78.95	13.75	24.45	8.10	8.15	38.75	75.85
100		81.80	99.75	76.95	98.90	21.80	51.10	8.40	12.15	71.20	98.80
		$\varphi_1 = 0.004$									
40		66.90	98.15	64.00	95.35	17.35	37.25	7.95	11.10	59.60	94.00
100		97.65	100.00	94.80	100.00	32.35	73.30	9.70	17.65	91.25	99.95
		$\varphi_1 = 0.005$									
40		86.60	100.00	80.20	99.50	23.85	54.25	8.15	13.20	76.75	99.10
100		99.70	100.00	99.10	100.00	44.75	89.50	10.15	26.05	98.10	100.00
		$\varphi_1 = 0.006$									
40		95.85	100.00	92.60	100.00	29.60	67.80	9.00	17.15	87.90	99.95
100		100.00	100.00	100.00	100.00	55.85	96.70	12.00	31.65	99.95	100.00
		$\varphi_1 = 0.007$									
40		99.05	100.00	98.10	100.00	38.15	81.30	9.75	20.55	96.10	100.00
100		100.00	100.00	100.00	100.00	67.85	99.35	14.45	40.00	100.00	100.00
		$\varphi_1 = 0.008$									
40		99.95	100.00	99.50	100.00	46.10	88.65	10.50	23.35	98.70	100.00
100		100.00	100.00	100.00	100.00	78.80	99.75	16.20	49.10	100.00	100.00
		$\varphi_1 = 0.009$									
40		99.95	100.00	99.80	100.00	52.70	94.10	11.55	29.70	99.45	100.00
100		100.00	100.00	100.00	100.00	86.45	100.00	16.90	59.30	100.00	100.00
		$\varphi_1 = 0.01$									
40		100.00	100.00	100.00	100.00	58.35	96.80	12.70	34.10	99.90	100.00
100		100.00	100.00	100.00	100.00	92.35	100.00	21.85	64.45	100.00	100.00

Notes: *SupT* and *AveT* are *Sup* and *Ave*, *t*-tests of $\varphi_1 = 0$ in DGP2, with rejection frequencies computed at $\varphi_1 = -0.01, 0.009, \dots, 0.0, 0.001, \dots, 0.009, 0.01$. $\mathcal{T}(\tau)$ is the *t*-test of the threshold effect ($\varphi_1 = 0$) computed for three *a priori* selected values of τ , $\tau = 0.2, 0.5$ and 0.9 . Filtered pooled estimators are computed using $\mathbf{q}_{it} = (1, d_{it}, d_{i,t-1}, d_{i,t-2}, \Delta y_{i,t-1})'$ as the vector of filtering variables.

Table 5: MC findings for Bias(x100) and RMSE(x100) of the estimation of φ_1 and τ in DGP3

Filtered pooled estimator				
	Bias (x100)		RMSE (x100)	
(N,T)	40	100	40	100
φ_1 (true value = -0.01)				
40	0.0225	0.0199	0.1403	0.0855
100	0.0241	0.0148	0.0908	0.0553
τ (true value = 0.80)				
40	-0.07	-0.02	0.89	0.32
100	0.00	0.00	0.34	0.13

Notes: Filtered pooled estimators are computed using $\mathbf{q}_{it} = (1, d_{it}, d_{i,t-1}, d_{i,t-2}, \Delta y_{i,t-1})'$ as the vector of filtering variables.

Table 6: Rejection frequencies of tests of $\varphi_1 = 0$ in DGP3, computed based on the filtered pooled estimator of φ_1

(N,T)		Rejection rates ($\times 100$):									
		<i>SupT</i>			<i>AveT</i>		$\mathcal{T}(0.2)$		$\mathcal{T}(0.5)$		$\mathcal{T}(0.9)$
		46	100	46	100	46	100	46	100	46	100
		$\varphi_1 = -0.01$									
40		100.00	100.00	100.00	100.00	62.10	98.40	16.35	42.05	100.00	100.00
100		100.00	100.00	100.00	100.00	92.80	100.00	24.20	74.80	100.00	100.00
		$\varphi_1 = -0.009$									
40		100.00	100.00	99.90	100.00	54.80	95.75	13.55	35.60	99.65	100.00
100		100.00	100.00	100.00	100.00	88.10	100.00	21.35	66.45	100.00	100.00
		$\varphi_1 = -0.008$									
40		99.95	100.00	99.30	100.00	47.15	91.25	11.75	30.45	99.15	100.00
100		100.00	100.00	100.00	100.00	80.15	99.90	19.00	58.40	100.00	100.00
		$\varphi_1 = -0.007$									
40		99.50	100.00	98.05	100.00	38.35	83.55	10.15	25.85	97.45	100.00
100		100.00	100.00	100.00	100.00	71.05	99.50	18.25	50.45	100.00	100.00
		$\varphi_1 = -0.006$									
40		97.05	100.00	93.35	100.00	31.80	72.40	10.80	19.30	91.30	100.00
100		100.00	100.00	100.00	100.00	57.55	97.05	13.40	38.40	99.85	100.00
		$\varphi_1 = -0.005$									
40		89.50	99.85	84.65	99.45	25.05	54.90	10.10	16.65	80.45	99.25
100		99.95	100.00	99.65	100.00	43.35	90.25	12.70	30.60	99.05	100.00
		$\varphi_1 = -0.004$									
40		69.95	98.90	67.30	97.10	17.35	42.00	9.10	12.85	62.60	96.20
100		98.25	100.00	96.60	100.00	32.75	76.55	11.35	23.15	93.70	100.00
		$\varphi_1 = -0.003$									
40		45.70	85.75	44.80	81.50	14.85	26.40	8.85	10.10	41.40	78.55
100		85.05	99.90	78.55	99.30	21.15	52.70	8.95	16.40	74.35	99.15
		$\varphi_1 = -0.002$									
40		25.80	49.60	26.35	49.75	9.40	14.00	8.15	8.70	24.50	47.65
100		51.30	89.55	48.00	85.55	14.35	28.30	8.60	9.80	46.95	83.75
		$\varphi_1 = -0.001$									
40		11.00	17.40	12.20	18.65	8.05	8.80	7.80	6.90	10.90	19.60
100		17.55	34.20	18.70	34.95	9.25	11.30	8.50	6.75	18.00	34.95
		$\varphi_1 = 0$									
40		10.50	7.50	9.70	6.95	7.55	6.35	8.50	5.65	7.70	6.15
100		9.65	7.15	9.70	7.25	7.25	7.30	6.95	5.10	7.65	5.85
		$\varphi_1 = 0.001$									
40		12.80	17.00	13.95	19.40	8.15	8.35	8.10	7.35	12.40	18.70
100		18.75	34.05	21.15	34.65	9.05	11.20	7.70	7.90	18.35	34.00
		$\varphi_1 = 0.002$									
40		24.45	52.75	26.35	52.40	10.25	14.70	8.20	9.10	25.45	50.50
100		50.20	90.80	50.20	87.25	14.70	27.40	9.25	11.20	45.00	84.60
		$\varphi_1 = 0.003$									
40		48.00	86.85	46.20	82.45	12.75	24.75	8.45	11.25	43.30	80.80
100		84.55	99.90	79.60	99.35	23.00	52.05	10.25	19.35	76.30	99.30
		$\varphi_1 = 0.004$									
40		71.55	98.90	68.30	97.85	16.80	40.75	9.65	15.05	63.95	95.90
100		98.05	100.00	95.50	100.00	33.70	74.50	12.20	26.30	93.10	100.00
		$\varphi_1 = 0.005$									
40		88.45	99.90	84.25	99.65	22.90	55.50	10.95	19.00	80.10	99.60
100		99.95	100.00	99.55	100.00	43.15	88.95	12.65	38.05	99.15	100.00
		$\varphi_1 = 0.006$									
40		96.95	100.00	93.55	99.95	29.40	68.00	12.30	24.30	90.45	99.90
100		100.00	100.00	99.95	100.00	55.10	96.75	17.40	49.20	100.00	100.00
		$\varphi_1 = 0.007$									
40		99.50	100.00	97.75	100.00	35.45	79.25	13.35	30.30	96.70	100.00
100		100.00	100.00	100.00	100.00	67.00	99.35	20.25	57.65	100.00	100.00
		$\varphi_1 = 0.008$									
40		99.80	100.00	99.55	100.00	42.50	86.70	14.90	38.45	98.90	100.00
100		100.00	100.00	100.00	100.00	74.65	99.65	24.00	70.75	100.00	100.00
		$\varphi_1 = 0.009$									
40		99.95	100.00	99.95	100.00	50.60	93.05	17.05	44.30	99.65	100.00
100		100.00	100.00	100.00	100.00	83.50	99.95	27.30	80.35	100.00	100.00
		$\varphi_1 = 0.01$									
40		100.00	100.00	100.00	100.00	57.85	96.75	18.70	51.00	99.90	100.00
100		100.00	100.00	100.00	100.00	89.65	100.00	33.70	84.85	100.00	100.00

Notes: *SupT* and *AveT* are *Sup* and *Ave*, *t*-tests of $\varphi_1 = 0$ in DGP3, with rejection frequencies computed at $\varphi_1 = -0.01, 0.009, \dots, 0.0, 0.001, \dots, 0.009, 0.01$. $\mathcal{T}(\tau)$ is the *t*-test of the threshold effect ($\varphi_1 = 0$) computed for three *a priori* selected values of τ , $\tau = 0.2, 0.5$ and 0.9 . Filtered pooled estimators are computed using $\mathbf{q}_{it} = (1, d_{it}, d_{i,t-1}, d_{i,t-2}, \Delta y_{i,t-1})'$ as the vector of filtering variables.

Table 7: MC findings for Bias(x100) and RMSE(x100) of the estimation of φ_1, φ_2 and τ in DGP4

Filtered pooled estimator					
		Bias (x100)		RMSE (x100)	
(N,T)	40	100	40	100	
φ_1 (true value = 0)					
40	0.0227	0.0123	0.1489	0.0926	
100	0.0190	0.0100	0.1029	0.0600	
φ_2 (true value = -0.01)					
40	-0.0070	-0.0025	0.1362	0.0864	
100	-0.0070	-0.0023	0.0891	0.0550	
τ (true value = 0.80)					
40	-0.06	-0.03	1.66	0.65	
100	-0.01	-0.01	0.59	0.27	

Notes: Filtered pooled estimators are computed using $\mathbf{q}_{it} = (1, d_{it}, d_{i,t-1}, d_{i,t-2}, \Delta y_{i,t-1})'$ as the vector of filtering variables.

Table 8: Rejection frequencies of tests of $\varphi_1 = \varphi_2 = 0$ in DGP4, computed based on the filtered pooled estimator of φ_1 and φ_2

(N,T)		Rejection rates (x100):			
		<i>SupF</i>		<i>AveF</i>	
		46	100	46	100
$\varphi_1 = 0$ and $\varphi_2 = -0.01$					
40		100.00	100.00	100.00	100.00
100		100.00	100.00	100.00	100.00
$\varphi_1 = 0$ and $\varphi_2 = -0.009$					
40		100.00	100.00	100.00	100.00
100		100.00	100.00	100.00	100.00
$\varphi_1 = 0$ and $\varphi_2 = -0.008$					
40		99.95	100.00	100.00	100.00
100		100.00	100.00	100.00	100.00
$\varphi_1 = 0$ and $\varphi_2 = -0.007$					
40		99.55	100.00	99.55	100.00
100		100.00	100.00	100.00	100.00
$\varphi_1 = 0$ and $\varphi_2 = -0.006$					
40		95.80	100.00	97.00	100.00
100		100.00	100.00	100.00	100.00
$\varphi_1 = 0$ and $\varphi_2 = -0.005$					
40		88.75	99.90	90.90	100.00
100		100.00	100.00	100.00	100.00
$\varphi_1 = 0$ and $\varphi_2 = -0.004$					
40		68.90	98.55	75.85	98.85
100		98.50	100.00	98.80	100.00
$\varphi_1 = 0$ and $\varphi_2 = -0.003$					
40		43.20	87.40	52.20	91.30
100		84.00	99.80	87.85	99.90
$\varphi_1 = 0$ and $\varphi_2 = -0.002$					
40		20.15	50.60	25.50	59.15
100		46.60	90.05	56.60	93.15
$\varphi_1 = 0$ and $\varphi_2 = -0.001$					
40		8.45	14.65	10.75	19.35
100		13.50	30.80	18.45	38.30
$\varphi_1 = 0$ and $\varphi_2 = 0$					
40		5.90	4.55	5.85	4.65
100		5.50	4.25	5.65	4.85
$\varphi_1 = 0$ and $\varphi_2 = 0.001$					
40		8.75	13.75	10.00	18.30
100		13.35	32.60	17.50	38.50
$\varphi_1 = 0$ and $\varphi_2 = 0.002$					
40		19.15	48.40	26.05	58.20
100		49.35	90.60	58.60	93.30
$\varphi_1 = 0$ and $\varphi_2 = 0.003$					
40		43.30	86.90	50.95	91.15
100		85.60	99.90	90.25	100.00
$\varphi_1 = 0$ and $\varphi_2 = 0.004$					
40		71.10	98.80	78.40	99.15
100		98.50	100.00	99.20	100.00
$\varphi_1 = 0$ and $\varphi_2 = 0.005$					
40		87.35	99.95	91.40	100.00
100		99.90	100.00	99.95	100.00
$\varphi_1 = 0$ and $\varphi_2 = 0.006$					
40		97.80	100.00	98.25	100.00
100		100.00	100.00	100.00	100.00
$\varphi_1 = 0$ and $\varphi_2 = 0.007$					
40		97.80	100.00	98.25	100.00
100		100.00	100.00	100.00	100.00
$\varphi_1 = 0$ and $\varphi_2 = 0.008$					
40		99.95	100.00	100.00	100.00
100		100.00	100.00	100.00	100.00
$\varphi_1 = 0$ and $\varphi_2 = 0.009$					
40		100.00	100.00	100.00	100.00
100		100.00	100.00	100.00	100.00
$\varphi_1 = 0$ and $\varphi_2 = 0.01$					
40		100.00	100.00	100.00	100.00
100		100.00	100.00	100.00	100.00

Notes: *SupF* and *AveF* are *Sup* and *Ave*, F-tests of $\varphi_1 = \varphi_2 = 0$ in DGP4, with rejection frequencies computed at $\varphi_1 = 0$ and for $\varphi_2 = -0.01, 0.009, \dots, 0.0, 0.001, \dots, 0.009, 0.01$. Filtered pooled estimators are computed using $\mathbf{q}_{it} = (1, d_{it}, d_{i,t-1}, d_{i,t-2}, \Delta y_{i,t-1})'$ as the vector of filtering variables.

Table 9: MC findings for Bias(x100) and RMSE(x100) of the estimation of φ_1 and τ in DGP5

Filtered pooled estimator				
	Bias (x100)		RMSE (x100)	
(N,T)	40	100	40	100
φ_1 (true value = -0.01)				
40	0.0630	-0.0109	0.3197	0.0931
100	-0.0076	-0.0163	0.1074	0.0583
τ (true value = 0.80)				
40	-2.69	-0.06	12.74	0.75
100	-0.02	-0.01	1.88	0.25

Notes: Filtered pooled estimators are computed using the vector of filtering variables, $\mathbf{q}_{it} = (1, d_{it}, d_{i,t-1}, d_{i,t-2}, \Delta y_{i,t-1}, \bar{\zeta}'_t, \bar{\zeta}'_{t-1}, \dots, \bar{\zeta}'_{t-p})'$ where $\bar{\zeta}_t$ is the arithmetic cross-sectional average of $\zeta_{it} = [d_{it}, \Delta y_{it}, g_{1it}(\tau)]'$ and p is the integer part of $0.5T^{1/3}$.

Table 10: Rejection frequencies of tests of $\varphi_1 = 0$ in DGP5, computed based on the filtered pooled estimator of φ_1

		Rejection rates (x100):									
		<i>SupT</i>			<i>AveT</i>		$\mathcal{T}(0.2)$		$\mathcal{T}(0.5)$		$\mathcal{T}(0.9)$
(N,T)		46	100	46	100	46	100	46	100	46	100
	$\varphi_1 = -0.01$										
40		99.95	100.00	99.90	100.00	52.35	92.30	30.70	72.50	99.80	100.00
100		100.00	100.00	100.00	100.00	83.40	99.90	49.65	96.80	100.00	100.00
	$\varphi_1 = -0.009$										
40		99.95	100.00	99.90	100.00	48.10	88.00	25.80	63.25	99.25	100.00
100		100.00	100.00	100.00	100.00	78.05	99.75	45.00	93.55	100.00	100.00
	$\varphi_1 = -0.008$										
40		99.35	100.00	99.05	100.00	38.10	79.40	24.20	54.80	97.70	100.00
100		100.00	100.00	100.00	100.00	69.05	99.25	39.00	88.30	100.00	100.00
	$\varphi_1 = -0.007$										
40		98.30	100.00	96.75	100.00	32.95	69.85	21.70	46.40	93.25	99.95
100		100.00	100.00	100.00	100.00	61.10	96.85	34.50	81.95	99.90	100.00
	$\varphi_1 = -0.006$										
40		93.80	100.00	91.10	100.00	26.45	57.65	18.20	39.50	87.55	99.85
100		100.00	100.00	99.95	100.00	49.65	91.05	27.85	71.20	99.85	100.00
	$\varphi_1 = -0.005$										
40		84.45	99.95	82.95	99.35	23.40	46.35	16.75	31.15	75.50	98.95
100		99.75	100.00	99.10	100.00	40.90	82.05	21.80	57.80	97.95	100.00
	$\varphi_1 = -0.004$										
40		68.45	97.35	67.20	96.45	19.30	34.40	13.75	24.10	59.65	94.45
100		97.15	100.00	95.15	100.00	29.15	64.05	19.45	42.45	91.35	100.00
	$\varphi_1 = -0.003$										
40		48.75	82.85	49.10	81.75	16.40	24.40	13.35	17.45	40.90	77.05
100		82.50	99.85	80.05	99.35	22.55	45.80	15.80	28.75	73.80	98.80
	$\varphi_1 = -0.002$										
40		33.50	51.35	32.60	51.65	12.50	15.35	12.60	11.30	26.65	47.90
100		50.75	88.30	50.75	87.40	14.15	23.50	14.05	17.00	44.25	83.95
	$\varphi_1 = -0.001$										
40		19.55	22.10	19.05	22.30	11.70	10.85	10.40	10.25	13.65	18.60
100		26.05	36.65	27.10	39.25	13.10	12.45	11.75	9.60	21.45	35.25
	$\varphi_1 = 0$										
40		17.10	9.05	16.00	9.35	11.95	7.80	11.30	7.60	10.50	7.30
100		16.60	10.90	15.05	9.35	10.60	8.00	11.45	7.15	10.20	7.00
	$\varphi_1 = 0.001$										
40		21.15	20.50	20.90	22.20	11.55	9.90	12.35	9.20	14.25	20.00
100		24.85	38.55	26.40	39.80	11.05	12.15	12.90	11.65	19.55	35.55
	$\varphi_1 = 0.002$										
40		31.55	52.95	32.50	54.50	12.35	14.65	11.85	12.75	28.05	49.45
100		52.00	88.90	52.70	87.05	16.70	23.85	12.85	18.70	44.55	83.10
	$\varphi_1 = 0.003$										
40		49.75	86.10	50.80	83.60	14.70	22.65	11.60	18.25	43.80	80.35
100		82.15	99.90	80.50	99.45	20.25	41.45	15.55	30.90	73.45	98.90
	$\varphi_1 = 0.004$										
40		69.55	97.75	68.70	95.75	18.25	30.85	14.50	21.90	60.35	94.50
100		97.10	100.00	96.30	100.00	28.55	60.70	20.50	49.30	92.20	100.00
	$\varphi_1 = 0.005$										
40		84.35	99.90	83.40	99.75	22.50	43.45	18.15	33.35	76.35	99.10
100		99.75	100.00	99.50	100.00	39.30	77.50	25.05	62.45	98.05	100.00
	$\varphi_1 = 0.006$										
40		93.45	100.00	91.55	100.00	28.30	56.20	19.55	43.00	86.95	99.95
100		100.00	100.00	99.95	100.00	48.50	88.20	31.00	77.95	99.60	100.00
	$\varphi_1 = 0.007$										
40		97.85	100.00	96.70	100.00	29.45	65.25	21.90	54.20	93.55	100.00
100		100.00	100.00	100.00	100.00	57.60	95.20	34.80	85.95	99.90	100.00
	$\varphi_1 = 0.008$										
40		99.55	100.00	99.10	100.00	36.85	76.05	25.50	63.00	97.20	100.00
100		100.00	100.00	100.00	100.00	64.85	97.55	45.05	92.30	100.00	100.00
	$\varphi_1 = 0.009$										
40		99.90	100.00	99.85	100.00	43.95	83.70	29.60	71.55	98.60	100.00
100		100.00	100.00	100.00	100.00	73.70	99.35	48.20	97.25	100.00	100.00
	$\varphi_1 = 0.01$										
40		99.95	100.00	99.80	100.00	50.20	86.55	33.55	78.30	99.70	100.00
100		100.00	100.00	100.00	100.00	80.55	99.70	56.65	98.10	100.00	100.00

Notes: *SupT* and *AveT* are *Sup* and *Ave*, *t*-tests of $\varphi_1 = 0$ in DGP5, with rejection frequencies computed at $\varphi_1 = -0.01, 0.009, \dots, 0.0, 0.001, \dots, 0.009, 0.01$. $\mathcal{T}(\tau)$ is the *t*-test of the threshold effect ($\varphi_1 = 0$) computed for three *a priori* selected values of τ , $\tau = 0.2, 0.5$ and 0.9 . Filtered pooled estimators are computed using the vector of filtering variables, $\mathbf{q}_{it} = \left(1, d_{it}, d_{i,t-1}, d_{i,t-2}, \Delta y_{i,t-1}, \bar{\zeta}'_t, \bar{\zeta}'_{t-1}, \dots, \bar{\zeta}'_{t-p}\right)'$ where $\bar{\zeta}_t$ is the arithmetic cross-sectional average of $\zeta_{it} = [d_{it}, \Delta y_{it}, g_{1it}(\tau)]'$ and p is the integer part of $0.5T^{1/3}$.

Table 11: MC findings for the estimation of φ_1 and τ in DGP6

Rejection rates for $Sup\mathcal{T}$ and $Ave\mathcal{T}$ tests, and bias(x100) and RMSE(x100) for estimates of φ_1

(N,T)	Without CS augmentation				With CS augmentation			
	40	100	40	100	40	100	40	100
Rejection rates of $Sup\mathcal{T}$ and $Ave\mathcal{T}$ tests								
	$Sup\mathcal{T}$		$Ave\mathcal{T}$		$Sup\mathcal{T}$		$Ave\mathcal{T}$	
40	63.45	79.60	65.55	81.35	12.10	7.55	9.90	7.65
100	83.25	92.05	83.45	92.90	9.95	7.65	9.20	6.60
Bias(x100) and RMSE(x100) for estimates of φ_1								
	Bias (x100)		RMSE (x100)		Bias (x100)		RMSE (x100)	
40	0.2344	0.2211	1.1033	0.8628	0.0000	-0.0041	0.2258	0.1428
100	0.3034	0.3725	1.0245	0.8554	0.0008	0.0004	0.1375	0.0863

Notes: Filtered pooled estimators without cross-section (CS) augmentation are computed using $\mathbf{q}_{it} = (1, d_{it})'$ as the vector of filtering variables, and the filtered pooled estimators with CS augmentation are computed using the vector of filtering variables, $\mathbf{q}_{it} = (1, d_{it}, \bar{\zeta}'_t, \bar{\zeta}'_{t-1})'$ where $\bar{\zeta}_t$ is the arithmetic cross-sectional average of $\zeta_{it} = [d_{it}, \Delta y_{it}, g_{1it}(\tau)]'$.

Part B: Additional Empirical Results

Table 1: Tests of debt-threshold effects for *advanced economies* (robustness to the inclusion of inflation in the regressions), 1966-2010

lags:	ARDL			DL				CS-ARDL		CS-DL			
	(1,1)	(2,2)	(3,3)	p=0	p=1	p=2	p=3	(1,1,1)	(2,2,2)	p=0	p=1	p=2	p=3
(a) Regressions with threshold variables: $g_1(d_{it}, \tau) = I[d_{it} > \ln(\tau)]$ and $g_2(d_{it}, \tau) = I[d_{it} > \ln(\tau)] \times \max(0, \Delta d_{it})$													
$\hat{\tau}$	0.80	0.60	0.60	0.80	0.80	0.80	0.80	0.10	0.10	0.10	0.10	0.10	0.20
<i>SupF</i>	20.21 [‡]	19.82 [‡]	20.5 [‡]	18.74 [‡]	24.44 [‡]	20.2 [‡]	22.09 [‡]	4.52	12.19	10.03	4.54	5.02	12.12
<i>AveF</i>	11.7 [‡]	11.57 [‡]	10.53 [‡]	11.47 [‡]	13.11 [‡]	10.38 [‡]	9.85 [‡]	2.14	3.0	4.39 [†]	2.13	2.69	6.16*
CD	18.16	14.41	14.13	24.01	18.91	15.70	14.02	4.40	2.70	10.77	6.86	3.44	3.10
(b) Regressions with threshold variable $g_1(d_{it}, \tau) = I[d_{it} > \ln(\tau)]$													
$\hat{\tau}$	0.80	0.80	0.80	0.80	0.80	0.80	1.10	0.20	0.90	0.20	0.90	0.90	1.00
<i>SupT</i>	3.18 [†]	2.73	2.43	3.98 [‡]	4.24 [‡]	3.98 [‡]	3.74 [†]	2.08	3.1	2.26	1.94	2.34	2.56
<i>AveT</i>	1.8 [‡]	1.3 [†]	0.84	2.95 [‡]	3.07 [‡]	2.63 [‡]	2.19 [‡]	1.21	1.14	1.19*	1.02	1.07	1.45
CD	18.76	14.90	14.47	24.67	20.10	16.37	14.89	7.07	4.30	10.98	6.48	4.74	4.88
(c) Regressions with interactive threshold variable $g_2(d_{it}, \tau) = I[d_{it} > \ln(\tau)] \times \max(0, \Delta d_{it})$													
$\hat{\tau}$	0.60	0.60	0.60	0.80	0.80	0.80	0.80	0.10	0.10	1.1	0.80	0.10	0.20
<i>SupT</i>	4.49 [‡]	4.42 [‡]	4.16 [‡]	3.97 [‡]	4.24 [‡]	4.13 [‡]	4.53 [‡]	2.07	2.44	3.39 [†]	2.55	2.4	3.62*
<i>AveT</i>	3.11 [‡]	3.13 [‡]	2.98 [‡]	2.48 [‡]	2.66 [‡]	2.53 [‡]	2.75 [‡]	1.21	1.23	1.85 [‡]	1.49 [†]	1.57 [†]	2.15 [‡]
CD	18.77	14.45	14.22	24.56	19.58	16.21	14.03	3.77	2.85	7.36	6.91	3.21	2.23

Notes: In addition to Δd_{it} , inflation (π_{it}) and its lagged values are included as regressors in the ARDL and DL specifications, (22)–(23), while the CS-ARDL and CS-DL specifications, (24)–(25), also include the cross-sectional averages of π_{it} and its lagged values. Panel (a) reports the *SupF* and *AveF* test statistics for the joint statistical significance of both threshold variables [$g_1(d_{it}, \tau)$ and $g_2(d_{it}, \tau)$], while panel (b) and (c) reports the *SupT* and *AveT* test statistics for the statistical significance of the simple threshold variable $g_1(d_{it}, \tau)$, and the interactive threshold variable, $g_2(d_{it}, \tau)$, respectively. Statistical significance of the *Sup* and *Ave* test statistics is denoted by *, † and ‡, at 10%, 5% and 1% level, respectively. CD is the cross-section dependence test statistic of (Pesaran 2004).

Table 2: Tests of debt-threshold effects for *developing economies* (robustness to the inclusion of inflation in the regressions), 1966-2010

lags:	ARDL			DL				CS-ARDL		CS-DL			
	(1,1)	(2,2)	(3,3)	p=0	p=1	p=2	p=3	(1,1,1)	(2,2,2)	p=0	p=1	p=2	p=3
(a) Regressions with threshold variables: $g_1(d_{it}, \tau) = I[d_{it} > \ln(\tau)]$ and $g_2(d_{it}, \tau) = I[d_{it} > \ln(\tau)] \times \max(0, \Delta d_{it})$													
$\hat{\tau}$	0.50	0.50	0.20	0.50	0.50	0.30	0.30	0.20	0.20	0.20	0.40	0.30	0.30
<i>SupF</i>	16.33 [†]	14.94 [†]	14.87*	12.15 [†]	8.77	10.96	12.68	9.42	5.98	10.06	8.21	6.92	7.68
<i>AveF</i>	6.61 [‡]	5.38 [‡]	4.71*	6.43 [‡]	5.16 [‡]	4.35 [†]	6.73 [‡]	3.45	2.92	3.42	3.34	3.31	3.16
CD	6.27	6.14	4.54	6.85	6.33	4.53	4.71	-1.53	-0.58	-1.77	-1.32	-0.94	-1.60
(b) Regressions with threshold variable $g_1(d_{it}, \tau) = I[d_{it} > \ln(\tau)]$													
$\hat{\tau}$	0.50	0.50	0.50	0.50	0.50	0.30	0.50	0.40	0.40	0.50	0.40	0.50	0.50
<i>SupT</i>	2.1	1.74	1.77	2.24	2.5	2.89	3.38 [†]	2.37	2.39	2.35	2.34	2.73	2.81
<i>AveT</i>	1.18*	1.05	0.74	1.45 [‡]	1.4 [†]	1.24*	1.89 [‡]	1.29	1.47*	1.29 [†]	1.47 [†]	1.54 [†]	1.36
CD	6.54	6.49	5.05	7.08	6.57	5.35	5.52	-1.33	0.11	-1.80	-1.49	-1.18	-2.19
(c) Regressions with interactive threshold variable $g_2(d_{it}, \tau) = I[d_{it} > \ln(\tau)] \times \max(0, \Delta d_{it})$													
$\hat{\tau}$	0.20	0.50	0.20	0.50	0.50	0.40	0.50	0.60	0.50	0.60	0.60	0.60	0.80
<i>SupT</i>	3.92 [‡]	3.83 [†]	3.15	3.54 [‡]	2.98*	3.1*	3.46 [†]	2.53	2.39	2.01	2.15	2.26	1.32
<i>AveT</i>	2.38 [‡]	2.1 [‡]	1.77 [‡]	2.41 [‡]	2.08 [‡]	1.72 [‡]	2.07 [‡]	0.76	0.59	0.8	0.7	0.61	0.45
CD	6.00	6.18	4.39	7.12	6.74	5.04	5.23	-1.48	-0.46	-1.63	-1.31	-1.34	-1.83

Notes: See the notes to Table 1.

Table 3: Mean group estimates of the long-run effects of public debt and inflation on output growth for *advanced economies*, 1966-2010

lags:	ARDL			DL				CS-ARDL		CS-DL			
	(1,1)	(2,2)	(3,3)	p=0	p=1	p=2	p=3	(1,1,1)	(2,2,2)	p=0	p=1	p=2	p=3
(a) Regressions with threshold variables: $g_1(d_{it}, \tau) = I[d_{it} > \ln(\tau)]$ and $g_2(d_{it}, \tau) = I[d_{it} > \ln(\tau)] \times \max(0, \Delta d_{it})$													
$\widehat{\phi}_{\Delta d}$	-0.052 [‡] (0.020)	-0.050 [‡] (0.024)	-0.051 [‡] (0.019)	-0.113 [‡] (0.015)	-0.075 [‡] (0.014)	-0.089 [‡] (0.017)	-0.060 [‡] (0.020)	-0.065 [‡] (0.023)	-0.091 [‡] (0.032)	-0.078 [‡] (0.021)	-0.075 [‡] (0.021)	-0.071 [‡] (0.027)	-0.015 (0.023)
$\widehat{\phi}_{\pi}$	-0.048* (0.027)	0.026 (0.031)	0.037 (0.033)	-0.012 (0.037)	-0.025 (0.039)	0.037 (0.044)	0.048 (0.039)	-0.155 [‡] (0.039)	-0.148 [‡] (0.050)	-0.136 [‡] (0.028)	-0.131 [‡] (0.047)	-0.109 [‡] (0.052)	-0.151 [‡] (0.068)
CD	18.16	14.41	14.13	24.01	18.91	15.70	14.02	4.40	2.70	10.77	6.86	3.44	3.10
(b) Regressions with threshold variable $g_1(d_{it}, \tau) = I[d_{it} > \ln(\tau)]$													
$\widehat{\phi}_{\Delta d}$	-0.069 [‡] (0.018)	-0.081 [‡] (0.020)	-0.073 [‡] (0.019)	-0.119 [‡] (0.017)	-0.082 [‡] (0.014)	-0.093 [‡] (0.018)	-0.080 [‡] (0.020)	-0.111 [‡] (0.023)	-0.114 [‡] (0.030)	-0.102 [‡] (0.016)	-0.114 [‡] (0.022)	-0.115 [‡] (0.025)	-0.075 [‡] (0.023)
$\widehat{\phi}_{\pi}$	-0.049 (0.034)	0.024 (0.041)	0.034 (0.042)	-0.015 (0.038)	-0.024 (0.039)	0.035 (0.045)	0.092 [†] (0.043)	-0.167 [‡] (0.041)	-0.250 [‡] (0.052)	-0.132 [‡] (0.030)	-0.215 [‡] (0.038)	-0.246 [‡] (0.057)	-0.371 [‡] (0.077)
CD	18.76	14.90	14.47	24.67	20.10	16.37	14.89	7.07	4.30	10.98	6.48	4.74	4.88
(c) Regressions with interactive threshold variable $g_2(d_{it}, \tau) = I[d_{it} > \ln(\tau)] \times \max(0, \Delta d_{it})$													
$\widehat{\phi}_{\Delta d}$	-0.045 [†] (0.020)	-0.053 [†] (0.023)	-0.053 [‡] (0.019)	-0.104 [‡] (0.016)	-0.062 [‡] (0.017)	-0.078 [‡] (0.020)	-0.060 [‡] (0.021)	-0.064 [‡] (0.020)	-0.080 [†] (0.031)	-0.084 [‡] (0.015)	-0.086 [‡] (0.018)	-0.069 [‡] (0.025)	-0.024 (0.021)
$\widehat{\phi}_{\pi}$	-0.058 [†] (0.027)	0.011 (0.030)	0.017 (0.032)	0.005 (0.034)	-0.006 (0.035)	0.054 (0.042)	0.055 (0.039)	-0.149 [‡] (0.040)	-0.120 [†] (0.047)	-0.188 [‡] (0.030)	-0.205 [‡] (0.040)	-0.087* (0.052)	-0.141 [‡] (0.050)
CD	18.77	14.45	14.22	24.56	19.58	16.21	14.03	3.77	2.85	7.36	6.91	3.21	2.23
(d) Regressions without threshold variables													
$\widehat{\phi}_{\Delta d}$	-0.069 [‡] (0.021)	-0.093 [‡] (0.022)	-0.090 [‡] (0.018)	-0.087 [‡] (0.017)	-0.101 [‡] (0.020)	-0.086 [‡] (0.019)	-0.085 [‡] (0.017)	-0.099 [‡] (0.023)	-0.105 [‡] (0.029)	-0.111 [‡] (0.021)	-0.113 [‡] (0.025)	-0.086 [‡] (0.020)	-0.084 [‡] (0.021)
$\widehat{\phi}_{\pi}$	-0.010 (0.032)	0.078* (0.040)	0.085 [†] (0.041)	0.020 (0.037)	0.086* (0.046)	0.098 [†] (0.046)	0.107 [†] (0.048)	-0.153 [‡] (0.040)	-0.158 [‡] (0.047)	-0.104 [‡] (0.038)	-0.117 [†] (0.053)	-0.147 [‡] (0.050)	-0.129 [†] (0.063)
CD	19.55	15.21	14.80	21.80	17.62	16.01	15.57	6.38	5.25	9.02	6.76	6.56	8.29

Notes: In addition to Δd_{it} , inflation (π_{it}) and its lagged values are included as regressors in the ARDL and DL specifications, (22)–(23), while the CS-ARDL and CS-DL specifications, (24)–(25), also include the cross-sectional averages of π_{it} and its lagged values. Statistical significance is denoted by *, † and ‡, at 10%, 5% and 1% level, respectively.

Table 4: Mean group estimates of the long-run effects of public debt and inflation on output growth for *developing economies*, 1966-2010

lags:	ARDL			DL				CS-ARDL		CS-DL			
	(1,1)	(2,2)	(3,3)	p=0	p=1	p=2	p=3	(1,1,1)	(2,2,2)	p=0	p=1	p=2	p=3
(a) Regressions with threshold variables: $g_1(d_{it}, \tau) = I[d_{it} > \ln(\tau)]$ and $g_2(d_{it}, \tau) = I[d_{it} > \ln(\tau)] \times \max(0, \Delta d_{it})$													
$\widehat{\phi}_{\Delta d}$	-0.060 [‡] (0.014)	-0.047 [‡] (0.015)	-0.033* (0.019)	-0.069 [‡] (0.013)	-0.068 [‡] (0.013)	-0.049 [‡] (0.012)	-0.059 [‡] (0.016)	-0.050 [‡] (0.013)	-0.059 [‡] (0.015)	-0.054 [‡] (0.014)	-0.061 [‡] (0.012)	-0.070 [‡] (0.017)	-0.080 [‡] (0.033)
$\widehat{\phi}_{\pi}$	-0.060* (0.033)	-0.024 (0.038)	0.012 (0.070)	-0.053* (0.030)	-0.049* (0.027)	-0.009 (0.038)	0.019 (0.038)	-0.049* (0.026)	-0.017 (0.042)	-0.069 [‡] (0.029)	-0.057 [‡] (0.026)	-0.059 (0.043)	-0.019 (0.053)
CD	6.27	6.14	4.54	6.85	6.33	4.53	4.71	-1.53	-0.58	-1.77	-1.32	-0.94	-1.60
(b) Regressions with threshold variable $g_1(d_{it}, \tau) = I[d_{it} > \ln(\tau)]$													
$\widehat{\phi}_{\Delta d}$	-0.068 [‡] (0.013)	-0.058 [‡] (0.015)	-0.071 [‡] (0.022)	-0.075 [‡] (0.014)	-0.075 [‡] (0.012)	-0.077 [‡] (0.012)	-0.077 [‡] (0.017)	-0.068 [‡] (0.014)	-0.083 [‡] (0.018)	-0.074 [‡] (0.016)	-0.070 [‡] (0.014)	-0.082 [‡] (0.017)	-0.091 [‡] (0.033)
$\widehat{\phi}_{\pi}$	-0.061* (0.032)	-0.026 (0.038)	0.010 (0.063)	-0.053* (0.030)	-0.049* (0.027)	-0.018 (0.036)	-0.007 (0.036)	-0.053* (0.031)	-0.026 (0.046)	-0.080 [‡] (0.028)	-0.059* (0.030)	-0.067 (0.044)	-0.035 (0.051)
CD	6.54	6.49	5.05	7.08	6.57	5.35	5.52	-1.33	0.11	-1.80	-1.49	-1.18	-2.19
(c) Regressions with interactive threshold variable $g_2(d_{it}, \tau) = I[d_{it} > \ln(\tau)] \times \max(0, \Delta d_{it})$													
$\widehat{\phi}_{\Delta d}$	-0.032 [‡] (0.013)	-0.047 [‡] (0.015)	-0.031 (0.019)	-0.067 [‡] (0.013)	-0.064 [‡] (0.013)	-0.032 [‡] (0.012)	-0.051 [‡] (0.017)	-0.075 [‡] (0.013)	-0.062 [‡] (0.014)	-0.073 [‡] (0.016)	-0.071 [‡] (0.013)	-0.071 [‡] (0.015)	-0.065 [‡] (0.033)
$\widehat{\phi}_{\pi}$	-0.063 [‡] (0.032)	-0.025 (0.038)	0.017 (0.068)	-0.053* (0.030)	-0.048* (0.027)	-0.018 (0.039)	0.002 (0.039)	-0.070 [‡] (0.027)	-0.042 (0.041)	-0.073 [‡] (0.028)	-0.060 [‡] (0.026)	-0.057 (0.040)	-0.029 (0.047)
CD	6.00	6.18	4.39	7.12	6.74	5.04	5.23	-1.48	-0.46	-1.63	-1.31	-1.34	-1.83
(d) Regressions without threshold variables													
$\widehat{\phi}_{\Delta d}$	-0.070 [‡] (0.014)	-0.062 [‡] (0.015)	-0.077 [‡] (0.022)	-0.074 [‡] (0.013)	-0.065 [‡] (0.014)	-0.068 [‡] (0.017)	-0.057 [‡] (0.020)	-0.072 [‡] (0.016)	-0.076 [‡] (0.018)	-0.071 [‡] (0.015)	-0.071 [‡] (0.019)	-0.078 [‡] (0.033)	-0.037 (0.037)
$\widehat{\phi}_{\pi}$	-0.064* (0.033)	-0.030 (0.041)	-0.000 (0.067)	-0.050* (0.028)	-0.028 (0.037)	-0.005 (0.039)	-0.029 (0.038)	-0.072* (0.038)	-0.041 (0.046)	-0.050 (0.031)	-0.046 (0.046)	-0.030 (0.060)	-0.120* (0.070)
CD	7.28	6.98	5.17	7.96	6.92	6.91	5.81	-1.05	0.27	-0.65	-0.24	-1.04	0.15

Notes: See notes to Table 3.

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