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?". 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
	($\varphi_1 = 0.01$)	($\varphi_1 = 0.01$)	($\varphi_1 = 0.01$)	($\varphi_1 = 0$)	($\varphi_1 = 0.01$)	($\varphi_1 = 0$)
	($\varphi_2 = 0$)	($\varphi_2 = 0$)	($\varphi_2 = 0$)	($\varphi_2 = 0.01$)	($\varphi_2 = 0$)	($\varphi_2 = 0$)
$P\left[g_1\left(d_{it}, \tau\right) = 1\right]$	37%	37%	37%	-	38%	41%
$P\left[g_2\left(d_{it}, \tau\right) = 1\right]$	-	-	-	23%	-	-
Correlation between $g_1\left(d_{it}, \tau\right)$ and e_{it}	39%	16%	17%	-	14%	27%
Correlation between $g_2\left(d_{it}, \tau\right)$ and e_{it}	-	-	-	27%		-
Correlation between f_{1t} and $g_1\left(d_{it}, \tau\right)$	-	-	-	-	0%	-17%
$E\left\lvert\lambda_1\left(\boldsymbol{\Psi}_i\right)\right\rvert$	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

	Rejection rates (x100):									
	SupT		*AveT*		$\mathcal{T}$ (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	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 $\varphi_1 = -0.01, 0.009, ..., 0.0, 0.001, ..., 0.009, 0.01$. $\mathcal{T}(\tau)$ 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 2b: Rejection frequencies of tests of $\varphi_1 = 0$ in DGP1, computed based on the fixed effect estimator of φ_1

	Rejection rates (x100):									
	SupT		*AveT*		*T* (0.2)		*T* (0.5)		*T* (0.9)	
(N,T)	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: See notes to Table 2a.

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

	Rejection rates (x100):									
	SupT		*AveT*		$\mathcal{T}(0.2)$		$\mathcal{T}(0.5)$		$\mathcal{T}(0.9)$	
(N,T)	46	100	46	100	46	100	46	100	46	100
	$\varphi_1 = -0.01$									
40	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

	Rejection rates (x100):									
	SupT		*AveT*		$\mathcal{T}(0.2)$		$\mathcal{T}(0.5)$		$\mathcal{T}(0.9)$	
(N,T)	46	100	46	100	46	100	46	100	46	100
	$\varphi_1 = -0.01$									
40	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 $\varphi_1 = -0.01, 0.009, ..., 0.0, 0.001, ..., 0.009, 0.01$. $\mathcal{T}(\tau)$ 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

	Rejection rates (x100):									
	SupT		*AveT*		$\mathcal{T}$ (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	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 $\varphi_1 = -0.01, 0.009, ..., 0.0, 0.001, ..., 0.009, 0.01$. $\mathcal{T}(\tau)$ 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

	Rejection rates (x100):			
	SupF		*AveF*	
(N,T)	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 $\varphi_2 = -0.01, 0.009, ..., 0.0, 0.001, ..., 0.009, 0.01$. 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, $\mathbf{q}_{it} = \left(1, d_{it}, d_{i,t-1}, d_{i,t-2}, \Delta y_{i,t-1}, \bar{\boldsymbol{\zeta}}_t', \bar{\boldsymbol{\zeta}}_{t-1}', ..., \bar{\boldsymbol{\zeta}}_{t-p}'\right)'$ where $\bar{\boldsymbol{\zeta}}_t$ 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):									
	SupT		*AveT*		$\mathcal{T}$ (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 $\varphi_1 = -0.01, 0.009, ..., 0.0, 0.001, ..., 0.009, 0.01$. $\mathcal{T}(\tau)$ 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, $\mathbf{q}_{it} = \left(1, d_{it}, d_{i,t-1}, d_{i,t-2}, \Delta y_{i,t-1}, \bar{\boldsymbol{\zeta}}_t', \bar{\boldsymbol{\zeta}}_{t-1}', ..., \bar{\boldsymbol{\zeta}}_{t-p}'\right)'$ where $\bar{\boldsymbol{\zeta}}_t$ 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

	Without CS augmentation				**With CS augmentation**			
(N,T)	**40**	**100**	**40**	**100**	**40**	**100**	**40**	**100**
	Rejection rates of $Sup\mathcal{T}$ and $Sup\mathcal{T}$ 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, $\mathbf{q}_{it} = \left(1, d_{it}, , \bar{\boldsymbol{\zeta}}_t', \bar{\boldsymbol{\zeta}}_{t-1}'\right)'$ where $\bar{\boldsymbol{\zeta}}_t$ 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

	ARDL			DL				CS-ARDL		CS-DL			
lags:	(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: $g_1(d_{it},\tau) = I\left[d_{it} > \ln(\tau)\right]$ **and** $g_2(d_{it},\tau) = I\left[d_{it} > \ln(\tau)\right] \times \max\left(0, \Delta d_{it}\right)$													
$\widehat{\tau}$	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
SupF	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
AveF	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 $g_1(d_{it},\tau) = I\left[d_{it} > \ln(\tau)\right]$													
$\widehat{\tau}$	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
$Sup\mathcal{T}$	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
$Ave\mathcal{T}$	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 $g_2(d_{it},\tau) = I\left[d_{it} > \ln(\tau)\right] \times \max\left(0, \Delta d_{it}\right)$													
$\widehat{\tau}$	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
$Sup\mathcal{T}$	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*
$Ave\mathcal{T}$	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 $\left[g_1\left(d_{it},\tau\right) \text{ and } g_2\left(d_{it},\tau\right)\right]$, while panel (b) and (c) reports the $Sup\mathcal{T}$ and $Ave\mathcal{T}$ test statistics for the statistical significance of the simple threshold variable $g_1\left(d_{it},\tau\right)$, and the interactive threshold variable, $g_2\left(d_{it},\tau\right)$, 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

	ARDL			DL				CS-ARDL		CS-DL			
lags:	(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** $g_2(d_{it},\tau) = I[d_{it} > \ln(\tau)] \times \max(0, \Delta d_{it})$													
$\widehat{\tau}$	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
SupF	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
AveF	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 $g_1(d_{it},\tau) = I[d_{it} > \ln(\tau)]$													
$\widehat{\tau}$	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
Sup$\mathcal{T}$	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
Ave$\mathcal{T}$	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 $g_2(d_{it},\tau) = I[d_{it} > \ln(\tau)] \times \max(0, \Delta d_{it})$													
$\widehat{\tau}$	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
Sup$\mathcal{T}$	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
Ave$\mathcal{T}$	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

	ARDL			DL				CS-ARDL		CS-DL			
lags:	(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‡	-0.050‡	-0.051‡	-0.113‡	-0.075‡	-0.089‡	-0.060‡	-0.065‡	-0.091‡	-0.078‡	-0.075‡	-0.071‡	-0.015
	(0.020)	(0.024)	(0.019)	(0.015)	(0.014)	(0.017)	(0.020)	(0.023)	(0.032)	(0.021)	(0.021)	(0.027)	(0.023)
$\widehat{\phi}_{\pi}$	-0.048*	0.026	0.037	-0.012	-0.025	0.037	0.048	-0.155‡	-0.148‡	-0.136‡	-0.131‡	-0.109‡	-0.151†
	(0.027)	(0.031)	(0.033)	(0.037)	(0.039)	(0.044)	(0.039)	(0.039)	(0.050)	(0.028)	(0.047)	(0.052)	(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‡	-0.081‡	-0.073‡	-0.119‡	-0.082‡	-0.093‡	-0.080‡	-0.111‡	-0.114‡	-0.102‡	-0.114‡	-0.115‡	-0.075‡
	(0.018)	(0.020)	(0.019)	(0.017)	(0.014)	(0.018)	(0.020)	(0.023)	(0.030)	(0.016)	(0.022)	(0.025)	(0.023)
$\widehat{\phi}_{\pi}$	-0.049	0.024	0.034	-0.015	-0.024	0.035	0.092†	-0.167‡	-0.250‡	-0.132‡	-0.215‡	-0.246‡	-0.371‡
	(0.034)	(0.041)	(0.042)	(0.038)	(0.039)	(0.045)	(0.043)	(0.041)	(0.052)	(0.030)	(0.038)	(0.057)	(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†	-0.053†	-0.053‡	-0.104‡	-0.062‡	-0.078‡	-0.060‡	-0.064‡	-0.080†	-0.084‡	-0.086‡	-0.069‡	-0.024
	(0.020)	(0.023)	(0.019)	(0.016)	(0.017)	(0.020)	(0.021)	(0.020)	(0.031)	(0.015)	(0.018)	(0.025)	(0.021)
$\widehat{\phi}_{\pi}$	-0.058†	0.011	0.017	0.005	-0.006	0.054	0.055	-0.149‡	-0.120†	-0.188‡	-0.205‡	-0.087*	-0.141‡
	(0.027)	(0.030)	(0.032)	(0.034)	(0.035)	(0.042)	(0.039)	(0.040)	(0.047)	(0.030)	(0.040)	(0.052)	(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‡	-0.093‡	-0.090‡	-0.087‡	-0.101‡	-0.086‡	-0.085‡	-0.099‡	-0.105‡	-0.111‡	-0.113‡	-0.086‡	-0.084‡
	(0.021)	(0.022)	(0.018)	(0.017)	(0.020)	(0.019)	(0.017)	(0.023)	(0.029)	(0.021)	(0.025)	(0.020)	(0.021)
$\widehat{\phi}_{\pi}$	-0.010	0.078*	0.085†	0.020	0.086*	0.098†	0.107†	-0.153‡	-0.158‡	-0.104‡	-0.117†	-0.147‡	-0.129†
	(0.032)	(0.040)	(0.041)	(0.037)	(0.046)	(0.046)	(0.048)	(0.040)	(0.047)	(0.038)	(0.053)	(0.050)	(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

	ARDL			DL				CS-ARDL		CS-DL			
lags:	(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: $g_1(d_{it},\tau) = I\left[d_{it} > \ln(\tau)\right]$ **and** $g_2(d_{it},\tau) = I\left[d_{it} > \ln(\tau)\right] \times \max(0, \Delta d_{it})$													
$\widehat{\phi}_{\Delta d}$	-0.060‡	-0.047‡	-0.033*	-0.069‡	-0.068‡	-0.049‡	-0.059‡	-0.050‡	-0.059‡	-0.054‡	-0.061‡	-0.070‡	-0.080†
	(0.014)	(0.015)	(0.019)	(0.013)	(0.013)	(0.012)	(0.016)	(0.013)	(0.015)	(0.014)	(0.012)	(0.017)	(0.033)
$\widehat{\phi}_{\pi}$	-0.060*	-0.024	0.012	-0.053*	-0.049*	-0.009	0.019	-0.049*	-0.017	-0.069†	-0.057†	-0.059	-0.019
	(0.033)	(0.038)	(0.070)	(0.030)	(0.027)	(0.038)	(0.038)	(0.026)	(0.042)	(0.029)	(0.026)	(0.043)	(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 $g_1(d_{it},\tau) = I\left[d_{it} > \ln(\tau)\right]$													
$\widehat{\phi}_{\Delta d}$	-0.068‡	-0.058‡	-0.071‡	-0.075‡	-0.075‡	-0.077‡	-0.077‡	-0.068‡	-0.083‡	-0.074‡	-0.070‡	-0.082‡	-0.091‡
	(0.013)	(0.015)	(0.022)	(0.014)	(0.012)	(0.012)	(0.017)	(0.014)	(0.018)	(0.016)	(0.014)	(0.017)	(0.033)
$\widehat{\phi}_{\pi}$	-0.061*	-0.026	0.010	-0.053*	-0.049*	-0.018	-0.007	-0.053*	-0.026	-0.080‡	-0.059*	-0.067	-0.035
	(0.032)	(0.038)	(0.063)	(0.030)	(0.027)	(0.036)	(0.036)	(0.031)	(0.046)	(0.028)	(0.030)	(0.044)	(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 $g_2(d_{it},\tau) = I\left[d_{it} > \ln(\tau)\right] \times \max(0, \Delta d_{it})$													
$\widehat{\phi}_{\Delta d}$	-0.032†	-0.047‡	-0.031	-0.067‡	-0.064‡	-0.032‡	-0.051‡	-0.075‡	-0.062‡	-0.073‡	-0.071‡	-0.071‡	-0.065†
	(0.013)	(0.015)	(0.019)	(0.013)	(0.013)	(0.012)	(0.017)	(0.013)	(0.014)	(0.016)	(0.013)	(0.015)	(0.033)
$\widehat{\phi}_{\pi}$	-0.063†	-0.025	0.017	-0.053*	-0.048*	-0.018	0.002	-0.070†	-0.042	-0.073‡	-0.060†	-0.057	-0.029
	(0.032)	(0.038)	(0.068)	(0.030)	(0.027)	(0.039)	(0.039)	(0.027)	(0.041)	(0.028)	(0.026)	(0.040)	(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‡	-0.062‡	-0.077‡	-0.074‡	-0.065‡	-0.068‡	-0.057‡	-0.072‡	-0.076‡	-0.071‡	-0.071‡	-0.078†	-0.037
	(0.014)	(0.015)	(0.022)	(0.013)	(0.014)	(0.017)	(0.020)	(0.016)	(0.018)	(0.015)	(0.019)	(0.033)	(0.037)
$\widehat{\phi}_{\pi}$	-0.064*	-0.030	-0.000	-0.050*	-0.028	-0.005	-0.029	-0.072*	-0.041	-0.050	-0.046	-0.030	-0.120*
	(0.033)	(0.041)	(0.067)	(0.028)	(0.037)	(0.039)	(0.038)	(0.038)	(0.046)	(0.031)	(0.046)	(0.060)	(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.

References

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