Growth slowdowns redux: New evidence on the middle-income trap

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1 Introduction

- Rapid growth of emerging markets is one of the most important trends of the world economy

- But how long can their rapid growth continue?
  - Middle-income trap
  - All eyes are on China

- Eichengreen, Park and Shin (2012) analyze the international historical experience of growth slowdowns up to 2007 to shed light on future growth prospects → based on PWT 6.3
  - Slowdowns occurred at a mean per capita GDP of USD 16,540 in 2005 constant US dollars at PPP, median of USD 15,085
  - China's figure was USD 8,511 in 2007

- Correlates of growth slowdowns
  - High growth in earlier period
  - Unfavorable demographics
  - Very high investment rates
  - Undervalued exchange rates

1 Introduction

- In this paper, we re-visit these questions
  - ➢ Concerns about slows continue to grow, even for China
  - ➢ More and better data → updated through 2010
  - ➢ Additional determinants of growth slowdowns – level and structure of human capital, level and structure of exports, financial and political stability, and external shocks
- Our new results are broadly consistent with our old results
  - ➢ Growth still slows down in the USD 15,000 range
  - ➢ But we find additional slowdown mode at around USD 11,000
- Some interesting new findings
  - ➢ High quality human capital reduces probability of slowdowns
  - ➢ High-tech exports reduce probability of slowdowns
  - ➢ Less robustly, financial crisis and political regime increase probability of slowdowns

1 Introduction

- Outline of presentation
  - ➤ Data and methodology
  - ➤ New list of slowdowns and comparison with old list
  - ➤ Correlates
  - ➤ Regression analysis
  - ➤ Concluding observations

2 Data and methodology

- Our definition of growth slowdowns builds on a symmetrical analysis of Hausmann, Pritchett and Rodrik (2005)

  ➢ $g_{t,t-n} \geq 0.035$

  the seven-year average growth rate of per capita GDP is 3.5 percent or greater prior to the slowdown (earlier growth was fast)

  ➢ $g_{t,t-n} - g_{t,t+n} \geq 0.02$

  a decline in the seven-year average growth rate of per capital GDP by at least by 2 percentage points (the slowdown is non-negligible)

  ➢ per capita GDP is greater than $10,000 in 2005 constant PPP prices

- Table 1 lists all the slowdowns identified by this approach.

  ➢ The first column shows the slowdown episodes selected only by our earlier paper (Eichengreen, Park and Shin 2012)

  ➢ The second column then presents additional slowdown episodes identified as a result of switching to Penn World Table 7.1.

  ➢ The slowdown episodes in the third column, finally, are those found in both data sets

Table 1. Old and New Slowdown Episodes

Country	Year Penn World Table 6.3	Year Penn World Table 7.1	Year Both	Growth before slowdown (t-7 through t)	Growth after slowdown (t through t+7)	Difference in growth	Per capita GDP at t
Argentina	1970*			3.6	1.5	-2.2	10,927
	1997*			4.3	-0.1	-4.5	12,778
	1998*			3.7	0.5	-3.2	13,132
Australia			1968	4.0	-0.1	-4.0	19,553
			1969	3.9	-0.2	-4.1	20,409
Austria		1960		6.4	3.5	-2.9	10,537
			1961	5.9	3.4	-2.5	11,042
			1974	4.8	2.5	-2.4	18,860
	1976			4.2	2.1	-2.1	18,615
			1977	4.0	1.6	-2.5	20,875
Bahrain			1977	4.7	-3.0	-7.7	30,133
		1978		3.9	-6.2	-10.1	28,339
Belgium			1973	4.7	2.5	-2.2	18,091
			1974	4.9	1.6	-3.3	18,852
			1976	3.9	1.1	-2.8	19,415
Chile	1994*			5.9	3.9	-2.0	11,145
	1995*			6.5	2.8	-3.7	12,223
	1996*			6.1	2.3	-3.8	13,004
	1997*			6.6	2.3	-4.3	13,736
	1998*			6.1	2.7	-3.4	14,011

2 Data and methodology

- In some cases, a string of years are identified as slowdowns
  - ➢ We employ the Chow test for structural breaks to identify one year
  - ➢ We assign 1 for t, t-1 and t+1 and 0 otherwise
  - ➢ We remove data for t+2, ….., t+7 → transition period
  - ➢ The comparison group then consists of all countries that did not experience a growth slowdown in that same year
  - ➢ The sample for the regression includes all countries for which the relevant data are available, including both slowdown countries and others that have never experienced a slowdown
- A number of robustness checks
  - ➢ we also report the results when we do not employ the Chow test
  - ➢ we also report the results when oil countries are removed
  - ➢ Throughout, we report cluster-robust standard errors that account for the panel structure of the data set

3 Slowdowns

- Second column in Table 1 reveals a number of new slowdowns
  - Austria in 1960 and Mexico in 1980
  - Sweden in mid-1960s, Hong Kong in 1981-1982, Oman in mid-1980s
- In other cases, the new version of the Penn World Tables has smoothed previously erratic growth rates so that what were identified as slowdowns no longer qualify
  - Argentina both in 1970 and at the end of the 1990s, Chile in the mid-1990s, Israel in 1996, Lebanon in 1985, Libya in the late 1970s (according to the more recent release, that country's slowdown instead occurred in the mid-1990s), Malaysia in the mid-1990s, Mauritius in 1992, Portugal in 2000, Spain in 1990, and Uruguay in the second half of the 1990s.
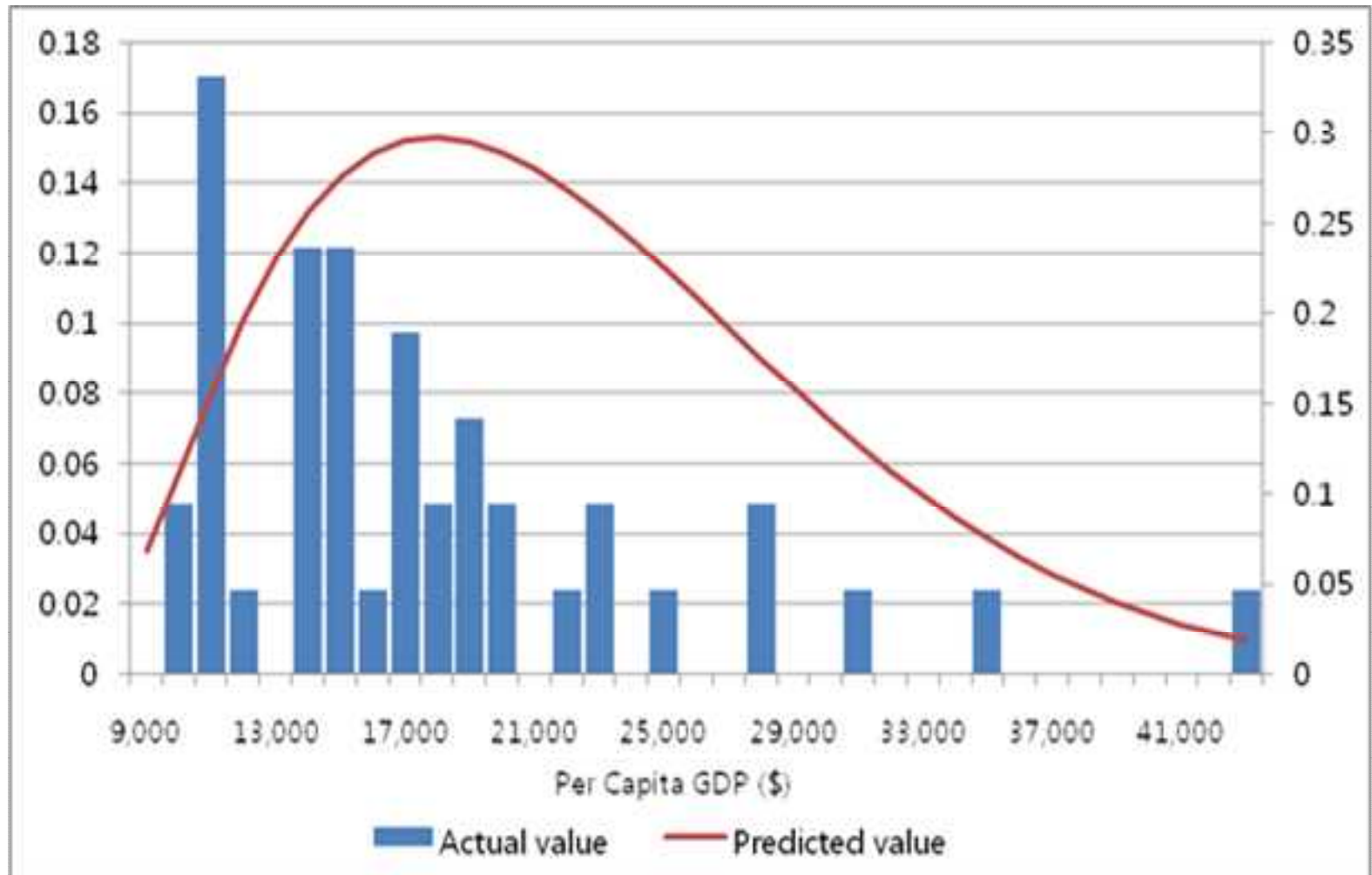
3 Slowdowns

- Extending the data for three additional years through 2010 allows us to analyze a number of recent slowdowns that previously went undetected

  - These include Estonia in 2002-3, Greece in 2003, Hungary in 2003, Spain in 2001 and the UK in 2002-3.

  - That these are all European countries is revealing in light of recent events

- In all but one case where the methodology picked out a string of successive slowdown years and these now remain the same, the Chow Test continues to identify the same unique break point as before.

  - The one exception is South Korea. While our methodology identifies the same string of years from 1989 through 1997 when Korean growth was at least two percentage points slower in the second of two successive seven year periods, the Chow Test previously identified 1997 as the single most significant slowdown year; now, in contrast, it picks out 1989

3 Slowdowns

- Slowdowns, when they occur, are large
  - In the new data set the per capita growth rate slows by 3.6 percentage points between successive seven year periods (oil exporters excluded)
  - This is slightly larger than the average slowdown in the earlier data set
- Figure 1 shows the per capita incomes at which growth rates slowed according to the Chow-Test break points
  - Now, in contrast to before, there appear to be two modes in the distribution of slowdown cases, one at a per capita GDP of approximately $11,000 and another at a per capita GDP of approximately $15,000.
  - The mode around $15,000 is familiar; cases clustered there include New Zealand in 1960, Greece in 1972, Spain in 1975, Ireland in 1978, and Portugal in 1990 but also Cyprus in 1989, Gabon in 1974, Israel in 1976, Oman in 1986, and Singapore in 1980. Countries experiencing slowdown at the modal per capita income we identified previously are, clearly, a heterogeneous lot

Figure 1. Frequency Distribution of Growth Slowdowns

3 Slowdowns

- Figure 1 shows the per capita incomes at which growth rates slowed according to the Chow-Test break points

  - In contrast, the mode at $11,000 is new. In part, it reflects the new dating for Korea, with the country's growth slowdown estimated to have occurred in 1989 (at a per capita income of $10,570) rather than in 1997 (at a per capita income of $17,843), as noted above

  - In part it reflects the fact, also already noted, that Austria in 1960 and Mexico in 1980 were not considered previously because their per capita incomes were below the $10,000 cutoff according to PWT 6.3 but are now slightly above according to the subsequent revision

  - A number of other cases at what is now this second mode, Hungary in 1978-9 and Puerto Rico in 1969 for example, were picked up previously, as were two oil exporters, Venezuela in 1974 and Iran in 1977. The countries clustered at this second mode are, again, quite heterogeneous

3 Slowdowns

- While growth in some of the countries in our sample appears, according to these figures, to slow down at a unique point in time, quite a few experience multiple slowdowns.

  ➤ Austria (1960 and 1974), Hungary (1977 and 2003), Greece (the 1970s and 2003), Japan (the early 1970s and early 1990s), New Zealand (1960 and 1965-6), Norway (1976 and 1997-8), Portugal (1973-4 and 1990-2), Puerto Rico (1970-2, 1988-91 and 2000-3), Singapore (post 1978 and post-1993), Spain (mid-1970s and 2001), and the UK (1988-9 and 2002-3)

  ➤ This substantial list suggests that two-step slowdowns are not uncommon

4 Correlates

- Table 2 summarizes the behavior of the independent variables in the full sample and the slowdown cases
  - At the time of their growth slowdowns, "slowdown countries" have a higher than average GDP per capita
  - Their per capita incomes average two thirds those of the lead country (for most of the sample period the United States), compared to only one third for the control group of non-slowdown cases
  - They are growing faster than average, suggesting that growth slowdowns may have an element of mean reversion
- In addition, while the country-year observations qualifying as slowdown cases are more open to trade than average, it does not appear that they are subject to larger or more variable terms-of-trade shocks
- Slowdown countries are less likely than average to experience political changes, both positive (from autocracy to democracy) and negative (from democracy to autocracy)

Table 2.1. Summary Statistics, Full Sample

Variable	Observation	Mean	Std. Dev.	Min	Max
Per capita GDP	5,028	7,024	8,475	161	46,318
Ratio	5,028	0.26	0.30	0.00	1.44
Pre-slowdown growth	4,207	0.04	0.03	-0.28	0.23
Old dependency	4,739	9.96	5.91	2.35	28.87
Young dependency	4,739	66.2	23.6	21.0	112.4
Consumption share of GDP	5,028	0.71	0.13	0.04	1.00
Investment share of GDP	5,028	0.22	0.10	-0.11	0.80
Government share of GDP	5,028	0.10	0.07	0.01	0.59
Inflation	3,904	0.47	2.79	-0.04	47.54
Inflation variability	3,497	0.58	4.62	0.00	82.01
Exchange rate variability	4,207	39.0	244.9	0.0	4846.2
Undervaluation of real exchange rate	4,680	0.00	0.51	-6.92	2.27
total years of schooling	4,593	5.48	3.00	0.13	12.71
years of schooling, secondary and higher	4,593	1.75	1.43	0.02	7.35
political change	4,578	0.36	0.48	0	1
Positive political change	4,578	0.26	0.44	0	1
Negative political change	4,578	0.15	0.36	0	1
Trade Openness	5,028	0.54	0.39	0.012	3.740
Lower 10% growth of terms of trade from t to t-1	3,584	0.10	0.30	0	1
World GDP growth	3,922	3.17	1.34	0.42	6.58
High technology export ratio	1,254	10.77	12.94	0.00	83.64
Dummy for crisis (t)	5,028	0.30	0.46	0	1
Dummy for crisis (t-1)	5,028	0.30	0.46	0	1
Dummy for crisis (t-2)	5,028	0.29	0.45	0	1

Table 2.2. Summary Statistics, Slowdown Countries

Variable	Observation	Mean	Std. Dev.	Min	Max
Per capita GDP	146	18,234	7,140	10,074	43,927
Ratio	146	0.67	0.18	0.31	1.20
Pre-slowdown growth	143	0.07	0.02	0.04	0.12
Old dependency	129	15.60	5.31	6.41	25.74
Young dependency	129	38.00	10.32	21.35	86.80
Consumption share of GDP	146	0.62	0.09	0.33	0.78
Investment share of GDP	146	0.31	0.08	0.14	0.50
Government share of GDP	146	0.08	0.04	0.02	0.25
Inflation	126	0.06	0.04	0.01	0.21
Inflation variability	123	0.03	0.03	0.00	0.14
Exchange rate variability	143	5.90	16.49	0.00	76.99
Undervaluation of real exchange rate	138	0.06	0.31	-0.45	1.02
total years of schooling	135	8.17	1.90	3.86	11.50
years of schooling, secondary and higher	135	2.91	1.19	0.71	5.53
political change	127	0.24	0.43	0	1
Positive political change	127	0.20	0.40	0	1
Negative political change	127	0.04	0.20	0	1
Trade Openness	146	0.75	0.71	0.09	3.23
Lower 10% growth of terms of trade from t to t-1	121	0.04	0.20	0.00	1.00
World GDP growth	127	3.25	1.60	0.42	6.58
High technology export ratio	45	24.60	15.00	3.53	57.02
Dummy for crisis (t)	146	0.42	0.50	0	1
Dummy for crisis (t-1)	146	0.32	0.47	0	1
Dummy for crisis (t-2)	146	0.27	0.45	0	1

4 Correlates

- Our slowdown cases seem to have moved further up the technological ladder into the production and export of high tech products compared to the control group of countries
- Consistent with this, our slowdown cases have higher average levels of education, both overall and in terms of average years completed of secondary and tertiary schooling
- In contrast, there is not much of a difference in the simple incidence of financial crises between slowdown cases and the control group, although the frequency of financial crises either in the first year of the slowdown or one of the two years preceding is slightly higher in slowdown cases

5 Determinants

- Table 3 replicates our earlier baseline regressions of the occurrence of a slowdown on per capita GDP and its square, expressed in levels and alternatively as a ratio to U.S. GDP per capita on the pre-slowdown growth rate in percentage points and additional controls

- These are probit regressions, where in Table 3.1 all slowdown years identified by our criteria are coded as one, while in Table 3.2 we so code only the break point identified by the Chow Test

5 Determinants: Baseline results

- Throughout, we report regression results both identifying strings of consecutive slowdown years and individual Chow-Test dates

- We also report regressions including both the level of per capita GDP and its ratio relative to the United States (some people preferring the latter)

- While oil exporters are excluded in what follows, most of the results are, in fact, robust to their inclusion

5 Determinants: Baseline results

- As before, both per capita GDP and its square enter with coefficients significantly different from zero at the 1 per cent level, the level positively, the square negatively

- When we include only the level and square of per capita GDP (column 1), the likelihood of a slowdown peaks at $17,900 US dollars (year 2005), a higher level than in the raw data and higher than we found in our previous work

- When we include other control variables, the peak is even higher, just over $20,000

- In addition, the probability of a slowdown is significantly greater the higher pre-slowdown growth

- Expressed in ratio form, the probability of a slowdown peaks when per capita GDP is roughly three-quarters that in the lead country (column 2)

5 Determinants: Baseline results

- As before, we still find that a high investment ratio increases the likelihood of a slowdown over the relevant range. This relationship is even stronger when we include just the linear term in the investment ratio. In the raw data there is a tendency for the investment ratio to rise further from relatively high levels in the lead-up to slowdowns and to decline thereafter

- Similarly, we again find that slowdowns are more likely in countries with undervalued exchange rates, other things equal (here, as before, undervaluation is calculated by regressing the real exchange rate on per capita GDP to account for Balassa-Samuelson effects, and taking the residual)

- A high old-age dependency ratio similarly increases the likelihood of a slowdown, although this result is no long statistically significant at conventional confidence levels (it was only marginally significant in our earlier paper)

5 Determinants: Baseline results

- Again as before, we find that slowdowns are less likely in more open economies over the relevant range, where this effect now registers at a higher level of statistical significance than previously, especially when we code as one the entire sequence of consecutive slowdown years

5 Determinants: Human capital

- As shown in Table 4, years of schooling in total displays no evident association with slowdowns. But when we include both total years of schooling and years of schooling at the secondary level and higher as separate variables, the latter is strongly negative: the more university attendees and graduates, on average, the less the likelihood of a slowdown

- That the number of graduates of secondary schools and universities exerts this negative effect is intuitive: more advanced education may be especially valuable for middle-income countries seeking to avoid a slowdown by moving into more the production of more technologically sophisticated goods and services

- But why total years of schooling is positively (and in most cases significantly) associated with the probability of a slowdown after controlling separately for higher education is less intuitive

Table 4. The impact of human capital structure on growth slowdowns
Table 4.1. Probit regressions using consecutive points

	Growth Slowdown			
	[1]	[2]	[3]	[4]
per capita GDP	63.411**		62.769**	
	[13.940]		[13.943]	
per capita GDP^2	-3.165**		-3.100**	
	[0.723]		[0.717]	
Pre-slowdown growth	62.008**	47.338**	69.881**	51.194**
	[6.843]	[6.456]	[7.786]	[6.577]
Ratio		20.094**		20.899**
		[3.958]		[3.572]
Ratio^2		-13.077**		-13.161**
		[3.115]		[2.690]
total years of schooling	-0.09	0.049	0.16	0.292**
	[0.089]	[0.086]	[0.116]	[0.102]
years of schooling, secondary and higher			-0.594**	-0.551**
			[0.171]	[0.157]
Observations	3565	3565	3565	3565

Table 4.2.Probit regressions using Chow test points

	Growth Slowdown			
	[1]	[2]	[3]	[4]
per capita GDP	34.410**		34.237**	
	[11.892]		[11.423]	
per capita GDP²	-1.698**		-1.669**	
	[0.623]		[0.594]	
Pre-slowdown growth	32.530**	30.113**	36.630**	33.587**
	[5.961]	[5.419]	[6.332]	[5.734]
Ratio		9.972**		10.393**
		[1.569]		[1.584]
Ratio²		-5.273**		-5.141**
		[1.217]		[1.040]
total years of schooling	-0.024	0.007	0.240**	0.266**
	[0.067]	[0.065]	[0.091]	[0.092]
years of schooling, secondary and higher			-0.554**	-0.556**
			[0.145]	[0.144]
Observations	2970	2970	2970	2970

5 Determinants: Political regime change

- We distinguish countries with positive political changes (movements away from autocracy and toward democracy) and negative political changes (movements away from democracy and toward autocracy)

- In Table 5 we list slowdown cases where there was a political regime change in the preceding five years. We see a large predominance of positive regime change cases

- Table 6 shows the associated regressions. Political change overall (both positive and negative) has no significant association with the probability of a slowdown. But when we distinguish positive and negative changes, positive changes significantly increase the likelihood of a slowdown in one of our two specifications

- Movements in the direction of democracy are sometimes associated increases in labor action and production costs – in Korea following democratization in 1987, for example

Table 5.Dating of Institutional Changes and Slowdowns

country	year	per capita GDP	pre growthrate (t-7 to 0)	post growthrate (0 to t+7)	Growth difference	positive regime change	negative regime change
Bahrain	1977	30,133	4.7	-3	-7.7	1	1
	1978	28,339	3.9	-6.2	-10.1	0	1
Greece	1969	11,282	8.3	4.8	-3.5	0	1
	1970	12,271	7.9	3.8	-4.1	0	1
	1971	13,194	7.6	3.5	-4.1	0	1
Israel	1970	12,275	5.5	2.3	-3.2	0	1
	1971	13,115	5.7	1.9	-3.8	0	1
Estonia	2002	12,526	7.1	3.9	-3.2	1	0
	2003	13,591	7.4	3.2	-4.2	1	0
France	1973	18,225	4.5	2.3	-2.2	1	0
Gabon	1994	11,828	3.8	-1.7	-5.5	1	0
Greece	1974	14,304	6	2.1	-3.9	1	0
	1975	14,988	5.6	1.2	-4.4	1	0
	1976	15,819	4.8	0.1	-4.7	1	0
	1977	15,955	3.8	0.2	-3.6	1	0
	1978	16,910	3.5	-0.3	-3.8	1	0
Korea, Republic of	1989	10,570	8.8	6.7	-2.1	1	0
	1990	11,643	8.8	5.7	-3.1	1	0
	1991	12,714	9	2.8	-6.2	1	0
	1992	13,077	8.5	4	-4.5	1	0
Kuwait	1993	45,376	6.4	-2.8	-9.2	1	0
	1994	43,825	6.1	-2.5	-8.6	1	0
	1995	43,893	6.3	-2.8	-9.1	1	0
	1996	43,346	3.9	-0.3	-4.2	1	0
Mexico	1980	10,208	4.1	-2	-6.1	1	0
	1981	10,882	4.4	-2.9	-7.3	1	0
Portugal	1974	10,238	7.4	1.5	-5.9	1	0
	1977	10,086	3.8	0.9	-2.9	1	0
Spain	1975	15,123	4.7	0.4	-4.3	1	0
	1976	15,463	3.9	0.2	-3.7	1	0
	1977	15,549	3.5	0.3	-3.2	1	0
Taiwan	1992	15,609	7.5	4.8	-2.7	1	0
	1993	16,512	6.9	4.8	-2.1	1	0
	1994	17,581	6.4	3.4	-3	1	0
	1995	18,542	6.5	3.3	-3.2	1	0
	1996	19,361	5.9	3.1	-2.8	1	0
	1997	20,330	5.7	3.3	-2.4	1	0

Table 6. The impact of political changes on growth slowdowns
Table 6.1. Probit regressions using consecutive points

	Growth Slowdown			
	[1]	[2]	[3]	[4]
per capita GDP	60.405**		59.503**	
	[13.946]		[13.512]	
per capita GDP^2	-3.023**		-2.976**	
	[0.724]		[0.702]	
Pre-slowdown growth	60.802**	44.898**	62.266**	45.903**
	[6.901]	[5.952]	[6.878]	[6.061]
Ratio		19.838**		19.989**
		[3.718]		[3.806]
Ratio^2		-12.629**		-12.719**
		[2.957]		[3.010]
political change	0.061	0.523		
	[0.263]	[0.280]		
Positive political change			0.196	0.698*
			[0.283]	[0.311]
Negative political change			-0.643	-0.368
			[0.492]	[0.376]
Observations	3677	3677	3677	3677

Table 6.2.Probitregressions using Chow test points

	Growth Slowdown			
	[1]	[2]	[3]	[4]
per capita GDP	40.603**		39.390**	
	[13.282]		[12.573]	
per capita GDP^2	-2.005**		-1.942**	
	[0.693]		[0.658]	
Pre-slowdown growth	37.337**	33.033**	38.118**	33.977**
	[6.525]	[5.829]	[6.541]	[5.977]
Ratio		11.554**		11.719**
		[1.924]		[1.976]
Ratio^2		-6.089**		-6.184**
		[1.365]		[1.392]
political change	0.388	0.484		
	[0.281]	[0.272]		
Positive political change			0.580	0.704*
			[0.300]	[0.292]
Negative political change			-0.505	-0.503
			[0.455]	[0.402]
Observations	2848	2848	2848	2848

5 Determinants: External factors

- Table 7 looks more broadly at the role of external factors in precipitating growth slowdowns, distinguishing trade openness from terms-of-trade shocks and global GDP growth

- The effect of trade openness is not consistent across specifications, but the likelihood of a slowdown is minimized at a trade (export plus import)-to-GDP ratio of approximately 1.3

- the terms of trade shock varies in sign and is generally insignificant

- The coefficient on global GDP growth also differs insignificantly from zero in most specifications, but where it is significant it is always negative, consistent with intuition

- This more careful look at external factors thus confirms that these matter for growth slowdowns in the expected way, although precise effects are sensitive to sample and specification

Table 7. The Impact of external shocks on growth slowdowns
Table 7.1 Probit regressions using consecutive points

	Growth Slowdown			
	[1]	[2]	[3]	[4]
per capita GDP	61.393**		60.946**	
	[16.799]		[17.620]	
per capita GDP^2	-3.076**		-3.045**	
	[0.874]		[0.915]	
Pre-slowdown growth	68.133**	58.029**	71.487**	61.564**
	[8.269]	[8.341]	[9.429]	[9.649]
Ratio		18.388**		20.283**
		[3.502]		[4.563]
Ratio^2		-11.366**		-13.011**
		[2.761]		[3.763]
Trade openness	-1.414*	-0.970*	-1.127	-0.653
	[0.581]	[0.493]	[0.653]	[0.570]
Trade openness^2	0.509**	0.363*	0.416*	0.254
	[0.188]	[0.157]	[0.204]	[0.177]
Lower 10% growth of terms of trade from t to t-1	0.006	-0.234	0.169	-0.156
	[0.429]	[0.363]	[0.446]	[0.363]
World GDP growth			-0.107	-0.159
			[0.146]	[0.121]
Observations	3083	3083	2726	2726

Table 7.2 Probit regressions using Chow test points

	Growth Slowdown			
	[1]	[2]	[3]	[4]
per capita GDP	31.081*		27.964*	
	[13.431]		[12.850]	
per capita GDP^2	-1.527*		-1.374*	
	[0.710]		[0.683]	
Pre-slowdown growth	36.121**	34.553**	38.622**	36.679**
	[7.785]	[7.467]	[8.291]	[7.884]
Ratio		9.061**		10.016**
		[1.546]		[2.127]
Ratio^2		-4.460**		-5.497**
		[1.124]		[1.937]
Trade openness	-1.338*	-1.132*	-1.326	-1.135
	[0.583]	[0.541]	[0.677]	[0.619]
Trade openness^2	0.469	0.405	0.452	0.386
	[0.245]	[0.229]	[0.268]	[0.245]
Lower 10% growth of terms of trade from t to t-1	0.446	0.26	0.418	0.216
	[0.390]	[0.308]	[0.389]	[0.313]
World GDP growth			-0.224	-0.24
			[0.129]	[0.128]
Observations	2458	2458	2102	2102

5 Determinants: Tech. content of exports

- An important challenge for middle-income countries seeking to maintain their customary high growth rates is to move up the technological ladder into the production of more technologically sophisticated goods, in part in order to get out of the way of lower-cost developing countries beginning to penetrate global markets for low-tech products (assembly operations and the like)

- In Tables 8.1 and 8.2 we therefore report regressions that include the share of high tech exports as a share of total manufactured exports

- In Table 8.2, where we use the Chow-Test approach to identify unique slowdown years, the results suggest that middle-income countries with a relatively large share of high-tech exports are less susceptible to slowdowns

- The results in Table 8.1 are less supportive of the hypothesis

Table 8. The Impact of the high-technology exports ratio on growth slowdowns
Table 8.1 Probitregressions using consecutive points

	Growth Slowdown							
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
per capita GDP	52.635*	50.624*	55.220*	52.809*				
	[25.025]	[24.253]	[26.674]	[25.603]				
per capita GDP^2	-2.563*	-2.474*	-2.692*	-2.583*				
	[1.275]	[1.243]	[1.356]	[1.309]				
Pre-slowdown growth	89.331**	89.517**	92.160**	92.304**	68.676**	70.432**	69.835**	71.232**
	[15.265]	[15.633]	[16.100]	[16.578]	[11.094]	[12.722]	[11.329]	[13.090]
Ratio					13.757**	14.392**	13.984**	14.572**
					[3.802]	[4.118]	[3.868]	[4.187]
Ratio^2					-8.112*	-8.673*	-8.266*	-8.788*
					[3.199]	[3.492]	[3.239]	[3.522]
High technology export ratio	-0.009	0.04	0.031	0.076	-0.008	0.045	0.011	0.058
	[0.019]	[0.048]	[0.025]	[0.053]	[0.017]	[0.035]	[0.019]	[0.031]
Trade openness		0.772		0.759		1.887		1.866
		[1.760]		[1.788]		[1.457]		[1.458]
Trade openness^2		-0.049		-0.045		-0.444		-0.439
		[0.470]		[0.473]		[0.404]		[0.404]
Trade openness*high technology export ratio		-0.075		-0.074		-0.1		-0.098
		[0.064]		[0.064]		[0.056]		[0.056]
Trade openness^2*high technology export ratio		0.017		0.017		0.029		0.028
		[0.016]		[0.016]		[0.018]		[0.018]
World GDP growth			0.053	0.033			-0.002	0.011
			[0.157]	[0.161]			[0.118]	[0.112]
World GDP growth*high technology export ratio			-0.014*	-0.013*			-0.007	-0.005
			[0.007]	[0.006]			[0.005]	[0.005]
Observations	1187	1187	1187	1187	1187	1187	1187	1187

Table 8.2 Probitregressions using Chow test points

	Growth Slowdown							
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
per capita GDP	10.468	12.416	10.306	12.26				
	[15.741]	[15.314]	[15.847]	[15.193]				
per capita GDP²	-0.375	-0.476	-0.366	-0.469				
	[0.829]	[0.809]	[0.835]	[0.802]				
Pre-slowdown growth	98.818**	104.585**	98.375**	103.612**	93.260**	96.438**	92.930**	95.290**
	[16.528]	[23.665]	[17.501]	[24.929]	[18.727]	[25.929]	[19.566]	[27.030]
Ratio					12.889**	13.557**	12.877**	13.392**
					[3.623]	[4.802]	[3.641]	[4.903]
Ratio²					-5.618*	-6.105*	-5.590*	-6.007*
					[2.359]	[2.890]	[2.332]	[2.907]
High technology export ratio	-0.055**	-0.005	-0.091**	-0.018	-0.054**	-0.006	-0.091**	-0.026
	[0.018]	[0.062]	[0.033]	[0.068]	[0.020]	[0.060]	[0.033]	[0.071]
Trade openness		0.037		0.028		0.563		0.514
		[2.927]		[2.916]		[2.744]		[2.758]
Trade openness²		0.677		0.669		0.44		0.44
		[0.960]		[0.958]		[0.898]		[0.899]
Trade openness*high technology export ratio		-0.068		-0.066		-0.069		-0.066
		[0.095]		[0.095]		[0.096]		[0.097]
Trade openness²*high technology export ratio		0.005		0.005		0.007		0.007
		[0.026]		[0.026]		[0.026]		[0.026]
World GDP growth			-0.976*	-0.716*			-0.878*	-0.664*
			[0.455]	[0.319]			[0.434]	[0.335]
World GDP growth*high technology export ratio			0.012	0.004			0.013	0.006
			[0.010]	[0.008]			[0.010]	[0.009]
Observations	800	800	800	800	800	800	800	800

5 Determinants: Financial instability

- Table 9 shows the distribution of crises around our Chow Test slowdown dates. Most types of crises – currency crises, banking crises, debt crises, inflation crises – accompany only a relatively small minority of our slowdown cases

- Stock market crises or crashes are clearly different; there is a relatively high incidence of these both before and after our slowdown episodes

- Table 10 reports the associated regression results. The crisis dummy lagged one year is positive and consistently significant at a relatively high level of confidence when we consider the entire sequence of slowdown years. The other results reported previously remain intact

Table 9.Crises and slowdowns

	Consecutive Slowdown Points						Chow Test Slowdown Points					
	t-2	t-1	t	t+1	t+2	Not during t-2~t+2	t-2	t-1	t	t+1	t+2	Not during t-2~t+2
Currency Crisis	7	3	5	9	12	76	2	1	1	2	4	19
Banking Crisis	4	4	8	12	15	83	1	1	2	1	4	21
Stock Crisis	33	41	57	58	46	19	4	8	14	15	12	5
Inflation Crisis	1	2	5	6	5	93	0	1	3	1	2	23
Domestic debt Crisis	0	0	0	1	1	105	0	0	0	1	0	26
External debt Crisis	0	0	0	1	2	105	0	0	0	1	1	26
Any of the sixcrises	40	47	62	67	59	15	6	10	15	16	16	3

5 Determinants: Financial instability

- To shed some light on the channels through which crises may lead to slowdowns, we added the investment ratio both before and after the year of the observation to this specification

- Specifically, we added two variables, one the average investment-to-GDP ratio over the preceding seven years, the other the average investment-to-GDP ratio over the subsequent seven years

- In this augmented specification, the investment ratio tends to enter positively before the slowdown (as before) but negatively thereafter; both measures are generally statistically significant at the ten per cent confidence level or better

- Importantly, the crisis variable no longer differs from zero at conventional confidence levels

- Therefore, crises may lead to slowdowns by depressing investment for an extended period

6 Concluding observations

- Rapid growth in emerging markets is perhaps the single most important economic development affecting the world's population in the last quarter century

- An important question is therefore "How long will it last?"

- Interest in this question has intensified with the deterioration in the global outlook following the onset of the global financial crisis

- Even China, the largest and most dynamic emerging market, has seen slower economic growth since the crisis, although opinion is divided over what this implies for the future

- Much of the literature on this topic flies under the heading of "the middle income trap"

- The troubled global outlook now poses a risk that even dynamic middle income economies like China might become trapped

6 Concluding observations

- In this paper we have again considered what history has to say about this question, revisiting the incidence and correlates of growth slowdowns

- In contrast to our earlier results, which pointed to the existence of a single mode around $15,000-$16,000 purchasing power parity 2005 dollars at which slowdowns typically occur, our new analysis points to the existence of two modes, one in the $10,000-$11,000 range and another around $15,000-$16,0000"

- The new analysis again confirms that slowdowns are more likely in economies with high old age dependency ratios, high investment rates that may translate into low future returns on capital, and undervalued real exchange rates that provide a disincentive to move up the technology ladder

6 Concluding observations

- In addition, we find that slowdowns are less likely in countries with high levels of tertiary education and where high-tech products account for a large share of exports, consistent with our earlier emphasis of the importance of moving up the technology ladder in order to avoid the middle income trap

- What do these new results imply for China? China has slightly higher average years of schooling at the secondary level than the median for our slowdown cases (3.17 years in China versus 2.72 years in our slowdown cases). It has a higher share of high-tech goods in exports (27.5 per cent in China versus 24.1 in our slowdown cases). In this sense China appears to be doing slightly better than average in moving up the technology ladder so as to avoid the middle-income trap

6 Concluding observations

- Our finding that high quality human capital reduces the probability of a slowdown seems intuitive. Skilled workers are needed to move up the value chain from low value-added industries and activities. High quality human capital is especially important for modern high value-added activities like business services

- Even emerging markets that have achieved rapid improvement in overall education attainment can suffer from shortages of specific kinds of skilled workers. ADB (2008) warns that such shortages are sufficiently prevalent to pose a risk to growth in China and other parts of emerging Asia

- That a large share of high-tech exports reduces the likelihood of a slowdown points to the same conclusion. Intuitively, the inherited stock of human capital shapes a country's ability to move up the technology ladder and its capacity export products embodying advanced technology

6 Concluding observations

- Other variables, from political regime changes and financial instability to trade openness, terms-of-trade shocks and global growth, also show some association with growth slowdowns. But compared to educational attainment and the structure of exports, they are less robustly related

- At some point, high growth in low- and middle-income countries will come to an end. But this does not mean that a slowdown at a specific income level is inevitable. Not all countries are equally susceptible

- Countries accumulating high quality human capital and moving into the production of higher tech exports stand a better chance of avoiding the middle income trap