The Great Recession and Small States

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Abstract

This paper raises a simple question: relative to the rest of the world, how was small state real per capita GDP growth impacted by the Great Recession of 2008–2009? While holding constant average business cycle dynamics, we isolate this shock to measure how small countries around the globe responded to the recession – something that has not been studied before. The results indicate that while small states had a more pronounced contraction than the rest of the world going into the Great Recession, their rebound was both stronger and quicker, allowing them to return to their long-run growth rates more rapidly than other countries. Additionally, the methods and data configurations used in this study will provide guidance to researchers analysing future global exogenous shocks.

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Introduction

Small states are countries with populations of about 1.5 million people or fewer.[4] They tend to have higher per capita GDP, greater levels of productivity, higher systematic growth volatility, and a higher degree of trade openness than their larger cousins (e.g. Easterly and Kraay 2000; Cabezon *et al* 2015; Briguglio 2016; Briguglio and Vella 2018; Crispolti 2018; Edwards and Romero 2020). Because they have small populations and are generally landlocked or island nations, however, it has been thought that small states are more vulnerable to a wide range of exogenous shocks. Indeed, the World Bank (2022 p 1) defines small states as facing '…unique development challenges. Due to their small population and economic base, these countries are particularly vulnerable to exogenous shocks such as economic shocks, natural disasters, and climate change. With limited economic opportunities and significant migration, they often face capacity constraints.'[5]

These claims are based largely upon either simple extrapolation, such as in the World Bank statement, or on the relationship between a standard set of determinants such as trade openness, FDI, etc., and growth rates. By evaluating differences in the sign or value of the estimate(s), researchers argue whether

small state economies are 'like' the rest of the world when formulating some of these opinions. That said, these studies are largely devoid of methodologies separating exogenous shocks from regular business cycle dynamics and do not seem adequately to measure the degree to which these smaller countries rebound from said shocks. For instance, Easterly and Kraay (2000) reference 'numerous conferences and seminars' on the economic 'difficulties' small states are presumed to have, yet test this by regressing average growth and its standard deviation over a 35 year period (i.e., long-run rates) on variables such as schooling, trade share, etc. The coefficient estimates on these variables are then compared to other nation-groups in an attempt to highlight differences across them.

While their study is indeed an important one, we believe that the differences between small states and the rest of the world can better be captured by focusing upon how they handle global shocks relative to other groups. Instead, researchers should be evaluating isolated periods surrounding these shocks and the speed at which small states respond by first separating out as much of the average business cycle dynamic as possible; they can then focus the microscope on the shock itself as a deterministic change in growth rather than as a 'correlated' systematic change in growth.

In this paper, we focus exclusively on the shock caused by the Great Recession of 2008-2009 on small states. The Great Recession was unique in its origins, global reach, and severity, compared with other post-World War II recessions. The International Monetary Fund (2009), for example, in its World Economic Outlook in April, 2009 labelled it 'the deepest post-World War II recession by far' (p xii) and 'an unprecedented contraction of activity and trade' (p 1). Griffith-Jones and Ocampo (2009 p 4) note that it was 'the worst global financial crisis and the worst recession since the Great Depression', while Ocampo *et al* (2012 p 3) add that it was also 'one of the worst (if not the worst) collapses of international trade in history.' Thus, this shock provides a particularly cogent lens through which to view the relative impacts of global shocks on small states vis-à-vis larger countries.

After it has been determined whether small states are affected by, and/or respond to, shocks (in our case, the Great Recession) similarly to countries with larger populations, then and only then should researchers analyse exactly which determinants can 'close the gap' in GDP growth between the two country types during these periods, if they are indeed different. Policy prescriptions can subsequently be written to manipulate these determinants in the 'correct' direction. If there is no significant difference between small states and larger countries when analysing these shocks, then we can conclude that there is no justification for them to deviate from their current policy prescriptions, except perhaps at the margins.

We begin this paper by using various estimation techniques and data configurations to compare changes in long-run real per capita GDP growth for small states relative to larger countries across the years of the Great Recession.

Relative to the rest of the world, we measure how much contraction in real per capita GDP growth was experienced by small states during this period, as well as their rebound. Our results are contrary to the World Bank's implicit assumption of small states, i.e. that because of their 'challenges', shocks they face which normally require a rapid expansion of capacity – capacity they lack, naturally result in a deeper contraction and slower expansion. Rather, our results are more in line with Easterly and Kraay (2000), whereby small states act much like larger nations but with one adjustment – our results also indicate that they may even respond to shocks more rapidly, and therefore more effectively, than larger countries. We find that even though the shock of the Great Recession was somewhat deeper for small states, they returned to long-run growth more quickly than the rest of the world – i.e. the recession for them was slightly deeper, but shorter. The authors of the present paper would not be surprised if future research determines that larger countries should take a page from the small state playbook when responding to shocks, rather than the other way around. But there is a second and more benign outcome of this paper that should help future researchers as well.

The second outcome of this paper is that the multiple estimation methods and country group configurations we use will help to guide future researchers when they inevitably investigate the impact of recent and future shocks on these same countries, as more data becomes available. Even though the data are sourced solely from the World Banks's World Development Indicators (WDI) database, we explore three different, well known, small state country configurations and employ everything from simple, pooled OLS procedures to far more advanced, highly customised dynamic panel models. We find that in general, the results remain robust across all group and methodological permutations. This should help future researchers focus more on inference and less on exactly which configuration and/or methodology is best suited to their small state research question(s).

Literature Review

Kose and Terrones (2015) identify four global recessions since 1960: in 1975, 1982, 1991, and 2009. Their analysis shows that the typical global recession leads to a 0.7 per cent decline in GDP per capita, or about 3 percentage points lower than average annual growth of the world economy during expansion years (2.4 per cent), while recoveries are generally characterised by 'average growth over the three years following a global recession close to the average growth of the world economy in a typical year.' (Kose and Terrones (2015 p 75) With respect to recovery after the 2008–2009 Great Recession, however, 'the recovery … has played out along significantly different trajectories for advanced versus emerging market economies. For advanced economies, it has been the weakest recovery among the four episodes; for emerging market economies – at least until 2014 – it has been the strongest.' (Kose and Terrones (2015 pp 4-5).

While other global recessions also included financial market challenges, the 2009 Great Recession was unique for a variety of reasons, including the origin, severity, and breadth of the worldwide financial crisis and depth and diffusion of the ensuing worldwide recession. For example, Kose and Terrones (2015 p 5) note that 'the 2009 global recession was the most synchronized of the four episodes… this is important because historical evidence suggests that highly synchronized recessions tend to be deeper and longer.' In addition, the fact that the Great Recession originated with a severe financial crisis in the US and spread quickly around the world is important here; none of the other global recessions identified by them have a severe financial crisis as their root cause.

Moreover, recessions caused by financial crises tend to produce more severe and protracted economic contractions than recessions caused by other factors. Cerra and Saxena (2008) and Teulings and Zubanov (2014) study the extensive effects of financial crises on output. They show that financial crises produce large negative effects on output (7.5 to 10 per cent output contraction) that persist for up to 10 years. Although their analyses do not focus on small states, they do cover a large set of countries (190 and 99 countries, respectively). The evidence of the severity of financial crises found in both studies is applicable to small states as well. For instance, in the Cerra and Saxena study, Western Hemisphere Island countries had a more severe output shock following a financial crisis —up to 15 per cent contraction over ten years. In terms of severity, none of the other three global recessions identified by Kose and Terrones were close; except for the Great Depression, no recession in the post-war period caused such deep and widespread global contraction.

The shock caused by the Great Recession is also of particular interest in the case of small states because they are even more highly integrated in the global financial system than the typical large country. For example, World Bank data show that Pacific Island states, and small states in general, have trade to GDP shares close to 110 per cent, compared with less than 50 per cent for non-island developing countries. In Pacific Island small states, remittances account for up to 10 per cent of GDP. Shocks caused by financial crises, as occurred in the Great Recession, would be expected to more quickly propagate through small states than other less integrated countries, prompting the rationale and historical focus for this study.

Antonakakis and Badinger (2016), while investigating the G7 group of countries, note that there was a very sharp increase in output growth volatility (from 27 per cent to 45 per cent) in late 2008 to early 2009. Arias and Wen (2015) also describe variations in growth during the Great Recession and the unequal recoveries seen in different economies. If Ramey and Ramey (1995), Badinger (2010), and Antonakakis and Badinger (2016) are correct when concluding that, empirically, there is an inverse relationship between volatility and growth – countries with higher volatility tend to have lower growth rates – and if small states have all of the constraints the World Bank says they do (see

above), it would make sense to conclude that small states would have suffered a larger contraction and slower expansion than larger countries. Supporting this line of thinking, the literature on small states has tended to focus on their economic vulnerabilities. Their 'disadvantages' range from being remote or landlocked, prone to hurricanes and other environmental catastrophes, vulnerability to terms of trade shocks, and an inability to realise increasing returns to scale (Srinivasan 1986; Streeten 1993; Briguglio 1995). Small states have greater dependence on foreign aid, remittances, and export revenues, all of which make them more vulnerable to external economic shocks (McGillivray *et al* 2010).

On the other hand, as pointed out by Srinivasan (1986 p 207), despite perceived economic challenges, 'smallness is neither a necessary nor sufficient condition for slow economic development.' Later, Easterly and Kraay (2000 p 224) suggested that despite greater growth volatility in per capita income in small states, relative to larger states, there is 'no significant difference in growth performance'.

Therefore, while it is true that small states face unique challenges – related to geography, small population size and environmental disadvantages – which predispose their economies to higher systematic volatility, there are no intrinsic reasons why the economies of these countries should be different from larger countries when responding to exogenous shocks.

Studies that have delved specifically into the economic growth outcomes of small states during the Great Recession are few and far between and usually investigate sub-groupings of small nations, such as islands. For instance, Colmer and Wood (2012) found that the 2008 global financial crisis did not produce a substantial direct impact on Pacific Island Countries (PICs), however, the subsequent global recession in 2009 did. Output levels remained relatively resilient in many PICs, but small states experienced a substantial fall in output. Kouame and Reyes (2011) found that the Great Recession produced a sharp growth contraction ranging from –7.7 to –0.3 in the Caribbean, far deeper than the rest of Latin America. Kumar and Singh (2009) found that the recession had a negative impact on tourism and exports, especially in the smallest PICs. Lastly, analysis by the OECD shows that in comparison to other developing countries, Small Island Developing States (SIDS) were hit the hardest by the 2008-09 global financial crisis, with their average GDP growth rates slumping from 8.8 per cent to 0.9 per cent in 2009, compared with a drop from 8.9 per cent to 3.4 per cent for other developing countries as a whole (OECD 2018). The impact was felt more severely in upper-middle income and Caribbean SIDS, given their greater integration in the global economy, through financial services, remittances, tourism and exports, than other SIDS.

In this paper, we attempt to bridge the gap between the larger more comprehensive studies and these studies of small state subcategories by looking more broadly at the small state category itself as traditionally defined by the World Bank and Easterly and Kraay (2000). We view our paper to be

complementary to the body of literature inaugurated by Cerra and Saxena (2008) and built upon by Teulings and Zubanov (2014) and Bakas and Mendieta-Muñoz (2020), who use dynamic models for output growth that include dummy variables to capture the occurrence of financial crises, and create impulse functions to measure the permanent effects of the shocks on macroeconomic outcomes--in particular output. Their work is generally centred on the question of 'whether countries recover from such large negative shocks in the sense that output losses are reversed.' (Cerra and Saxena 2008 p 439).

While the work of Cerra and Saxena (2008) suggests differences in the severity of the negative economic impact at the start of a global financial crisis between lower-income and higher-income countries (distinct from small versus large state economies), the primary focus of this recent literature is on the question of whether output losses resulting from financial and political crises have permanent or transitory effects; and the size and duration of output loss in response to the crisis onset. While related, the question we ask is different and more focused: relative to the rest of the world, how was small state real per capita GDP growth impacted by the Great Recession of 2008–2009? We focus specifically on the dynamic(s) of the contraction and recovery of these countries from the Great Recession and relate those findings to the rest of the world. However, ours is not an attempt to explain the contraction and recovery, but simply to measure it while holding constant business cycle dynamics. This has never been done before and is necessary if future research wants to take this a step further by relating our findings to a set of determinants addressing specific questions and/or hypotheses.

Data

Since this paper is simply about measuring the shock of the Great Recession experienced by small states, confidence in the results will not be reinforced by what is in the conditioning set as much as it will be by the countries used and the estimation method employed.

We have data on all 195 countries from the World Bank's WDI dataset. We are using uneven panel data that span the years 1960 to 2020 with observations numbering from 8,699 to 9,089, depending on the model. We use three different country configurations: (1) countries that were used in Easterly and Kraay (2000), (2) countries the World Bank includes in its Small States Forum, and (3) countries that the World Bank formally defines as small states, which are states that had a population less than 1.5 million in 2008 (which was arguably the beginning of the recession). All three lists appear in Appendix A. We pull our data for all three configurations from the WDI to maintain a level of comparability across these groups.

The Easterly and Kraay group (EK) has 33 countries in it, although we only incorporate 32 because Reunion Island no longer appears in the WDI. They chose these countries based upon the criterion of an average population below one million over the period 1960 to 1995. Theirs was not an exhaustive dataset

as there were originally 55 countries with a population that low, but only 33 had data available for their conditioning set over that period.

The World Bank defines a small state as a country that has a population of less than 1.5 million people. However, the World Bank's 'working' definition for membership into their Small States Forum (SSF) includes eight countries with larger populations, but which have 'similar challenges' to those with smaller populations.[6] This group of countries therefore has economic as well as political undertones in its construction. The forum is comprised of 50 countries, and it is this set that we use as our second country group configuration.

The remaining country group is the simple World Bank definition of a small state – i.e. those with a population below 1.5 million . This gave us 52 countries. The reader might think that the SSF and this group are the same except for two countries – i.e. 50 versus 52 countries, but that is not the case. This third configuration includes eight autonomously governed countries and/or territories – Bermuda, Gibraltar, Liechtenstein, Luxembourg, Monaco, Aruba, Andorra, and American Samoa – that are not included in the SSF group. On the other hand, there are six countries in the SSF group that do not appear in this third group – Botswana, Gabon, The Gambia, Jamaica, Lesotho, and Namibia. As mentioned earlier, these are countries that have more than 1.5 million people but have 'similar challenges' to smaller countries.

Model

Our study starts with a very basic, cursory glance at the Great Recession. We build our baseline by including a simple pooled OLS model that does not differentiate between country-groups, then we proceed with the same model that distinguishes between small and large states, and finally we support that with a fixed effects setup (least squares dummy variable; LSDV) that does not assume homogeneous long-run growth rates across countries. Hence, this first set of regressions take the form

$$Growth_{it} = a_{i0} + a_1 SS_{0809} + a_2 ROW_{0809} + e_{it} \quad (1)$$

where *Growth* is the annual per capita GDP growth rate for country *i* in year *t*, and *SS* and *ROW* represent a single dummy variable for the years 2008 and 2009, for each of the groups small states (SS) and the rest of the world (ROW), respectively. This regression is executed separately for each of the three country configurations. In the OLS version of (1), the *i* subscript for the constant, a_{i0}, represents a separate conditional mean for the two groups, small states and the rest of the world, while it represents individual means for each country in the LSDV model. In the pooled case, there is no *i* subscript on the constant and SS and ROW are combined into a single vector. The means are important as they loosely represent the long-run per capita GDP growth rate(s). Therefore, when we are measuring the shock of the recession, it will be captured in the two dummy variables for that year, SS and ROW, while holding the long run growth rate constant. However, what is not being held constant is each group's

business cycle dynamic. Hence, the coefficient estimates for SS and ROW will be capturing both the mean business cycle as well as the recessionary shock – we address this issue in our next model.

The next model we employ is a more sophisticated version of the popular dynamic panel GMM model (Blundell and Bond 1998) that takes the form:

$$Growth_{it} = b_{i0} + \sum_{j=1}^{2}(b_{ss,j}Growth_{t-j} = b_{ROW,j}Growth_{t-j}) + c_1SS_{0809} + c_2ROW_{0809} + u_{it} \quad (2)$$

Not only does this model include the same recessionary dummies for small states and the rest of the world, but also include two lags of per capita GDP growth that will hold constant the long run 'average' business cycle for each group. The estimates of c_1 and c_2 will still not be able to tell us the exact magnitude of the recession for each group, as they will continue to have some residual business cycle effects embedded in them, but they should come close.[7]

Because of the standard endogeneity issues that result from a dynamic panel model with fixed effects (Edwards 2014), this procedure will generate instruments for each lag using earlier values of growth. Even though our conditioning set is small and the total number of countries is 195, to maximise confidence in our results we still employ a restricted GMM method – we do not want to run into the bias that results when too many instruments generate over-specification problems (Roodman 2006).[8] To avoid this problem, we create one instrument for each right-hand side variable and lag distance instead of for each variable, lag distance, and time period. We also use a finite-sample correction to the two-step covariance matrix introduced by Windmeijer (2005), and test for second-order serial correlation (first order is expected given the design of the method). A Hansen test will check for independence between the residuals and the lagged and contemporaneous variables. Lastly, even though the results below indicate that the coefficients on lagged growth sum to far less than one for all groups, we still run a Fuller (1996) type, unit root test to ensure the Growth variable is stationary. This test is preferable to other tests as it does not require strongly balanced panels.

In our final analysis, we attempt to estimate not only the magnitude of the recessionary shock to each group, but also their recoveries. This model takes the form:

$$Growth_{it} = e_{i0} + \sum_{j=1}^{2}(e_{ss,j}Growth_{t-j} = e_{ROW,j}Growth_{t-j}) + \sum_{k=2007}^{2011}(f_kSS_k + g_kROW_k) + r_{it} \quad (3)$$

Model (3) is similar to model (2) but with five separate yearly dummies for small states and the rest of the world, covering the years 2007 to 2011 inclusive. The year 2007 was included simply to have an initial position to compare the other years to, while 2011 is the year that median house prices in the US were returning to their pre-shock levels.[9] Taking these dummy variables beyond 2011 would likely not lead to any gains in inference and would most likely result in the coefficient estimates reflecting more business cycle activity during

that period, as the dummies would start to dominate the average long-run cycle; this would defeat the purpose of controlling for the cycles in the first place.

OLS and LSDV Results

Before we comment on the results of each regression permutation, we outline the model and data configuration for each table. All the tables below contain three sets of columns – EK, SSF and 1.5 MM. These columns represent regressions run over the country group configurations using Easterly and Kraay, the World Bank's Small States Federation, and what the World Bank formally defines as small states with less than 1.5 million people, respectively.

The columns in Table 1 are further broken down into OLS and LSDV columns. In the OLS case, we assume that the long-run growth rates can be different between small states (SS) and the rest of the world (ROW), but each country within these groups has the same long-run rate; while in the LSDV case we assume that each country can have different long-run rates; and we display their average in the table. In addition, Table 1 includes a column titled Pooled. This is to create a baseline 'global' estimation covering all countries and years in our dataset.

The configuration for Table 2 is similar, but as with the LSDV case, the dynamic GMM model(s) assumes each country can have different long-run growth rates – the rate we post is the average of these rates across all countries. Table 3's configuration is similar to Table 2 but includes a recovery period. The estimates for the lagged values of growth, as well as the recession/recovery dummy estimates, are separated into the SS and ROW columns, respectively, to save space.

In Table 1 we find that the Great Recession lowered per capita GDP growth to roughly –1.8 per cent, on average for countries worldwide which amounts to a 3.9 percentage point drop from the conditional long-run growth rate of about 2.1 per cent. The recession was more severe for small states with rates ranging from about -2.6 per cent (SSF countries) to –3.3 per cent (EK countries), while the rest of the world realised rates from about –1.2 per cent (1.5 million population countries) to –1.5 per cent (SSF countries). The difference in the recessionary growth estimates between the small states and the rest of the world is statistically significant in all cases except one – the SSF, LSDV estimation.

Magnifying the shock from the Great Recession is the fact that the long-run growth rate for small states is marginally higher than for the rest of the world. This means that small states not only fell to a lower growth rate during the recession, but fell from a higher initial position. This adds anywhere from about 0.2 percentage points to almost 0.4 percentage points to their contraction, relative to the rest of the world.[10]

Table 1: Results from Model (1) using 2008–09 Dummy in White-Corrected OLS-type Growth Regressions

Variables	Pooled	EK		SSF		1.5 MM	
(GR = growth rate)	OLS	OLS	LSDV	OLS	LSDV	OLS	LSDV
SS Recession GR		–3.330***	–3.267***	–2.582***	–2.612***	–3.169***	–3.084***
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
ROW Recession GR		–1.426***	–1.557***	–1.453***	–1.570***	–1.240***	–1.399***
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Pooled Recession GR	–1.734***						
	(0.000)						
SS Long-Run GR		2.308***		2.324***		2.410***	
		(0.000)		(0.000)		(0.000)	
ROW Long-Run GR		2.106***		2.085***		2.049***	
		(0.000)		(0.000)		(0.000)	
Pooled Long-Run GR	2.139***		2.143***		2.143***		2.143***
	(0.000)		(0.000)		(0.000)		(0.000)
Diff in Recession P-value		0.002***	0.013**	0.076*	0.120	0.002***	0.011**
Diff in Mean P-value		0.178		0.143		0.025**	
# Groups	195	195	195	195	195	195	195
# Observations	9089	9089	9089	9089	9089	9089	9089
R^2	0.003	0.109	0.074	0.109	0.074	0.110	0.074

P-values are in parentheses. * indicates significance at 10%, ** indicates significance at 5%, and *** indicates significance at 1%. White's corrected standard errors are used for heteroskedasticity. EK is using the Easterly and Kraay country configuration, SSF uses the Small State Federation configuration, 1.5 MM contains countries with fewer than 1.5 million people. SS = small states; ROW = rest of world.

Robustness across country configuration and estimation method seems quite good. Some of the estimates do vary across country groups but the inference is largely consistent. For instance, as already mentioned, the recessionary rate for small states ranges from –2.6 to –3.3, but they are all statistically significant. We see the same thing for estimates of the long run growth rates. Perhaps the only notable inferential inconsistency is in the statistical significance of differences in long run means, where we see insignificant differences in the EK and SSF country groups, but significant differences for the 1.5 million population group.

Table 1 indicates that (a) small states suffered a much greater fall in per capita real GDP growth during the Great Recession than the rest of the world; and (b) neither the country group configuration nor the estimation method matter very much when drawing inference from the results. However, even though the estimates are consistent, these simple models are not controlling for business cycles within these groups. Controlling for cycles is critical because what we are trying to measure, for all intents and purposes, is a *deterministic* shock, not a cyclical one. Unless we control for these short-run cycles in growth, the estimates we are getting may be measuring cyclical outcomes rather than deterministic ones, or a combination of both.

Dynamic Panel (GMM) Results

The econometric models producing the results in Tables 2 and 3 control for the average long-run business cycle by including the first and second lags of real per capita GDP growth in each group's conditioning set. In other words, these are dynamic panel, second order autoregressive models. As mentioned earlier, incorporating lagged dependent variables in a panel configuration will inject endogeneity into the regression. To address this, instruments of each lagged dependent variable are constructed. However, a typical system GMM estimation would generate instruments for each variable, lag distance and time period which can run the risk of overfitting the instruments, thus defeating the purpose of instrumenting the variables in the first place. The number of instruments exceeding the number of cross-sectional units and/or a Hansen p-value of overidentifying restrictions close to one are both tell-tale signs of overfitting (Roodman 2006). To avoid overfitting, we 'collapse' the instrument matrix by generating instruments for each variable and lag distance, but not for each time period. With an average of over 40 time periods across nations, including instruments for each period would rapidly increase the number of instruments we employ in our system.

For example, we ran our simple EK regression both ways (see Appendix B). The collapsing procedure produces only 12 instruments, while the standard GMM instrumentation process produces 352 instruments. In both cases, the number of countries in our sample is 195, hence the latter version produces 157 more instruments than there are countries. Furthermore, the Hansen p-value statistic for overidentifying restrictions in the former is 0.468, indicating

Table 2: 2008–09 Time Dummy Only, Dynamic Panel Regressions

Variables	EK	SSF	1.5 MM
SS Recession Growth Rate	–2.187**	–0.705	–1.041
	(0.013)	(0.465)	(0.291)
ROW Recession Growth Rate	–1.501**	–1.859**	–1.698**
	(0.014)	(0.010)	(0.013)
SS Growth (t–1)	0.259***	0.247***	0.240***
	(0.000)	(0.000)	(0.000)
SS Growth (t–2)	0.049	–0.033	–0.048
	(0.247)	(0.385)	(0.170)
ROW Growth (t–1)	0.187**	0.186*	0.182*
	(0.021)	(0.077)	(0.079)
ROW Growth (t–2)	0.003	0.022	0.028
	(0.868)	(0.284)	(0.186)
SS Long-Run Growth Rate	1.563***	1.736***	1.750***
	(0.000)	(0.000)	(0.000)
ROW Long-Run Growth Rate	1.706***	1.667***	1.671***
	(0.000)	(0.000)	(0.000)
Pooled Long-Run Growth Rate	1.685***	1.677***	1.692***
	(0.000)	(0.000)	(0.000)
Difference in Recession P-value	0.517	0.340	0.583
Difference in Long Run P-value	0.372	0.793	0.578
# Groups	195	195	195
# Observations	8699	8699	8699
# of Instruments	12	12	12
Chi-square P-value	0.000	0.000	0.000
AR(2) P-value	0.390	0.370	0.422
Hansen P-value	0.468	0.463	0.242

P-values are in parentheses. * indicates significance at 10%, ** indicates significance at 5%, and *** indicates significance at 1%. White's corrected standard errors are used for heteroskedasticity. EK is using the Easterly and Kraay country configuration, SSF uses the Small State Federation configuration, 1.5 MM contains countries with fewer than 1.5 million people. SS = small states; ROW = rest of world.

that the instruments as a group are indeed exogenous, but the same test for the standard method produces a Hansen p-value of unity. Lastly, one can see that in many cases, both the parameter estimates and inference are different, highlighting the bias that would result had we not collapsed the instrument matrix.

The first notable observation from Table 2 is that the regressions are performing quite well. For instance, the first lag of growth is statistically significant in most cases, while the second lag is insignificant in every case, indicating that we have likely captured close to the full long-run cyclical pattern in the dependent variable. This tells us that for each group, the average growth cycle does not have a memory of more than one year and is therefore sufficiently captured with only two lags. We also find that the sum of the first and second lag coefficient estimates never exceeds about 0.30, indicating with near certainty that no unit root exists in these data. That said, we also ran a Fuller (1996) type unit root panel test that does not require either strongly balanced panels or a continuous time series for each country. In all cases, the null hypothesis that the panels contain unit roots was rejected with p-values of 0.000. Lastly, the number of instruments is quite low, assuring us that our results are not subject to overspecification. This is supported by the Hansen test p-values that are well below one but well above zero, indicating that if there is any feedback occurring from the instruments to growth, it is not of a significant level.

The estimates of interest from Table 2 are in stark contrast to those from Table 1. While all recessionary coefficient estimates for small states are negative, a consistency which is indicative of negative growth regardless of p-value, it is only a significant effect in one case – the Easterly and Kraay country grouping. Furthermore, in no case is the difference in these values statistically significant from the rest of the world. The difference in recession coefficients between SS and ROW is not statistically significant (see Difference in Recession P-values at the bottom of Table 2). In other words, based on dynamic panel regressions, a researcher may very well conclude that there was no difference between the recession small states encountered and that experienced by the rest of the world. Relative to the simple results in Table 1, these results could indicate three things: (1) either the lags are swamping the structural effects; (2) the recession and recovery from it follow a consistent stepwise pattern that is mimicking a business cycle, meaning that the lags are picking that up instead of the structural dummies; or (3) these results are an accurate reflection of the impact of the recession on these groups and there is simply no difference between them.

To address these possibilities, we expand the structural effects by introducing year dummies from 2007, the year before the recession, through to 2011. We stopped at 2011 because that was the year median and inflation adjusted home prices in the US (arguably the cause of the recession) started to rise again, post-recession. We do not want to carry these dummies too much further or we

shall defeat the purpose of using them to pick up this specific shock. Including too many deterministic time periods in our conditioning set will almost certainly result in the dummies mimicking the cyclical effects – i.e. the effects we are trying to hold constant in the first place.

Table 3 lists the coefficient estimates for the five year dummies, 2007 to 2011, inclusive. Just like in Table 2, they are broken down into the three different country configurations, Easterly and Kraay, World Bank, and less than 1.5 million in population. The left-hand column under each of these

Table 3: Yearly Growth from 2007 Through 2011 After Controlling for Cycles

Variables	EK		SSF		1.5 MM	
	SS	ROW	SS	ROW	SS	ROW
2007	2.969***	1.237*	2.326**	1.309*	3.063***	0.769
	(0.000)	(0.093)	(0.011)	(0.099)	(0.002)	(0.522)
2008	0.467	-0.329	1.189	–0.650	1.347*	–0.936
	(0.574)	(0.616)	(0.141)	(0.385)	(0.090)	(0.423)
2009	–2.983***	–3.756***	–3.014***	–3.820***	–3.007***	–4.141***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
2010	2.692***	1.096	1.943***	1.143	2.235***	0.721
	(0.000)	(0.196)	(0.001)	(0.273)	(0.000)	(0.659)
2011	2.012**	0.037	1.734**	–0.101	2.318***	–0.705
	(0.032)	(0.970)	(0.010)	(0.932)	(0.000)	(0.705)
Growth (t-1)	0.262***	0.194***	0.250***	0.192**	0.250***	0.185
	(0.000)	(0.008)	(0.000)	(0.039)	(0.000)	(0.121)
Growth (t-2)	0.058	0.004	–0.027	0.024	–0.035	0.028
	(0.162)	(0.814)	(0.477)	(0.207)	(0.307)	(0.155)
Long-Run Growth Rate	1.330***	1.661***	1.577***	1.616***	1.497***	1.683***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
# Groups	195		195		195	
# Observations	8699		8699		8699	
# of Instruments	22		22		22	
Chi-square P-value	0.000		0.000		0.000	
AR(2) P-value	0.456		0.409		0.550	
Hansen P-value	0.548		0.537		0.301	

P-values are in parentheses. * indicates significance at 10%, ** indicates significance at 5%, and *** indicates significance at 1%. White's corrected standard errors are used for heteroskedasticity. EK is using the Easterly and Kraay country configuration, SSF uses the Small State Federation configuration, 1.5 MM contains countries with fewer than 1.5 million people. SS = small states; ROW = rest of world.

configurations shows the estimates for the small states' dummies, and on the right, those for the rest of the world. In each of these regressions we find that the models perform quite well – i.e. only 22 instruments in each, with Hansen and AR(2) test p-values in the 0.30 to 0.55 range.

The estimates themselves are performing more like we would expect with a statistically significant recession in 2009 for all the groups and configurations. There is, however, a far more interesting tale to tell when we scan the dynamics across all years. We find that the small states went into the recession with a strong growth rate of 2.3 per cent to 3 per cent depending on the country configuration, while the growth rates for the rest of the world in 2007 were more modest, ranging from about 0.8 per cent to 1.3 per cent. Moving into 2008, small states maintain far smaller, but still positive, growth rates while the rest of the world experiences negative growth, albeit statistically insignificant. At the heart of the recession in 2009, both groups of countries experience statistically significant and negative growth rates, ranging from about 3 per cent to 4 per cent in absolute value. As with Table 1, the fall in rates for small states is much larger than for the rest of the world: from peak to trough, small states realised a fall in per capita GDP growth of up to 6 per cent, while the rest of the world saw a fall of about 5 per cent. That said, the fall in small state growth is not significantly different from the fall in the rest of the world, with test statistic p-values from 0.35 to 0.85, depending upon the group configuration tested.

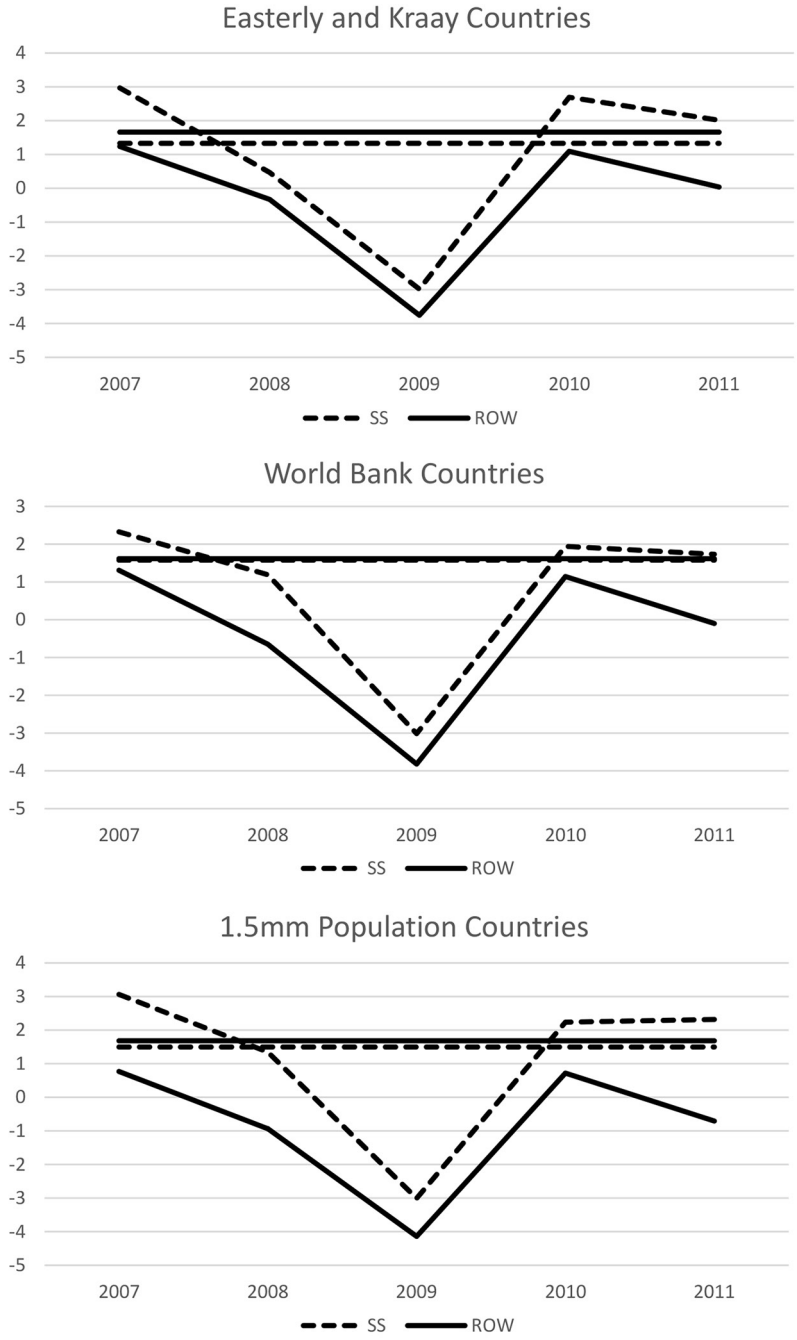
Coming out of the recession into 2010, we find that small states realised rates that were about two to three times those in the rest of the world , indicating a much more rapid recovery for these countries. Finally, in 2011, the rest of the world continued to see relatively sluggish growth, while growth in small states continued to remain robust and well above their long-run rate(s).

Graphical Representation of Table 3

Figure 1 contains plots of the dynamic rates from Table 3 for each of the country configurations. The horizontal axis contains the years 2007 to 2011, while the vertical axis contains growth rates. The dashed lines represent small states (SS) and the solid lines the rest of the world (ROW). The horizontal lines are the groups' respective static, long-run growth rates, while the variable (v-shaped) lines are the individual dummy coefficient estimates from Table 3.

While all graphs in this figure are slightly different, the story they tell is consistent, regardless of country configuration, but we first must clarify what exactly we are looking at. We are not looking at actual growth rates for these country groups during these periods. Rather, we are looking at their structural rates while holding constant their cyclical rates.[11] As a simple example, in 2007 the small state rate (regardless of plot) is above their long-run rate while the rest of the world starts out just below their long-run rate. The global per capita GDP growth rate was just above 3 per cent for 2007, meaning that the actual rate for each group was above their initial position.

Figure 1: Dynamic rates for each of the country configurations



As a rule of thumb, holding constant the error term, multiplying the cyclical rate of the previous year by the first lag's coefficient estimate in Table 3, then adding that to the structural rate, would yield roughly the actual rate for that group. Theoretically, then, devoid of any unforeseen shocks to these economies, their structural rate should match their long-run rate, which these most likely will if you carry the graph back a number of years. It is more or less impossible to determine exactly where they meet in history, because one could argue that there are very few times all countries simultaneously exhibit zero deterministic shocks. However, each graph does clearly imply that the initial position quite nicely 'hovers' around their long-run rate.

Figure 1 is interesting because it shows how rapidly small state per capita GDP growth rates dropped during the recession relative to the rest of the world, and how rapidly they returned to their long-run rate after bottoming out. On the other hand, while the Great Recession was milder for the rest of the world, their rates never quite returned to the long-run rates. In other words, the structural effects of the Great Recession lingered on for much of the world, well after the recession was over. This is a clear indication that small states, although more volatile when hit with massive shocks such as this, tended to perform better than the rest of the world during the recovery period.

Conclusions

This paper raises a simple question: How did small states, relative to the rest of the world, respond economically to the Great Recession of 2008–2009? A commonly held view posits that small states, because of their small economic base and vulnerability to exogenous shocks, face serious economic challenges that both lead to deeper economic contractions and more protracted recoveries than larger states when faced with a severe worldwide economic downturn such as the Great Recession.

The empirical analysis carried out here, which filters out the impacts of endogenous business cycle dynamics from those related to exogenous shocks, helps us to more carefully and clearly address the simple question raised above. The results from simple OLS and fixed effects models that include year country-group dummy variables for the Great Recession – but do not fully control for business cycles *within* country groups – suggest that small states suffered a greater decline in per capita real GDP growth during the Great Recession than the rest of the world. A more sophisticated dynamic panel GMM model that accounts for the long run 'average' business cycle for each country group shows that most countries, regardless of size, experienced similar negative growth rates in per capita GDP during the Great Recession. However, the *fall* in per capita GDP growth rates, from peak to trough, was relatively larger, although not statistically significant for small states compared with the rest of the world. Clearly, the recovery was much more robust for small states than the rest of the world, since small states returned to at least their long-run mean rates, while larger countries continued to flounder.

Including additional year dummies to the GMM model allows us to compare not only the negative economic impact of the Great Recession on small states and the rest of the world, but also these groups' economic recoveries following the downturn. The results show that the growth rate of per capita GDP coming out of the Great Recession in 2010 increased at a much faster pace for small states than the rest of the world; and that this continued into 2011. Contrary to earlier research on small states that highlighted the greater economic challenges that small states face relative to the rest of the world, the results here are more in line with those of Easterly and Kraay (2000), who showed that, in terms of per capita GDP growth rates, large and small countries are more similar than different. In fact, the results here show that while the initial negative economic impacts of the Great Recession were somewhat larger for small states than the rest of the world, the subsequent rebound was quicker and stronger (as also suggested by the casual observations of other researchers, such as those of Kose and Terrones 2015).

The methods and data configuration used here, as well as the results, are also useful in guiding future researchers analysing other deep global exogenous shocks such as the COVID-19 pandemic, which affected economies around the world beginning in 2020. As more data on COVID-19 become available, our research will hopefully save colleagues time and allow future researchers to focus on outcomes rather than data and method.

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Appendix A

1.5mm
Aruba
Andorra
American Samoa
Antigua and Barbuda
Bahrain
Bahamas, The
Belize
Bermuda
Barbados
Brunei Darussalam
Bhutan
Comoros
Cabo Verde
Cyprus
Djibouti
Dominica
Estonia
Fiji
Micronesia, Fed. Sts.
Gibraltar
Guinea-Bissau
Equatorial Guinea
Grenada
Guyana
Iceland
Kiribati
St. Kitts and Nevis
St. Lucia
Liechtenstein
Luxembourg
Monaco
Maldives
Marshall Islands
Malta
Montenegro
Mauritius
Nauru
Palau
Qatar

Solomon Islands
San Marino
Sao Tome and Principe
Suriname
Eswatini
Seychelles
Timor-Leste
Tonga
Trinidad and Tobago
Tuvalu
St. Vincent and the Grenadines
Vanuatu
Samoa

World Bank
Antigua and Barbuda
Bahrain
Bahamas, The
Belize
Barbados
Brunei Darussalam
Bhutan
Botswana
Comoros
Cabo Verde
Cyprus
Djibouti
Dominica
Estonia
Fiji
Micronesia, Fed. Sts.
Gabon
Gambia, The
Guinea-Bissau
Equatorial Guinea
Grenada
Guyana
Iceland
Jamaica
Kiribati
St. Kitts and Nevis
St. Lucia
Lesotho
Maldives
Marshall Islands
Malta
Montenegro
Mauritius
Namibia
Nauru
Palau
Qatar
Solomon Islands
San Marino
Sao Tome and Principe
Suriname
Eswatini
Seychelles
Timor-Leste
Tonga
Trinidad and Tobago
Tuvalu
St. Vincent and the Grenadines
Vanuatu
Samoa

Easterly and Kraay
Antigua and Barbuda
Bahrain
Bahamas, The
Belize
Bermuda
Barbados
Botswana
Comoros
Cabo Verde
Cyprus
Djibouti
Fiji
Gabon
Gambia, The
Guinea-Bissau
Grenada
Guyana
Iceland
St. Kitts and Nevis
St. Lucia
Luxembourg
Maldives
Malta
Mauritius
Qatar
Solomon Islands
Suriname
Eswatini
Seychelles
St. Vincent and the Grenadines
Vanuatu
Samoa

Appendix B

A comparison of collapsing the instrument matrix into a column vector whereby instruments are constructed using variables and lag distances, versus keeping the full matrix using variables, lag distances and time periods. The EK country group is used for this example. The estimates in the middle column are identical to those in the EK column of Table 2.

Variables	Collapsed Instrument Matrix	Not Collapsed
SS Recession Growth Rate	–2.187**	–3.329
	(0.013)	(0.117)
ROW Recession Growth Rate	–1.501**	–1.796 ***
	(0.014)	(0.000)
SS Growth (t-1)	0.259***	0.234 ***
	(0.000)	(0.000)
SS Growth (t-2)	0.049	0.006
	(0.247)	(0.887)
ROW Growth (t-1)	0.187**	0.196 ***
	(0.021)	(0.009)
ROW Growth (t-2)	0.003	0.043 **
	(0.868)	(0.016)
SS Long-Run Growth Rate	1.563***	1.762 ***
	(0.000)	(0.000)
ROW Long-Run Growth Rate	1.706***	1.618 ***
	(0.000)	(0.000)
Pooled Long-Run Growth Rate	1.685***	1.642 ***
	(0.000)	(0.000)
Difference in Recession P-value	0.517	0.476
Difference in Long Run P-value	0.372	0.367
# Groups	195	195
# Observations	8699	8699
# of Instruments	**12**	**352**
Chi-square P-value	0.000	0.000
AR(2) P-value	0.390	0.947
Hansen P-value	**0.468**	**1.000**

P-values are in parentheses. * indicates significance at 10%, ** indicates significance at 5%, and *** indicates significance at 1%. White's corrected standard errors are used for heteroskedasticity. EK uses the Easterly and Kraay country configuration.

Endnotes

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4. https://www.worldbank.org/en/country/smallstates/overview

5. https://www.worldbank.org/en/country/smallstates/overview

6. https://www.worldbank.org/en/country/smallstates/overview

7. Some cycles are larger/smaller than others, so the difference in cycles will continue to be captured in the recessionary dummies but holding constant the average cycle should capture most of it.

8. The programme we use was constructed by David Roodman of the Center for Global Development in Washington DC, and is not the same programme found canned in Stata. This one is more sophisticated and more flexible.

9. US Census Bureau (2022).

10. Some might find it interesting that the R^2 values for the group OLS regressions are quite a bit higher than the LSDV regressions where each country has a separate dummy variable; however, this difference is most likely caused by the loss of over 190 degrees of freedom for the LSDV regressions.

11. In theory, the 'actual' rate equals the structural rate plus the gap between the cyclical and long-run rates. If the long-run and structural rates are the same, then the cyclical gap plus long-run growth rates will equal the actual growth rate at that point in the countries business cycle.

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