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The Path of Reform: The Consequences of Institutional Volatility

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I. INTRODUCTION

Economists since Adam Smith have acknowledged that sustained, long-term growth requires institutions that create growth-enhancing incentives. In recent years, a growing body of literature emphasizes economic and political institutions as the primary explanation for discrepancies in economic development around the world.[1] However, the actual process of reforming institutions is more complicated than economists often admit. Therefore, academics confidently preach the importance of "good" institutions, but speak much less confidently about the practical steps policy makers should take in pursuit of good institutions.[2]

Rodrik (2005) emphasizes this point by showing the mixed evidence of success observed in countries that reformed economic institutions according to prevailing standards of "good" institutions. Furthermore, he shows that many of the countries that are often considered success stories experienced an unorthodox process of reform relative to the standards of western economists. For example, South Korea liberalized economic institutions modestly in a trial-and-error fashion while retaining restraints on imports, subsidization of exports, tax incentives, and restrictions on direct foreign investment.[3] Latin America, on the other hand, liberalized more completely. Nonetheless, South Korea's economic growth outpaced Latin America and other countries who liberalized more completely.

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[1]See for examples, Acemoglu, Johnson, and Robinson (2001); Glaeser and Shleifer (2002); Acemoglu, Johnson, and Robinson (2005); and La Porta, Lopez-de-Silanes, and Shleifer (2008).

[2]Lawson and Clark (2010) disentangle the association between economic and political freedom. Their analysis supports the claim that high levels of political freedom must accompany high levels of economic freedom.

[3]For an alternative perspective on South Korea's economic success, see Holcombe (2013).

This example and others like it demonstrate that the correct path of institutional reform is both important and unknown.

The new institutional literature does not address the reform path on a broad scale.[4] Regrettably, many of the growth models in this literature ignore the reform path completely. Researchers, often using indexes of institutional quality, emphasize that good institutions increase growth rates, but they rarely take advantage of changes in the data over time. Rather, they commonly include only the initial level of institutional quality and/or the change in institutional quality from the beginning and ending periods. Results often show institutions to be positively associated with economic growth, and instrumental variable estimation provides evidence that this result is causal.[5] However, including only the initial and final values of institutional quality ignores the reform path. In other words, these models do not distinguish between the institutions of countries like Malta and Guatemala in Figure 1 with similar beginning and ending points.

Figure 1a depicts the institutional transition from 2000-2015 of these two countries using a common measure of institutional quality, the Economic Freedom of the World (EFW) index, which is described in more detail later. Both Malta and Guatemala share almost identical scores for institutional quality in 2000 (roughly 6.75 EFW points). Additionally, both countries experience an almost identical change in their score by 2015 (an average of 0.935 EFW points). Therefore, the institutions of these two countries would be indistinguishable in many growth models. However, as shown in Figure 1b, the changes in the EFW index from 2000-2015 for both countries highlight the volatility of Malta's reform relative to Guatemala's.

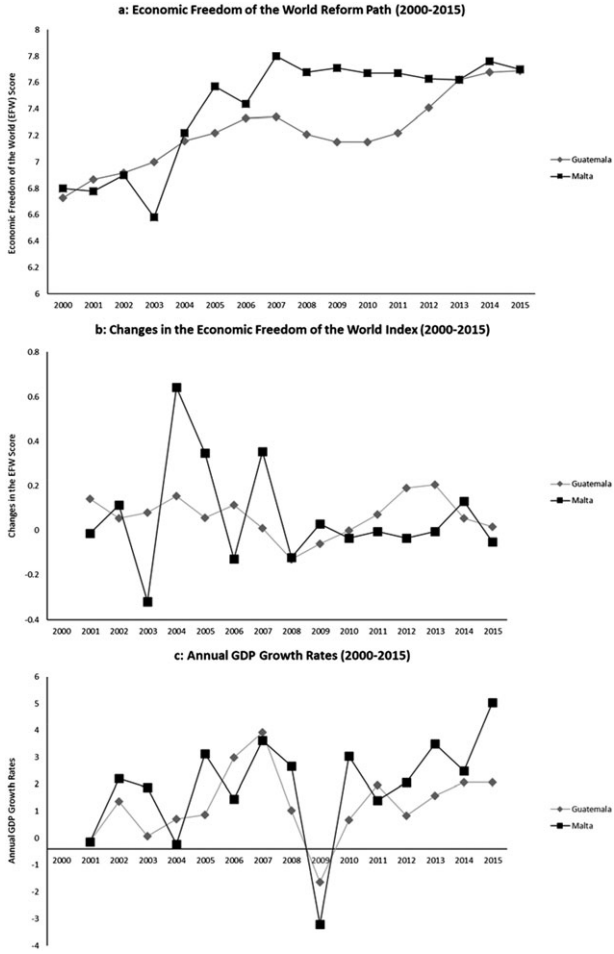
In this paper, we seek to understand if dissimilar reform paths, as illustrated by Malta versus Guatemala, lead to different economic outcomes. To further illustrate our conjecture, Figure 1c shows the annual GDP growth rates for both countries. Both Malta and Guatemala experience lower growth rates, on average, during the periods of more volatile institutional change (pre-2008 for Malta and post-2007 for Guatemala) than in the periods of more stable institutional change (post-2007 for Malta and pre-2008 for Guatemala). This suggests a negative relation between institutional volatility and economic growth. In order to draw conclusions about the growth-effects of institutional volatility, a more rigorous quantitative approach is necessary to control for other factors that affect growth rates. Nevertheless, the eye-test shows that the reform paths and the

[4]For an exception, see Paldam and Gundlach (2018) who empirically relate income and the path of political regime changes.

[5]See Dawson (1998), Carlsson and Lundström (2002), Gwartney et al. (2006) and Rode and Coll (2012) for studies regarding economic freedom and growth. See Faria and Montesinos (2009), Faria et al. (2016) and Bennett et al. (2017) for instrumental variable estimates using the EFW index. See De Haan et al. (2006), Doucouliagos (2005), Bergh and Karlsson (2010) and Hall and Lawson (2014) for surveys of the literature. See Powell, Clark and Nowrasteh (2017) for the relation between immigration and economic freedom.

Figure 1

Economic Freedom of the World Reform Path: Comparing Guatemala and Malta



Note: Figure a shows the annual EFW scores for Guatemala and Malta from 2000-2015. Figure b is the first difference of the annual EFW scores for Guatemala and Malta, which illustrates volatility in the EFW index. Figure c shows the annual growth rates, which is the dependent variable in models presented later in the paper. The EFW data source is the *Economic Freedom of the World: 2016 Annual Report* by Gwartney et al. The World Bank's World Development Indicators (WDI) provides GDP growth data.

economic growth rates of these two countries vary, leading one to question the inherent assumption of many models that the institutions of these countries are the same.

The goal of this research is to quantify the reform path using the data that we often assume away and to measure its effect on economic growth. This research is not an attempt to refute the claim that good institutions lead to higher rates of economic growth. Rather, we accept this claim as given and build on it by studying the path from bad institutions to good institutions (and vice versa). Specifically, the growth-effects of institutional volatility are analyzed by using the changes in institutional quality over time to measure institutional volatility. In so doing, this paper highlights the marginal cost of assuming away differences in the reform path.[6]

We hypothesize that volatility in the reform process decreases economic growth because it increases uncertainty. This increase in uncertainty decreases gains from trade and increases transaction and production costs. Risky investments necessitate a risk premium to attract investors away from safer investment opportunities. Given the same level of potential return, investors will seek to pursue opportunities with the lowest level of uncertainty. Consequently, a country can increase economic growth by mitigating volatility to strengthen investors' confidence in the future institutional arrangement: the fiscal stability of its government, the security of its investors' property rights, the credibility of its currency, and the protection of its investors from onerous regulations.

Alternatively, institutional volatility may have a positive effect on economic growth. Theoretically, a positive relation between institutional volatility and economic growth may occur due to the growth-hampering effects of institutional sclerosis. Institutional sclerosis, as described by Olson (2008), is the inability of institutions to evolve from a less than optimal state because of the vested interest of parties who benefit from the current institutional environment.[7] In such a situation, institutional volatility may increase growth by decreasing institutional sclerosis.

The scarce research devoted to the optimal path of reform is found in the transition literature that debates the speed of reform for former Soviet states. In the early contributions to this literature, proponents of speedy reform, like Sachs (1991) and Lipton et al. (1990), claim that rapid transition is necessary to overcome political and economic obstacles. The opponents of this "shock-therapy", such as McMillan and Naughton (1992) and Murrell (1991), argue for a gradualist approach to reform like that pursued by China during privatization.

[6]Boettke (2001) discusses issues of economic reform and the problem with simplifying economics phenomena to aggregate quantities.

[7]Also, see Tullock (1975), Acemoglu et al. (2005), and Thomas (2009).

As liberalization progressed among the former Soviet states, economists created and analyzed measures of liberalization to test these competing theories. Commonly used indexes include the liberalization index created by de Melo et al. (1996) and the EBRD index.[8] Falcetti et al. (2006) summarize the literature's progress and claim that "the influence of reforms on growth have become more, rather than less, controversial."

Decades later, uncertainty surrounding the path of reform remains and little research tests and applies the claims of this literature more broadly. The theoretical arguments of scholars in this literature inform the *ex-ante* expectations in this paper, but this research does not attempt to settle the shock-therapy debate. Rather, we examine an aspect of economic reform that relates to the speed of reform but receives less attention in the literature – volatility.

The policy uncertainty literature also informs the *ex-ante* expectations of this paper. Dating back to Bernanke (1983), this literature shows the economic consequences of policy uncertainty, such as the delay of investments and hiring by firms. In a more recent contribution, Baker et al. (2016) create a measure of economic policy uncertainty using archived newspapers and find that uncertainty reduces investment and employment in policy-sensitive firms. Additionally, they find that policy confusion foreshadows declines in investment, output, and employment in the United States. Their data is limited to twelve major economies due to the lack of availability of archived newspapers. Citing their results, John Taylor testified before the Committee on the Judiciary of the U.S. House of Representatives in September of 2012 that regulation complexity "increases uncertainty which holds back investment."

Due to data constraints, the policy uncertainty literature often uses small samples, which limit the external validity of the results. The shock-therapy literature also shares this liability due to its specific focus on the former Soviet states. This paper seizes the opportunity to conduct a broad-scope, empirical analysis using institutional data measured by the Economic Freedom of the World (EFW) index.[9] We create measures of institutional volatility using the EFW index. While some economists argue that the EFW index measures a combination of policies and institutions, we draw no such distinction between these two categories.[10] North (1990) defines institutions as "the humanly devised constraints that shape human interaction," which necessarily includes policies.

The results support the *ex-ante* expectations based on the policy uncertainty and shock-therapy literatures. Countries who experience volatile institutional change experience lower average growth rates. For example, a one standard deviation increase in volatility decreases growth by about 0.50 percentage points.

[8]European Bank for Reconstruction and Development (EBRD) *EBRD Transition Report 1995*.
[9]Economic Freedom of the World (EFW) index is authored by Gwartney, Lawson, and Hall (2017) and published by the Fraser Institute. See Hall and Lawson (2014) for a review of the literature using the index.
[10]See Pierson (2006).

This finding is robust to multiple estimation techniques and omitted variable bias. Mediation analysis reveals that institutional volatility directly decreases economic growth by about 6.62 percentage points. Evidence suggests that this is partially mediated through volatility's impact on private investment.

Therefore, reducing uncertainty by minimizing institutional volatility is a generally applicable, growth-enhancing reform principle for liberalizing countries. The policy implications are straightforward – policy makers should pursue stable, predictable liberalization of economic institutions. The implication for researchers is also clear – the reform path matters and should not be assumed away without first weighing the benefits and costs of doing so.

This paper most similar to this is Berggren et al. (2012), which measures the growth-effects of the instability of institutions. They show that institutional instability has a heterogeneous effect across income levels and reform directions. While they argue theoretically that institutional volatility's effect may be negative, their primary result is that institutional instability *increases* growth in high-income countries. While we find some evidence to support this claim, our primary result indicates that institutional instability *decreases* economic growth. Moreover, the results provide some evidence that institutional volatility is associated with decreased private investment, which is consistent with volatility creating uncertainty. Thus, our findings complement their work by demonstrating the negative effect of institutional volatility. Furthermore, the measure of volatility used in this research is unique from the measure of instability used in their paper.

This paper also builds on Pitlik (2002), who first used institutional indexes to measure volatility in the reform path (although with limited data). Lastly, this work follows Sobel (2017) who uses changes in the EFW index to study the dynamic properties of economic reform.

II. THEORY

According to North (1990), institutions reduce uncertainty and create a stable structure of exchange. Consequently, improving economic institutions increases economic growth by decreasing transaction and production costs and increasing the gains from trade. However, institutional volatility often accompanies institutional reform, which may increase uncertainty and decrease the gains from trade. Intuitively, a reform path that minimizes volatility mitigates its growth-hampering effects.

On the other hand, other scholars have argued that institutional volatility may increase growth if a country is suffering from institutional sclerosis, which inhibits institutions' abilities to reform and adapt. Institutional sclerosis, as described by Olson (2008), results from interest groups engaged in rent seeking behavior with vested interests in maintaining the current institutional

environment. Thus, institutional volatility can decrease the power of interest groups and increase economic growth along with institutional quality.

The small subset of pre-existing studies of institutional volatility find a heterogeneous effect on growth, which suggests both effects may be at work depending on institutional trend and income level. It is also possible that the effects of institutional volatility vary with the quality of institutions. Once institutional quality surpasses some threshold, volatility may no longer alter the confidence of economic actors enough to decrease growth.

In addition, high-quality informal institutions, which are often associated with higher quality formal institutions, may smooth the effects of institutional volatility. For example, cultural norms and social networks enforce property rights and contracts in periods of uncertainty or in the absence of formal institutions (Greif, 1993; Greif et al., 1994; Leeson, 2007a,b; Licht et al., 2007; Williamson and Kerekes 2011). Alternatively, when institutional quality is low, institutional volatility may significantly decrease economic growth in the absence of growth-smoothing informal institutions. This paper considers the possibility that volatility has heterogeneous effects contingent on the quality of institutions in addition to the previously studied explanations of the literature.

We test the growth-effects of institutional volatility across various subsamples to allow for heterogeneity in the growth-effects. We also test whether institutional volatility affects economic growth, at least partially, through private investment, which is consistent with the theoretical expectation that uncertainty decreases growth. Bernanke (1983) notes that if the benefits of waiting for improved information are more valuable than the short-run return of the investment, investors will postpone investing during periods of uncertainty. Applying this principle to institutional volatility, decreased private investment may help explain the channel through which volatility affects economic growth.

In addition to the previous work on institutional volatility, two distinct literatures inform the *ex-ante* expectations of this paper. First, the shock-therapy literature suggests decreased growth is necessary during economic reform as the reallocation of resources results in the temporary loss of output. Popov (2000) calls this the supply-side explanation for decreased short-run growth during transition. Indeed, this is the effect that gradualists hoped to avoid by slowing the liberalization process (i.e. Murrell 1991). The logic of the gradualists applies here. The shock-therapists did not primarily dispute this part of the gradualists' argument. Rather, they argued that rapid institutional reform increases the likelihood of the reform to stick in the long run. For example, Lipton et al. (1990) and Sachs (1991) claim that rapid reform is necessary to avoid political and economic obstacles, like entrenched interest groups and hyperinflation.

We do not assume that all shock-therapists agree with the gradualists' expectations for short-run decreased growth, but the logic is not exclusively a

gradualist position nor a counter-argument to the shock-therapist position. Note, however, that the shock therapy literature addresses a unique economic transition during which economists evaluate the proper liberalization path from low to high quality institutions. Therefore, the claims of this literature do not specifically address institutional volatility in other contexts, such as in high-income countries with high quality institutions. However, we believe that the theoretical logic of scholars in the literature apply broadly.

Second, the policy uncertainty literature suggests decreases in private investment and output accompany uncertainty. Baker et al. (2016) shows this effect on individual firms in policy-sensitive industries, while Rodrik (1991) and Higgs (1997) show that macroeconomic policy uncertainty decreases private investment and growth. Taken together, these literatures suggest that institutional volatility will negatively affect private investment and economic output.

III. DATA

The EFW index is utilized to measure reform volatility for a sample of 89 countries. The EFW index assigns an overall economic freedom score ranging from 0-10 to each country in the dataset. The overall economic freedom score is the equally weighted average of five components. The five components also range from 0-10 with equal weight assigned to further subcomponents. The five components include the size of government, legal system and property rights, sound money, trade policies, and regulations. The data for each component is publicly available. External sources, including the World Bank, International Monetary Fund, and World Economic Forum, provide the raw data that compose the index.

The EFW index was originally constructed in five-year increments from 1970-1995 and has been updated annually since 2000. This paper only uses the sixteen years of annual data to ensure equidistant measures of time for all observations. This is necessary to calculate the measures of volatility discussed below. Additionally, this sample does not overlap with the post-Soviet reforms of Eastern Europe, and thus, the former Soviet states do not drive the result. While the most recent year of data in the EFW index includes 159 countries, our sample is limited to 89 countries for which EFW scores and other independent variables are available from 2000-2015. Appendix 1 lists the sample of countries included in our models.

We create a measure of institutional volatility using the standard deviation of the annual change in the EFW index. This measure captures the consistency of a reform path. Countries that experience no annual institutional change experience no volatility. Likewise, countries that experience institutional improvement of the same amount each year experience no volatility. Therefore, both groups of countries have a perfectly consistent reform path according to this measure.

Alternatively, countries that experience inconsistent annual institutional changes have higher standard deviations. This signals a volatile reform path.

Table 1 depicts two scenarios where institutions reform by 0.25 EFW points but follow different reform paths. The two columns represent *stable* and *volatile* reforms. Column (1) depicts a reform path where the annual change is identical every year for five years, 0.083 annual improvement. Column (2) depicts the same *net* reform but with a volatile reform path. We use the standard deviation to calculate the volatility of reforms in column (1) and column (2). The reform path in column (1) is perfectly consistent resulting in a standard deviation of zero. The reform path in column (2) is inconsistent resulting in a standard deviation of 0.10.

This measurement also applies to countries experiencing no net reform over a period. For example, suppose Country A experiences institutional change over a five-year period of 0, 0, 0, 0, and 0, and Country B experiences institutional change over a five-year period of 0.1, -0.2, 0.4, -0.25, -0.05. Both countries experience no *net* change in institutional quality, yet Country B experiences institutional instability. A measure of reform volatility distinguishes the institutional inconsistency of Country B as volatile and the institutional consistency of Country A as stable even though neither experienced a net change in institutions.

This measure is unique from the measure of instability used by Berrgren, et al. (2012), which quantified any change in institutions as instability. In other words, a perfectly consistent liberalization path qualifies as institutional stability. This highlights an important distinction of the current work from the previous work of these authors. Institutional instability, as defined by Berrgren et al. (2012), necessarily accompanies all institutional reform, whereas institutional volatility, as we define it, may or may not accompany institutional reform. The measure of volatility used by Pitlik (2002) is similar to that used in this paper.

Table 1

Classifications of Institutional Change

Stable Institutions (1)	**Volatile Institutions (2)**
Consistent Reform	Inconsistent Reform
6.75, 6.83, 6.92, 7.0	*6.75, 6.91, 6.88, 7.0*
ΔEFW = 0.25	ΔEFW = 0.25
St. Dev. (ΔEFW) = 0	**St. Dev. (ΔEFW) = 0.10**

Note: Stable institutions are those that follow a consistent reform path, such as that described in column one, where institutions change by a similar amount each year. Volatile institutions are those that follow an inconsistent reform path, such as that described in column two, where institutional change varies from year to year.

The dependent variable in most models is GDP growth, collected from The World Development Indicators (WDI, 2018). Control variables are consistent with the existing models in the literature, including controls for GDP per capita, private and public investment, geography and human capital. WDI provides measures of GDP per capita and measures of private and public investment. Gross fixed capital formation, calculated as a percentage of GDP for the private and public sectors, serve as measures of private and public investment. OECD measures of private and public investment as a percentage of GDP substitute for WDI data when WDI investment data is unavailable for a particular country.

Because the Penn World Table human capital data is available annually, it serves as the human capital measure in this paper. Geography controls include the percentage of a nation's population located in a tropical climate and the portion of the population located within 100 kilometers from an ocean coastline from Gallup et al. (1999). Additionally, we test each model for robustness to including malaria ecology from Acemoglu et al. (2002).

Table 2 lists the summary statistics for the cross-sectional data. The average EFW score for institutional quality in 2000 is 6.64, which is roughly equivalent to the institutional quality of Slovenia. Rwanda's EFW score improved by 1.553 points from 2000 to 2015, the largest EFW improvement in the sample. Alternatively, Venezuela's EFW score declined by 2.832 points over the same period. The standard deviation of Zimbabwe's change in institutional quality is the highest in the sample at 0.47. Logged GDP levels and growth summary statistics are from both the World Bank.

Table 2

Summary Statistics for Cross Section

Variable	Obs.	Mean	Std. Dev.	Min	Max
EFW (2000)	89	6.644	0.999	4.200	8.650
ΔEFW (2000-2015)	89	0.208	0.587	-2.832	1.553
St. Dev. ΔEFW (2000-2015)	89	0.147	0.064	0.063	0.470
ln (GDP per capita) (2000)	89	8.486	1.647	5.375	11.311
Avg. Annual GDP growth	89	2.059	1.749	-2.543	8.977
Avg. Public Investment (% of GDP)	89	5.143	2.505	-1.349	12.955
Avg. Private Investment (% of GDP)	89	16.957	4.847	6.471	36.349
ΔHuman Capital (2000-2014)	89	0.265	0.145	-0.057	0.703
Tropical Population (%)	89	0.452	0.481	0.000	1.000
Population 100 km from Coast (%)	89	0.452	0.355	0.000	1.000

Note: The ΔEFW and the standard deviation of the annual ΔEFW are calculated from 2000-2015. All averages are means of annual data from 2000-2015. The EFW data source is the *Economic Freedom of the World: 2016 Annual Report* by Gwartney et al. The World Bank's World Development Indicators (WDI) provides GDP growth data and investment data. OECD investment data substitutes for WDI data when WDI investment data is unavailable. Penn World Table 9.0 provides the annual measure of human capital. Geography data is from Gallup et al. (1999).

IV. MODEL

We begin with the following cross-sectional growth model,

$$\Delta\overline{GDP}_i = \beta_1 + \beta_2 Initial\_EFW_i + \beta_3 \Delta EFW_i + \beta_4 Vol_i + \beta_5 \ln\left(\frac{GDP}{Pop}\right)_i + \beta_6 \overline{Priv}_i + \beta_7 \overline{Pub}_i + \beta_8 \Delta HC_i + \beta_9 Trop_i + \beta_{10} Coast_i + e_i \quad (1)$$

where $Initial\_EFW_i$, ΔEFW_i, and Vol_i measure the initial quality of institutions, the change in institutions and the volatility of institutions respectively. $\overline{Priv}_i$ and $\overline{Pub}_i$ are the average private and public investment rates as a percentage of GDP. Additionally, we control for initial GDP per capita, the change in human capital, the percent of the population in a tropical climate and the percent of the population within 100 km of a coast.[11] The sample period is 2000-2015, the period for which annual EFW data is available.

This growth model closely resembles those frequently used in the economic freedom literature, specifically the commonly cited growth models of Gwartney, Holcombe, and Lawson (2006), hereinafter referred to as GHL. The original GHL framework is also conducive for determining whether institutional volatility affects growth rates through private investment. Therefore, we adopt and improve on the GHL framework for testing whether private investment is a mediator through which institutional volatility affects growth rates.

We test this in two ways. First, following GHL, we model the effect of institutional volatility on growth *holding private investment constant* (β_4) and the effect of private investment on growth *holding institutions constant* (β_6). Then, in a separate OLS model, we calculate the effect of institutional volatility on private investment *ceteris paribus* (α_1). The net effect of institutions on economic growth can be calculated as the sum of the *direct* effect (β_4) and the *indirect* effect through private investment ($\beta_6\ \alpha_1$). The resulting coefficient is ($\beta_4 + \beta_6\ \alpha_1$). In practice, substituting the *residuals* from the model of private investment for the *actual* private investment values in the growth model and adjusting the standard error accomplishes this end.[12]

[11]We also included measures of malaria ecology for robustness in each estimation discussed hereafter. The results were largely unchanged. Institutional volatility coefficients retained the same sign and remained statistically significant. Furthermore, we disaggregated the EFW index to determine if a particular component drives the result. No single area or group of areas of the EFW index consistently returned a coefficient that was much larger in magnitude nor more statistically significant.

[12]The standard errors resulting from the GHL technique of substituting the residuals of the private investment model are biased downward. The true standard errors are $\mathrm{var}(b_1 + b_2\ \alpha_1) = \mathrm{var}(b_1) + \alpha_1^2\ \mathrm{var}(b_2) + b_2^2\ \mathrm{var}(\alpha_1) + 2\alpha_1\ \mathrm{cov}(b_1, b_2)$. Although the original GHL model did not include this correction, we make this correction in the models presented below. We assume the $\mathrm{cov}(\hat{\alpha}_1, b_1) = \mathrm{cov}(\hat{\alpha}_1, b_2) = 0$. Based on a replication of the original GHL model with corrected standard errors, only the precision of the estimates is affected. The overall results of the model remain unchanged.

Mediation analysis, the origination of which is attributed to Baron and Kenny (1986), is an alternative technique for achieving the same end.[13] Mediation analysis calculates the *direct* effect of an independent variable, X, on some outcome, Y. Additionally, it calculates the *indirect* effect of independent variable, X, on some outcome, Y, through a mediator, M. We use mediation analysis, specifically the "medeff" Stata package, to calculate the direct effect, the average causal mediation effect (the indirect effect), and the total effect of institutional volatility on economic growth, where the average private investment rate is the mediator.[14]

After reporting the results of the cross-sectional model adapted from GHL and the results of mediation analysis, we also run the GHL model as a dynamic panel, using GLS fixed-effects and system GMM estimators and adding $\Delta\overline{GDP}_{i,t-1}$ as an independent variable in the model. Because past changes in GDP are likely an important predictor of current changes in GDP, this is our preferred specification for modeling growth rates. In this panel, the fifteen years of annual data are aggregated to five three-year periods of panel data. Now, the volatility in each three-year period serves as one observation in a panel with five observations per country. The resulting model is

$$\Delta\overline{GDP}_{it} = \beta_1 + \beta_2 Initial\_EFW_{it} + \beta_3 \Delta EFW_{it} + \beta_4 Vol_{it} + \beta_5 \ln\left(\frac{GDP}{Pop}\right)_{it} + \beta_6 \overline{Priv}_{it} + \beta_7 \overline{Pub}_{it} + \beta_8 \Delta HC_{it} + \beta_{11} \Delta\overline{GDP}_{i(t-1)} + \gamma_i + \lambda_t + e_{it} \quad (2)$$

where γ_t and λ_t are country and period fixed-effects.

Furthermore, unless specifically noted, the models in this paper only measure the *direct effect* of institutions on growth. Therefore, the effects of volatility on growth in the dynamic panel models discussed below may be interpreted as a conservative estimate insofar as institutional volatility is associated with decreased rates of private investment.

V. RESULTS

V.1. Estimates Using Cross-Sectional Data

The models in Table 3 are OLS cross-sectional models. The first model estimates GDP growth as a function of institutional volatility and control variables. The results indicate that institutional volatility and economic growth are negatively related. The coefficient on institutional volatility is the *direct* effect of institutions

[13]Also, see Robins and Greenland (1992), Pearl (2001, 2011) and Imai et al. (2010a), Imai et al. (2010b), and Imai et al. (2010c) for more recent papers discussing causal inference approach to mediation.

[14]The Stata package, medeff by Hicks et al. (2011), follows the processes described by Baron and Kenny (1986) and Imai et al. (2010a), Imai et al. (2010b), and Imai et al. (2010c).

Table 3

GDP Growth, Private Investment and Institutional Volatility

Dependent variables:	(1) Avg. GDP Growth	(2) Avg. Priv. Inv.	(3) Avg. GDP Growth	(4) Avg. GDP Growth
EFW (2000)	0.146 (0.301)	0.331 (0.919)	0.204 (0.339)	**0.654** (0.210)**
ΔEFW (2000-2015)	0.219 (0.432)	1.717* (1.016)	0.521 (0.440)	**0.780* (0.400)**
Institutional Volatility	**-7.066** (3.169)**	**-14.69 (10.37)**	**-9.649*** (3.692)**	
Log GDP per capita (2000)	-0.556*** (0.195)		-0.556*** (0.195)	-0.573*** (0.210)
Tropical Location	-0.588 (0.427)	-3.737*** (1.295)	-1.245*** (0.484)	-1.210** (0.466)
Coastal Population	0.407 (0.471)	1.406 (1.281)	0.654 (0.528)	0.452 (0.479)
Avg. Private Investment	0.176*** (0.0482)		0.176*** [2] (0.0482)	0.190*** [2] (0.052)
Avg. Public Investment	0.134* (0.0729)		0.134* (0.0729)	0.116 (0.0850)
ΔHuman Capital	2.264** (1.045)		2.264** (1.045)	2.052* (1.100)
Constant	2.609 (2.249)	17.61** (7.947)	5.707** (2.396)	1.614 (1.985)
Observations	89	89	89	89
R-squared	0.434	0.298	0.434	0.396

Note: = residuals from the equation number listed alongside symbol. Robust standard errors in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$. The EFW data source is the Economic Freedom of the World: 2016 Annual Report by Gwartney et al. The World Bank's World Development Indicators (WDI) provides GDP data and investment data. OECD investment data substitutes for WDI data when WDI investment data is unavailable. Penn World Table 9.0 provides the annual measure of human capital. Geography data is from Gallup et al. (1999).

on economic growth. As discussed previously, we also calculate the *indirect* effect of institutions on growth through private investment using the model in the second column.

The dependent variable in column 2 is the average private investment rate. Increased volatility of institutions is associated with decreased rates of private investment (the coefficient is -14.69). Furthermore, as demonstrated in column 1, average private investment rates are positively associated with average growth rates (the coefficient is 0.176). In the model presented in column 3, we substitute the residuals from column 2 for the measure of private investment. The resulting coefficient on institutional volatility includes both the direct and indirect effects of institutional volatility. Therefore, the absolute value of the coefficient on institutional volatility in column 3 (-9.649) is larger than the coefficient in column 1 (-7.066). As we described earlier, the resulting coefficient can also be calculated by summing the direct effect and indirect effect using the coefficients from columns 1 and 2 (-7.066 + 0.176 * -14.69 = -9.649).

Both the economic and statistical significance of the growth-effect of institutional volatility increase when the indirect effect is added to the direct effect. Therefore, these results provide *some* evidence that institutional volatility affects economic growth indirectly through decreased private investment. However, the estimated relation between institutional volatility and average private investment rates is not statistically significant. Therefore, the evidence from the GHL method that private investment is a mediator between volatility and growth is somewhat weak. And, we cannot definitively conclude that private investment is a channel through which institutional volatility affects growth rates.

The marginal effect of a one standard deviation increase in institutional volatility is roughly a 0.5 percentage point decrease in average GDP growth rates (0.43 percentage point decrease for the direct effect and 0.58 percentage point decrease for the combined effect). Regardless of the strength of the indirect effect, this result provides evidence that institutional volatility has an economically and statistically significant effect on economic growth.

The coefficients for the initial institutional quality and the change in institutional quality are positive, which is consistent with the original GHL results. However, the coefficients are statistically insignificant, which is different from the original results. We believe these differences result from the high correlation between institutional volatility and the other institutional measures. The correlation coefficient between institutional volatility and the initial EFW score is -0.57, and the correlation coefficient between institutional volatility and the change in the EFW score is -0.40. Column 4 shows that when omitting institutional volatility both institutional measures are positive and statistically significant, as expected.

As discussed previously, mediation analysis is a more modern technique for measuring the direct and indirect effect of institutional volatility. Table 4 presents

Table 4

Mediation Analysis of Institutional Volatility on Economic Growth Through Private Investment

Growth-effects of institutional volatility				
	Average direct effect	Average indirect effect *via priv. inv.*	Average total effect	% of the total effect *mediated through priv. inv.*
Mean	-6.62	-2.50	-9.12	28.76%
95% CI	(-13.27 to -0.96)	(-7.23 to 0.52)	(-17.04 to -2.74)	(14.70% to 91.44%)

Note: Mediation analysis is conducted using the "medeff" command in Stata by Hicks et al. (2011), which follows the procedures discussed by Imai et al. (2010a), Imai et al. (2010b), and Imai et al. (2010c).

the results of mediation analysis. An increase in volatility by one standard deviation decreases the average growth rate by 2.5 percentage points *indirectly through private investment*. An increase in volatility by one standard deviation decreases the average growth rate by 6.62 percentage points *directly*. Therefore, the total effect of a one standard deviation increase in institutional volatility on average growth rates is -9.12 percentage points. Average private investment rates mediate 28.76 percent of the total effect on average.

The 95 percent confidence interval for the indirect effect suggests that the effect is not statistically different from zero. But, the 95 percent confidence interval for the percent mediated *is* statistically different from zero. Therefore, the results of the mediation analysis do not illustrate that institutional volatility's effect is driven mainly through private investment. Instead, the results suggest that volatility has a strong direct effect and a weaker indirect effect. Hereafter, the models only measure the direct effect of institutional volatility on economic growth.

If good institutions are those that mitigate uncertainty as suggested by North (1990), these results indicate that volatile institutions are not good. Therefore, a tradeoff exists between liberalizing institutions to achieve desirable economic outcomes and the volatility that often accompanies institutional reform. If institutional improvement follows a volatile reform path, liberalization's benefits are mitigated by uncertainty surrounding future institutional quality. Reformers do well to establish a binding and credible commitment to liberalization.

V.2. Estimates Using a Dynamic Panel

While the previous section replicates the original GHL model as accurately as possible, the effect of institutional volatility is better modeled as a dynamic panel model. Previous values of GDP growth are good predictors of current values of GDP growth. Additionally, aggregating the data into a dynamic panel creates lagged values of endogenous variables to use as instruments in system GMM estimation. Summary statistics for this subset of data are found in Table 5.

Table 5

Summary Statistics for Dynamic Panel

Variable	Obs.	Mean	Std. Dev.	Min	Max
$EFW_{initial}$	340	6.829	0.895	3.209	8.497
ΔEFW	340	0.020	0.214	-1.038	1.158
St. Dev. ΔEFW	340	0.125	0.089	0.006	0.786
ln (GDP per capita)$_{initial}$	340	8.736	1.624	5.349	11.425
Avg. Annual GDP growth	340	2.111	2.861	-12.161	11.474
Avg. Annual GDP growth $_{(t-1)}$	340	2.094	2.897	-12.161	11.448
Avg. Public Investment (% of GDP)	340	5.273	3.146	-3.243	25.006
Avg. Private Investment (% of GDP)	340	17.298	5.478	0.926	40.267
ΔHuman Capital	340	0.034	0.023	-0.038	0.149
Tropical Population (%)	340	0.438	0.476	0.000	1.000
Population 100 km from Coast (%)	340	0.461	0.353	0.000	1.000

Note: The ΔEFW and the standard deviation of the annual ΔEFW are calculated in five three-year increments from 2000-2015. All averages are means. The EFW data source is the *Economic Freedom of the World: 2016 Annual Report* by Gwartney et al. The World Bank's World Development Indicators (WDI) provides GDP growth data and investment data. OECD investment data substitutes for WDI data when WDI investment data is unavailable. Penn World Table 9.0 provides the annual measure of human capital. Geography data is from Gallup et al. (1999).

The first two columns in Table 6 present the results of the fixed-effects estimation of equation 2. The first column is the estimation of the GHL model as a dynamic panel without a measure of institutional volatility. The results are consistent with the original GHL model. Both the initial value of institutions and the change in institutions are positively associated with average growth rates and are statistically significant. Moreover, when a measure of institutional volatility is added in the second column, the coefficients do not change significantly. The fixed-effects results show, again, that institutional volatility is negatively associated with economic growth. The marginal effect of a one standard deviation increase in volatility is a 0.48 percentage point decrease in the average growth rate.

However, it is likely that the coefficients of the OLS and fixed-effect models suffer from endogeneity and, therefore, should be interpreted as imprecise. In fact, the literature widely acknowledges that institutions are endogenous, not to mention measures of investment, human capital, and past rates of growth. Instrumental variable estimation is the common method of dealing with endogeneity in the economic freedom literature.[15] While several valid instruments exist for institutional *quality*, an instrument for institutional *volatility* has proved elusive. Therefore, we use system GMM estimation to control for endogeneity in the third and fourth columns.

System GMM is appropriate for small T, large N panels where external instruments for endogenous variables are unavailable. Therefore, system GMM instruments these variables with their own lags. This estimation technique, as described by Arellano and Bond (1991), Blundell and Bond (1998) and

Table 6

Modified GHL Model (2000-2015 Dynamic Panel)

Dependent variables:	(1) Avg. GDP Growth	(2) Avg. GDP Growth	(3) Avg. GDP Growth	(4) Avg. GDP Growth
$EFW_{initial}$	2.638*** (0.763)	2.399*** (0.777)	-1.060 (5.073)	-1.439 (1.138)
ΔEFW	2.231** (0.911)	2.120** (0.880)	2.587 (4.062)	2.316 (2.407)
Institutional Volatility		**-3.493* (1.878)**		**-23.44** (9.405)**
$(Avg.\ \Delta GDP)_{t-1}$	-0.0602 (0.0882)	-0.0746 (0.0936)	-0.329 (0.683)	-0.00964 (0.286)
$(Log\ GDP\ per\ capita)_{initial}$	-8.689*** (2.820)	-9.014*** (2.587)	1.251 (1.087)	0.163 (0.548)
Avg. Private Investment	0.204*** (0.0472)	0.203*** (0.0477)	0.780 (0.516)	0.313* (0.188)
Avg. Public Investment	0.261** (0.112)	0.274** (0.115)	0.541 (0.833)	0.322 (0.280)
ΔHuman Capital	22.37** (9.217)	23.64** (9.711)	-1.097 (50.08)	14.24 (57.25)
Tropical Population			3.527 (3.354)	0.585 (1.700)
Coastal Population			-1.281 (3.745)	0.177 (1.160)
Constant	54.90** (25.28)	59.70** (22.90)	0 (0)	5.597 (9.246)
Estimator	GLS FE	GLS FE	Sys. GMM	Sys. GMM
Observations	340	340	340	340
R-squared	0.414	0.425		
Number of Countries	89	89	89	89
# of instruments			20	30
P-value A-B test (AR2)			0.632	0.316
P-value Hansen (overid.)			0.273	0.412

Robust standard errors clustered by country in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$. The EFW data source is the Economic Freedom of the World: 2016 Annual Report by Gwartney et al. The World Bank's World Development Indicators (WDI) provides GDP data and investment data. OECD investment data substitutes for WDI data when WDI investment data is unavailable. Penn World Table 9.0 provides the annual measure of human capital. Geography data is from Gallup et al. (1999).

Roodman (2015), is increasingly popular in the institutional transition literature. GMM offers a valuable alternative to IV estimation for estimating endogenous regressors. In fact, IV estimation is a special case of GMM estimation, and GMM is actually the more efficient estimator in the presence of heteroscedasticity.

Columns 3 and 4 in Table 6 present the GMM estimation of the dynamic panel model. We use two-step system GMM estimation with Windmeijer-corrected standard errors and report the instrument count for each model. We treat every variable in the model as endogenous except for the geographical measures. The results of the Arellano-Bond test for AR (2) autocorrelation and Hansen test for over identification verify the appropriateness of the chosen GMM model and are presented in Table 6. The instruments satisfy the exclusion restrictions and there is no evidence of autocorrelation of error terms in the models. The column 3 presents the dynamic panel estimation of the GHL model without institutional volatility. The column 4 adds a measure of institutional volatility.

The results from these dynamic panel models indicate that while institutional liberalization increases economic growth, institutional volatility decreases

Table 7

Selection on Unobservables (Oster) Test for Institutional Volatility and Economic Growth

	Coefficient, Uncontrolled Model	Coefficient, Controlled Model	δ for β=0; $max(R^2)$=1	Oster bounds of β; $max(R^2)$=1
Institutional Volatility	-3.417	-3.493	7.89	(-3.63 to -3.49)
R-Squared	0.012	0.425		

Note: Selection on unobservables is conducted using the "psacalc" command in Stata by Oster (2016). δ is the proportional selection of unobservables, where δ=1 means that unobservables are equally as important as observables in the model. The bounds of β are calculated using δ=0 and δ=1. Test conducted on the fixed effects (year and country) models presented in Table 6, where the three-year average GDP growth rate is the dependent variable and controls include average private and public investment rates, initial institutional quality, the change in institutional quality, changes to human capital and initial GDP.

economic growth. Therefore, volatility in the reform path mitigates or even negates the benefits of economic liberalization. The marginal growth-effect of increasing the ΔEFW by 0.214 EFW points (a one-standard-deviation increase) is 0.45 percentage points, according to the fixed-effects estimates. Alternatively, the marginal growth-effect of increasing institutional volatility by 0.089 (a one-standard-deviation increase) is -0.31 percentage points. Put another way, the marginal effect of increasing institutional volatility by one standard deviation has a similar growth-effect as a decline in institutional quality of 0.15 EFW points.

As an additional test of the robustness of our results to endogeneity, we conduct a selection on unobservables test, known as the Oster test. Table 7 presents the results. The Oster test uses coefficient stability and r-squared movements to determine if an estimation result is robust to omitted variable bias.[16] It provides bounds for an estimated coefficient by making assumptions about the variation in the dependent variable explained by both observed and unobserved variables. We employ the strictest condition in our robustness test, namely that the observed and unobserved variables collectively explain 100 percent of the variation in average growth rates (maximum r-squared equals one).

In the table, δ is the degree of selection of unobserved variables relative to observed variables, where δ=1 indicates that unobserved variables and observed variables are equal in their ability to explain the average growth rate and δ>1 indicates that unobserved variables explain more variation in the dependent variable than observed variables. Column three presents the value of δ such that the growth-effect of institutional volatility, β_4, equals zero under the condition that the maximum r-squared equals one. The resulting value, 7.89, indicates that

[16]See Oster (2016) for a detailed explanation of the Oster test and for a description of the associated Stata package, psacalc.

in order to conclude that β_4=0, unobserved variables would need to account for more than seven-times more variation in average growth rates than the observed variables. Altonji et al. (2005) and Oster (2016) recommend that a result of $\delta>1$ is a robust result.

Column four presents the results in another form, as Oster bounds of β_4. The bounds are calculated by forcing δ=0 and δ=1 separately. Importantly, the range of β_4 does not include zero and is similar to the results from Table 6. These results suggest that the negative growth-effects of institutional volatility are robust to omitted variable bias.

Table 8 presents the marginal growth-effects of three liberalization paths selected from our sample to further illustrate these results. Both the fixed-effects results and system-GMM results are included. In the first two examples, we select countries from our sample that experienced two similar three-year EFW improvements with different levels of volatility. Using two three-year reform observations from the same country holds constant many of the other factors that affect a country's growth rates, like geography and culture.

Czech Republic's EFW score improved by 0.12 points from 2004 to 2006, and it improved again, by the same amount, from 2012 to 2015. However, the 2012-2015 reform was more volatile than the 2004-2006 reform (volatility measures are 0.12 and 0.02, respectively). Similarly, Ireland's EFW score improved by roughly 0.18 points from 2000 to 2003 and from 2012 to 2015. But, the 2000-2003 reform was more volatile than the 2012-2015 reform (volatility measures are 0.18 and 0.11, respectively). In both examples, the less volatile reform period

Table 8

Marginal Effect of Three-Year Institutional Change

	Czech Rep. (2004-2006) ΔEFW = 0.12	Czech Rep. (2012-2015) ΔEFW = 0.12
Estimator	**St. Dev. (ΔEFW) = 0.02**	**St. Dev. (ΔEFW) = 0.12**
Fixed-Effects Estimates	0.19	-0.11
System-GMM Estimates	-0.22	-2.17
Actual Growth Rate	5.93	2.14
	Ireland (2012-2015) ΔEFW = 0.185	Ireland (2000-2003) ΔEFW = 0.181
Estimator	**St. Dev. (ΔEFW) = 0.11**	**St. Dev. (ΔEFW) = 0.18**
Fixed-Effects Estimates	0.01	-0.25
System-GMM Estimates	-2.13	-3.83
Actual Growth Rate	11.47	3.40
	Tanzania (2006-2009) ΔEFW = 0.341	Zimbabwe (2012-2015) ΔEFW = 0.348
Estimator	**St. Dev. (ΔEFW) = 0.09**	**St. Dev. (ΔEFW) = 0.17**
Fixed-Effects Estimates	0.40	0.16
System-GMM Estimates	-1.41	-3.10
Actual Growth Rate	3.80	0.60

Table 9

Volatility Results by Subsample

	GLS FE Avg. GDP Growth	System GMM Avg. GDP Growth
Liberalizers	-3.273*	-7.563
Non-Liberalizers	-0.884	-8.760
Low Income	-4.104*	-4.618
High Income	0.028	1.002
Low Initial Quality	-6.013**	-18.58**
High Initial Quality	2.773	5.971

Note: Coefficients are reported from identical models to those pictured in columns two and four in Table 6 with narrowed subsamples by income, institutional trend and initial institutional quality. Liberalizing (declining) institutions are those whose EFW score increased (decreased) from 2000-2015. Low-income (high-income) economies are those whose GDP per capita is less than (greater than) 15,994 USD. Low (high) initial quality institutions are those below (above) the sample mean in 2000.

is associated with higher growth rates, which is consistent with our finding of a negative relation between institutional volatility and economic growth.

The third example compares two similar, low-income countries. Again, both countries experience comparable improvement to their EFW score, 0.341 points for Tanzania from 2006 to 2009 and 0.348 points for Zimbabwe from 2012 to 2015. However, Tanzania's reform was roughly half as volatile as Zimbabwe's reform, and unsurprisingly, it experienced a high rate of growth during the period.

The existing studies of the growth-effects of institutional volatility, including Pitlik (2002) and Berggren et al. (2012), use OLS estimation techniques that are likely biased by endogeneity. The use of system GMM in this paper represents the first use of an instrument to control for reverse causality and/or omitted variables that likely bias previous results. The system GMM results indicate that, on average, the effect of institutional volatility on growth is negative. Moreover, the marginal effect of the system GMM estimates are larger than those estimated using biased and inconsistent fixed-effects estimates. However, this does not rule out a potential heterogeneous effect based on institutional quality, trend and income.

V.3. The Heterogeneous Effects of Institutional Volatility

Berggren et al. (2012) finds institutional volatility is positively associated with economic growth for high-income countries. Otherwise, they generally find no effect of institutional volatility on economic growth. Therefore, we run the same models on multiple subsamples to test for heterogeneity in the effect of institutional volatility. We divide the sample based on institutional trend, quality and average income.

The subsample of liberalizers are those countries whose institutional quality improved from 2000-2015, and the non-liberalizers are all other countries. Low-income countries are those countries whose average GDP per capita is below $15,994, which is the mean in the sample. High-income countries are those whose average GDP per capita is equal to or greater than $15,994. The high-income subsample includes 26 countries, 25 of which are OECD countries. Lastly, countries with low initial quality institutions are those with EFW scores below the mean in 2000, and countries with high initial quality are those with EFW scores above the mean in 2000.

Although only the system GMM estimates are consistent, we include both the fixed-effects and system GMM results to determine if there is any evidence of a positive effect using the fixed-effects estimates. We find very little evidence of a positive relation between institutional volatility and economic growth. Nearly every coefficient is negative, but only the coefficients for liberalizers, low-income countries and countries with low initial institutional quality institutions are statistically significant.

The system GMM estimate for high-income countries is positive but statistically insignificant. Therefore, we do not find evidence of the institutional sclerosis hypothesis advanced by Berggren et al. (2012). However, there are several differences in our data that might account for the differences in our result. Most importantly, we measure institutional *volatility*, whereas they measure institutional *stability* as discussed previously. Second, we use different sample periods and measures of institutions. Thus, we do not view our work as evidence overturning their result.

Overall, the GMM models provide some evidence of a causal, negative effect of institutional volatility on economic growth. This result is particularly strong for countries with low quality institutions, low-income, and for those that are liberalizing. This result is consistent with the growth-hampering effects from uncertainty in the policy uncertainty literature.

V.4. Disaggregating Institutional Volatility

Lastly, we examine the subcomponents of the economic freedom index to test if any one area's volatility in particular effects economic growth. Appendix 2 presents the results of the fixed-effects and system GMM models with the EFW index disaggregated into its five areas. The coefficients are those from a single model with all five areas (including an initial level, change, and volatility measure for each) included simultaneously. Running five separate models and including each individual EFW area separately results in nearly identical coefficients.

Only the coefficient for volatility in EFW Area 1 (size of government) is negative and statistically significant. According to the fixed effects model, a one-

standard-deviation increase in the size of government's volatility is associated with a 1.6 percentage point decrease in the average growth rate. The system GMM estimate suggests a more negative growth-effect of 4.045 percentage points. None of the measures of volatility in the other EFW areas is statistically significant.

It is common in the economic freedom literature for the coefficients of the disaggregated components of the EFW index to be insignificant or take a different sign than the aggregated index. For example, Carlsson and Lundström (2002), in one of the earliest attempts to decompose the effects of economic freedom on growth, find *insignificant* effects of monetary policy and *negative* effects of openness and size of government. Our results from using the disaggregated index show that volatility in the size of government negatively affects growth rates holding all else constant. However, the growth-effects of the other EFW areas individually are not statistically different from zero holding all else constant.

VI. CONCLUSION

The effects of institutional volatility are theoretically ambiguous. On one hand, institutional volatility may destabilize the structure of exchange, which increases costs and decreases the gains from trade. On the other hand, institutional volatility may free an economy from institutional sclerosis, or the growth hampering effects of rent seeking interest groups. Using OLS, fixed effects, and GMM estimations, this paper tests the growth-effects of institutional volatility and finds a negative association. Moreover, this research provides some evidence that institutional volatility's overall effect is mediated through volatility's negative impact on private investment rates. Collectively, our results are contrary to previous studies of institutional volatility that find a positive growth-effect for high-income countries.

Our results are consistent with the policy uncertainty literature. Institutional volatility likely increases uncertainty across many policy sensitive dimensions, including firm production, private investment, and household consumption. Furthermore, institutional volatility requires economic resources to endure costly reallocation, which decreases growth. Although institutional volatility often accompanies institutional reform, policy makers should minimize volatility to maximize economic growth during transition. Reformers are likely to receive a higher payoff from their policy reform efforts by minimizing volatility, which signals a binding and credible commitment to liberalization. Thus, gradual institutional improvements may be a better policy for sustained economic growth compared to quick, large institutional changes. Overall, our research supports prior works that policy makers should pursue economic freedom; however, they should do so along a stable reform path to maximize economic growth.

In addition to policy implications, our work also has academic implications. Growth models including only the initial and/or final value of institutional quality implicitly ignore institutional volatility. Researchers should reconsider assuming away the information contained in time-variant measures of institutional quality. Institutional volatility, as measured by volatile changes in an institutional index, has both a statistically significant and an economically significant effect of growth rates. As such, the economic freedom literature, and the institutional literature more broadly, can be enriched by including institutional volatility in the analysis.

We believe our work highlights several avenues for future research. Economic freedom influences not only economic growth but other dimensions of quality of life, including life expectancy, health outcomes, happiness, and many others. Thus, researchers could explore how institutional volatility influences such quality of life outcomes. Another option is to explore and identify additional channels through which volatility influences economic growth. Finally, researchers could examine determinants of institutional volatility. Determinants of institutional quality focus on deep historical factors such as culture, climate, state antiquity, historical prevalence of diseases, and the strength of long-run ultraviolet radiation exposure (Bjørnskov and Méon 2013; Davis 2016; Nikolaev and Salahodjaev 2017; Ang et al. 2018; Gohmann 2018). Building from this literature may produce useful insights into why some countries experience more volatility than others.

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SUMMARY

The new institutional literature widely acknowledges the benefits of growth-enhancing institutions but rarely discusses the path of institutional reform. While good institutions stabilize the structure of exchange and decrease uncertainty in market transactions, institutional reform may involve institutional volatility. If institutional volatility increases uncertainty, it can mitigate the benefits of reform. Using a sample of 89 countries from 2000-2015, this paper empirically examines the effects of institutional volatility on economic growth. We find that institutional volatility decreases economic growth, particularly during liberalization for countries with low quality institutions and low income. In fact, a one standard deviation increase in volatility decreases growth by about 0.50 percentage points. This finding is robust to multiple estimation techniques and omitted variable bias. Evidence is provided suggesting that this effect is partially mediated through volatility's impact on private investment. These results support prior works that policy makers should pursue economic freedom, but our work indicates they should do so along a stable reform path to maximize economic growth.