Chapter 3: How Are Institutions Related?

By Christopher J. Coyne and Russell S. Sobel *

1 Introduction

There is widespread consensus among economists that institutions matter for economic development or stagnation. A large literature indicates that wealthy countries are those where property rights are clearly defined and protected, the rule of law is established and enforced, citizens have political and civil liberties, and policymakers adopt sound monetary and fiscal policies.[1] Poor countries tend to lack most, if not all, of the ingredients required for development. Given the widespread agreement regarding the importance of good institutions for economic growth, an important question for poor countries is to how to engage in effective institutional reform.

Reform is a messy process as illustrated by the high variance in the economic performance of transition countries following the collapse of communism. Part of the difficulty stems from the fact that reformers must address issues of reform prioritization, sequencing, and selectivity. Further complicating the process is that economic and political reforms are highly context-specific. As Dani Rodrik notes, "appropriate growth policies are almost always context specific. This is not because economics works differently in different settings, but because the *environments* … differ in terms of the opportunities and constraints they present" (Rodrik, 2007: 4). In general, when it comes to reform, economists know *what* institutions and policies are necessary to ignite economic growth but they know much less about *how* to go about getting those institutions and policies. Closing the gap between "know what" and "know how" in institutional reform is critical for achieving sustained growth.

This chapter contributes to closing this gap by exploring the interrelationship between a variety of institutional measures. The idea that the relationship between institutions matters for economic and political outcomes can be found in the work of F.A. Hayek and Milton Friedman, who argued that economic freedoms were critical for political freedoms (Hayek, 1944; Friedman, 1962). The underlying idea is that when the government controls the means of production there is little room for dissent and the exchange of ideas.[2] We contribute to this line of inquiry by exploring whether there is a relationship between a country's economic and political institutions. Our analysis also provides insight into whether changes to institutions are permanent or tend to revert back to where they started.

Using time-series techniques, we analyze several measures of economic and political institutions commonly used in the literature on this topic. These measures capture various aspects of economic and political institutions. In addition to comparing several aggregate measures of institutions—for example, autocracy, democracy, constraints on the executive, economic freedom—we also analyze how the five Areas of the index published in *Economic Freedom of the World* (EFW are related to other institutions.

Our analysis involves two steps. First, we perform empirical testing to determine whether each institutional measure is stationary or non-stationary. A stationary variable tends to revert to some prior mean value when it is shocked, and thus changes are only temporary. On the other hand, for a non-stationary variable, changes are permanent. Thus the test for stationarity is a test for whether or not changes to that particular institutional measure tend to "stick," that is, whether the change tends to be permanent. Second, we test

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1 See, e.g., North and Thomas, 1973; Barro, 1996; North and Weingast, 1989; Gwartney, Lawson, and Holcombe, 1999; Aron, 2000; Acemoglu, Johnson, and Robinson, 2001, 2002; Rodrik, Subramanian, and Trebbi, 2004; Acemoglu and Johnson, 2005; Ovaska and Sobel, 2005; Sobel, Clark, and Lee, 2007.

2 For an empirical test of the Hayek-Friedman hypothesis, see Lawson and Clark, 2010.

for relationships among the many institutional measures: in particular, we test for cointegration, which indicates whether a pair of institutions tend to move together through time. When two institutions are cointegrated it implies that the changes to one institution will only be permanent if changes to the other institution occur as well. Either both change or neither changes over the long term.

Our main findings can be summarized as follows. First, most formal economic and political institutions are non-stationary: changes to these institutions are permanent. The exceptions to this finding are the measures of civil liberties and political rights and of legal structure and property rights found in Area 2 of the EFW index, which we find to be stationary. This implies that changes to these institutions tend to revert to the mean, at least within the 35-year time period we examine. Our explanation for the stationarity of these measures is that they capture aspects of informal, embedded institutions that tend to take longer than formal institutions to change permanently. Second, we find that most of a country's institutions are cointegrated, implying that sustainable institutional change requires reforms across multiple institutions. Taken together, these results provide insight into our understanding of how institutions are related. If economic and political institutions tend to move together, sustainable institutional reform requires simultaneous reforms and emphasis must be placed on seeking opportunities for changes to an array of institutions.

We proceed as follows. Section 2 discusses what the concept of institutions entails and why institutions matter for economic outcomes. Section 3 is broken into two subsections. The first provides an overview of the data we use in our analysis while the second provides an overview of our methodology. Section 4 tests for stationarity in each measure, while Section 5 tests for cointegration across the measures. In addition to the aggregate measures of institutions, we also test for stationarity and cointegration across Areas of the *Economic Freedom of the World* index. In addition to presenting our results, we also suggest explanations for our findings. Section 6 concludes with the implications of our analysis.

2 Institutions—What are they and why do they matter?

Institutions are the formal and informal rules governing human behavior (see North 1990, 1991). By providing the rules of the game, institutions facilitate economic, political, and social outcomes through their influence on production and transaction costs, political stability, and conflict resolution. The defining characteristic of formal institutions is that they are codified. Examples include constitutions, laws, and regulations. In contrast, informal institutions lack formal codification. Examples include conventions, norms, and traditions. While formal institutions tend to be backed by the force of law, informal institutions are typically enforced through social custom.

An important relationship exists between formal and informal institutions: the enforcement costs associated with formal institutions will be a function of the extent to which they align with informal institutions. Where informal institutions align with formal institutions, enforcement costs will be low because people will already be behaving in a manner that supports formal institutions absent the threat of coercion (see Boettke, Coyne and Leeson, 2008; Williamson, 2009). In contrast, where there is a gap between formal and informal institutions, enforcement costs will be high because people will tend to behave in a manner that contrasts with the dictates of formal institutions. Perhaps nothing illustrates this point better than the well-known study of property rights in Peru by Hernando de Soto (1989). De Soto concluded that Peru's formal institutions, characterized by excessive regulation, clashed with informal norms of property and entrepreneurship, driving many productive activities into the underground economy. This widespread underground activity, in turn, limited capital investments, the extent of the market, and economic development.

Also important for institutional reform is how long it takes to change informal compared to formal institutions. The literature on institutions indicates that it is typically easier to change formal institutions than informal institutions. For example, Oliver Williamson indicates that informal, embedded institutions can take 100 to 1,000 years to change while formal institutions can change within a matter of decades (2000). In general, informal institutions "display a great deal of inertia—some because they are functional (such as conventions); others take on a symbolic value … many are pervasively linked with complementary institutions (formal and informal), etc." (Williamson, 2000: 597). Similarly, Fukuyama indicates that, while culture can be affected by developments in ideology, formal institutions, and civil society, culture "tends to change the most slowly of all." He goes on to note that culture is largely "beyond the reach of institutional solutions, and hence of public policy" (1995: 8–9). This makes sense when one considers that, while formal institutions can typically be changed through methods that are democratic (e.g., statute, amendment, etc.) or nondemocratic

(e.g., government dictate), informal institutions are deeply ingrained in the fabric of society and are therefore more difficult to change.

The distinction and connection between informal and formal institutions has important implications for making predictions about institutional reforms. First, changes to informal institutions are less likely to be permanent given that they can take many generations to change. Second, given the connection between informal and formal institutions, there is reason to believe that a country's many institutions are related. Third, informal institutions will shape the feasible set of reforms that can be made to formal institutions. Reformers must appreciate these implications when considering changes to existing institutions.

3 Data and methodology

3.1 Data—institutional measures

There are numerous measures of institutions used in the literature. Our analysis relies on several well-known measures of political and economic institutions, described in table 3.1. All measures were collected at five-year intervals (1970–2005) whenever data are present. We made an attempt to include as many popular institutional measures as possible but were only able to use those with sufficient observations in both the time and cross-sectional dimensions. Across all measures, 215 countries are represented over a 35-year window. The institutional measures employed capture different aspects of economic and political institutions. After a discussion of our methodology in the next subsection, we present, in sections 4 and 5 the findings of our analysis of these institutional measures. In doing so, we provide an interpretation of these results in the context of the discussion of institutions from the previous section.

3.2 Methodology—stationarity and cointegration

A time series variable, such as one of the institutional measures, would be considered stationary if, when it is shocked, it tends to revert to a prior, time-invariant, mean level. If, instead, the series is non-stationary (i.e., has a "unit root"), then all changes become permanently incorporated into the series. A familiar example of a non-stationary process is the "random walk," where any change becomes permanently part of the series. In this chapter, we apply this distinction to international measures of institutions and this allows us to estimate whether changes to the series tend to remain permanent in the actual data or whether they tend to decay. In our analysis, we perform two popular tests for stationarity for each institutional measure.

While stationarity is a property of an individual time-series variable, cointegration refers to a relationship *among* different non-stationary variables through time. In essence, if two variables are cointegrated it means that they tend to move together through time, and if they are shocked apart that they will tend to move back together. For our institutional measures, this test will allow us to estimate whether it is possible to reform specific, individual institutions in isolation, or whether simultaneous institutional reform is necessary for the changes to remain permanent. If two institutions are cointegrated, for example, a change in one will only be permanent if both change. If both do not change, in the long run the one institution that changed will be pulled back to the long-run path determined by the other institution(s). We employ three popular statistical tests for cointegration, using slightly different methodologies, for our analysis of the institutional measures.

It should be made clear that the panel-time-series techniques we use are very different from simple cross-sectional analysis. In particular, our techniques allow for institutions to be related over the long run, even though they may be shocked off this long-run relationship for short periods of time. Such short-run distortions are problematic for cross-sectional analysis as they tend to be viewed as observations that do not fit the relationship.

As an example, suppose that democracy and capitalism are cointegrated. They should tend to stick together within a country in the long run, but either may experience a shock in a given time period or country that sends it away from this long-run relationship. Over time, this will correct but empirically in a cross section we will still witness many observations that may be contrary to the true relationship (e.g., way off the true regression line). Thus, it is possible for there to be many counter examples to the pairing of democracy and capitalism in any given year though there is still a presence of a long-run positive association between the two in countries over a long time horizon. Our panel-time-series techniques properly account for these dynamics and are, therefore, a better way to test for true relationships among institutions within countries.

4 Are Institutions Stationary?

We conduct two tests for stationarity (i.e., panel-unit-root tests) on each measure, the Im, Pesaran, and Shin W-statistic (IPS) and the augmented Dickey-Fuller Chi-square (ADF).

Table 3.1: Institutional measures, sources, and maximum cross-sections of countries

Economic Freedom of the World (EFW)	
A measure of a country's economic freedom. Each EFW score is calculated using 42 different measures to create an index ranking countries around the world. Economic freedom is measured in five different areas: (1) size of government; (2) legal structure and security of property rights; (3) access to sound money; (4) freedom to trade internationally; and (5) regulation of credit, labor and business.	max x-sect. =130
Source: Gwartney, James D., and Robert A. Lawson (various years). *Economic Freedom of the World.* Fraser Institute.	
Political Rights (PR)	
Political Rights (PR) – A measure of political rights held by citizens. The calculation of this variable is based on ten political questions grouped into three sub-categories: (1) electoral process; (2) political pluralism and participation; (3) functioning of government.	max x-sect. = 191
Civil Liberties (CL)	
Civil Liberties (CL) – A measure of civil liberties held by citizens. The calculation of this variable is based on fifteen political questions grouped into four sub-categories: (1) freedom of expression and belief; (2) associational and organizational rights; (3) rule of law; (4) personal autonomy and individual rights.	max x-sect. = 191
Source: Freedom House (various years). *Freedom in the World. Freedom House.*	
Constraints on the Executive (EXEC)	
A measure of the extent of institutionalized constraints on the decision making powers of chief executives, whether individuals or collectives. Accountability may be executed by a variety of groups including legislatures, an independent judiciary, ruling parties, councils of nobles or advisors, or the military. The main focus of this measure is on the various checks and balances on the executive decision making process.	max x-sect. = 128
Democracy (DEM)	
A measure of the degree of democracy in a given country based on: (1) the competitiveness of political participation; (2) the openness and competitiveness of executive recruitment; and (3) the constraints on the chief executive.	max x-sect. = 128
Autocracy (AUT)	
A measure of the degree of autocracy in a given country based on: (1) the competitiveness of political participation; (2) the regulation of political participation; (3) the openness and competitiveness of executive recruitment; and (4) constraints on the chief executive.	max x-sect. = 128
Source: Jaggers, Keith, and Monty G. Marshall (2000). *Polity IV Project.* Center for International Development and Conflict Management, University of Maryland.	

A significant test statistic rejects the null hypothesis that the series has a unit root, *thus significant values indicate the series is stationary*. For institutional changes to be permanent, the series should be non-stationary, which would be found if there is an insignificant test statistic. Our results are presented in table 3.2.

Both tests indicate non-stationarity for four of the institutional measures—Constraints on the Executive (EXEC), Democracy (DEM), Autocracy (AUT), and the Economic Freedom of the World index (EFW). Non-stationarity implies that changes or reforms to any of these measures are permanent. We also find that the results for Political Rights (PR) and Civil Liberties (CL) are significant, which means these measures are stationary or mean-reverting. This indicates that within our sample, the changes to these two data series tend to decay away and the series ultimately reverts to some prior mean level.[3]

One interpretation of these findings is as follows. The Economic Freedom of the World (EFW), Autocracy

3 Because our sample has a limited number of time periods but a larger number of cross sections, the power of the ADF test can be biased in favor of finding stationarity. Given our robust findings for non-stationarity on several of the variables, however, we believe this is not an issue, and our other stationarity tests seem to confirm the accuracy of the ADF tests.

Table 3.2: Panel-unit root tests for major institutional measures

	Test Statistic (Null = series is non-stationary, has unit root) IPS	ADF	Results
Economic Freedom of the World (EFW)	−1.59	212.81	Non-stationary
Political Rights (PR)	−1.70*	325.90*	Stationary
Civil Liberties (CL)	−3.80*	317.03*	Stationary
Constraints on the Executive (EXEC)	−0.06	123.56	Non-stationary
Democracy (DEM)	1.96	75.65	Non-stationary
Autocracy (AUT)	−7.40	95.84	Non-stationary

Notes: Test statistics are the Im, Pesaran, and Shin W-statistic (IPS) and the augmented Dickey-Fuller Chi-square (ADF). A significant test statistic rejects the null hypothesis that the series has a unit root, and thus significant values indicate the series is stationary; * denotes statistical significance at a 5% level or better. All tests allow for heterogeneous dynamics (individual roots), lag-length selection by SIC, and employ Newey-West bandwidth selection using the Bartlett kernel.

(AUT), Democracy (DEM), and Constraints on Executive (EXEC) measures are dominated by formal elements of economic and political institutions. In contrast, the measures of Political Rights (PR) and Civil Liberties (CL) are not meant to be direct measures of formal political institutions. Instead, these measures capture the freedoms and rights experienced by citizens. Landman writes that "Freedom House [the PR and CL indexes] includes a wide range of institutional and rights concepts in its checklists, which are reflected in its overall scores" (2005: 48). Further, Aron notes that CL captures elements of the concept of social capital, which includes notions of trust and other embedded norms (2000: 109). This implies that the PR and CL indexes, as compared to the other institutional indexes, capture significant elements of informal institutions. As discussed in Section 2, formal institutions are easier to change than informal institutions. Given this, we would expect institutional measures that capture significant formal institutional elements to tend more towards being non-stationary than indexes that capture significant elements of informal institutions.

We next consider whether the five Areas of the EFW index are stationary. The results are presented in table 3.3. The results for both tests indicate that Area 1: Size of Government, Area 4: Freedom to Trade Internationally, and Area 5: Regulation of Credit, Labor, and Business are non-stationary, meaning that changes to these components will tend to be permanent. The results for Area 3: Access to Sound Money are mixed, with one test indicating non-stationarity and one indicating that the series is stationary. The mixed finding implies that empirically, across all countries, the EFW score for monetary policy is less likely to have changes that remain permanent. Why our analysis yields mixed results is a question we cannot answer with the data but, in the end, the results are mixed and one of the two tests does say it is non-stationary and capable of permanent change. Finally, all three tests indicate that Area 2: Legal Structure and Security of Property Rights is stationary. So, while we find that the overall EFW index is non-stationarity, one of its components (Area 2) is stationary while another (Area 3) is mixed.

One explanation for why property rights tend to be mean-reverting is that a society's legal structure and property rights include a significant informal element. While property rights can be codified and strengthened through formal institutions, they are grounded in informal institutions such as norms, conventions, and beliefs. The idea that the notion of property is grounded in informal institutions can be traced back to David Hume who argued that the property and justice were the result of convention which were later codified into formal law (Hume, [1739/1740] 2000: book III, part ii, Sections 1 and 2). This same point has been made more recently in the work of Hernando de Soto (1989), who notes that informal notions of property can facilitate cooperation even in the face of stifling formal regulations. Similarly, Elinor Ostrom (1990) illustrates how community norms can lead to common property regimes over common-pool resources. Finally, Platteau (1994, 2000) contends that economic growth requires well-defined property rights and notions of trust, the extent of which are largely a function of society's cultural endowment.

To the extent that informal institutions underpin stationary institutions, it implies that a change to these institutions ultimately entails changing underlying norms and belief systems. The process of changing informal institutions is often long and varied and involves changing the mental models that people use to frame how they view

Table 3.3: Panel-unit root tests for areas of the economic freedom of the world (EFW) index

	Test Statistic (Null = series is non-stationary, has unit root)		
	IPS	ADF	Results
Area 1: Size of Government	0.60	225.27	Non-stationary
Area 2: Legal Structure and Security of Property Rights	−3.02*	306.40*	Stationary
Area 3: Access to Sound Money	−1.41	315.24*	Mixed
Area 4: Freedom to Trade Internationally	0.11	204.26	Non-stationary
Area 5: Regulation of Credit, Labor, and Business	1.69	198.45	Non-stationary

Notes: Test statistics are the Im, Pesaran, and Shin W-statistic (IPS) and the augmented Dickey-Fuller Chi-square (ADF). A significant test statistic rejects the null hypothesis that the series has a unit root, and thus significant values indicate the series is stationary; * denotes statistical significance at a 5% level or better. All tests allow for heterogeneous dynamics (individual roots, intercepts, and trends), lag-length selection by SIC, and employ Newey-West bandwidth selection using the Bartlett kernel.

the costs and benefits associated with various courses of action. As recent work by Douglass North (2005) indicates, economic research in this area is still in its infancy and much work remains to be done. The finding that Area 2 is stationary implies that the informal institutions that underpin property-right structures within a country are not as likely to change permanently within the time period covered in our sample.

Returning to the EFW measure, Areas 1, 3, 4, and 5 represent policies that can more easily be changed than property rights and legal regimes that are embedded in informal institutions. This implies that it will tend to be more difficult to make permanent changes to Area 2 characteristics. While changes to formal rules regarding property are indeed important, in order to be effective those changes must be grounded in the appropriate informal institutions.

To provide a visual interpretation of our results, figure 3.1 shows actual area scores for a select group of countries. These countries have data patterns that are representative of the interpretation and implications of our results. The top two graphs illustrate the data pattern expected for a stationary series, which is what we found holds, on average across countries, for the Area 2 measure, and possibly for Area 3. In graph 3.1a, it is clear that South Africa's score for Area 2 was shocked downward between 1980 and 1990, and that it subsequently rebounded to its prior mean value around the year 2000. In graph 3.1b, the United Kingdom's score for Area 2 exhibits the same mean reversion process after it was shocked downward in the 1980s and rebounded to its prior level.

The data in graphs 3.1c and 3.1d illustrate the data pattern expected for a non-stationary series, which is what we found holds, on average, clearly for Area 1, Area 4, and Area 5, and possibly for Area 3. In graph 3.1c, we present South Africa's score for Area 1, which trends upward through time with no evidence of an intention to move back to some prior mean level. Similarly, in graph 3.1d, Turkey's score for Area 4 exhibits many upward shocks without any apparent tendency to return to a prior mean level.

5 Are Institutions Cointegrated?

We use three popular cointegration tests: nonparametric Phillips-Perron group rho (PP-rho) test, nonparametric Phillips-Perron group (PP) test and group Augmented Dickey-Fuller (ADF) test. In these results, a significant test statistic rejects the null of no cointegration, *thus significant values indicate the two series are cointegrated* and the two institutions tend to move together over long periods of time. Only non-stationary time series can be cointegrated and thus the measures found to be stationary—Political Rights (PR), Civil Liberties (CL), and Area 2 of the EFW index—are excluded from our cointegration tests.

We first consider whether all of the aggregated institutional measures are cointegrated. For two series to be cointegrated requires that they both be individually non-stationary. The results for the tests on the remaining non-stationary measures are presented in table 3.4. In all cases, and for all tests, the institutional measures are cointegrated, implying that they move together over time. This supports the claim that economic and political institutions are interrelated.

This finding implies that changes to one set of institutions—either political or economic institutions—will not be sustainable over the long run without changes to the other set of institutions. One explanation for this

Figure 3.1: Examples of stationary and non-stationary Areas of the EFW index

finding is that changes to only one set of institutions without concomitant changes to the other set may result in backsliding in future periods. For example, reforms to economic institutions without related reforms to political institutions that create appropriate constraints on government could result in the erosion of those very economic reforms as time passes.

We next consider whether the various areas EFW are cointegrated with one another. Because Area 2 was found to be stationary, we exclude it from our analysis. Given that the unit root test results for Area 3 were mixed—one test found it to be stationary, one non-stationary—we include it in our cointegration test. The results are shown in table 3.5. The results indicate that the various Areas of the index are pair-wise cointegrated with the other Areas, meaning that the various Areas move together over time within a country.

Similarly, we consider whether the non-stationary Areas of the EFW index are cointegrated with the other non-stationary institutional measures. The results are shown in table 3.6. As in previous findings, the results indicate that the various EFW Areas are pair-wise cointegrated with the other institutional measures; this give further support to the claim that institutions move together through time.

Taken as a whole, the findings of the cointegration tests support Hayek and Friedman's contention that economic and political institutions are related. Our results

Table 3.4: Pair-wise panel cointegration tests among major institutional measures

	EXEC	DEM	AUT
Phillips-Perron rho (PP-rho) test statistics (Null: No cointegration)			
EFW	5.09*	4.97*	5.80*
EXEC		5.95*	6.66*
DEM			6.48*
AUT			
Phillips-Perron (PP) test statistics Null: No cointegration			
EFW	–4.55*	–7.65*	–5.82*
EXEC		–8.63*	–8.06*
DEM			–9.19*
AUT			
Augmented Dickey-Fuller (ADF) test statistics Null: No cointegration			
EFW	–4.23*	–6.18*	–4.86*
EXEC		–7.79*	–7.89*
DEM			–8.58*
AUT			

Notes: Test statistics are nonparametric Phillips-Perron rho (PP-rho) test, nonparametric Phillips-Perron (PP) test, and Augmented Dickey-Fuller (ADF) test. A significant test statistic rejects the null of no cointegration, thus significant values indicate the two series are cointegrated; * denotes statistical significance at a 5% level or better. All tests allow for heterogeneous dynamics (individual roots), lag-length selection by SIC, and employ Newey-West bandwidth selection using the Bartlett kernel. See table 3.1 for institutional measure abbreviations. In a test for simultaneous cointegration, all four areas (AUT, EXEC, DEM, EFW) were indeed all mutually cointegrated.

indicate that permanent changes to institutions can only happen as part of broader reforms to other institutions. One explanation for this finding is that when there is space for reforms in one institutional area there is also the possibility for reforms in other institutional areas.

There are at least two channels through which opportunities for wide-ranging institutional reforms can emerge. The first channel is changes in voter ideology, as illustrated by the Thatcher Revolution in the United Kingdom where the opportunity emerged for dramatic political and economic reforms. The second channel is through the collapse of formal institutions due to shocks such as financial crisis, natural disaster, or war. Examples of this second channel would be Japan and West Germany after World War II, where the war resulted in a collapse of existing formal institutions and the opportunity for broad-based economic, political, and social reforms.

Again to provide a visual interpretation of our results, figure 3.2 shows actual area scores, and how they stay related through time, for two countries. Again we pick these countries because they have data patterns that are representative of the interpretation and implications of our results.

Graph 3.2a shows Thailand's scores for Areas 1, 4, and 5. Despite the many ups and downs of each series, the three clearly hang together through time. In fact, it almost appears as if the Area-1 score fluctuates up and down centered around the Area 4 score's evolutionary pattern through time. When viewed over this longer time horizon, one can clearly see they are related in their long-run trend movements. But this example also illustrates the power of our econometric technique relative to previous simple cross-sectional methods. Despite the long run relationships, there are clearly periods where some areas are moving in the opposite direction from others: for example, Area 1 is falling from 1995 to 2000, while Area 4 is rising during the same period. Cross-sectional techniques that only explore the correlations among changes in the Area scores, therefore, may identify negative or misleading correlations by looking at these patterns without properly accounting for the time-series properties of these cointegrated relationships.

The data presented in graph 3.2b, which shows Turkey's scores for Areas 1, 4, and 5, is clearly another example of how these areas tend to be cointegrated through time.

Table 3.5: Pair-wise panel cointegration tests among non-stationary Areas of the EFW index

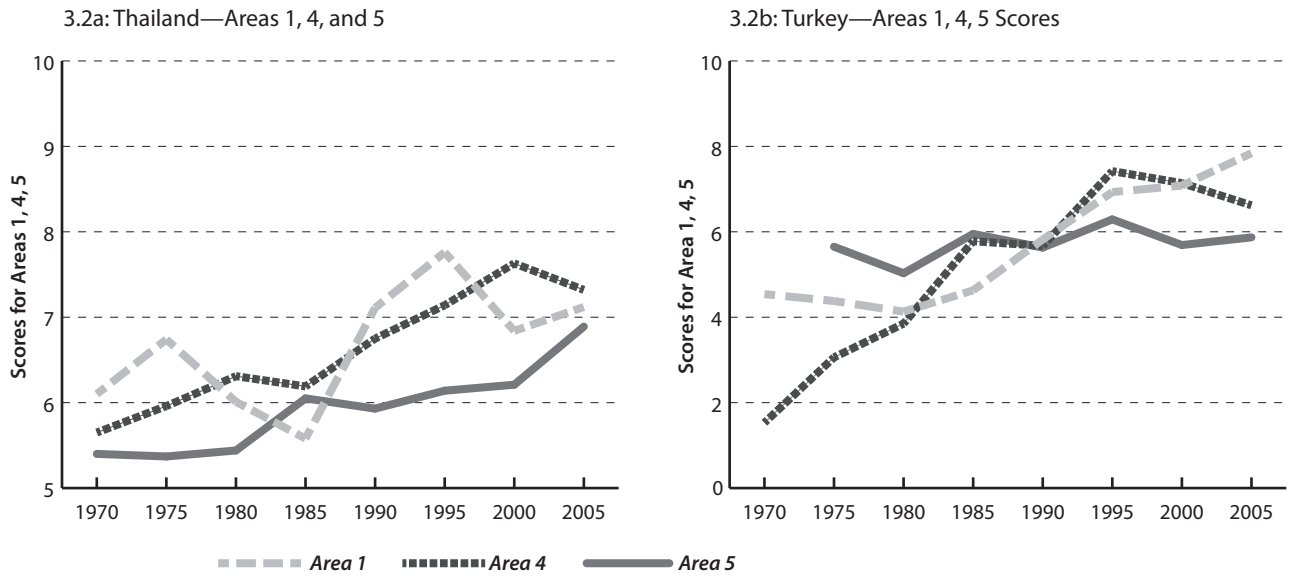
	Area 3: Access to Sound Money	Area 4: Freedom to Trade Internationally	Area 5: Regulation of Credit, Labor, and Business
Phillips-Perron rho (PP-rho) test statistics (Null: No cointegration)			
Area 1: Size of Government	9.10*	8.43*	9.05*
Area 3: Access to Sound Money		7.34*	8.04*
Area 4: Freedom to Trade Internationally			7.20*
Phillips-Perron (PP) test statistics (Null: No cointegration)			
Area 1: Size of Government	−7.92*	−5.65*	−6.03*
Area 3: Access to Sound Money		−9.63*	−10.17*
Area 4: Freedom to Trade Internationally			−11.23*
Augmented Dickey-Fuller (ADF) test statistics (Null: No cointegration)			
Area 1: Size of Government	−5.68*	−3.59*	−4.94*
Area 3: Access to Sound Money		−8.01*	−8.41*
Area 4: Freedom to Trade Internationally			−10.50*

Table 3.6: Pair-wise panel cointegration tests between non-stationary Areas of the EFW index and institutional measures

	EXEC	DEM	AUT
Phillips-Perron rho (PP-rho)test statistics (Null: No cointegration)			
Area 1: Size of Government	7.57*	6.75*	6.95*
Area 3: Access to Sound Money	5.87*	6.08*	5.53*
Area 4: Freedom to Trade Internationally	6.33*	6.81*	6.30*
Area 5: Regulation of Credit, Labor, and Business	6.25*	6.17*	5.95*
Phillips-Perron (PP) test statistics (Null: No cointegration)			
Area 1: Size of Government	−6.10*	−5.17*	−8.51*
Area 3: Access to Sound Money	−8.63*	−9.12*	−9.74*
Area 4: Freedom to Trade Internationally	−8.28*	−5.34*	−6.30*
Area 5: Regulation of Credit, Labor, and Business	−6.05*	−6.97*	−9.00*
Augmented Dickey-Fuller (ADF) test statistics (Null: No cointegration)			
Area 1: Size of Government	−4.72*	−4.34*	−7.28*
Area 3: Access to Sound Money	−7.16*	−7.20*	−8.91*
Area 4: Freedom to Trade Internationally	−7.63*	−5.30*	−6.16*
Area 5: Regulation of Credit, Labor, and Business	−5.29*	−6.11*	−8.67*

Notes for tables 3.5 and 3.6: Test statistics are nonparametric Phillips-Perron rho (PP-rho) test, nonparametric Phillips-Perron (PP) test, and Augmented Dickey-Fuller (ADF) test. A significant test statistic rejects the null of no cointegration, thus significant values indicate the two series are cointegrated; * denotes statistical significance at a 5% level or better. All tests allow for heterogeneous dynamics (individual roots), lag-length selection by SIC, and employ Newey-West bandwidth selection using the Bartlett kernel. Test for simultaneous cointegration of all four areas indicated they indeed were all mutually cointegrated. Area 2 is excluded from these tests because earlier tests showed it was stationary.

Figure 3.2: Examples of cointegration of Areas 1, 4, and 5 of the EFW index



It is also worth noting that the area scores presented for both Thailand and Turkey are also representative of the estimated non-stationary nature of these three Areas that we presented in graphs 3.1c and 3.1d.

6 Concluding Remarks

Our analysis has several implications that are important for our understanding of institutions and institutional reforms. First, most of a country's formal institutions are non-stationary, which means that reforms to these institutions tend to be sustainable over time. For political institutions, the exception to this finding are the two rights-based measures—political rights (PR) and civil liberties (CL)—that tend to revert to the mean. This implies that changes to these institutions are less likely to be permanent. For the measures of the EFW index, we found that Area 2: Legal Structure and Security of Property Rights was stationary. This might be explained by the fact that this Area of the EFW index captures aspects of informal institutions, which are typically more difficult to change than formal institutions. These findings confirm the theoretical predictions about how quickly formal institutions change compared to informal, which are are less likely to change even over relatively long periods of time.

Our analysis also indicates that a country's non-stationary institutions are co-integrated meaning that there are long-term links between political and economic institutions. In terms of policy, this implies that over the long term, reforms to one set of institutions are more likely to stick if reforms to other institutions are also undertaken. This makes the task of sustainable institutional reform more difficult because our results indicate that ultimate success requires changes to an array of institutions. Targeting aid or reform efforts at a narrow set of institutions may generate short-term change but are less likely to generate permanent change absent reforms in other areas. Widespread institutional reform requires identifying opportunities for broad change, whether it is swings in voter preferences or some kind of dramatic shock to the status quo. These opportunities are rare, but they present the best chance of sustainable institutional reform because they open the door for reforms over a larger range of institutions.

Finally, given the finding that institutions are cointegrated, our analysis implies that untangling institutions to determine the main institutional driver of economic growth is empirically difficult, if not impossible. Given the existence of cointegrated institutions, there is no way empirically to isolate the single institution that is most important for development. Because all of these institutions move together over the long-run, there will be correlations among all of them and economic development. This should lead to skepticism about efforts to reform a single institutional area with the hopes of generating long-term growth. While it is possible for a narrow range of reforms to generate short-term growth, reforms to a wide range of institutions are necessary for sustained, long-term growth.

To be clear, this last implication is not an endorsement of high-level, blueprint approaches to reform such as the Washington Consensus, which includes a wide array of policy and institutional reforms. Blueprint approaches to development neglect the fact that most reforms are highly context-specific: institutions that work in one setting may not work in other settings (see Rodrik, 2007: 41–43). Sustained development ultimately requires a long process of experimentation and trial and error to discover how the first-order principles of private property, rule of law, limited government, and sound policies can be implemented and codified in formal political and economic institutions. As this process of experimentation unfolds, it is important to understand that institutional reforms cannot be implemented in isolation, or without knowledge of which sets of institutions must be reformed simultaneously, to ensure that the reforms result in permanent change and progress.

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