Measurable Relationships Between Freedom and Prosperity and the Consequences for the Washington Consensus and New Economic Paradigm

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Measurable Relationships Between Freedom and Prosperity and The Consequences for the Washington Consensus and New Economic Paradigm*

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Abstract

Freedom has frequently been associated with economic prosperity. This analysis adds to that literature by strengthening the claim that freedom is a cause of prosperity by showing strong statistical relationships between freedom in one time period and greater prosperity in subsequent periods. The analysis draws on the *Human Freedom Index* and its sub-indexes as measures of freedom. Most prior analysis has used only the Economic Freedom Index and its components. This analysis adds the dimensions of the newer Personal Freedom Index (which is a sub-index of the *Human Freedom Index*). In addition to adding the more recent personal freedom dataset, the analysis also explores systematically the relative strengths of different detailed dimensions of freedom in facilitating economic growth. Because the many dimensions of freedom are often strongly correlated with each other, the paper devotes careful attention to the correlations among the various subindexes, as a guide both for minimizing estimation error from multicollinearity and for understanding the mechanisms by which freedom enables prosperity. The results indicate that while the existing "Washington Consensus" on policies to encourage economic development may not be a complete or ideal framework, it is at least consistent with encouraging economic growth through stronger freedom. But the newly constructed "Cornwall Consensus" is antithetical to freedom, an impediment to growth, and doomed to failure.

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Background and Objectives

Freedom is the condition in which we "live our lives as we choose so long as we respect the equal rights of others."[1] Inherent in this understanding of freedom is the absence of any coercive constraints from government, other than the minimum required to prevent the imposition of coercive constraints by one individual on another.[2] The desire for freedom is almost universal, and the struggle to achieve and protect it is at least as long as written history. Yet, today, millions still live under varying degrees of authoritarian abridgements of their natural rights to freedom.

For generations, leading thinkers have challenged us to understand, analyze, and protect our freedom. But only recently have those efforts been extended to measuring freedom with quantitative methods. The quantification of freedom is not a denial of the fundamentally philosophical, religious, behavioral, and human foundations of freedom. Rather, it is an added perspective that helps us understand more thoroughly the strengths and weaknesses, trends, and geographic distribution of freedom as it actually affects humanity.

This paper applies the *Human Freedom Index*[3] and its sub-indexes to demonstrate and measure the contribution of freedom to economic prosperity. Prosperity is not by any means the only, or even the most important, benefit of freedom, but it is one significant consequence that is often underappreciated. There is a rich literature with a long history that applies economic theory to demonstrate the effects of freedom on economic performance and uses quantitative analysis to show

[1] David Boaz, *The Libertarian Mind*, (New York: Simon & Shuster, 2015), 1.
[2] For a fuller discussion, see George H. Smith, *The System of Liberty: Themes in the History of Classical Liberalism*, (New York: Cambridge University Press, 2013), 133–51; *Tom G. Palmer, Realizing Freedom: Libertarian Theory, History, and Practice* (Washington: Cato Institute, 2009).
[3] Ian Vásquez, Fred McMahon, Ryan Murphy, and Guillermina Sutter Schneider, *The Human Freedom Index 2021: A Global Measurement of Personal, Civil, and Economic* Freedom, (Washington: Cato Institute, 2021), 9-33.

the economic effects of policies that enhance or erode freedom in specific contexts.[4] This investigation seeks to add to that corpus by using newly available data and additional analytical techniques.

The Economic Freedom Index began publication with data for 1975-1995.[5] Much of the data has since been extended back to 1950 and the index is updated annually. Beginning with data for 2008, a newer Personal Freedom Index expanded measurement to more individual dimensions of freedom that were not primarily economic in nature.[6] The Personal Freedom Index (PFI) and Economic Freedom Index (EFI) were combined into a comprehensive Human Freedom Index (HFI).

There is abundant suggestive evidence that freedom, especially in matters related to economic performance, is a strong enabler of economic prosperity. Since its inception in 2015, the annual release of the *Human Freedom Index* has been accompanied by analysis showing that higher levels of human freedom as measured by that index are associated with greater per-capita income as measured by Gross Domestic Product (GDP).[7] Its predecessor Economic Freedom Index has presented similar results for the more limited-scope index over a longer time period.[8]

Comparison of economic growth between nations that were in similar positions at some point in time but have since diverged in economic performance has shown that greater human freedom has been positively associated with higher economic growth in specific cases: South Korea vs. North Korea; Chile vs. Venezuela; Hong Kong (especially until recently) vs Cuba; Botswana vs Zimbabwe; Taiwan vs. Peoples Republic of China; PRC post 1982 vs its prior self; and other less dramatic cases.

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[4] For example, see Milton Friedman, *Capitalism and Freedom,* (Chicago: University of Chicago Press, 2002) and Friedrich Hayek, *The Constitution of Liberty,* (Chicago: University of Chicago Press, 1960).
[5] James Gwartney, Robert Lawson, and Walter Block, *Economic Freedom of the World: 1975-1995,* (Vancouver, B.C.: Fraser Institute: 1996).
[6] The data for the Personal Freedom Index has more recently been expanded to the year 2000.
[7] Ian Vásquez, Fred McMahon, Ryan Murphy, and Guillermina Sutter Schneider, 30-31.
[8] James Gwartney and Robert Lawson, *Economic Freedom of the World 2001 Annual Report,* (Vancouver: The Fraser Institute, 2001), 8-12.

Econometric assessments also generally support liberty as an enabler of economic growth.[9] In fact, a comprehensive review of the literature has uncovered a total of 1,303 published papers that cited the EFI or its components as central or secondary variables.[10] Of the total 1,303 papers, 721 were empirical studies. Of those, 365, slightly more than half, found the EFI to be positively correlated with some positive outcome. Only 33 found a negative relationship, and the remainder were mixed, null, or uncertain.

With that vast literature, one might well wonder about the value of yet one more study. This analysis is intended to provide the following useful additions: (1) examines the possible effects from the addition of personal freedom components of the PFI, (2) updates the results to 2019 – the latest available at this writing, (3) draws lessons to enlighten the emerging debate between the Washington Consensus and New Economic Paradigm (or Cornwall Consensus) for developing economies, (4) examines whether the factors affecting economic growth vary at different levels of economic development, and (5) applies more robust methods to deal with issues of direction of causation and multi-collinearity.

The Data

Econometric analysis of cross-national data is always challenging. The data impose significant limitations both as to availability and reliability. The HFI is available for 165 nations in 2019, but this investigation uses only 98 of them for most of the following analysis because measures related to long-term growth in GDP require comparable data over a significant period of time. Most of the analysis

[9] Jean-Pierre Chauffour, "What Matters for Development – Freedom or Entitlement?" *Economic Freedom of the World 2011: Annual Report*, 167-178.
[10] Robert Lawson, "Chapter 3: Economic Freedom in the Literature: What Is It Good (Bad) For?", James Gwartney, Robert Lawson, Joshua Hall, and Ryan Murphy, *Economic Freedom of the World: 2022 Annual Report,* (Vancouver, B.C.: Fraser Institute, 2022), 188-193.

encompasses the years 2000 through 2019 as a minimum period necessary to measure long-term economic growth. The year 2019 is the most recent available as of this writing. The HFI and PFI are available only beginning with 2008. The EFI goes back much farther, but the number of countries for which it is available falls to only 125 in the year 2000. But of that number, only 98 have comparable GDP-related data covering the full period, so that set of 98 has generally been used. In a few cases, this study adopts a slightly smaller sample to test the effects of independent variables that do not cover the entire set of 98. While a data set of 165 observations would reduce the standard errors of the estimates by about 23 percent, the smaller 98 observations are necessary in order to have sufficient historical observations for enough economic variables to make the calculations described later.

The PFI and EFI are created, respectively, from five and seven components each. Many of these components are further divided into still more detailed sub-components with up to two more levels of detail in some cases. At the most detailed level, 82 components are measured. This investigation will explore independent effects of the twelve primary components. One of the components, size of government, will also be examined at the second level of detail for reasons discussed later. Each index at every level of detail is measured on a scale from 0 to 10, with 0 being no freedom and 10 being total freedom within the dimension covered by the particular index. Aggregate freedom indexes are simple averages of their component indexes.

Following is the hierarchical list of indexes to be investigated, including the shortened names in parentheses that will be used in tables and equations.

1. Human Freedom Index (HFI)
    1.1. Personal Freedom Index (PFI)
        1.1.1. Rule of law (Law)
        1.1.2. Security and safety (Safety)

1.1.3. Movement (Move)

1.1.4. Religion (Religion)

1.1.5. Association, assembly, and civil society (Associate)

1.1.6. Expression and information (Express)

1.1.7. Relationships (Relate)

1.2. Economic Freedom Index (EFI)

1.2.1. Size of government (Govern)

1.2.1.1. Government consumption (Gov_consum)

1.2.1.2. Transfers and subsidies (Gov_trans)

1.2.1.3. Government investment (Gov_inv)

1.2.1.4. Top marginal tax rate (Marg_tax)

1.2.1.5. State ownership of assets (Gov_asset)

1.2.2. Legal system and property rights (Rights)

1.2.3. Sound money (Money)

1.2.4. Freedom to trade internationally (Trade)

1.2.5. Regulation (Regulate)

In addition to the HFI data, this analysis primarily uses economic metrics from the Penn World Table compiled by members of the Faculty of Economics and Business at the University of Groningen[11] and the World Bank.[12] The Penn World Table is compiled by professional economists with an eye to maintain accuracy, comparability, and definitions that are consistent with generally recognized economic aggregates. It also has both the breadth of countries covered and a depth of history that

[11] Feenstra, Robert C., Robert Inklaar and Marcel P. Timmer (2015), "The Next Generation of the Penn World Table" *American Economic Review*, 105(10), 3150-3182, available for download at www.ggdc.net/pwt.

[12] World Bank, https://databank.worldbank.org/source/world-development-indicators.

meets the needs for estimating economic performance over at least 20 years. The "World Bank World Development Indicators" is a larger data set, but in some cases the added data are available only for short periods. The World Bank describes its data as "compiled from officially recognized international sources." Of course, that is also a weakness. For example, in deference to China's revanchist insistence, it omits data about Taiwan. Being an organ of governments, it generally takes any "official" numbers, despite some of their obvious flaws

The technical inadequacies of many nations' statistical systems and the inclination of national governments to treat their official statistics as an extension of their political story rather than objective facts create significant non-sampling errors in the data for all sources. The Penn World Table seems to do a better job than most in minimizing the impacts of these deficiencies.

The Organization for Economic Cooperation and Development (OECD) also has very extensive data by country, but the number of countries is smaller than the other two sources, focusing primarily on its own members and their major trading partners. Developing nations are significantly underrepresented.[13]

Structure of Freedom Indexes

In principle, freedom is indivisible. Either you are free to do as you would without any coercive constraints other than those required to enable others to exercise the same freedom, or you are not. But there may still be degrees to which freedom is realized. In some dimensions of life, you may be free, but in others not – free to practice your religion, but coercively constrained in foreign trade. Differences in scores for each of the component indexes indicate the differences in freedom across different

[13] Organization for Economic Cooperation and Development, https://stats.oecd.org/.

dimensions of life. Adding the PFI to the EFI has provided a more comprehensive set of the dimensions that are checked for the presence of coercive constraints. Even in the same sphere of life, there may be degrees of coercion – your property rights may be protected up until the point that they become inconvenient for the local economic development agency that covets your house. The differences in indexes among individual countries on a single component show the varying degrees of freedom for that component, to the degree that the underlying data can distinguish them.

Some components of the HFI, namely the rule of law; safety and security; and the legal system and property rights include the institutions and processes necessary to prevent some individuals from infringing on the liberty of others. They can also serve as protections from other government functions infringing on liberty

The formal and informal arrangements that assure one's freedom generally arise from the political and civil structures and processes of the nation and reflect the values and understanding of those making decisions – whether few or many. As a result, we might reasonably expect that if a country were to score a high on one of the measured dimensions of freedom, it would also likely score high on other dimensions, although not necessarily with the same degree of fulfillment. That expectation can be tested using correlation analysis.

The following analysis of the relationships among the various freedom indexes below is conducted for the year 2019, but it is confined to only the 117 countries that have full data for the period 2000-2019 (2008-2019 for the PFI and its components) since eventually we will be looking at their effect on economic growth over the period 2000-2019. This analysis includes 19 countries that cannot be used for the economic growth analysis because they lack some key data, but they can still be used here where we are studying only freedom indexes among themselves.

In most cases, the year-to-year changes in a specific index are very small, so that there is strong multicollinearity between years over short time spans and using multiple years of the same index for estimating an equation, can increase the variance of the estimate and even create significant biases in the coefficients. But later in this paper, the change in the same index separated by 19 years does not usually create multicollinearity problems. Even the 11-year span between the first and last year of PFI components generally creates enough difference and variation to avoid significant multicollinearity.

Table 1 shows some of the standard measures for central tendency and variation for the HFI, PFI, EFI, and the components that will be used in the following analysis. Because all these indexes are constructed to allow only minimum and maximum values of 0 and 10, the differences in their measures of central tendency are relatively small, but within that range there are notable differences. Median sores for rule of law, government consumption, and legal system & property rights show the lowest freedom among all the dimensions. Freedom of movement, freedom of religion, and sound money are the most-free dimensions.

Table 1. Measures of central tendency and variation for the Human Freedom Index and some of its principal components, 2019

Variable	Mean	StDev	Minimum	Q1	Median	Q3	Maximum	IQR
Human Freedom	7.41	1.12	4.49	6.64	7.49	8.40	9.11	1.76
Personal Freedom	7.62	1.44	3.63	6.60	7.83	8.89	9.63	2.29
Law	5.41	1.68	2.48	4.00	5.15	6.76	8.80	2.77
Safety	8.13	1.75	2.35	7.30	8.66	9.47	9.87	2.17
Move	8.76	1.30	5.12	8.01	9.50	9.84	10.00	1.83
Religion	8.42	1.69	1.71	7.82	8.99	9.63	10.00	1.81
Associate	7.61	2.15	1.67	6.46	8.44	9.28	10.00	2.82
Express	7.23	1.88	2.36	6.13	7.54	8.80	9.80	2.67
Relate	7.79	2.44	0.32	5.63	8.75	10.00	10.00	4.37
Economic Freedom	7.10	0.87	4.90	6.54	7.26	7.80	8.91	1.26
Govern	6.86	1.06	4.62	6.12	6.79	7.68	9.41	1.56
Gov_consum	5.59	2.14	0.69	4.06	5.61	7.36	10.00	3.31
Gov_trans	7.55	2.14	0.00	6.02	8.06	9.43	10.00	3.41
Gov_inv	7.80	2.79	0.00	7.04	8.77	10.00	10.00	2.97
Marg_tax	6.04	2.26	1.00	4.50	6.00	8.00	10.00	3.50
Gov_asset	6.96	1.66	0.00	6.32	7.34	7.93	9.37	1.61
Rights	5.60	1.60	2.41	4.52	5.28	6.63	8.68	2.10
Money	8.54	1.28	4.00	7.35	9.28	9.53	9.87	2.18
Trade	7.30	1.32	2.55	6.42	7.71	8.37	9.56	1.95
Regulate	7.22	0.96	4.81	6.60	7.28	7.88	9.29	1.27

Note: Q1 = first quartile, Q2 = third quartile, IQR: Interquartile range (Q3 - Q1)

Source: Computed from Ian Vásquez, Fred McMahon, Ryan Murphy, and Guillermina Sutter Schneider, *The Human Freedom Index 2021: A Global Measurement of Personal, Civil, and Economic Freedom*, (Washington: Cato Institute and Fraser Institute, 2021) and accompanying "Human Freedom Index Data 2021 HFI2021.xlsx."

Table 2 shows the correlation matrix between each of the pairs of the 12 component indexes in the HFI. Spearman correlation coefficients are most appropriate here because many of the indexes are ordinal scales rather than robust ratio scales. An index of 8.0 is definitely greater than an index of 4.0, but, for many of the indexes (although not all of them), we cannot really say that the 8.0 index represents twice as much freedom as the 4.0. The more traditional Pearson correlation coefficients measure the correlation of ratio scales. The same analysis was conducted using Pearson coefficients for comparison purposes. The results are not substantially different, but the picture is much crisper for the Spearman, as well as being theoretically more appropriate.

Note that Table 2 is a "full" correlation matrix with 1's in the diagonal and each pair-wise correlation coefficient appearing twice – once in the column-by-row and once in the row-by-column. This makes the patterns easier to see than in the often-used half-matrix presentation.

Table 2. Spearman correlation coefficient between pairs of component indexes in the Human Freedom Index, 2019

		Personal Freedom							Economic Freedom				
		Law	Safety	Move	Religion	Associate	Express	Relate	Govern	Rights	Money	Trade	Regulate
Personal Freedom	Law	1.000	0.757	0.697	0.492	0.667	0.727	0.526	-0.402	0.919	0.537	0.707	0.724
	Safety	0.757	1.000	0.524	0.274	0.410	0.501	0.333	-0.426	0.707	0.428	0.626	0.536
	Move	0.697	0.524	1.000	0.749	0.821	0.820	0.574	-0.118	0.685	0.396	0.570	0.546
	Religion	0.492	0.274	0.749	1.000	0.775	0.734	0.521	0.036	0.454	0.256	0.363	0.382
	Associate	0.667	0.410	0.821	0.775	1.000	0.884	0.550	-0.103	0.673	0.390	0.494	0.540
	Express	0.727	0.501	0.820	0.734	0.884	1.000	0.501	-0.192	0.709	0.358	0.479	0.536
	Relate	0.526	0.333	0.574	0.521	0.550	0.501	1.000	-0.223	0.556	0.422	0.506	0.391
Ecomomic Freedom	Govern	-0.402	-0.426	-0.118	0.036	-0.103	-0.192	-0.223	1.000	-0.359	0.015	-0.192	-0.134
	Rights	0.919	0.707	0.685	0.454	0.673	0.709	0.556	-0.359	1.000	0.592	0.723	0.750
	Money	0.537	0.428	0.396	0.256	0.390	0.358	0.422	0.015	0.592	1.000	0.741	0.506
	Trade	0.707	0.626	0.570	0.363	0.494	0.479	0.506	-0.192	0.723	0.741	1.000	0.636
	Regulate	0.724	0.536	0.546	0.382	0.540	0.536	0.391	-0.134	0.750	0.506	0.636	1.000
	Average excluding government with ..												
	Other PFI	0.644	0.467	0.697	0.591	0.685	0.694	0.501	-0.204	0.672	0.398	0.535	0.522
	Other EFI	0.722	0.574	0.549	0.364	0.524	0.521	0.469	-0.168	0.688	0.613	0.700	0.631
Both PFI and EFI		0.675	0.510	0.638	0.500	0.620	0.625	0.488	-0.310	0.677	0.463	0.584	0.555

Significantly positive
Significantly negative
Not significant (at P = 0.05)

Source: Computed from Ian Vásquez, Fred McMahon, Ryan Murphy, and Guillermina Sutter Schneider, *The Human Freedom Index 2021: A Global Measurement of Personal, Civil, and Economic Freedom*, (Washington: Cato Institute and Fraser Institute, 2021) and accompanying "Human Freedom Index Data 2021 HFI2021.xlsx."

There are three substantive conclusions one can draw from this correlation matrix.

1. The 132 paired comparisons among 12 indexes of different dimensions of freedom show moderate, statistically significant, positive correlations in 121 cases (91.7% of the total cases). This means that although each of the sub-indexes captures a somewhat different

dimension of freedom, a country that assures one dimension of freedom is also likely, although not certain, to guarantee many other dimensions as well.

2. The only exception to this pattern is for size of government, which is actually significantly negatively correlated with six other component indexes: rule of law; safety and security; expression and information; relationships; legal system and property rights; and freedom to trade internationally. It is not significantly correlated in either direction with the other five component indexes. This singular exception will be investigated in more detail below by looking at the second-order components within the size of government index.

3. Dimensions of personal freedom are only slightly more strongly correlated with each other than with the dimensions of economic freedom, excluding size of government – averages of 0.611 versus 0.532 respectively. Similarly, dimensions of economic freedom, other than government size, are somewhat more strongly associated with each other than with dimensions of personal freedom – 0.658 versus 0.532. There are two notable counter examples to this general relationship between PFI and EFI components. Rule of law and safety and security are, on average, more strongly related to components of EFI than to other PFI components. Their relationships to other dimensions of personal freedom are still moderately strong, but it appears that many dimensions of economic freedom are more strongly tied to the rule of law and to safety and security, suggesting that nations recognize the critical nature of assuring the rule of law and safety security as a condition for assuring freedom generally.

In aggregate, these results show that, with the strong and singular exception of the component for size of government, the other 11 individual component-indexes each provide additional information

about freedom, while at the same time reflecting a common understanding of human freedom underlying all of them.

Before exploring the different behavior of the index related to size of government, let's consider a slightly different technique for analyzing correlations among related variables. Calculations by Guillermina Sutter Schneider apply factor analysis to understand more completely the behavioral relationships that may underlie the correlation among the 12 dimensions of freedom used in the HFI.[14] The rotated factor loadings from that analysis are shown in Table 3.

The first factor, F1, accounts for 32% of the total variation among the 12 indexes; the second, for 29% of the variation; and the final, for only 8%. Altogether, the three factors combined account for 70% of the total variation. The strongest loadings on F1 are generally personal freedoms and relate to an individual's freedom to act without coercive constraints. This result is consistent with most of the strong loadings coming from subindexes of the Personal Freedom Index. These freedoms mostly require that government stay out of the way and provide protection against individuals or private organizations who would impose coercive constraints on individuals.

F2 components, on the other hand, generally relate to economic activity and include most of the Economic Freedom indexes. F2 is also significantly loaded on two personal-freedom indexes: strongly to the rule of law and moderately strongly to security and safety. While most personal freedom components receive high scores from little or no government activity, these two components require at least some minimal and effective proactive steps to assure the rule of law and security & safety. Clearly,

[14] Unpublished calculations prepared by Guillermina Sutter Schneider, 2022. . The results are based the 2019 components of the HFI. Factors with initial eigenvalues greater than 1.00 were kept for the final analysis. Results reported here are from orthogonal rotation using the varimax method.

too much government intervention would be detrimental to freedom, but too little in these areas could also be detrimental.

The two moderately strong component loadings on factor F3 relate to direct activity by government – enforcing the rule of law and using economic resources. The other two components showing any moderate loading on F3 both relate to active government roles as well – assuring security and safety and maintaining a fair legal system with property rights. The three positive loadings on F3 with at least moderate strength fit together in a coherent way, indicating that societies practicing the rule of law are also likely to assure security and safety and provide for legal processes that protect individual property rights. In the comparison of correlation coefficients above, these three were not only significantly correlated with each other, but also with all but one of the 12 HFI components. The F3 negative loading for the size of government is consistent with the correlation coefficient analysis above which showed that the size of government was the only one of the 12 components of the HFI that had significant negative correlation with any of the other components. In fact, all of its significant correlations with the other components were negative. (See Table 2.)

Table 3. Factor loadings after rotation of the 12 components of HFI, 2019

		Factor		
Component of HFI		F1	F2	F3
Personal Freedom	Law	0.3864	0.7040	0.5333
	Safety	0.1763	0.4916	0.3978
	Move	0.8203	0.3659	0.0471
	Religion	0.9068	0.1303	-0.1047
	Associate	0.9249	0.2175	-0.0778
	Express	0.8810	0.2774	0.1221
	Relate	0.4926	0.3603	0.0612
Ecomomic Freedom	Govern	0.1003	0.0263	-0.5108
	Rights	0.4112	0.7205	0.4190
	Money	0.1774	0.7794	-0.1123
	Trade	0.2569	0.8640	-0.0746
	Regulate	0.2155	0.7156	0.0978
	Strong to moderately strong correlation			
	Moderate correlation			

Source: Guillermina Sutter Schneider, unpublished calculations (2022) based on "Human Freedom Index Data 2021 HFI2021.xlsx." Factors rotated with varimax method.

It is not surprising that eleven of the EFI components are, in varying degrees, positively correlated with each other, in both the simple correlation analysis and the first two factors of the factor analysis. A strong societal commitment to freedom is likely to lead to most of these dimensions of freedom being strong. Conversely, a lack of commitment to freedom generally will cause most of the components to be weak.

But it is not immediately obvious why government size is different from the others, correlating negatively with other components and loading differently in the underlying 3-factor analysis. It accounts

for only 8% of the total variation but still needs to be understood better. These results would seem to tell us that, on average, nations exhibit some combinations of the following general behaviors:

- Countries with large governments (a low score on size of government) are more likely to assure other freedoms.
- Countries with small governments (a high score on size of government) are less likely to assure other freedoms.
- Countries with strong commitments to freedom with positive correlations among the first eleven dimensions of freedom, tend to score low with respect to government size because they have large governments.
- Countries with weak commitments to freedom with positive correlations among first eleven dimensions of freedom, tend to score high with respect to government size because they have smaller governments.

The size-of-government component consists of five sub-components and looking at them may offer some additional insights. The sub-components are as follows, with short-hand tabular names in parentheses.

- Government consumption (Gov_consum): General government consumption spending as a percentage of total consumption. Smaller percentage is higher freedom
- Transfers and subsidies (Gov_trans): Transfers and subsidies as percentage of GDP. Smaller percentage is higher freedom.
- Government investment (Gov_Inv): Government investment expenditures as percentage of total economy-wide investment expenditures. Less expenditure is greater freedom.

- Top marginal tax rate (Marg_tax): A composite measure of the top marginal tax rate and the income level at which it becomes effective. Lower top marginal rates that are effective at higher incomes score higher on the index.
- State ownership of assets (Gov_asset): The degree to which government owns and controls capital, including land. Less ownership is scored higher.

Table 4 shows the correlation of these five sub-components of government size with the other 11 major components, and with each other. The high-level pattern is clear. Government investment expenditures and asset ownership have significant, positive correlation with almost all the 11 major components of the HFI. That is consistent with how the other major components relate to each other. Smaller amounts of government investment spending and asset ownership mean greater freedom and a society that favors limited government ownership is also likely to support other dimensions of freedom

Governments acquire assets either by spending or expropriation. The significant correlation between government investment spending and government asset ownership is consistent with the legal path to ownership. It is also consistent with the investment spending required to maintain assets.

The other three government sub-components – government consumption, transfer payments, and top marginal tax rates – have significant negative correlations with almost all the other components of the HFI and are the source for the negative correlation and factor loading for government size with other components. The exceptions of government size and three of its sub-components are a little bit difficult to understand. The results suggest that decision makers in many countries see government acquisition, maintenance, and ownership of capital assets as deprivation of freedom in much the same way as other freedoms relate to each other. But at the same time, the data suggest that they do not see increases in government consumption, greater levels of transfer payments, or higher tax rates as coercively compelling citizens to surrender a portion of their standard of living.

Table 4. Spearman correlation coefficients between major components of the Human Freedom Index and the sub-component freedom indexes for the government size component, 2019

		Government Details				
		Gov_consum	Gov_trans	Gov_inv	Marg_tax	Gov_asset
Personal Freedom	Law	-0.629	-0.738	0.336	-0.252	0.196
	Safety	-0.522	-0.592	0.237	-0.297	0.156
	Move	-0.314	-0.526	0.359	-0.202	0.380
	Religion	-0.116	-0.260	0.270	-0.228	0.377
	Associate	-0.274	-0.542	0.355	-0.295	0.398
	Express	-0.286	-0.530	0.270	-0.363	0.357
	Relate	-0.397	-0.506	0.332	-0.229	0.237
Economic Freedom	Govern					
	Rights	-0.595	-0.698	0.330	-0.237	0.219
	Money	-0.238	-0.318	0.354	0.030	0.368
	Trade	-0.449	-0.561	0.340	-0.026	0.291
	Regulate	-0.381	-0.468	0.244	-0.050	0.192
Government Details	Gov_consum	1.000	0.622	-0.126	0.293	0.173
	Gov_trans	0.622	1.000	-0.262	0.340	-0.074
	Gov_inv	-0.126	-0.262	1.000	-0.230	0.318
	Marg_tax	0.293	0.34	-0.230	1.000	-0.134
	Gov_asset	0.173	-0.074	0.318	-0.134	1.000

	Significantly positive
	Significantly negative
	Not significant (at P = 0.05)
	Not meaningful. One variable contained in other.

Source: Computed from Ian Vásquez et al.

Table 5 shows factor loadings similar to Table 3 but replaces the single government-size component with its five subcomponents. F1 in Table 5 is very similar to F1 in Table 3, with the strongest loadings from personal freedom. But with the government-size subcomponents replacing the single size-

of-government measure, F1 also adds a strong positive loading on government ownership of assets and a moderate loading with the government investment to acquire and maintain those assets. F2 in Table 5 essentially duplicates the loadings from Table 3.

F3 in Table 5, although generally consistent with Table 3, gives a more nuanced understanding of the relationship of government size. The loadings in Table 5 using government subcomponents are generally stronger in both positive and negative directions. Strong negative loadings from spending for government consumption and transfer payments point to decisions to sacrifice freedom in exchange for putative public goods and income redistribution. The negative loading on taxes is at least partly related to the need to finance the government consumption and redistribution. It is somewhat weaker because this measure relates to marginal tax rates rather than to total taxes and because significant proportions of consumption and transfer payments may be financed through debt or printing money to devalue the currency. Although increased debt may eventually raise taxes, the current tax load may not be affected

Strong positive loadings from the rule of law and protection of property rights and a moderate positive loading from security and safety complete the picture that suggests F3 is a factor that captures the role of government – proactively protecting personal rights and economic rights, while at the same time diminishing freedom by diverting economic resources to government consumption and redistribution.

Table 5: Factor loadings after rotation of 11 components of HFI plus the five sub-components of the size-of-government component, 2019.

		Factor		
Component of HFI		F1	F2	F3
Personal Freedom	Law	0.3074	0.5599	0.6941
	Safety	0.1402	0.4219	0.4654
	Move	0.7595	0.3194	0.2659
	Religion	0.8817	0.1041	0.0861
	Associate	0.9208	0.1764	0.1873
	Express	0.8400	0.1931	0.3472
	Relate	0.4897	0.2743	0.2983
Ecomomic Freedom / Govermement Size	Gov_consum	0.0913	-0.1866	-0.6792
	Gov_trans	-0.2987	-0.2401	-0.6547
	Gov_inv	0.4178	0.2911	0.1017
	Marg_tax	-0.3334	0.2294	-0.4158
	Gov_asset	0.7978	0.2398	-0.0913
Ecomomic Freedom	Rights	0.3397	0.5932	0.6215
	Money	0.2322	0.7457	0.1269
	Trade	0.2860	0.8372	0.1881
	Regulate	0.1644	0.7323	0.2345
	Strong to moderately strong correlation			
	Moderate correlation			

Source: Guillermina Sutter Schneider, Factors rotated with varimax method.

One possible interpretation for the negative correlation of government consumption and transfer payments with other measures of freedom is that many more developed countries achieved high levels of prosperity with a history of strong personal and economic rights and then began to divert some of that prosperity to government consumption and redistribution. To explore that possible relationship, I have constructed a special version of the HFI that includes all the components of the published HFI but excludes the government size measure. As one would expect from the foregoing analysis, that HFI excluding government size has strong to moderately strong negative correlations with

government consumption (r = -.454, p-value = 0.000), transfer payments (r = -.645, p-value = 0.000), and marginal tax rates (r = -.440, p-value = 0.000).

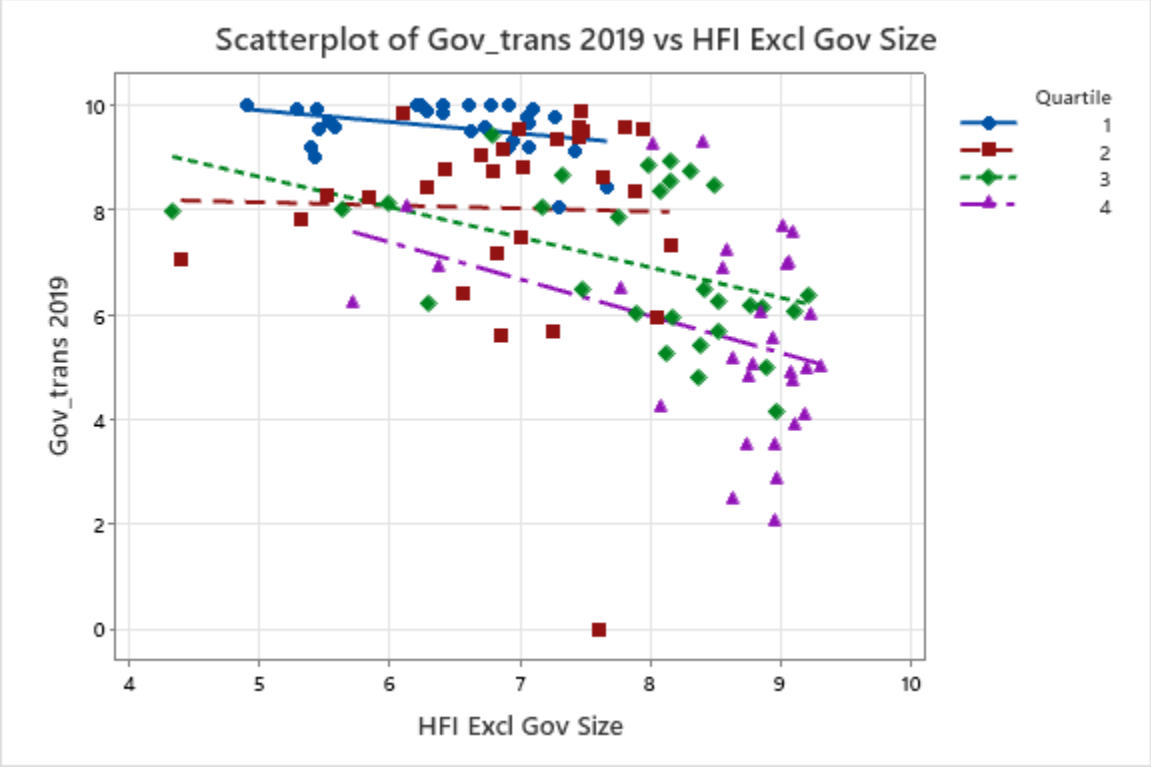
Next the 117 countries were divided into four nearly equally sized quartiles of GDP per employed person. The correlations between the three negatively related sub-components and HFI excluding government size were tested within each quartile.

Figure 1 shows the results for the relationship of transfer payments as a percentage of GDP related to HFI excluding government size. Each point on the graph represents the percentage of transfer payments and the HFI excluding government size for one of 117 countries. Each quartile is plotted in a different color and shape for the country marker. In addition to these usual features of a scatter diagram, the figure includes a least-squares regression line relating the two variables within each of the quartiles and plotted with the same color for that quartile as the data points and using a unique line pattern for that quartile.

For most of the range, the first (bottom) quartile line is the highest, meaning that, on average, the least-developed fourth of nations have the highest freedom scores for government transfers – that is, the smallest proportions of their GDPs go to transfer payments. The fourth (top) quartile line is the lowest line. The most developed countries in the world actually redistribute the greatest proportion of their GDP. The second and third quartiles fall in in order between these two. The median freedom score for transfer payments in the bottom quartile of countries is 9.8 out of 10. The second quartile is 8.6; the third, 6.5; and the top, 5.3. These difference are statistically significant. Not only does each successively higher quartile have a lower freedom score for transfer payments, but within the top quartile, there is a statistically significant (P-value=.10) downward trend with the freedom score for transfers falling 0.70 points for each one-point increase in overall human freedom except government size. Within the third

quartile, freedom from transfers declines 0.58 points for each one-point rise in overall freedom except government size.

Figure 1. Scatter diagram of freedom from transfer payments as a percentage of GDP versus HFI excluding government size, by developmental quartile, 117 countries, 2019



These results strongly suggest that even as governments have improved their policies to guarantee many important dimensions of human freedom, they have also actively reduced freedom by using government force to redistribute increasing amounts of income from those who earn it to those who do not. One could propose a number of theories for this perverse behavior. Government officials may seek to buy support for staying in power by transferring income to potential voters or others whose support can facilitate their remaining in power – the modern version of bread and circuses. Or, at least at the higher development levels, there may be a societal consensus to use government power to provide charitable redistribution – for example Sweden's choice to move to a more socialist arrangements in the 1970's, which severely damaged its economic health and has since been

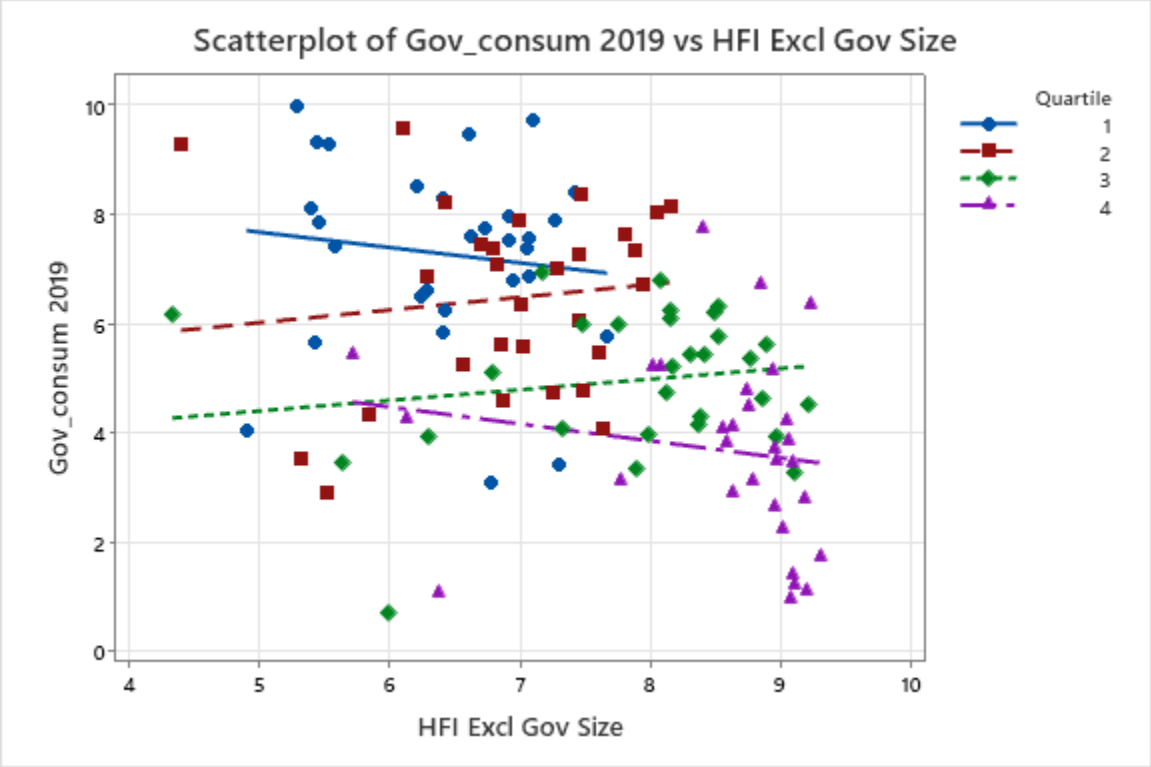
substantially reversed.[15] Exploring these or other theories are beyond the scope of this paper, but they represent potential areas for fruitful further research.

The patterns are weaker for government consumption expenditures and marginal tax rates. See Figure 2 and Figure 3. But each, nevertheless, suggests some relationships that are worth considering.

One possible explanation for the negative relationship of government consumption expenditures with other measures of freedom is that some government consumption spending is necessary for the operation of courts, police, and the armed forces to assure freedom related to the rule of law, a legal system that guarantees property rights, and provision for security and safety. Figure 2 is, to some degree, consistent with such a theory. Comparing quartiles suggests that higher levels of development are associated with more freedom as measured by the HFI excluding government size. But within the top quartile, rising government consumption (and lower freedom from that source) is associated with somewhat higher levels of freedom generally. A similar pattern applies to the bottom quintile.

[15] Jesús Fernández-Villaverde and Lee E. Ohanian, "How Sweden Overcame Socialism," *Wall Street Journal,* January 10, 2019. https://www.wsj.com/articles/how-sweden-overcame-socialism-11547078767?mod=searchresults&page=1&pos=1.

Figure 2. Scatter diagram of freedom from government consumption as a percentage of total consumption versus HFI excluding government size, by developmental quartile, 117 countries, 2019



Exploring this relationship in detail is beyond the scope of this paper, but a simple test points to the issue as one for fruitful further investigation. If government consumption spending is at least, in part, the financial resources needed to assure our legal system and rights, then we might expect that there is some statistical relationship between the two sets of component indexes.[16] Clearly some minimum amount is needed, and additional spending may also help deliver still more effective protection of freedom. But it is also possible that beyond the minimum necessary, additional spending on consumption of services creates excessive government interference in private lives that reduces freedom.

The rule of law, security & safety, and the legal system & property rights are three components of the HFI that might be thought of as "infrastructure" freedoms. Without them, it would be difficult, if

[16] This line of inquiry was suggested to me by James Gwartney.

not impossible, to assure many of the other freedoms. Table 6 shows the results of simple regressions to test the possible effects on government consumption spending from spending on these freedom infrastructure components.

Table 6: Simple regression equations with government consumption spending Index from the HFI as dependent variable and three different components of the HFI that might affect government consumption spending.

Equation	R-sq	R-sq (adj)	Constant	Freedom index(s)	Coefficients of freedom index
A	41.00%	40.49%	10.002	Rule of law	**-0.816**
B	20.23%	19.53%	10.057	Security & safety	**-0.550**
C	37.05%	36.50%	10.150	Legal system & property rights	**-0.815**
D	41.42%	40.39%	10.467	Rule of law	**-0.751**
				Security & safety	-0.101
E	41.19%	40.16%	10.129	Rule of law	**-0.682**
				Legal system & property rights	-0.153
F	41.64%	40.09%	10.620	Rule of law	**-0.604**
				Security & safety	-0.104
				Legal system & property rights	-0.164

Note: Bold coefficients are statistically significant at P=.05 or better.

Each of the three infrastructure freedom indexes shows a significant relationship with government consumption spending. Their negative signs are consistent with increased freedom on each dimension resulting in the loss of freedom from greater government consumption to fund support of that infrastructure freedom. Rule of law has the greatest explanatory power of the three, and when one or both of the others are added to rule of law in the equation, the explanatory power is not improved. (Compare adjusted R-squares.) This does not mean that there is no meaningful consumption expenditure on the other two. It merely means that consumption spending is partly determined by spending to support the rule of law – namely, when a society is dedicated to the rule of law, it will spend significantly to support it, and more than 40 percent of the variation in government consumption spending across nations is associate with variation in the rule law across nations. The significance of

each of the other two alone accompanied by their insignificance when combined with the rule of law implies that the consumption variation for security & safety and for legal system & property rights is generally associated with similar variation in the expenditure for the rule of law and that these other two do not generate additional explanation (either up or down) independently.

These results suggest that further research should be conducted to improve the Government-size/Consumption-expenditure component of HFI by creating independent sub-components for expenditures that enhance other freedoms. This may be difficult to complete on a cross-national basis, but some further investigation would be worthwhile. Table 7 illustrates how that might be done.

Table 7: Government consumption spending in the United States by government function

Government function	Percent of government consumption
Public safety: police, courts, prisons	10.9%
General government: executive, legislative, taxation, etc	9.9%
National defense	21.3%
Health	10.6%
Economic affairs: transport, space, labor, agriculture, etc.	12.5%
Education	25.9%
Housing & community services incl fire	3.2%
Income security administration (NOT benefits)	4.1%
Recreation and culture	1.7%

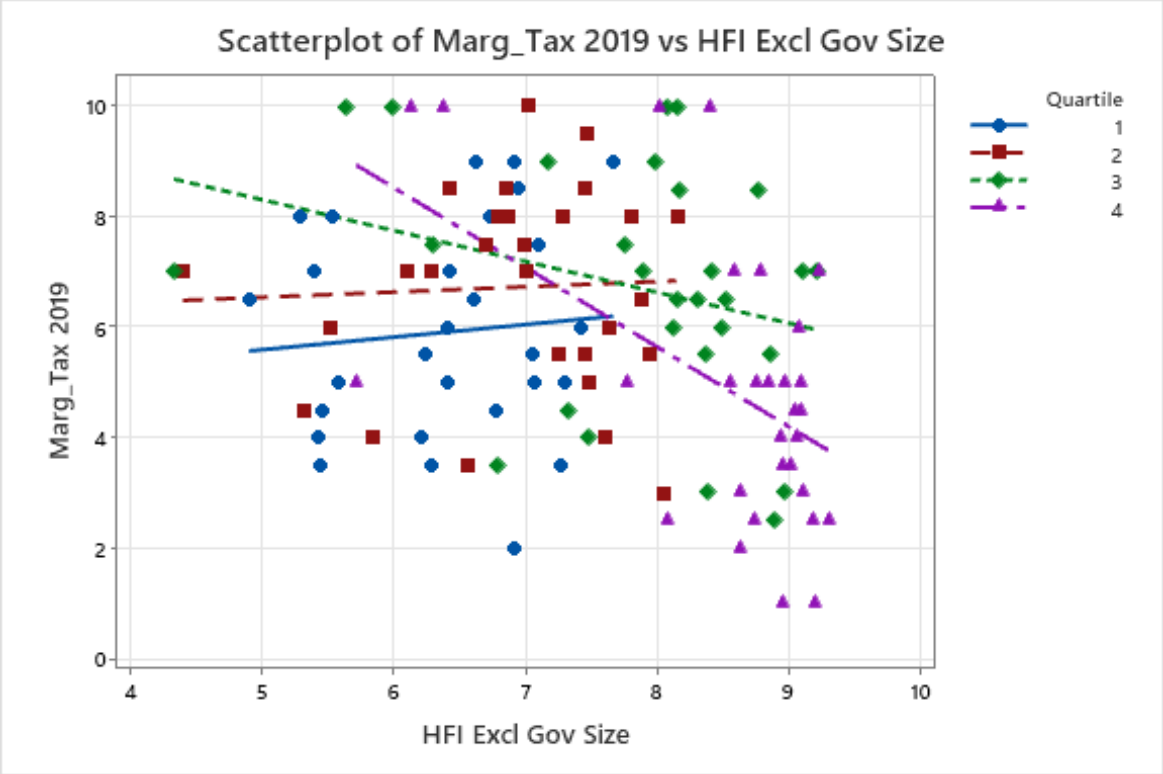
Source: Calculated from Bureau of Economic Analysis, National Income and Product Accounts, Tables 3.1 and 3.15.5.

Table 7 shows estimates of United States government consumption expenditures by government function based on the national income and product accounts. The first three functions include expenditures that might reasonably be assigned as consumption used to assure the rule of law, the legal system & property rights, and safety & security, although it is highly unlikely that all of those expenditures serve those purposes. We can be reasonably sure, however, that none of the other

functions in consumption expenditures do support those freedoms. The first three functions constitute 42% of the total, so that would be the upper bound of consumption expenditures supporting freedom for the United States.

Figure 3 shows the relationship between the HFI sub-component for marginal income and payroll tax rates and the total HFI excluding the government size component. For the lower two quartiles, there is no clear pattern. For the higher two, however, there is a fairly clear indication that with greater freedom, other than freedom from large government, taxes are raised and freedom from excessive taxation falls.

Figure 3. Scatter diagram of freedom from high marginal income and payroll tax rates at low income versus HFI excluding government size, by developmental quartile 117 countries, 2019



The marginal tax rate index has two detailed indicators – one for the top marginal rate based on income taxes alone and a second indicator based on the highest marginal rate for the combination of income taxes and payroll taxes. Each of these detailed indicators combines a measure of the top

marginal tax rate for the relevant taxes and a measure of the lowest income to which that top rate applies. Each country's detailed indicator index is scored based on those two measures according to the relationships in Table 8.

Table 8: Coding of top-marginal tax rates freedom indexes based on level of top rate and threshold at which it applies

Top Marginal Tax Rate	Income Threshold at Which the Top Marginal Rate Applies (1983 US$)			
	<$25,000	$25,000 – <$50,000	$50,000 – <$150,000	$150,000+
< 21%	10	10	10	10
21% – <26%	9	9	10	10
26% – < 31%	8	8	9	9
31% – <36%	7	7	8	9
36% – <41%	5	6	7	8
41% – <46%	4	5	6	7
46% – < 51%	3	4	5	5
51% – <56%	2	3	4	4
56% – <61%	1	2	3	3
61% – <66%	0	1	2	2
66% – <70%	0	0	1	1
70%+	0	0	0	0

Source: James Gwartney and Robert Lawson, *Economic Freedom of the World 2001 Annual Report,* (Vancouver: The Fraser Institute, 2001), 252.

There are several features to the marginal tax rate indicator that limit the ability to interpret these results and use it in subsequent models for economic growth:

1. The Index for each of the detailed indicators is, strictly speaking, only a nominal scale because only integer values are assigned to each observation and those integers are judgmentally assigned to combinations of ranges of top rates and ranges of income to

which the top rates apply. Within a single income range the score is ordinal because at higher top marginal rates, and the index is lower. But by assigning the index value to combinations of the top rate and the threshold to which it applies, that ordinality disappears because there is no inherent ordering system for the combinations. For example, if the top rate is between 41% and 46% and it is applied to income levels less than $25,000, a score of 4 is assigned. If the top rate is 5 percentage points higher and it is applied to incomes above $50,000, then a score of 5 is assigned. So how do we know that a somewhat more narrowly applied higher tax rate represents more freedom? Certainly, for those paying it, there is less freedom. So, the index is not really ordinal.

2. This statistical weakness creates practical problems. Note that in Figure 3 data points on the vertical scale exist only for 10.0, 9.5, 9.0, 8.5 etc. The integer points (10, 9, 8 etc.) are defined by Table 8, but there is no meaning for the points 9.5, 8.5, etc., so how do we interpret them? They are simply the average of two integers that have an odd sum. In fact, even the integer values (9.0, 8.0, etc.) have no meaning at the level of the sub-component index because they have been averaged from nominal values of the detailed indicators for income taxes and income-plus-payroll taxes that happen to have an even sum. That average has no meaning on the nominal scale. In the special case where both the detailed indicators have the same value, the meaning is trivially meaningful, but no other averages are.
3. More generally, top rates are poor indicators of tax burden. A significant literature shows that the top rates are weakly, and even negatively, related to the actual amount of taxes collected because (a) higher top rates are usually associated with multiple exceptions, exclusions, and deductions such that, despite the nominal thresholds, very few actually pay the top rate, especially at the higher top rates and (b) high earners will

readily adapt their income sources and spending to maximize their use of the exceptions to avoid the top rate.[17]

4. By assigning greater freedom values to scenarios in which a top rate is applied only at higher income levels, the index adopts a statist view of taxation, namely that more highly progressive tax rates are inherently better. It ignores the position that tax regimes that more closely approximate a flat tax are not only more consistent with liberty but also more conducive to prosperity. Significant literature on tax policy supports this latter view.[18] A measure of the effect of taxation on freedom need not necessarily give favorable weight to a flat tax design, but it most certainly should not give preferential weight to greater progressivity.
5. The measure is very narrow since it is applied only to income and payroll taxes. In the United States, those account for 64% of all taxes, leaving more than one third unaccounted for. But the United States relies more heavily on those income-related taxes than any other developed or moderately developed country, except for Germany where they also are 64%. In France, they are only 56%; Great Britain, 46%; Turkey, 44%;

[17] David Splinter, "U.S. Tax Progressivity and Redistribution," *National Tax Journal*, 73 (4) (December 2020): 1005–1024, numbers from backup workbook, Tab 5-Top, available at http://davidsplinter.com/TaxProgressivity-Splinter.xlsx. Gerald Auten and David Splinter, "Income Inequality in the United States: Using Tax Data to Measure Long-term Trends," http://davidsplinter.com/AutenSplinter-Tax_Data_and_Inequality.pdf. United States Treasury Department, Bureau of Internal Revenue, Statistics of Income for 1938, Part 1, https://www.irs.gov/pub/irs-soi/38soireppt1ar.pdf, p. 102, and Statistics of Income for 1945, https://www.irs.gov/pub/irs-soi/45soireppt1ar.pd, p. 69. Phil Gramm, Robert Ekelund, John Early, *The Myth of American inequality: How Government Limits Policy Debate*, (Lanham: Roman & Littlefield, 2022), 114-117.

[18] Chris Edwards and Daniel J. Mitchell, *The Global Tax Revolution: The rise of Tax competition and the Battle to Defend It,* (Washington: Cato Institute, 2008). Ryan Bourne, "New Chancellor Rishi Sunak Must Prove the Conservatives Haven't Forgotten Good Tax Policy," *UK Telegraph*, February 13, 2020. James A. Dorn, "Tax Cuts Without Spending Limits Will Not Make America Great Again," *Investor's Business Daily (Online),* May 10, 2017, archived at https://www.cato.org/commentary/tax-cuts-without-spending-limits-will-not-make-america-great-again. Chris Edwards, "Options for Tax Reform," Policy Analysis No. 536, Cato Institute, February 24, 2005, https://www.cato.org/sites/cato.org/files/pubs/pdf/pa536.pdf.

Israel, 36%; Mexico, 34%; and Chile, 17%.[19] For any nation alone the measure is only partial, and for cross-national comparisons it is substantially distorted. Better measures would be total taxes as percentage of GDP or of personal income.

6. Even at the detailed indicator level for income levels, the results are extremely difficult to interpret. The same dollar levels are used to define the tax thresholds for all countries, even though there is huge variability in the income levels among individual countries. The median country has 22 times more income per worker than the poorest country and the highest income country earns 4 times more than the median country.[20]
7. Finally, the construction includes an odd bit of double counting. At the most detailed level there are two indexes – one for the top marginal rate for income tax alone and one for the combination of income tax and payroll tax. These two are averaged to get the overall marginal tax rate sub-component. Of course. the average of two nominal measures is hard enough to interpret, but even if there were continuous variables for these two detailed indicators the average of A and A+B offers no clear quantitative superiority over using simply A+B. In effect the average of A and A+B is equal to A+0.5*B. Since in the HFI aggregate indexes are otherwise simple unweighted averages of their components, it is not clear why that should be different here.

Measuring some aspects of freedom may inherently or practically require the use of ordinal metrics, just as discrete variables are sometimes needed in building other models. But that need certainly does not exist in the case of taxes. By replacing straightforward continuous variables such as

[19] Organization for Economic Cooperation and Development, "Tax on Personal Income," https://data.oecd.org/tax/tax-on-personal-income.htm.

[20] Computed from World Bank GDP per employed person in 2000. World Bank, https://databank.worldbank.org/source/world-development-indicators. The year 2000 is used because that is the base year for the following analysis. While GDP per employed person will not be equal to the income subject to tax, it provides a reasonable proxy for the relative sizes of taxed income among countries.

taxes as percentage of income with discrete nominal variables, the index unnecessarily destroys information.

"Total taxes as a percentage of total income" is a more comprehensive measure of taxes, although it is not readily available for as many countries as the tax table measures used in the HFI. Figure 4 contains an index of freedom from total taxes as percentage of total income computed on the same 0-to-10 scale as the HFI components. In this case, since the individual observations and the scales are computed from continuous data, the result is also a continuous variable.

Figure 4. Scatter diagram of freedom from high average total taxes versus HFI excluding government size 2019, by developmental quartile 77 countries, 2019

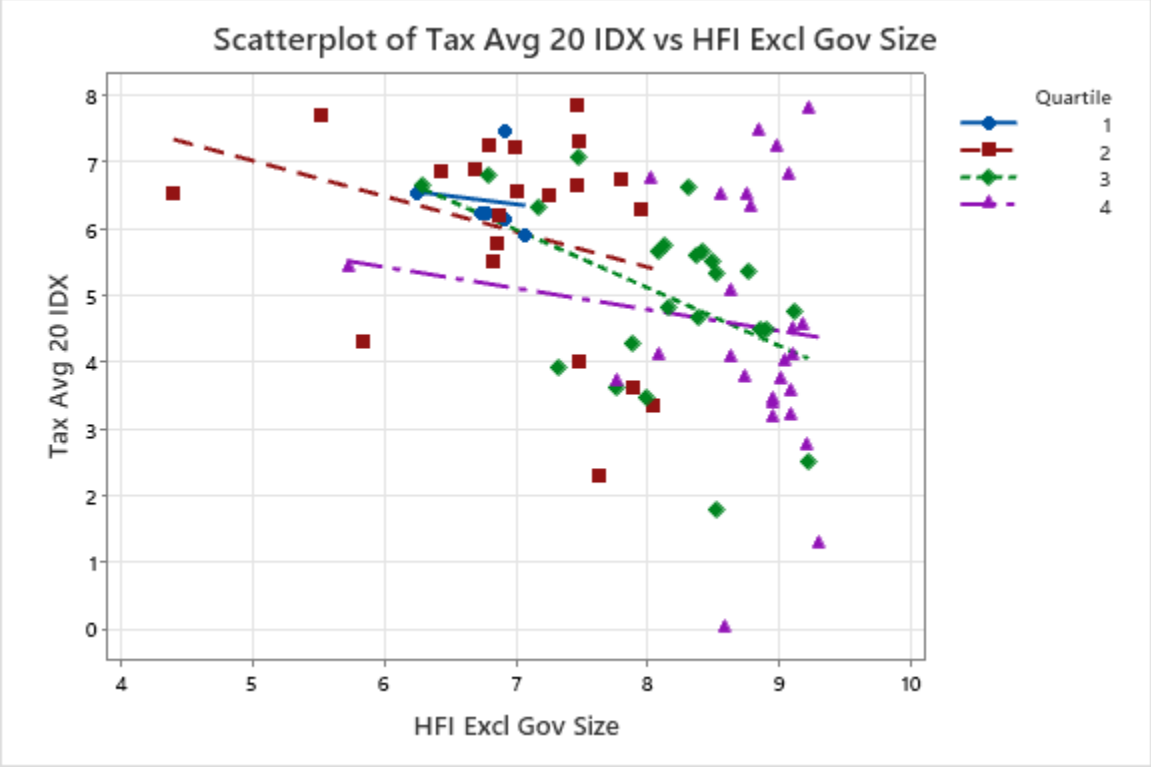


Figure 4 does not give a substantially different result than Figure 3, but the result is clearer and more consistent. As freedom on the eleven dimensions other than government size increases, freedom from high taxes declines systematically from an average of 6.4 for the lowest developmental quartile to

6.0 for the second, 5.0 for the third, and 4.6 for the highest. Also, within each of the quartiles, freedom from the average total tax rate declines as the level of freedom for other dimensions increases.

More analysis of reasons why the size of government relates negatively to other freedom indicators could be a potential fruitful endeavor, but additional detail is beyond the scope of this inquiry, which will focus on the impact of the HFI and its components on economic growth. The understanding developed thus far about the correlation among the HFI components and the associated significant degree of multicollinearity among them is sufficient to help inform the modeling below.

Analysis of effect of freedom on economic growth

This analysis uses the percentage change in GDP per employed person as the dependent variable and a variety of measures of freedom as the independent variables. Other studies described earlier have used GDP per capita. But GDP per worker is a better metric of growth in this case because it reflects more appropriately the effectiveness of a nation's production function. Per capita GDP has extra noise in it deriving from differences in the age distributions of the population. Populations that are unusually young or old will demonstrate slower growth per capita strictly as the result of an exogenous skewed population distribution that has more people consuming per person producing.

Analyses of the relationship between economic prosperity and freedom have often relied on comparing the level of GDP per capita with the level of freedom as measured by the HFI or its components, both at the same point in time.[21] This type of comparison is subject to some uncertainty as to the direction of causation. Does greater freedom generate higher GDP, or does higher GDP provide the basis for greater freedom? Although that is a good technical question in isolation, the long-term

[21] Ian Vásquez, Fred McMahon, Ryan Murphy, and Guillermina Sutter Schneider, 30-31. James Gwartney and Robert Lawson, 8-12.

historical analysis of the emergence of modern growth and prosperity in Europe clearly indicates that the spread of freedom arose and grew starting in the late 17th Century, well before the explosion of economic prosperity that it generated in the 19th Century.[22] More recent history also shows changes in freedom preceding changes in economic growth: the divergence of the two Koreas and the two Germanys; Chile versus Venezuela; Hong Kong (at least until recently) versus Cuba; Taiwan versus Peoples Republic of China; PRC post 1982 versus its prior self.

The following analysis is designed to minimize uncertainty as to the direction of causation. The dependent variable is the change in GDP per employed person from time 0 to time t (t>0). The principal independent variables are measures of the level of freedom indexes at time 0. It is physically impossible for the direction of causation to be reversed since events in the future cannot affect events in the present (outside of interactions between entangled quantum particles, which are not relevant here). In addition to the time-zero independent variable, some equations will add changes in an independent variable over time. Those additions are not equally unambiguous as to the direction of causation, but since they are used in combination with the time-zero levels the plausibility of reverse causation is greatly diminished.

The formulations used here do not dispose entirely of other questions of causation that are common in almost any econometric analysis. The initial level of freedom and subsequent economic growth might both be caused by some third factor that preceded both. That is a hypothesis that could be tested if there were a plausible third variable to test.

I use the following definition for any variable X:

[22] Gregory Clark, "The Condition of the Working Class in England, 1209-2004," *Journal of Political Economy*, 2005, vol. 113, no.6, 1307-1340. http://www.journals.uchicago.edu/t-and-c. N. F. R. Crafts, "Economic Growth in France and Britain, 1830-1910: A Review of the Evidence," *The Journal of Economic History*, Vol. 44, No. 1 (March 1984), 49-67, https://www.jstor.org/stable/2120555. Angus Maddison, *Contours of the World Economy, 1–2030 AD: Essays in Macro-Economic History,* (New York: Oxford University Press, 2007).

$$\tilde{X} = \frac{\dot{X}}{X} = \frac{\frac{dX}{dt}}{X} \approx \frac{\Delta X}{X}$$

The primary variables are:

$Z = GDP\ per\ 1000\ employed\ persons$

$F_i = one\ or\ more\ of\ the\ freedom\ indexes\ or\ their\ components$

$P_i = the\ Personal\ Freedom\ Index$

$E_i = the\ Economic\ Freedom\ Index$

$v = other\ variables\ that\ may\ be\ tested\ for\ their\ effect\ on\ growth$

The analysis fits the following generalized equation in multiple forms

(1) $\tilde{Z} = k + mZ + f(F_i) + g(F_i) + h(F_i) + \varphi(v) + \epsilon_0$

Where:

$k = constant\ term$

$m = coefficient\ of\ GDP\ level\ per\ 1000\ employed\ persons\ (convergence)$

$f, g, h = functions\ of\ freedom\ indexes$

$\varphi = a\ function\ of\ other\ variables$

$i = identifier\ of\ specific\ freedom\ index$

A specific element of assessing the time dimension is the observed "convergence" of developing economies. In the modern global economic system, developing economies tend to grow faster than more mature economies for a number of reasons such as (1) being able to import or copy technologies that were developed elsewhere without needing to invest time and funds in R&D and (2) the

contribution of existing high consumption demand from the more developed economies that create stronger foreign markets for the emerging nations. From a technical perspective, the estimates will need to control for the effects of convergence and not confound them with the underlying effects of liberty on growth. The variable Z is that control.

Solo's classic growth models consider a slightly different concept of convergence, arguing that over time there is a declining return to capital, thereby creating a slowing of growth. In this analysis, that effect may also be captured with the Z variable, but since we will be doing a cross-sectional analysis over only a 20-year time period, it is the convergence of the less developed to the more developed that is more likely to be reflected.

The functional forms of the freedom indexes that were ultimately used are fairly simple:

F_0 = index in the base year (2000 for EFI and 2008 for PFI and their components)

F_t = index for the final year of the data set, 2019

$(F_t - F_0)$ = the change from the base period to the final period

Avg(F) = average over the total period tested

Several other simple functional forms were tested but none proved to be terribly helpful – log, inverse, square root. Because the time period was so short and the freedom indexes collinear with each other, efforts to try other lag structures were also futile, except for long-term changes over the full 20-year period.

Both the base index and final index could plausibly affect growth. The one is a measure of the strength of freedom at the beginning of the period and the other is the strength in the final year. Either could plausibly affect the outcome. Equations of the following form were tested, and in many cases both freedom terms were significant.

(2) $\tilde{Z} = k + mZ + a'(F_0) + b'(F_t) + \epsilon_0$

Where

$a' and b' = coefficients\ used\ temporarily\ in\ this\ discussion$

But that form is mathematically identical to:

(3) $\tilde{Z} = k + mZ + a(F_0) + bg(F_t - F_0) + \epsilon_0$

Where …

$a = (a' - b')\ and\ b = b'$

In the following discussion, estimates will be constructed using (3) because that form has a more useful interpretation, and it is entirely possible that either F_0 or (F_t - F_0) could be significant without the other being significant. Of course, if F_0 is significant, the meaning is that the starting point of freedom will have a significant impact on the subsequent economic growth. If (F_t - F_0) is also significant, it means that the change in freedom has an effect. If (F_t - F_0) is significant and F_0 alone is not, that means that only the change is significant. Because the freedom indexes are not purely continuous ratio variables and the levels do not necessarily translate directly into economic terms, it is possible that the level may not be related directly to growth, while the change would be. Furthermore, the starting point for any particular country may be conditioned by many exogenous variables that cannot be modeled here, so the level is not readily related to the growth. But if freedom changes over the time period, irrespective of the starting point, then at least the direction of that change might have significant effect.

For example, countries in the base period will have different levels of natural and human resources that may not be fully captured by the model, so the differences between some nations in the index for the freedom to trade internationally may get swamped by other exogenous, unmeasured factors. But changes in the degree of free trade, either up or down, may create relative differences that

are meaningful because some of the exogenous factors that affect inter-country comparisons are relatively constant across time in the same country.

The results of regressing GDP growth rate on the two major components of the HFI are contained in Table 9. In all cases, the constant term is insignificant, but the constant term is retained to avoid any distortions of forcing the estimates through the origin. The convergence effect of the level of GDP per employed person is small but significant in all cases. Both here and in later results, it is also reasonably stable.

Table 9. Cross-sectional regression of 98 countries' growth in GDP per employed person over the period 2000-2019 on freedom indexes from the Human Freedom Index

Equation	R-sq	R-sq (adj)	Constant	GDP per 1,000 employed persons 2000	Freedom index function	Coefficients of freedom terms				Proportion of 20-yr growth created by 1.0 index change				
						a	b	c	d	a	b	c	d	Total
4	26.21%	24.66%	-0.4230	**-0.0080**	a avg(E)	**0.1708**				40.9%				40.9%
5	19.67%	17.98%	0.4160	**-0.0060**	a avg(P)	0.0345				8.3%				8.3%
6	26.98%	24.65%	-0.3940	**-0.0080**	a avg(E)+ b avg(P)	**0.2117**	**-0.0411**			50.7%	-9.9%			40.9%
7	39.37%	37.44%	-0.2260	**-0.0060**	$aE_0 + b(E_t - E_0)$	**0.1146**	**0.3169**			27.5%	76.0%			103.4%
8	19.56%	16.99%	0.4310	**-0.0060**	$aP_0 + b(P_t - P_0)$	0.0326	0.0182			7.8%	4.4%			12.2%
9	40.27%	37.02%	-0.1920	**-0.0060**	$aE_0 + b(E_t-E_0) + cP_0 + d(P_t-P_0)$	**0.1618**	**0.3457**	-0.0476	-0.0170	38.8%	82.9%	-11.4%	-4.1%	106.2%
10	40.22%	37.65%	-0.1730	**-0.0060**	$aE_0 + b(E_t-E_0) + cP_0$	**0.1587**	**0.3438**	-0.0468		38.0%	82.4%	-11.2%		109.2%
11	39.39%	36.79%	-0.1920	**-0.0060**	$aE_0 + b(E_t-E_0) + c(P_t-P_0)$	**0.1162**	**0.3179**	-0.0117		27.9%	76.2%	-2.8%		101.3%
12	39.87%	37.28%	-0.2110	**-0.0060**	$aE_0 + b(E_t-E_0) +$ c avg(P)	**0.1494**	**0.3365**	-0.0335		35.8%	80.7%	-8.0%		108.5%

Note: Significant (at 95% or greater) coefficients are in bold. E = Economic Freedom Index. P = Personal Freedom Index. The average real GDP per employed person across all 98 countries was 41.7% from 2000 to 2019.

Data Sources: GDP: Penn World Tables, 2000-2019. Freedom Indexes: Ian Vásquez, Fred McMahon, Ryan Murphy, and Guillermina Sutter Schneider, *The Human Freedom Index 2021: A Global Measurement of Personal, Civil, and Economic Freedom*, (Washington: Cato Institute and Fraser Institute, 2021),

Equation 4 regresses growth on the average of the EFI over the 20-year period. It is significantly positive and explains 26.21% of the total growth variation, a relatively strong explanation for a single variable (after adjustment for convergence). On average across the period, a 1.0-point increase in the EFI would account for 40.9% of the total growth (an average of 41.7% growth).

Equation 5 regresses the average PFI on growth. The PFI, overall, does not explain a significant amount of growth, but more results below show some significant effects from components of the PFI. Equation 6 combines the averages of both the EFI and PFI. With both averages in the equation, the EFI effect remains very significant and slightly larger. The PFI is effect is a very small negative and insignificant. This does not mean that the PFI has a negative effect on growth. It specifically means that in the presence of the EFI, the PFI has a slight negative effect, and that effect may, in fact, be zero. Also note that the adjusted R-squared for equation 6 is no better than the adjusted R-squared for equation 4, meaning that there is no improvement in total explanatory power when adjusted for changes in degrees of freedom. Also note that the sum of coefficients a and b in equation 6, equal coefficient a in equation 4. Recall also the relatively strong correlation between some elements of the PFI and EFI. In such cases it can be difficult to disentangle the relative contributions from weaker variables.

Equation 7 measures the effects of both the initial level of the EFI and the effects of its change over the period. Both are significant, but the effects of the change are about 3 times as large as the effects of the initial condition. The equation explains 39.37% of the variation in growth. A starting EFI level that is 1.0 greater combined with an increase over the period of 1.0 is more than enough to explain all the growth between 2000 and 2019.

Equation 8 shows insignificant explanatory power from the combination of initial level and change functions for the PFI. Like equation 6, these effects are small, negative, and significant. Equation 9 combines both initial levels and changes for the EFI and PFI. Again, the PFI adds no explanatory power. Equations 10, 11, and 12 test alternative functional forms for the PFI, none of which show any significant contribution.

Table 10 shows the relationship to growth at one greater level of detail for the freedom indexes, regressing the component indexes of PFI and EFI on GDP growth, still controlled for convergence. Each

of the components is initially tested an equation alone in the form $ax_0 + b(x_t-x_0)$. Following the results for each component index, the table displays one or more combinations of the components with stronger effects on GDP growth, again using both the initial level and the change.

Table 10. Cross-sectional regression of 98 countries' growth in GDP per employed person over the period 2000-2019 on component freedom indexes from the Human Freedom Index

Equation	R-sq	R-sq (adj)	Constant	GDP per 1,000 employed persons	Freedom sub-components	Coefficients of freedom terms						Added terms	
						a	b	c	d	q	r	First	Second
					EFI components								
13	23.44%	20.99%	**0.6350**	**-0.0050**	Government size	0.0017	**0.1106**						
14	37.65%	35.66%	-0.0420	**-0.0080**	Legal & property rights	**0.1327**	**0.2805**						
15	29.40%	27.15%	0.1520	**-0.0060**	Sound money	0.0545	**0.1083**						
16	37.10%	35.09%	0.1620	**-0.0050**	Trade internationally	0.0624	**0.1825**						
17	29.26%	27.00%	-0.1630	**-0.0070**	Regulation	**0.1165**	**0.1991**						
					EFI combined components								
18	46.51%	43.60%	0.1000	**-0.0060**	Rights & Trade	**0.1225**	**0.2278**	-0.0229	**0.0940**				
19	47.80%	43.74%	0.1900	**0.0020**	Rights, Trade, Regulation	**0.1371**	**0.2258**	-0.0121	**0.0922**	-0.0395	0.0428		
20	47.38%	43.28%	0.0420	**-0.0060**	Rights, Trade, Government	**0.1244**	**0.2189**	-0.0275	**0.0846**	0.0120	0.0558		
					PFI components								
21	26.96%	24.63%	0.1710	**-0.0100**	Rule of law	**0.1188**	0.0834						
22	36.65%	34.63%	-0.2400	**-0.0090**	Security & safety	**0.1261**	**0.1157**						
23	19.46%	16.89%	**0.7730**	**-0.0010**	Movement	-0.0130	-0.0338						
24	22.53%	20.06%	**1.0610**	**-0.0010**	Religion	-0.0508	-0.0482						
25	19.04%	16.45%	**0.7320**	**-0.0050**	Association	-0.0092	0.0103						
26	18.88%	16.29%	**0.6210**	**-0.0060**	Expression	0.0055	-0.0007						
27	20.24%	17.70%	**0.5250**	**-0.0060**	Relationships	0.0188	-0.0546						
					PFI combined components								
28	37.28%	33.87%	-0.2680	**-0.0020**	Safety/security & rule of law	**0.1120**	**0.1052**	0.0331	0.0456				
					PFI & EFI combined components								
29	53.30%	48.58%	**-0.1330**	**-0.0070**	Rights, Trade, Safety/security	**0.0889**	**0.1807**	-0.0340	**0.0708**	**0.0754**	**0.0930**		
30	51.68%	48.50%	**-0.3030**	**-0.0070**	Rights, Trade, Safety/security	**0.0712**	**0.1592**	N.A.	**0.1020**	**0.0718**	**0.0881**		
31	53.08%	49.12%	**-0.9700**	**-0.0090**	+ Average total tax rate	**0.1299**	**0.1590**	N.A.	**0.1055**	**0.0721**	**0.1056**	**0.0682**	
32	51.99%	48.26%	-0.4980	**-0.0070**	+ Transfers 2019	**0.0782**	**0.1592**	N.A.	**0.1006**	**0.0745**	**0.0876**	0.0166	
33	60.88%	53.07%	**-0.7480**	**-0.0080**	+ Capital formation %GDP 2019	**0.0804**	**0.1290**	N.A.	**0.1037**	**0.0633**	**0.0722**	**0.0223**	
34	63.80%	60.18%	**-1.2510**	**-0.0090**	+ Tot tax & Capital form %GDP	**0.1251**	**0.1352**	N.A.	**0.1031**	**0.0657**	**0.0782**	**0.0508**	**0.0213**
35	53.72%	50.12%	**-0.6030**	**-0.0080**	+ Marginal tax rate	**0.0798**	**0.1553**	N.A.	**0.1013**	**0.0798**	**0.0888**	**0.0333**	
36	62.66%	59.18%	**-1.0130**	**-0.0090**	+ Marg tax & Cap form %GDP	**0.0882**	**0.1249**	N.A.	**0.1026**	**0.0707**	**0.0731**	**0.0303**	**0.0220**

Equations 13-17 each apply the five EFI components. Each component alone produces a statistically significant effect on GDP growth. All five show a significant effect from the change over time, but only legal system & property rights and trade internationally also show a significant effect from the initial level. The generally stronger performance of the change function is, as previously discussed, not

terribly surprising because although the indexes are expressed as a continuous ratio variable, they are to varying degrees numeric labels of qualitative conditions, so the numeric significance of a particular level may be somewhat uncertain in its effect, while the effect of its change either upward or downward will be more certain.

Equation 18 incorporates both legal & property rights and trade internationally. Both are significant when combined and the explanatory power of the equation is increased by the combination. Equations 19 and 20 add regulation and government size, respectively. Neither of these additions is significant, and neither adds to the explanatory power. (Compare adjusted R-squares.)

Equations 21-27 test the significance and explanatory power of each of the PFI components individually. Only security & safety and rule of law are significant. That does not mean that the others are not important freedoms, but it does mean that they have less independent effect on economic growth than the first two. Equation 28 combines security & safety with rule of law. Only safety & security is significant in the combination, and the adjusted R-squared for the combination is actually smaller than for security & safety alone. Again, both are undoubtedly important freedoms, and each has shown significant correlation with economic growth, but with safety & security in the equation, the power of the rule of law alone is not sufficient to explain more growth.

Next, equation 29 combines all three components that have shown significant explanatory power in combinations –legal system & property rights, trade internationally, and safety & security. In combination, all three remain significant, although trade internationally is significant only for the change variable. These three freedom indexes can explain nearly half of the variation in GDP growth among the 98 nations. An increase of 1.0 index points for these metrics would account for 118 percent of the observed growth in GDP among the 98 nations.

Equation 30 simply removes the insignificant initial level for trade. Equations 31 adds the average total tax rate as an explanatory variable, with its coefficient listed under "added terms.". This is the World Bank measure of total taxes as percentage of GDP, converted into the same index structure as the HFI, with the highest tax rate equal to 0 and the lowest equal to 10. It is a more inclusive measure of total tax burden on the economy than the EFI tax measure which, as discussed above, uses a measure that judgmentally mixes the highest marginal tax rate with the income level at which that tax rate applies.

Equation 32 tests adding the most powerful remaining government-size subcomponent – transfer payments as a percentage of GDP. The average total tax rate proves to be significant, while the transfer payments are not.

Equation 33 tests gross capital formation as a percentage of GDP as an independent variable. It is significant and adds explanatory power, raising the R-squared substantially. Finally, equation 34 adds both the total tax rate and capital formation. Both remain significant with no meaningful diminution of the effects of any other variable.

Finally, equations 35 and 36 re-estimate equations 31 and 34 respectively, replacing the average total tax rate with the average marginal tax rate from the EFI. The results are only slightly different. Equation 34 using the average total tax rate shows somewhat greater explanatory power and the tax coefficient in both equations 31 and 34 is substantially larger, although the difference is significant only at 89% confidence. Both measures clearly show that lower taxes are consistent with faster growth. The differences, however, do suggest that the more comprehensive total tax measure should be given consideration in constructing the HFI.

One significant theme in the literature on economic development and growth has been the role of geography. Gallup, Sachs, and Mellinger highlighted a number of geographic features of a nation,

particularly emphasizing the proportion of the population living within 100 kilometers of the coast, the distance from the capital to the closest major market (New York, Rotterdam, Tokyo), and the proportion of the population living in a tropical climate.[23] Sachs later added the ecology for malaria as a more specific causal factor related to tropical climate. The index for malaria ecology incorporates temperature, abundance of species that transmit the disease, and the types of disease vectors most harmful to humans.[24]

Connors, Gwartney, and Montesinos combined the measures of malaria ecology, costal population, and distance to major markets to create an overall metric of geographic disadvantage. [25] Each of the three elements was standardized with a mean of zero and standard deviation of one. Because this is a measure of disadvantage, nations with significant geographic advantage have negative scores, while disadvantaged nations have positive scores. Table 11 contains regression results from adding these measures of geographic disadvantage to three significant equations from Table 10.

In Table 11, equations 4, 7, and 30 simply repeat the results from Table 10. Since GDP per 1,000 employed persons is a control variable for the level of development, the first test is whether geographic disadvantage might be a better control variable, so equations 4R, 7R, and 30R (R for replacement) each replace the GDP variable with the geographic disadvantage variable. Next, the "T" (for total) versions of the equations employ both the GDP control variable for convergences of growth rates across levels of development and the geographic disadvantage variable. Then the ecology for malaria (E), major markets

[23] John Gallup, Jeffrey Sachs, and Andrew Mellinger, "Geography and Economic Development," *International Regional Science Review*, 1999, 22 (2): 179–232.
[24] Jeffrey Sachs, "Institutions Don't Rule: Direct Effects of Geography on Per Capita Income." NBER Working Paper No. 9490, (Cambridge: National Bureau of Economic Research: 2003).
[25] Joseph Connors, James D. Gwartney, and Hugo M. Montesinos, "The Transportation-Communication Revolution: 50 Years of Dramatic Change in Economic Development," *Cato Journal*, Vol. 40, No. 1 (Winter 2020), 153-198.

(M), and coastal population (C) components of the geographic disadvantage index are each tested individually in addition to the GDP level.

Table 11. Effect of geographic disadvantage variables on growth rate equations

Equation	R-sq	R-sq (adj)	Constant	GDP per 1,000 employed persons 2000	Freedom index function	Coefficients of freedom terms						Geographic disadvantage		
						a	b	c	d	q	r	Measure	Coefficien	P-value
4	26.21%	24.66%	-0.4230	**-0.0080**	a avg(E)	**0.1708**						None		
4R	2.48%	0.43%	0.3250	N.A.	a avg(E)	0.0153						Total geog alone	0.0781	0.159
4T	26.24%	23.89%	-0.3940	**-0.0080**	a avg(E)	**0.1670**						Total geog added	-0.0103	0.839
4E	26.21%	23.85%	-0.4230	**-0.0080**	a avg(E)	**0.1708**						Ecology malaria	0.0000	1.000
4M	28.42%	26.14%	-0.3210	**-0.0090**	a avg(E)	**0.1598**						Major markets	-0.0680	0.092
4C	27.48%	25.17%	-0.5280	**-0.0080**	a avg(E)	**0.1853**						Coastal population	-0.0541	0.202
7	39.37%	37.44%	-0.2260	**-0.0060**	$aE_0 + b(E_t - E_0)$	**0.1146**	**0.3169**					None		
7R	28.83%	26.56%	0.2620	N.A.	$aE_0 + b(E_t - E_0)$	-0.0079	**0.3163**					Total geog alone	0.0332	0.483
7T	39.52%	36.92%	-0.1690	**-0.0060**	$aE_0 + b(E_t - E_0)$	**0.1071**	**0.3130**					Total geog added	-0.0217	0.636
7E	39.80%	37.21%	-0.1470	**-0.0060**	$aE_0 + b(E_t - E_0)$	**0.1031**	**0.3157**					Ecology malaria	-0.0382	0.416
7M	40.45%	37.89%	-0.1780	**-0.0070**	$aE_0 + b(E_t - E_0)$	**0.1117**	**0.3044**					Major markets	-0.0480	0.197
7C	40.07%	37.49%	-0.3210	**-0.0060**	$aE_0 + b(E_t - E_0)$	**0.1285**	**0.3199**					Coastal population	-0.0406	0.300
30	51.68%	48.50%	**-0.3030**	**-0.0070**	Rights, Trade, Safety/security	**0.0712**	**0.1592**	N.A.	**0.1020**	**0.0718**	**0.0881**	None		
30R	38.26%	34.19%	0.0560	N.A.	Rights, Trade, Safety/security	-0.0041	**0.1384**	N.A.	**0.1498**	0.0403	**0.0957**	Total geog alone	0.0475	0.316
30T	51.71%	47.95%	-0.2930	**-0.0080**	Rights, Trade, Safety/security	**0.0696**	**0.1601**	N.A.	**0.1016**	**0.0718**	**0.0859**	Total geog added	-0.0095	0.828
30E	51.74%	47.98%	-0.2960	**-0.0080**	Rights, Trade, Safety/security	**0.0683**	**0.0336**	N.A.	**0.1007**	**0.0726**	**0.0844**	Ecology malaria	-0.0154	0.747
30M	52.64%	48.96%	-0.2360	**-0.0080**	Rights, Trade, Safety/security	**0.0663**	**0.1576**	N.A.	**0.1020**	**0.0682**	**0.0846**	Major markets	-0.0454	0.181
30C	52.25%	48.54%	-0.3080	**-0.0070**	Rights, Trade, Safety/security	**0.0734**	**0.1600**	N.A.	**0.1024**	**0.0699**	**0.0932**	Coastal population	-0.0361	0.302

Note: Coefficients that are significant (at P-value =.05) are shown in bold.

None of the formulations in Table 11 yield significance for geographic disadvantage terms for either the total or components. Nevertheless, noting some of the coefficient patterns can add to our understanding and suggest future lines for research. To aid in the analysis, the P-value for the geography coefficient is also included.

In all three cases where the geographic disadvantage replaced the GDP level, the sign for the geography variable is positive and insignificant, as opposed to a significant negative sign for the GDP level. The GDP variable is always positive, and it serves as a control variable for convergence. Its coefficient is negative because, on average in the last 20 years, economies at lower levels of development have grown more rapidly for the reasons described above.

The geographic disadvantage variable and its three components are constructed such that nations with greater geographic disadvantage have larger positive values while more advantaged nations have negative values. Consequently, by construction, the two variables have opposite signs relative to level of development. When the geographic disadvantage variable or one of its components is used in conjunction with the GDP variable, the sign is negative, albeit far from significant. Negative signs here, if significant, would suggest that nations with geographic disadvantages have grown faster than those without disadvantage. Such a relationship would be consistent with the findings of Connors, Gwartney, and Montesinos that the revolution in transportation and communication efficiency and effectiveness have helped overcome some of the geographic disadvantages and enabled at least moderately disadvantaged countries to grow faster than high-income countries.[26]

The fact that the effects of geographic disadvantage in Table 11 are not significant is not inconsistent with the Connors-Gwartney-Montesinos finding because these data relate only to approximately the last third of the time period covered by their much longer-term study. The effects of the underlying changes that they identify in transportation and communication were larger in the earlier periods and the relationships in Table 11 already incorporate benefits from those earlier gains from the transportation and communication revolutions.

Two of the components of geographic disadvantage hint that there may be a developing story here for further research. The major-markets component is not significant at the 0.05 level, but in one equation it is significant at the 0.10 level and in the other two at the 0.20 level. Since the underlying metric considers minimum distance to only three markets (New York, Rotterdam, and Tokyo), it is

[26] Joseph Connors, James D. Gwartney, and Hugo M. Montesinos, "The Transportation-Communication Revolution: 50 Years of Dramatic Change in Economic Development," *Cato Journal*, Vol. 40, No. 1 (Winter 2020), 153-198.

possible that a more comprehensive set of markets might improve the fit, especially since more markets are becoming significant.

The ecology of malaria is very insignificant. While the ecology surrounding the disease may not have changed much in the last 50 years, the incidence of the disease itself has fallen dramatically, in what may be another important revolution, this time in public health. Of the 98 countries in this analysis, 45 had at least some malaria in the beginning year 2000, but by the end in 2019, 67% had reduced their disease incidence by half or more. Only two countries had a higher disease incidence. One was Panama, an insignificant case where the incidence rose from only 0.37 per 1,000 population to 0.40 per 1,000. The other was Venezuela where government failure caused the EFI to decline by half from 5.91 in 2000 to 2.83 in 2019, followed by malaria incidence rising by more than 1000% from 2.94 per 1,000 to 32.78 per 1,000.[27]

Role of freedom in development

An important question is whether the results derived so far apply similarly at all levels of development. To evaluate that question, the data set of 98 countries was divided into four approximately equally sized quartiles based on their GDP per employed person and calculated the same regressions based on the sample of each quartile. Since each quartile has a sample approximately one-quarter the size of the full sample, the sampling errors are about twice as large, so fewer of the results are significant at the 95% level of confidence (P-value = .050). Because the samples are so small the equations were also re-estimated for the top and bottom halves of the countries, for which the sampling errors will be only about 40% larger. Having both stratifications will help sort out random from

[27] Calculated from World Health Organization, Global Health Observatory Data Repository/World Health Statistics, https://data.worldbank.org/indicator/SH.MLR.INCD.P3.

meaningful differences. Table 12 reproduces three of the equations from Table 9 (shown in shaded lines), and then re-estimates those equations for each half, which are named by original equation number, followed by an "H" and then the half number – number 1 being the lower GDP, and number 2, the higher GDP. The quartile equations follow, with a similar naming convention employing "Q" for the quartile number.

Table 12. Cross-sectional regression of 98 countries' growth in GDP per employed person over the period 2000-2019 on freedom indexes from the Human Freedom Index

Equation	n	R-sq	R-sq (adj)	ANOVA Regression P-value	Constant	GDP per 1,000 employed persons 2000	Freedom function	a	b	c	d
7	98	39.37%	37.44%	0.000	-0.2260	**-0.0060**	$aE_0 + b(E_t - E_0)$	**0.1146**	**0.3169**		
7H1	50	30.30%	25.76%	0.001	-0.2620	-0.0013		0.1364	**0.3870**		
7H2	48	46.91%	43.29%	0.000	-0.4610	**-0.0050**		**0.1381**	**0.2211**		
7Q1	25	35.19%	25.93%	0.025	-0.7200	-0.0230		0.2240	**0.4530**		
7Q2	25	24.46%	13.67%	0.110	-0.1320	-0.0050		0.0460	**0.3100**		
7Q3	24	44.70%	36.41%	0.007	-0.1780	-0.0100		**0.1339**	**0.2383**		
7Q4	24	45.50%	37.33%	0.006	**-2.2670**	**-0.0100**		**0.3215**	**0.3420**		
8	98	19.56%	16.99%	0.0000	0.4310	**-0.0060**	$aP_0 + b(P_t - P_0)$	0.0326	0.0182		
8H1	50	1.80%	0.00%	0.838	0.6560	-0.0070		0.0072	0.0700		
8H2	48	40.27%	36.20%	0.000	-0.0930	**-0.0050**		**0.8140**	-0.0185		
8Q1	25	10.05%	0.00%	0.517	1.6500	0.0380		-0.1610	0.2580		
8Q2	25	1.03%	0.00%	0.974	0.2410	-0.0010		0.0363	0.0260		
8Q3	24	41.67%	32.93%	0.012	0.1110	**-0.0150**		**0.1148**	-0.1319		
8Q4	24	25.83%	14.71%	0.106	-0.3960	-0.0010		0.0710	0.0770		
9	98	40.27%	37.02%	0.000	-0.1920	**-0.0060**	$aE_0 + b(E_t - E_0) + cP_0 + d(P_t - P_0)$	**0.1618**	**0.3457**	-0.0476	-0.0170
9H1	50	35.10%	27.73%	0.001	0.0960	-0.0110		**0.2260**	**0.4589**	-0.1361	-0.002
9H2	48	51.68%	45.93%	0.000	-0.5780	**-0.0050**		0.0969	**0.1921**	0.0479	-0.0942
9Q1	25	40.27%	24.56%	0.062	0.0110	-0.0120		0.3460	**0.4450**	-0.226	0.11
9Q2	25	32.98%	15.34%	0.147	-0.2600	0.0140	y	0.1450	**0.4890**	-0.1119	0.093
9Q3	24	55.59%	43.25%	0.008	-0.2350	**-0.0130**		0.0834	**0.1782**	0.0649	-0.115
9Q4	24	51.63%	38.20%	0.015	**-2.5790**	0.0010		**0.2677**	**0.3760**	0.058	0.047

Note: n = number of countries in sample

These results are important. The change in the EFI has a statistically significant positive effect on economic growth in each developmental quartile and each half. In fact, the change in the EFI over time

has the greatest effect in the least developed quartile (Q1) and bottom half (H1). The effect of the initial level of EFI is not significant for the bottom half and two lowest quintiles, but it is also not significantly less than the top half and top two quintiles. The differences among the halves and quartiles are not statistically significant, both here and in most of the comparisons in the table. It may not be true that freedom is more important for growth among the least developed countries, but it is certainly not true that it is less important either.

These results mean that economic freedom is an important predecessor for economic growth and for moving from the least developed to the highly mature economies. These economic freedoms are not some Western *ex post* explanation for why some nations have been so economically successful and others have not. Freedom has been a precursor to economic growth at all times and in all places.

Both here and in additional analysis below, there is a general pattern that coefficients for freedom indexes among the lower-GDP nations are more likely to be insignificant (that is with a probability greater than 0.05 that it might be zero or of opposite sign) than coefficients for the nations with higher GDP. Despite the lower frequency of significance among coefficients for the low-GDP nations, in almost all cases, the differences between coefficients for the top and bottom of the GDP distribution are also insignificant, meaning that we cannot reject the hypothesis that the coefficients for each GDP level are the same. In fact, with few exceptions, it is substantially more likely that the coefficients for each GDP level are the same than that any of them are zero or less.

These statistical relationships are helpful for interpreting the results, but they are not mere statistical artifacts, they also reflect structural factors that reduce the likelihood for statistical significance at the lower GDP levels. The freedom indexes are not single dimension measures such as distance, mass, or force. They are, in effect, standardized counts of characteristics. The median country in the top quartile has an EFI score of 8.0, which means that there are only 2.0 scoring points, or 20

percent of the total, on which a pair of countries can differ from each other and still be in that quartile. In the bottom quartile, the median score is 5.9, which means that pairs countries in the bottom quartile can differ on 41 percent of the available scoring points. A little combinatorial calculation tells us that there are 2,158 times more opportunities for median countries in the bottom quartile to differ from each other in the details of the EFI than there are for countries in the top quartile. As a result, we would naturally expect that the variances for estimates for the bottom quartile are more likely to be greater than for the top quartile.[28]

As is the case with so many other phenomena in life, there are always more ways to fail than there are to succeed, so there will be greater variation among the failing group (in this case those with lower GDP) than among the successful group, and hence less statistical significance. Although expressed quite differently, and perhaps too pessimistically, this principle has been known for at least 2000 years, in the words of ancient scripture: "Enter through the narrow gate because the wide gate and broad road lead to destruction, and many go through them. The narrow gate and hard road lead to life, and few find them."[29]

Personal freedom, as measured by the PFI, was not significant for the full 98-coutries in the total sample, but it was significant for the top half and the third quartile. One should not over-analyze an exception like this, but the difference is both substantial in size and highly significant statistically, so it deserves at least some thought. One feature that distinguishes the third quartile from second and fourth

[28] If we make a simplifying assumption that each of the 42 indicators has only two values – "good" and "bad" – then we can get a lower bound on the difference in variation among the top and bottom quartiles. Some of the indicators are binary like that, but most have intermediate values. With intermediate values the number of possible combinations will be greater, as will the variation, so this assumption is very conservative. At the median of the bottom quartile, countries will have selected "good" values for 25 of the indicators, and "bad" values for 17. There are 2.5×10^{11} combinations for that selection. At the upper end of the top quintile, countries would have selected 34 "good" choices and 8 "bad," which have only 118,030,185 (1.2×10^{8}) possible combinations. The number of combinations possible for the bottom quartile are 2,158 greater than for the top.

[29] Translation of Matthew 7:13-14 by author after Eberhard Nestle, *Novum Testamentum Graece,* (Philadelphia: American Bible Society, 1952) and Alfred Marshall, *The Interlinear Greek-English New Testament,* (London: Samuel Bagster and Sons Ltd., 1958), 24-25.

is that it has more variation in the PFI. On one hand, it includes countries like Estonia, Croatia, Korea, and Iceland that generally made significant gains in freedom over the 20 years, and on the other hand, it has countries like Hong Kong, Argentina, Hungary, and Mexico that made considerable progress in preserving freedom but slipped significantly for at least some part of the two decades. These two contrasting sets of countries give clear, substantial, statistically significant differences for the PFI that distinguish their differences in GDP.

The fourth (highest) quartile, of course, had variations among its countries too, but was dominated by countries that "had arrived," at least in relative terms. Some did better at continuing to maintain freedom, and others lost ground, but the differences were smaller, so with a small sample, there was not a significant trend in personal freedom's effect within the top quartile. But the top half, including both the top and third quartiles, was not only significant, but one of the largest coefficients in the entire study, giving a clear signal that as nations in the top half of development improved their personal freedom, the economy also grew faster.

In the bottom and second quartiles, very few countries had ever achieved significant levels of freedom, and as discussed above, had many different modes of failure, so it was difficult for statistics to sort out any pattern in such a small sample. There is no measurable effect at all from the PFI in the bottom half, and the absence of that effect in the bottom half is the primary reason there is no effect from the total sample.

The estimates for the halves and quartiles for equation 9, which include both the EFI and PFI, add no major surprises. With both EFI and PFI in the equation, the PFI significance in the third quartile and top half disappears since the EFI dominates the effects for economic growth. The significant cases from equation 8 tells us that increases in personal freedom, at least at the upper end of development, accompanied the increases in economic freedom. But when EFI and PFI are combined in the estimation,

the effects of the more direct economic freedom variables overshadowed any additional contributions from personal freedom, at least at this high summary level. The most significant result is preserved, however. Freedom is critical for growth and development.

Table 13 extends this analysis by developmental halves and quartiles to the EFI and PFI component level for most of the equations in Table 10. Of course, the smaller sample sizes for the developmental strata mean that their equations will generally have lower explanatory power and coefficients for independent variables will be less likely to be significant than for the equations based on the full 98-country sample. Despite these effects of smaller sample size, the halves and quartile estimates are not inconsistent with the full-sample estimates, just less statistically significant.

Table 13. Cross-sectional regression of 98 countries' growth in GDP per employed person over the period 2000-2019 on component freedom indexes from the Human Freedom Index by developmental halves and quintiles

								Coefficients of freedom terms						Added terms	
Equation	n	R-sq	R-sq (adj)	ANOVA Regression P-value	Constant	GDP per 1,000 employed persons 2000	Freedom function	a	b	c	d	q	r	First	Second
13	98	23.44%	20.99%	0.000	**0.6350**	**-0.0050**	Government size	0.0017	**0.1106**						
13H1	50	9.14%	3.21%	0.216	0.7860	-0.0050		-0.0180	0.1263						
13H2	48	26.83%	21.84%	0.003	0.5040	-0.0040		0.0103	0.0321						
13Q1	25	16.89%	5.02%	0.264	0.6860	-0.0350		-0.0250	0.1760						
13Q2	25	1.58%	0.00%	0.952	1.0000	0.0050		-0.0540	0.0020						
13Q3	24	9.74%	0.00%	0.552	1.0730	-0.0090		-0.0382	-0.0480						
13Q4	24	14.81%	2.04%	0.350	0.1790	-0.0030		0.0369	0.1060						
14	98	37.65%	35.66%	0.000	-0.0420	**-0.0080**	Legal & property rights	**0.1327**	**0.2805**						
14H1	50	34.81%	30.65%	0.000	**-0.7320**	**-0.0220**		**0.3286**	**0.4000**						
14H2	48	43.51%	39.66%	0.000	0.1510	**-0.0060**		**0.0780**	**0.1412**						
14Q1	25	55.58%	49.24%	0.001	-1.6880	0.0030		**0.5270**	**0.5230**						
14Q2	25	15.15%	3.04%	0.317	-0.0730	0.0120		0.1550	0.2380						
14Q3	24	50.00%	42.51%	0.003	0.3640	**0.0160**		**0.1328**	0.1110						
14Q4	24	32.66%	22.56%	0.044	-0.3250	-0.0010		**0.0750**	-0.0030						
15	98	29.40%	27.15%	0.000	**0.1520**	**-0.0060**	Sound money	0.0545	**0.1083**						
15H1	50	14.51%	8.94%	0.063	0.2020	-0.0120		0.0595	**0.1298**						
15H2	48	41.92%	37.96%	0.000	-0.0460	-0.0050		**0.0693**	**0.1005**						
15Q1	25	14.26%	2.01%	0.347	0.0660	-0.0130		0.0809	0.1473						
15Q2	25	17.89%	6.16%	0.237	0.2480	0.0070		-0.0940	0.0781						
15Q3	24	38.11%	29.88%	0.017	0.2290	0.0090		0.6400	**0.0335**						
15Q4	24	34.76%	24.97%	0.033	**-2.8800**	-0.0040		**0.3210**	**0.3150**						
16	98	37.10%	35.09%	0.000	**0.1620**	**-0.0050**	Trade internationally	0.0624	**0.1825**						
16H1	50	28.48%	23.81%	0.001	-0.0140	-0.0110		0.1061	0.2349						
16H2	48	39.86%	35.76%	0.000	-0.1000	**-0.0050**		**0.0838**	**0.1211**						
16Q1	25	31.56%	21.78%	0.043	0.1580	-0.0012		0.0540	0.2020						
16Q2	25	20.68%	9.34%	0.174	-0.2500	-0.0050		0.1165	**0.2295**						
16Q3	24	35.85%	26.22%	0.028	0.0880	0.0110		**0.1003**	**0.1313**						
16Q4	24	23.45%	11.96%	0.140	-1.2740	0.0020		0.1870	0.1587						
17	98	29.26%	27.00%	0.000	-0.1630	**-0.0070**	Regulation	**0.1165**	**0.1991**						
17H1	50	17.67%	12.30%	0.029	-0.1700	-0.0080		0.1183	**0.2606**						
17H2	48	36.10%	31.75%	0.000	-0.2160	**-0.0060**		**0.1163**	0.0810						
17Q1	25	20.42%	9.05%	0.179	-0.4200	0.0020		0.1490	**0.2910**						
17Q2	25	12.77%	0.30%	0.402	-0.1590	0.0040		0.0692	0.2110						
17Q3	24	24.05%	12.65%	0.131	-0.0010	-0.0120		0.1258	0.1028						
17Q4	24	31.77%	21.54%	0.050	-1.3430	0.0020		**0.2107**	0.1870						
18	98	46.51%	43.60%	0.000	**0.1000**	**-0.0060**	Rights & trade	**0.1225**	**0.2278**	-0.0229	**0.0940**				
18H1	50	42.38%	35.83%	0.000	-0.5650	**-0.0200**		**0.2580**	**0.3020**	0.0165	0.1126				
18H2	48	49.73%	43.74%	0.000	0.1230	**-0.0040**		**0.8450**	0.1249	-0.0142	0.0814				
18Q1	25	61.08%	50.83%	0.002	-1.0920	0.0240		**0.5130**	**0.4680**	-0.1150	0.0250				
18Q2	25	24.88%	5.12%	0.322	-0.2740	0.0110		0.1260	0.1410	0.0440	0.1710				
18Q3	24	57.00%	45.05%	0.006	0.3850	**0.0130**		**0.1345**	0.1200	-0.0259	0.0662				
18Q4	24	47.15%	32.47%	0.003	-1.6190	0.0010		**0.0766**	-0.0462	0.1248	**0.1986**				

Table 13 (continued). Cross-sectional regression of 98 countries' growth in GDP per employed person over the period 2000-2019 on component freedom indexes from the Human Freedom Index by developmental halves and quintiles

								Coefficients of freedom terms						Added terms	
Equation	n	R-sq	R-sq (adj)	ANOVA Regression P-value	Constant	GDP per 1,000 employed persons 2000	Freedom function	a	b	c	d	q	r	First	Second
21	98	26.96%	24.63%	0.000	0.1710	**-0.0100**	Rule of law	**0.1188**	0.0834						
21H1	50	20.88%	15.72%	0.012	-0.2180	**-0.0250**		**0.2683**	**0.2580**						
21H2	48	50.02%	46.61%	0.000	-0.0100	**-0.0070**		**0.1027**	**-0.1627**						
21Q1	25	52.84%	45.69%	0.001	-1.2960	0.0000		**0.5270**	**0.6170**						
21Q2	25	8.01%	0.00%	0.616	-0.0160	-0.0080		0.1350	0.0100						
21Q3	24	58.78%	52.60%	0.000	0.2290	**0.0170**		**0.1501**	-0.1348						
21Q4	24	32.71%	22.67%	0.044	-0.4390	-0.0030		**0.1110**	-0.1380						
22	98	36.65%	34.63%	0.000	-0.2400	**-0.0090**	Security & safety	**0.1261**	**0.1157**						
22H1	50	30.00%	25.43%	0.001	-0.4860	-0.0080		**0.1623**	**0.1254**						
22H2	48	34.04%	29.54%	0.000	0.1250	-0.0050		0.0573	0.0944						
22Q1	25	36.17%	27.05%	0.022	-1.2410	0.0010		**0.2529**	0.0761						
22Q2	25	29.59%	19.53%	0.057	-0.5440	0.0030		**0.1268**	0.1737						
22Q3	24	26.48%	15.46%	0.098	0.3070	-0.0100		0.0658	0.1149						
22Q4	24	14.25%	1.39%	0.369	-0.720	-0.0020		0.1130	0.1640						
23	98	19.46%	16.89%	0.000	**0.7730**	**-0.0050**	Movement	-0.0130	0.0338						
23H1	50	4.60%	0.00%	0.534	**1.1500**	-0.0040		-0.0591	0.0444						
23H2	48	34.06%	30.14%	0.000	0.0310	**-0.0050**		0.0610	-0.0642						
23Q1	25	14.03%	1.75%	0.355	1.4200	0.0400		-0.1190	0.1420						
23Q2	25	11.10%	0.00%	0.971	0.6700	0.0010		-0.0234	0.0210						
23Q3	24	27.05%	16.11%	0.091	0.0720	0.0100		0.8480	-0.1051						
23Q4	24	21.46%	9.68%	0.176	-0.4080	-0.0010		0.0696	0.0876						
24	98	22.53%	20.06%	0.000	**1.0610**	**-0.0010**	Religion	-0.0508	**-0.0482**						
24H1	50	14.91%	9.36%	0.057	1.6090	**-0.0010**		**-0.1221**	-0.0688						
24H2	48	34.61%	30.15%	0.000	0.1560	**-0.0050**		**0.0475**	-0.0682						
24Q1	25	25.80%	15.20%	0.093	2.0340	0.0160		**-0.1862**	-0.0650						
24Q2	25	2.26%	0.00%	0.921	0.9330	0.0020		-0.0426	-0.0204						
24Q3	24	32.81%	22.73%	0.043	0.3970	0.0110		0.0535	**-0.1491**						
24Q4	24	31.02%	20.68%	0.055	-0.6280	0.0000		**0.0854**	0.0407						
25	98	19.04%	16.45%	0.000	**0.7320**	**-0.0050**	Association	-0.0092	0.0103						
25H1	50	3.60%	0.00%	0.636	**0.9640**	-0.0040		-0.4140	0.0202						
25H2	48	34.87%	30.43%	0.000	0.2150	**-0.0050**		**0.4130**	-0.0551						
25Q1	25	12.99%	0.56%	0.393	1.3260	0.0330		-0.1036	0.1300						
25Q2	25	0.69%	0.00%	0.985	0.6740	0.0000		-0.0207	-0.0120						
25Q3	24	35.81%	26.18%	0.028	0.4620	0.0140		**0.0665**	-0.0991						
25Q4	24	23.88%	12.46%	0.133	**-0.0820**	-0.0010		0.0370	0.5400						
26	98	18.88%	16.29%	0.000	**0.6210**	**-0.0060**	Expression	0.0055	-0.0007						
26H1	50	1.49%	0.00%	0.871	0.7780	0.0040		-0.0192	0.0012						
26H2	48	36.91%	32.61%	0.000	0.2020	-0.0050		**0.0455**	-0.0459						
26Q1	25	2.63%	0.00%	0.903	0.7330	0.0220		-0.3580	0.0940						
26Q2	25	0.40%	0.00%	0.993	0.553	0.0020		-0.0127	0.0060						
26Q3	24	36.96%	27.51%	0.024	0.3820	-0.0130		**0.0688**	-0.0751						
26Q4	24	22.39%	10.75%	0.158	**0.0740**	-0.0010		0.0208	0.0952						
27	98	20.24%	17.70%	0.000	**0.5250**	**-0.0060**	Relationships	0.0188	-0.0358						
27H1	50	2.80%	0.00%	0.724	**0.6600**	-0.0060		0.0020	0.0607						
27H2	48	38.61%	34.43%	0.000	0.1090	**-0.0050**		**0.0554**	0.0080						
27Q1	25	2.64%	0.00%	0.902	0.7200	0.0160		-0.0270	-0.0610						
27Q2	25	4.56%	0.00%	0.801	0.1940	0.0040		0.0241	0.0769						
27Q3	24	35.57%	25.90%	0.029	0.4220	**0.0150**		**0.0770**	0.0218						
27Q4	24	32.22%	22.00%	0.047	-0.6090	-0.0010		0.0892	-0.0080						

Table 13 (continued). Cross-sectional regression of 98 countries' growth in GDP per employed person over the period 2000-2019 on component freedom indexes from the Human Freedom Index by developmental halves and quintiles

								Coefficients of freedom terms						Added terms	
Equation	n	R-sq	R-sq (adj)	ANOVA Regression P-value	Constant	GDP per 1,000 employed persons 2000	Freedom function	a	b	c	d	q	r	First	Second
28	98	37.28%	33.87%	0.000	-0.2680	**-0.0020**	Safety/security & rule of law	**0.1120**	**0.1052**	0.0331	0.0456				
28H1	50	35.14%	27.77%	0.001	-0.5740	-0.0170		**0.1281**	**0.1164**	0.1150	0.1970				
28H2	48	53.37%	47.82%	0.000	0.0780	0.0070		-0.0085	0.0861	**0.1026**	**-0.1845**				
28Q1	25	56.43%	44.96%	0.005	-1.1850	0.0000		0.3070	**0.5780**	0.1071	0.0725				
28Q2	25	30.95%	12.78%	0.182	-0.7030	0.0020		0.0430	-0.0440	**0.1207**	0.1674				
28Q3	24	65.34%	55.72%	0.001	0.3780	**0.0160**		**0.1581**	-1.4590	-0.0264	0.0928				
28Q4	24	35.35%	17.39%	0.133	-0.2600	0.0020		**0.1363**	-0.1480	0.044	0.035				
30	98	51.68%	48.50%	0.000	-0.3030	**-0.0070**	Rights, trade, safety/security	**0.0712**	**0.1592**	N.A.	**0.1020**	**0.0718**	**0.0881**		
30H1	50	50.78%	43.92%	0.000	**-0.8120**	**-0.0160**		**0.1755**	**0.2227**	N.A.	**0.0922**	**0.0968**	**0.0854**		
30H2	48	52.76%	45.84%	0.000	0.2260	**-0.0040**		**0.0853**	0.1116	N.A.	**0.0994**	-0.0236	0.0730		
30Q1	25	63.57%	51.43%	0.003	-1.9060	0.0010		**0.3830**	**0.3580**	N.A.	0.0535	0.1116	0.0063		
30Q2	25	38.57%	18.10%	0.139	-0.6020	-0.0040		0.0720	**0.1290**	N.A.	0.0915	0.0969	0.1378		
30Q3	24	67.12%	55.52%	0.002	0.4170	**0.0130**		**0.1331**	0.0644	N.A.	**0.0974**	-0.0237	**0.1284**		
30Q4	24	45.62%	26.43%	0.075	-0.2600	0.0020		**0.1194**	-0.0020	N.A.	0.1265	-0.068	0.022		
34	89	63.80%	60.18%	0.000	**-1.2510**	**-0.0090**	Rights, trade, safety/security + Avg tax & Capital form %GDP	**0.1251**	**0.1352**	N.A.	**0.1031**	**0.0657**	**0.0782**	**0.0508**	**0.0213**
34H1	50	65.20%	57.25%	0.000	**-0.2829**	-0.0070		**0.2928**	**0.2204**	N.A.	0.0754	**0.0787**	0.0475	**0.1561**	**0.0245**
34H2	48	72.98%	66.97%	0.000	-0.5930	**-0.0060**		**0.0936**	0.0686	N.A.	**0.1132**	0.0168	0.0608	0.0186	**0.0160**
34Q1	19	76.03%	56.85%	0.023	-3.9700	0.0130		0.3820	0.3250	N.A.	0.0923	0.0632	0.1560	0.2930	0.0156
34Q2	25	55.94%	33.91%	0.054	-3.2700	0.0080		**0.3370**	0.1610	N.A.	0.1104	0.0488	-0.0620	**0.1820**	0.0399
34Q3	22	75.11%	59.79%	0.006	1.0520	-0.0012		**0.1830**	0.0855	N.A.	**0.1466**	-0.1392	**0.1941**	0.0200	-0.0026
34Q4	23	87.99%	81.12%	0.000	-0.6580	-0.0030		**0.0779**	-0.0606	N.A.	0.0681	-0.0016	0.0920	0.0021	**0.0203**

Note: coefficients that are significant at 95% confidence ($P \leq 0.05$) are in bold type.

= coefficient significant at 90% confidence, but not at 95%.

The two components of the EFI that were most significant for the total sample also show relatively strong results for the halves and quartiles. The strongest component was legal system & property rights. Both halves and three of the four quartiles show significant effects from the initial level of the index. Both halves and one of quartiles also show significant effect from the change over time. The second quartile coefficients are not significant at the 95% level, but the change in the index is significant at the 90% level. These results suggest that the existence and protection of property rights is a strong prerequisite for economic growth at all levels of development.

The trade internationally component is almost as strong in total as legal system & property rights. But within halves and quartiles the relationships are weaker, although the coefficients are comparable. Clearly, across the full range of economies the trade effect is substantial, but within more similar levels of development, it is less of a differentiator. Combining legal system & property rights with trade internationally adds still more explanatory power, although for the most part, the contribution of trade is significant only for the fourth quartile. In terms of the magnitude of their effects, the coefficients for legal system & property rights are substantially larger.

The components of the PFI begin with equation 21. Rule of law and security & safety show the strongest explanatory power among the PFI set. Equation 28 combines both of them. The combined results show no improved overall significance compared with safety & security alone, so, as in the case of Table 10, the strongest result for combining components from both EFI and PFI retains only legal & property rights, trade internationally, and safety & security in equation 30. All three of these freedom components are significant at the level of the total sample and each component is significant for at least one of the quartiles and one of the halves.

The explanatory power for this model is surprisingly good for these types of independent variables. The results for the full-sample and for each of the halves explain more than half the variation in economic growth. For the first and third quartiles, the equation 30 results pass the significance test strongly, with P-values of 0.003 and .002 respectively. The fourth quartile is significant at a p-value of 0.075. The strength of the fit at the first and third quartiles is especially important because it gives assurance that these elements of freedom are significant contributors to continuing development.

Finally, equation 34 adds two more significant factors. The first is the total tax rate. The second is gross capital formation as a percentage of GDP. These measures are not part of the HFI, but they provide significant additional contribution to economic growth, beyond the effect of the freedom

indexes. This final equation explains nearly two-thirds of the variation in economic growth across the full sample and each developmental half, an extremely strong 88% for the fourth quartile, three-quarters in the first and third quartiles, and even more than half in the second quartile. The P-values are extremely strong for all quartiles except the second, and even it just barely misses the 0.050 threshold for significance. This strong explanatory power across and within all levels of economic development should focus the policy discussion on implementing the best approaches for insuring freedom as a key driver for economic development.

Implications for economic growth

The data show that societies that value, promote, and protect freedom in one area are likely, but not certain, to value it in other areas. This correlation among different dimensions of freedom makes it difficult to tease out which, if any, of the elements of freedom's full scope are most important for growth. The fact that the forgoing analysis has been able to identify some of the more compelling freedom dimensions for growth does not mean that others may not also contribute, but it is useful to know which dimensions are most likely to facilitate growth and development, which of course is not the only reason to aggressively pursue freedom.

Perhaps the most globally consequential effect of freedom is that on developing nations' rise from low-development and poverty to greater economic maturity and prosperity. This question has recently become more pressing as the G7 Economic Resilience Panel has proposed a new economic

paradigm (NEP)—so-called the "Cornwall Consensus"—in which the state would play a larger role than in the current "Washington Consensus," which is more focused on market-led development.[30]

Neither of these prescriptions is really a consensus at all, despite the use of that term. The Washington Consensus was first documented by John Williamson in 1989 as a list of ten general policies that he observed to be most generally observed among United States policymakers in international development at the time. He has since revisited that list in 2004, and, with some further refinements, continued to see them as largely valid. In short, the ten were (with minor editing):[31]

1. Keep budget deficits small
2. Direct public expenditures toward items that can be justified by economic returns
3. Broaden the tax base and cut marginal tax rates
4. Promote financial liberalization with market-determined interest rates
5. Establish a unified competitive exchange rate to induce exports
6. Abolish barriers to international trade
7. Remove barriers to foreign direct investment
8. Privatize state-owned enterprises
9. Abolish impediments to new firm entry and free competition
10. Safeguard property rights

The order here is Williamson's, not necessarily a reflection of their relative importance. The term Washington Consensus has not always been used to mean exactly these ten items, but they are sufficiently reflective of the core of that concept for us to use a checklist.

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[30] For a good short overview of the issues and sources see, James A. Dorn, "Conflicting Views of Economic Development: Mazzucato vs. Bauer," Cato At Liberty Blog, October 27, 2021. https://www.cato.org/blog/conflicting-views-economic-development-mazzucato-vs-bauer.

[31] John Williamson, "The Washington Consensus as Policy Prescriptions for Development," Institute for International Economics, 2004.

The Cornwall Consensus was certainly not a consensus since it was written by bureaucrats assigned to the G7 Panel on Economic Resilience who merely applied their traditional central planning training to the question without considering alternatives. The document contains eight recommendations.[32] They cannot be characterized in short titles that are as pithy as those of the Washington Consensus because each is a broadly stated set of objectives rather than specific activity. Even when specific actions are endorsed, they sometimes appear to be in conflict with each other or even the headline objective. The following list tries to capture the breadth of each recommendation with as few words as possible.

1. Improve equity in global health responses with more planning for collective efforts that require public-private partnerships to avoid unequal purchasing power. Take a new approach to intellectual property rights that recognizes that knowledge is the result of a collective value-creation process.
2. Accelerate public investment to protect climate and biodiversity. Establish and fund an international organization focused on decarbonizing the economy.
3. Improve resilience of global supply chains. Facilitate collective "political level" coordination to prioritize public goods like security and health and vulnerabilities such as market concentration.
4. Close digital governance gap. Create an international "Data and Technology Board" to assure common standards among G7 governments. Collectively reduce technology monopolies and "ensure digital firms pay their fair share of taxes."
5. Tackle market fragilities in minerals critical to climate policy and in semiconductors. Diversify markets in these industries and align them with climate goals.

[32] Summarized from G7 Panel on Economic Resilience, "G7 Panel on Economic Resilience: Key Policy Recommendations," October, 2021." Includes some context from panel member Mariana Mazzucato in "A New Global Economic Consensus," Project Syndicate, October 13, 2021.

6. Champion investment-focused recovery. The majority of investment would be private, "but public investment will have a key role to play, particularly in sustainable infrastructure." Address corporate "offshoring" of profits, which "deprives government of revenue" and "fuels inequality." Align the environmental, social, and corporate governance (ESG) agenda internationally, especially the social dimension.
7. Reform World Trade Organization (WTO) to strengthen "open and rules-based trade." In particular, phase out tariffs on environmental goods and ensure "that the Agreement on Trade-Related Intellectual Property Rights is not used to abuse market power over life-saving drugs."
8. Support stronger labor standards and more inclusive labor participation. "Ensure this recovery is more inclusive and just than … in 2008." Ensure compliance with International Labor Organization standards. Recognize collective bargaining rights as critical for enhancing equity. Develop common standards for "just transition to greener economies."

The analysis in this paper has considered how freedom contributes to economic growth and prosperity for all. But at least some of the proponents of the Cornwall Consensus actually disavow that objective and affirm, "We argue for a radical reorientation in how we think about economic development – moving from measuring growth in terms of GDP, GVA (gross value added), or financial returns to assessing success on the basis of whether we achieve ambitious common goals." The limitation of intellectual property rights on pharmaceuticals is justified as recognizing that "knowledge is the result of a collective value-creation process." And they claim that the underlying principle of the document is "creation of long-term public value rather than short-term private profit."[33]

Table 14 lists the major policy elements of the Washington Consensus and the Cornwall Consensus. Each column in the table is associated with one of the components of the HFI that has been

[33] Mariana Mazzucato, 2021.

shown to be strongly or moderately related to economic growth. “Other govern” is the size of government index excluding taxes. A green checkmark is placed in the intersection of a proposed policy element and freedom component when the policy would likely be consistent with that freedom. A red “X” is placed where the policy element would likely reduce that freedom. A blank intersection means that there is no obvious significant connection between the two. The assignment of these markers involves judgement, but the relationships are straightforward and only very clear connections are marked.

Table 14. Comparison of two "Consensuses" on economic growth and development and their relationship to dimensions of freedom

	Effect on growth -->	Strong				Moderate		
	HFI Component/Sub-component-->	Rights	Trade	Safety	Taxes	Money	Regulate	Other Govern
	Washington Consensus							
	Small deficits					√		√
	Spend justified by economic returns					√		√
	Broad, low taxes				√			
	Fiscal liberalization, market interest	√				√		
	Unified competitive exchange rate					√		
	Abolish trade barriers		√					
	No barriers foreign direct investment		√			√		
	Privatize state-owned enterprise	√						√
	No entry barriers, free competition	√					√	
	Safeguard property rights	√						
	Cornwall Consensus							
	Collective equity in health. Limit property rights	X						X
	More public investment in climate					X	X	X
	Collective digital regulation	X					X	
	Political-level coordination of supply chains	X	X					
	Collective regulation rare minerals, semiconductors	X	X				X	
	Invest, avoid offshoring, ESG	X			X			X
	Open rules-based trade, limit IP	X	√					
	Compliance with ILO standards						X	
√	= elements of policies affect component of freedom positively							
X	= elements of policies affect component of freedom negatively							

The individual Cornwall policies have multiple marks more frequently because its proposals are much more general and usually contain multiple specific interventions that may have somewhat different effects. The "Open rules-based trade, limit IP" policy, for example, has a positive rating for its

advocacy of free trade, which support the freedom to trade internationally. But the rules it advocates include limiting rights to intellectual property, thus earning a negative indicator. The Washington Consensus elements generally support some component of freedom. They are by no means necessarily sufficient or even critical for gaining and preserving that dimension of freedom, but they are at least consistent with it. The Cornwall elements often diminish one or more components of freedom. Since the freedom components in Table 14 also support stronger economic growth, the Cornwall effects will carry through to slower growth, greater poverty, and generally less prosperity for all.

What have we learned?

Freedom is its own reward. It is something that each one of us has at birth, and only unimpeded brigands or overweening government can take it from us. The HFI captures and summarizes 82 indicators of freedom. This analysis has shown that in general, most of the components of freedom are rather strongly associated with each other, although it is still possible for a society to have some of the elements of freedom without having others. The factor analysis showed the strong interrelationship among components of the HFI and two common underlying factors – one that largely captures the personal dimensions of freedom and the other that captures the economic dimension. Both of these factors share strong relationships with the rule of law and the legal protection of property rights. These two dimensions would seem to be required in any society with significant freedom.

The size and power of government appears to be a third major dimension. It affects the personal and economic dimensions, but, in practice, many societies seem to value and preserve fundamental personal and economic freedoms while surrendering some of their freedom to excessive government. The debate between the Washington and Cornwall Consensus on economic growth and development reflect that divergence. The long-standing Washington Consensus has at least been consistent with preserving some dimensions of freedom and avoiding some of the more devistating encroachments of

government. The new Cornwall formulation seeks to replace freedom of individuals and civil society with dictates from governments acting in concert to impose their view of what is good on persons rather than letting persons choose.

The data are on the side of the Washington Consensus. Most measures of freedom are strongly and positively correlated with greater economic performance, and there are significant freedom effects at all levels of economic development.

The Cornwall scheme is doomed to failure. Hopefully it will fail because free individuals will rise up and say "No." But more fundamentally, it will fail because its prescriptions will cause economic growth to slow and deteriorate. The central core of this analysis shows that without freedom, growth flounders. While the Cornwallians seem to reject economic growth in favor of some other set of objects, they completely miss the point that without growth, there are no resources to achieve whatever other outcomes they would like. One can always use the fruits of growth to build and pursue dreams, but without growth there are no resources to build with.