

Appendix: Methodological Approach, Limits, and Extensions

Perfecting Parliament surveys a good deal of history and reflects many years spent reading constitutional documents, political treatises, and hundreds of books and papers written by careful historians. However, *Perfecting Parliament* is not intended to be mainly a historical work, but rather a contribution to social science. The book attempts to develop and test a particular theory of constitutional design and reform, rather than to induce patterns from past experience. This is not because induction is logically impossible or without interest. Indeed, my recognition of the importance of the king and council template was a consequence of research on Swedish constitutional history (Congleton 2001b, 2003c). Rather, it is because the main goal of this book is to advance constitutional theory.

The book develops a general theory of rule-based governance and reform. It uses that model to explain the emergence and properties of king and council-based systems of governance and peaceful transitions from authoritarian to constitutional democracy. The case studies, historical overviews, and statistical analysis were undertaken to explore the limits of that analytical approach to history. The evidence developed in part II and in chapter 19 suggest that relatively simple rational choice models can shed significant light on important episodes of Western constitutional history. Although the cannot predict every detail of the constitutional bargains adopted, the choice settings characterized by the models and prose are evidently sufficiently realistic and universal that their implications are evident in American, European and Japanese constitutional histories. The specific transitions focused on in the case studies are important ones, and the narratives suggest that a theory of constitutional reform that focuses on bargaining between parliaments and kings can shed useful light on the emergence of liberal democracy in the countries examined.

In addition to the evidence developed in this book, a good deal of other case-specific quantitative evidence also supports the contention that economic and ideological interests have influenced important policy and constitutional debates within parliaments. For example, Schönhardt-Bailey (2003, 2006) provides statistical evidence that such ideas influenced repeal of the Corn Laws (agricultural tariffs) in the United Kingdom. Aidt and Jensen (2009) provide evidence that franchise extension and the size of government were correlated for a broad cross section of European countries and in a manner that is consistent with the model of constitutional exchange developed in this volume.

A. Blunting Anticipated Criticisms: On the Scope of Historical Narratives

The historical narratives do make contributions to historical research, by providing unusually tight and focused constitutional histories for six countries. That six countries are covered rather than one or two makes it clear that constitutional negotiations were not isolated events of individual countries and that much was taking place inside parliaments and between parliaments and kings that were essentially universal in nature. That six countries were covered, rather than a dozen, allows more of the details of the reforms adopted and the contributions of particular individuals to be developed in a manner that allows readers to judge for themselves what is general and what is idiosyncratic in the constitutional reforms adopted. The level of detail provided also made the historical part of this project manageable and allows a good deal of constitutional history to be discussed within a single volume.

The historical narratives developed above are not simply tightly written summaries of existing research. Very few historical narratives devote as much attention to institutional history and institutional detail as the case studies of part II do, and those that do tend to focus on single institutions within rather short periods. No other comparative study examines as many constitutional documents as those used in the present study.

Nonetheless, several criticisms can be made regarding the scope of the historical analysis. For example, some critics might argue that the book neglects work by particular historians that might be relevant for a complete analysis of the emergence of Western democracy. A basis for this criticism clearly exists, because only a few hundred of the many thousands of references that could have been brought to bear on the subject are cited. Moreover, as true of most broad historical accounts, nearly every sentence in the historical chapters of this book could be expanded into a chapter, and nearly every section into a book in its own right. (Indeed many subsections are short summaries of such books.)

A partial defense is that the references listed in the bibliography do not include all the references consulted, and that hundreds of other references are indirectly accounted for in the secondary texts written by the historians that are cited. The latter are assumed to give accurate summaries of additional historical resources for the periods and areas analyzed. The use of both narrow and broad case studies and general histories implies that the book's historical narratives are based upon a more thorough analysis of historical details than actually undertaken by the author.

An analogous criticism could be directed at those who study institutional reform, or history in general, without taking proper account of all contemporary research in economics, statistics, and political research. There is a sense in which all historical research requires an interdisciplinary approach, because people are influenced by a variety of social, political, economic, and legal factors. Every historical analysis, thus, could be improved by taking greater account of research in other fields.

However, this conclusion also demonstrates that the usefulness of such criticism is quite limited, because it applies to every possible research project that could be undertaken by individual scholars or small teams of scholars. Complete historical or social science research in this sense is impossible! Given the breadth and depth of the available historical resources and social science research, it should also be acknowledged that both historical and social science research is always at least partly statistical in nature. To the extent that there are general patterns in history and in historical narratives, a reasonably thorough sampling of primary and secondary sources should provide a reasonably complete understanding of the material, research, and conclusions available.

Scientific and historical progress is only possible insofar as social systems can be divided into sufficiently independent and uncomplicated subsystems for a human mind to understand them, a few parts at a time.

Just as an impressionist painting is clearest when one is a bit too distant to see the individual brush strokes, and the notion of impressionism itself is clearest when one studies several such paintings; so too are constitutional developments easiest to see when one focuses on the core procedures of governance and studies several countries in which similar changes in core constitutional procedures are evident. And, just as impressionism as a genre might be missed by roaming through a great museum in a single day, or focusing exclusively on a single painting; similarities in Western transitions may easily be missed by work that focuses on the great sweep of history or that focuses entirely on the idiosyncrasies and genius of the unique men and women whose pen strokes and compromises determined the exact expression of particular constitution documents and reforms.

B. Blunting Anticipated Criticism: Limits of Rational Choice–Based Analysis

If a theory of constitutional political economy is possible, common factors must exist that influence both constitutional design and constitutional reform.

Part I of the book uses rational choice models to identify general factors that are likely to influence constitutional design and reform. The models do so in part by focusing on specific choice settings and by subjecting the models to a variety of methodological norms. A model should be logically consistent, which eliminates many intuitively plausible representations of relationships among people, markets, and political factors. To obtain clear results, a model should employ Ockham's razor to minimize the factors used in one's explanation, which requires focusing attention on "important" or "essential" factors in particular choice settings. A rational choice model should, thus, rely as much as possible on narrow self-interests as explanatory factors, not because such interests always dominate, but because they are essentially universal and likely to influence the decisions of most persons in most settings—at least at the margin. Rational choice models should also be consistent with earlier models and existing historical and statistical research on the topics of interest.

Such methodological norms have produced simple, but sophisticated, models that provide considerable insight into the operation of economic markets and political systems in the short and medium run. This book suggests that similar models can be used to help understand the factors and relationships that lead more or less self-interested men and women to adopt and reform constitutions in the long run.

It should be acknowledged, however, that the implications of rational-choice models to characterize behavior are never as precise as their associated mathematics seems to imply. For example, predicting the behavior of specific persons who are completely "rational" and well informed is difficult if individuals pursue a large number of goals in a large number of circumstances. The more complex are the goals and circumstances of individuals, the more difficult it is for social scientists to catalog them all and to take account of their associated choice-relevant tradeoffs. Even if mistakes were never made, persons behaved exactly as modeled, it would be impossible to predict individual choices perfectly without complete information about the particular aims and tradeoffs of particular individuals.³⁸³

One very sensible method of dealing with the multiplicity of goals and circumstances that characterize many decision settings is simply to ignore them and, instead, to focus on the subset of

³⁸³ Rationality does not imply that outcomes are always what one might have hoped for. Gambling is not necessarily a mistake as far as the individual is concerned, although it may be. In the case of lotteries, a series of purchases may be mistaken in that it reflects a poor understanding of probability theory, but it may be entirely rational given what is known at the time the decisions were made. On the other hand, even a fair game will have losers along with winners.

goals and circumstances that can be plausibly assumed to be more or less universal and relevant for most of the decisions being analyzed. This allows a theorist to conduct “other things being equal” analyses that yield useful explanations and predictions of “typical” behavior. The neglected factors are often assumed to have little effect “at the margin,” and/or are assumed to be sufficiently unsystematic that their average effect on decisions is approximately zero and so can be neglected without significant loss of explanatory power. These are stronger assumptions than necessary, but are often reasonable first approximations of the effects of simplification.

Such considerations often induce economists to assume that the persons modeled are concerned only with maximizing their own personal wealth. An interest in personal wealth is nearly universal, because most other goals require resources (wealth) to advance them. Efforts to increase wealth are consequently very likely to play a role in a wide variety of individual decisions, even if maximizing wealth is not the direct aim of many persons in the real world. Indeed, additional resources also advance biological purposes as well as idiosyncratic ones, and so a preference for greater wealth tends to be genetically and culturally reinforced. Economists and game theorists often assume that persons have such “narrow” self-interests partly to make their models tractable and in some cases because some theorists evidently believe that all the other goals are indirectly determined by such interests. It is the universality of such interests, however, rather than their narrowness, that accounts for their usefulness (Pareto 1897, Stigler and Becker 1977).

Nonetheless, the importance of personal idiosyncrasies, chance events, ideas, and errors has to be acknowledged, and such effects are evident in the historical narratives.

The more idiosyncratic the choice-relevant aims of individuals and the more important information problems and theories are, the less likely a rational choice model will explain or predict the specific decisions made, because the individual idiosyncrasies and mistakes will be relatively more important determinants of the choices made than the general factors analyzed.

For example, each of the narratives mention exceptional persons (by name) who played pivotal roles in the course of their nation’s reforms: Willem I, William III, Washington, Madison, Thorbecke, DeGeer, Bismark, and Taisuke. The historical narratives also imply that slight changes in “luck” might have altered history on many occasions. The Spanish Habsburgs might have subdued the Dutch revolt in the sixteenth century. King James II might have correctly anticipated the landing point of Willem III in 1688, defeated the Dutch intervention, and continued his centralization of political authority in England and in the North American colonies. Several of the unsuccessful transitions also involved a bit of bad luck. Wilhelm II might have agreed to surrender a bit more

authority to the German parliaments of the 1890s, which might have allowed an orderly transition to parliamentary democracy in the next two or three decades, rather than a somewhat chaotic one at the end of a very costly war. The assassination of influential liberals and moderates in Japan during the early twentieth century might have failed or been prevented by minor changes in personal schedules and security.

The conclusions derived from models are necessarily somewhat imprecise and incomplete, because models always ignore idiosyncratic factors that are often significant determinants of specific decisions by individual consumers, firms, voters, and politicians. The importance of idiosyncratic factors can, of course, be accepted at the same time that systematic factors are focused on in one's analysis and historical research.

More than good or bad luck was clearly involved in the emergence of Western democracy, although idiosyncratic and chance factors cannot be ignored.

C. Predictability and Controversy in Social Science and Historical Analysis

The usefulness of models is not a result of their precision, rather it is their ability to identify key variables and to improve our understanding of key relationships among those variables. In this respect, the scientific aim of a humble model builder differs from that of the most ambitious historians. For many historians, completeness is very important, and identifying what is unique is at least as important as identifying what is general. Consequently, historians devote enormous time and attention to studying particular people and events, especially unusual ones. Such unique people and events, however, are nearly without interest for a model builder, because their main purpose is identification of a few more or less universal determinants of the phenomena of interest.

We can predict with absolute certainty that the numbers on ordinary dice can add up to no less than two and no more than twelve, but we cannot predict the result of any single roll of the dice, even though the number of factors that need to be taken into account is far less than the number that need to be taken account of in most political and economic settings. Statistics, however, implies that, although little can be said about a single roll of the dice, a variety of predictions can be made about the outcomes of a series of dice rolls. Perhaps surprisingly, a series of cases in which government officials roll the dice repeatedly is more predictable than any single case.

Social scientists and statisticians can, thus, provide explanations of particular "histories" of governmental dice rolling in more or less similar circumstances, and can make predictions about as yet unrealized "histories" that would emerge in the future. A government official will roll a seven

about 1/6 of the time using unweighted dice in ordinary circumstances. A series of rolls may test and refute various possible hypotheses about dice rolling—for example, that “dice can be hot” if they are fair.

For a historian, the research question is a bit different and in many ways more interesting than that addressed by social scientists and statisticians. Having observed a particular roll of the dice, the historian wants to explain exactly how the values observed arose. Here, there are clearly proximate causes—more or less the same ones used by a physicist—and also indirect causes: the government official rolling the dice was upset, was under pressure, had been exposed to different theories of rolling dice, was affected by beliefs about divine causality, was left handed, near sighted, weak from age, lived north of the equator, etc. All these factors might affect the manner in which the dice were thrown and, therefore, would largely determine the flight of the dice actually observed. It is entirely possible that this partial list of factors might have “determined” the exact trajectory of the dice imposed by the official who controlled the dice and the numbers that appeared on top.

Such completely accurate histories may, thus, explain exactly what happened, without shedding any light on what will happen on the next roll of the dice. Although “history will repeat itself” about 1/6th of the time in this case, little of the detail that applies to a particular instance of dice rolling will be relevant for explaining the next similar event (rolling a seven), because either the underlying chain of causality is too complex to be fully understood or truly stochastic phenomena occur.

This is not to say that social science is only about prediction, or that history is only about explanation, because the persons who engage in these enterprises are often themselves interested in both questions to varying degrees, and properly so. Social science provides a lens through which particular events can be made sense of, and historical research can stimulate new hypotheses to be tested, as well as provide facts that can be used to test existing hypotheses. Such “convex combinations” of research interests produce a more useful and compact body of knowledge for fellow travelers, scholars, and practitioners than would have been produced by methodological “purists.”

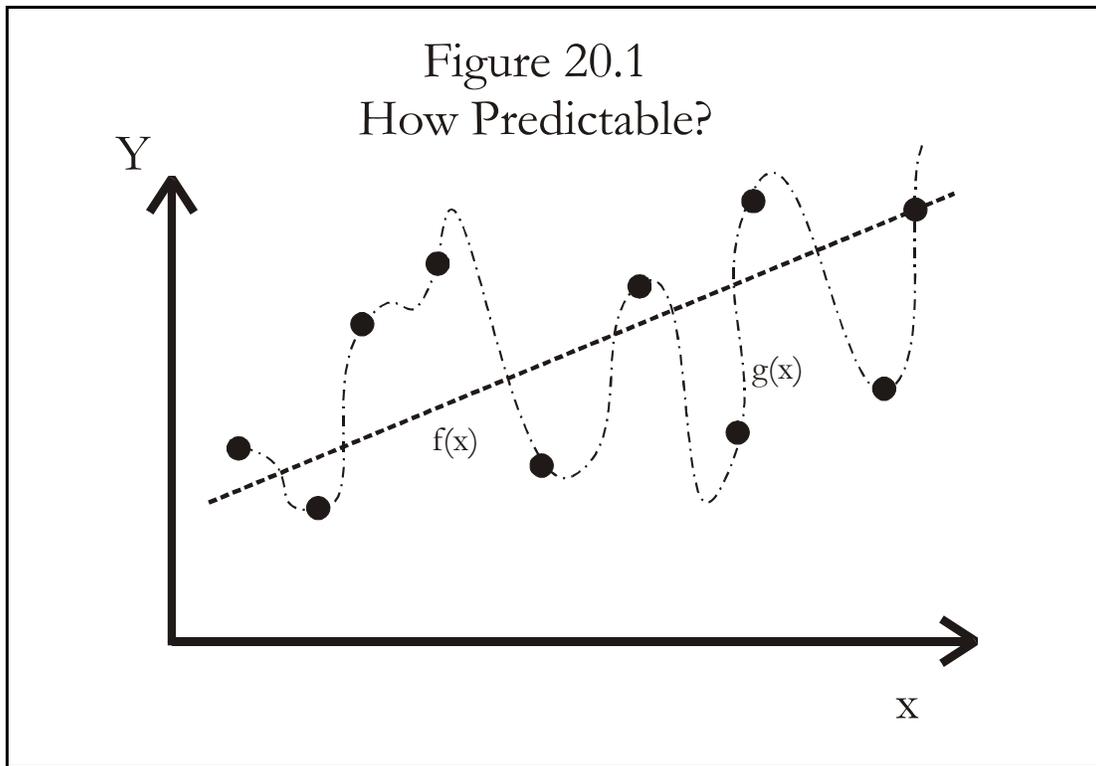
Moreover, in cases in which there are few determining factors, the explanations of historians and theories of social scientists tend to be very similar. The light went on because a person flipped the wall switch. The building survived a direct lightning strike unharmed, because it was protected by Ben Franklin’s invention (the lightning rod). The battle was lost because one side was greatly outnumbered, outgunned, and caught by surprise. Prices rose in seventeenth century Spain because of the influx of gold from South America.

In cases in which causal relationships are simple, even a single instance may generalize perfectly to a wide variety of settings. In other cases in which causality is more complex, there are often many plausible claims and counter-claims. Here disagreements are commonplace across disciplines and within disciplines. This book, it is hoped, may induce a few historians to think a bit differently about special persons and events in the past, just as their work has induced this author to think more carefully about constitutional theory and practice.

Unexplained Residuals and Beliefs about Determinism

Controversy and fresh insights are not caused only by differences in methodology or research aims, as might be said about differences between social scientists and historians. Disagreements and progress within social science also occur because disagreements exist about the extent to which human behavior is predictable in general, or in particular circumstances, and therefore about the extent to which particular theories can be used to explain particular events.

To appreciate this point, consider the time series of data points depicted below in figure 20.1. For those who believe that the world is completely determined, the “finely nuanced” dashed fitted line, $g(x)$, will be the sort of theory to which they aspire. For those who believe that the world is not so readily explained, whether because of complexity or the existence of truly random factors, the “essentialist” dotted linear line, $f(x)$, is all that they believe can be accounted for. Disagreements of this sort may cause social scientists from the same field of research to disagree for reasons that seem similar to those discussed above, but which are subtly different. Some social scientists would insist that “we” can or will be able to predict each successive dice roll; others would regard such precision to be impossible. For the former group, a very small “error term” does not imply that other explanations or factors do not exist. For the latter group, an error term can be too small as well as too large; and, moreover, a very large “error term” does not necessarily imply that a faulty analysis has been undertaken or that a theory can be improved upon.



It seems clear that we know a good deal about social phenomena that can be generalized and a good deal that cannot be generalized. Yet, there is little systematic evidence on the “meta-questions” that might allow us to assess the degree to which present theories will explain new cases, or the extent to which new explanations and new theories will be required to understand cases not yet analyzed. Indeed, each side of the debate can point to scientific episodes in which “they” have been proven correct.

Limits of Systematic Theories of Constitutional History

With respect to the focus of this book, it is not immediately obvious how much of the rise of Western democracy can be explained by general features of the political and historical setting and how much is peculiar to the men that advocated particular constitutional designs or reforms and the circumstances in which their arguments and decisions were made.

For example, three major episodes of constitutional reform occurred in Sweden during the nineteenth and early twentieth centuries, although proposals for major and minor constitutional reforms were nearly continuously proposed during the entire period. Why significant new constitutional gains to trade emerged in three particular decades is not obvious. It also seems clear

that the details of reform were affected by the specific person's holding high offices and unique Swedish circumstances. Nowhere else in Europe was an explicit wealth-weighted voting system adopted. However, broadly similar patterns of reform were adopted in several other European kingdoms during approximately the same time period. For example, Denmark, the Netherlands, Belgium, the United Kingdom, and Norway also adopted reforms in the nineteenth century that gradually shifted power from their kings to their parliaments and increased the importance and breadth of suffrage in elections for parliament.

How much of this pattern of reform is explainable by general economic, social, and political forces might be debated by serious and well-informed scholars for a variety of reasons. They may be interested in somewhat different aspects of history or approach it from different methodological perspectives, as noted above. This book takes an intermediate position on these issues. Social scientists who agree about the aim of research and share a common vision of human behavior may also use different methodologies and reach different conclusions, because they disagree about how predictable a series of relevant events can be.³⁸⁴

Such disputes are partly what makes research interesting for those who engage in it, because they imply that each new research project can potentially generate new and useful results in even long-standing areas of research. New explanatory factors are constantly being "discovered" by determinists, at the same time that previously accepted explanatory factors are "disposed" of by skeptics.

D. Similarities of Scientific and Constitutional Revisions

Political constitutions are the durable rules through which ordinary day-to-day and year-to-year public and decade-to-decade policy decisions are made. In this, constitutions can be said to be the "natural laws" of the political game in a particular place at a particular time.

A constitution must be taken as given for purposes of ordinary legislation if it is to determine the process through which policies are adopted. Without standing procedures, conflict over

³⁸⁴ For example, social scientists tend to be more or less interested in historical detail according to their beliefs about the underlying predictability of the events being analyzed, because this affects beliefs about what can be learned from different kinds of data. For example, the returns from charting the course of deliberations within the chambers in which constitutional reforms are adopted would be considered to be larger or smaller according to whether the scientists in question believed that such behavior was more or less predictable. If not much is truly predictable, a good deal of historical data is simply random noise, rather than part of the underlying causal chain.

decisionmaking procedures would dominate, and “governments” would consist of disorganized groups engaged in intense fighting over their organization’s (potential) surplus. Without standing procedures for making policies, the organization’s expected surplus tends to be dissipated in costly disputes, as in rent-seeking games.³⁸⁵ It is therefore completely reasonable to assume that stable decisionmaking rules and constraints are in place when analyzing the kinds of policies that a government is likely to adopt in a given year or decade.

Constitutions, unlike star systems but like astronomical theories, can be revised and copied, which implies that understanding contemporary constitutional designs requires a theory of constitutional reform as well as a static theory of constitutions, just as a theory of science requires a theory of refinement and innovation.

Most constitutions include formal and informal procedures for changing the rules of the game, because most constitutional designers believe that some flexibility is necessary for their constitutions to be robust and, thus, durable rules for making rules. By including procedures of amendment, constitutional designers acknowledge the limits of their own ability to foresee future conditions and the fact that even very good constitutions are somewhat context specific. The norms of scientific work are similarly modest, in that no answer or theory is to be taken to be exempt from challenge and revision.

The procedures specified for constitutional amendments are normally designed to be more demanding than those required for ordinary legislation and tend to require more repeated reviews of proposals and/or greater supermajorities. This suggests that most constitutional designers believe that stability is of greater importance than flexibility at the margin. The rules of the game have to be stable enough to determine day-to-day politics, but allow for occasional improvements. The more closely one examines any nation’s constitutional history, the more evident are the nearly continuous efforts to advance and oppose reforms of standing procedures and constraints; however relatively few reform proposals gain sufficient support to be adopted (Rasch and Congleton 2006).

The institutions of science and scholarship reflects similar tradeoffs between stability and flexibility. Education requires stability in the facts and explanations of relationships among facts if knowledge is to be transmitted to students and other scholars. On the other hand, orthodox theories are subject to nearly constant challenges, particularly at their various frontiers, and are gradually

³⁸⁵ See Congleton, Hillman, and Konrad 2008 for an extensive overview of the rent-seeking literature. See Hillman and Katz (1987) for a model of intra-organizational rent-seeking.

revised as a consequence of those challenges. As in governance, a series of minor reforms can have important effects on mainstream historical and scientific theories.

As a consequence, both constitutional liberalization and paradigm shifts are often most evident many years after they have occurred, as proponents of older institutions and theories gradually accept new evidence, and as older ideas and persons in senior positions at major institutions are gradually replaced by a new generations of ideas and men and women.

E. Liberalism, Reform, and the Use of Scientific Methodology

It is interesting to note that the methodology and domain of modern science emerged at roughly the same time as Western political and economic systems. Indeed, it can be argued that contemporary science was partly a product of the same reforms. Liberalism played a significant role in determining the broad outlines of science as it emerged from the nineteenth century. Conversely, scientific attitudes also affected the penetration of liberal ideas.

Liberalism included a number of hypotheses about how individuals could achieve improve themselves and society. Economic liberals argued that monopolies reduced economic income and national wealth. Political liberals argued that more representative, but rule-bound, governments provide better public policies, more liberty, more tolerance, and broader opportunities. Insofar as liberal policies produced the hypothesized results, the theory was affirmed, and became more widely accepted. Similar norms were clearly evident among the scientists and engineers of the nineteenth century, who believed both in scientific progress and empirical research.

Although many liberals acknowledged limits in a person's or society's ability to determine what the "best" policies are, they generally agreed that a scientific approach was better than an unthinking adherence to traditional ways of doing things. Support for the deduction-experimental approach was itself partly empirical. Technological progress tended to support the contention that improvements were possible, insofar as the new modes of transportation, communication, and farming were widely considered superior to horseback, letters, and traditional life in farm villages. The countries that allowed these new technologies to be employed grew more rapidly than the countries that maintained their medieval institutions, and the nation states that allowed and/or supported industrialization tended to be militarily more powerful as well. Good things followed from the better understanding of animals, plants, minerals, and energy produced through scientific methodology.

The revised economic rules also encouraged people to experiment with new technologies and new lifestyles. Many people moved from farms and villages to new towns and expanding cities,

where their occupations and lifestyles could be pursued that were very different from those of their parents and grandparents. Their new lives were not all together better, nor all together worse, but they chose them over their traditional alternatives. Liberal theories helped explain (and justify) their new more market-oriented, more urban lifestyles. Liberal political theories helped to explain how better public policies could be adopted, and new organizations helped the new middle class participate in local and national politics.³⁸⁶

As internal trade barriers were dismantled, transport costs were reduced, and public education expanded, new economic organizations were created and older ones expanded. Specialization inside firms and among firms increased, which created new higher paying jobs for middle managers, engineers, accountants, and lawyers, at the same time that it produced a large number of less skilled jobs paying somewhat more than subsistence wages. Higher wage rates for work in the new firms and factories were possible, because of the greater productivity of the new methods of organizing production. Employment, of course, was voluntary and the new economic organizations had to attract labor from other long-standing enterprises.

The higher wage rates induced migration from the countryside to cities, and the increased use of money wages by the new enterprises created a variety of commercial opportunities for independent shop keepers and tradesmen in the areas around the new factories. As a consequence, older cities expanded, and new towns and cities emerged around the sites of new factories and mines. New towns also emerged at the various transport nodes of the expanded highway, canal and railroad systems for similar reasons. Persons working at firms or living in communities that have (or were believed to have) significant competitive advantages tend to favor fewer laws regulating access to internal and external markets. Many such persons also favored political reforms, because the new urban centers were widely believed to be underrepresented in parliament.

Commercialization and industrialization also affected the national government's interest in expert knowledge and in technological advances that could spur economic development. Taking advantage of the new technologies often required answers to new questions, as well as new public policies. This increased the informational advantages of representative parliaments, the bureaucracy,

³⁸⁶ The books of scholars indirectly affect mainstream thought and government policy by strengthening arguments in a manner that affects public discourse and also the development of public school and university curriculums. See Levy and Peart (2005) for an interesting overview of debates among liberal and conservative intellectuals in England during the nineteenth century on such matters as natural hierarchy, racism, and eugenics. See Schonhardt-Bailey (2006) for an exhaustive analysis of English parliamentary debates concerning free trade in the 1830s and 1840s.

and organized economic interest groups and indirectly increased their influence over domestic and trade policies relative to the sovereign. It also increased the demand for experts that could provide advice about public finance, the organization of government, and make use of the new technologies of transportation, communication, and warfare. Better trained bureaucrats were needed.

New polytechnic universities were founded, and scientists and other scholars hired. At the new universities, both science and science students were produced at “knowledge factories,” where middle class students could obtain advanced technical and scientific training in relatively large, standardized, classes at a reduced (and subsidized) price.

Technological, economic, and political developments also created a variety of new phenomena to be interpreted and understood. Efforts to provide answers gradually produced new more specialized scientific fields of research, including the “new” social sciences, which largely emerged as distinct fields of research in the nineteenth and early twentieth centuries. The rapid technological and scientific advance made possible by reforms that encouraged innovation and the educational investments of the nineteenth century continued throughout the twentieth century. The list of significant innovations in agriculture, mining, materials, machines, electronics, and organizations is nearly endless.

In this manner, liberalism opened and widened the doors of science in much the same manner that it opened politics and economics: by reducing entry barriers, exploiting economies of scale, and increasing specialization.