Summaries of Doctoral Dissertations

Distributional Impacts of Pension Policy in Argentina

Historically speaking, social security systems are a recent development. At the beginning of the twentieth century, there was limited state social intervention in the developed world, and even less in Latin America. A remarkable expansion of "social rights" took place in the second half of the century. By the 1970s most Latin American countries had set up at least some form of old-age protection, while others had already developed a wide welfare network.[1] Public social expenditures grew to represent over 20 percent of the gross domestic product in a number of countries, including Argentina.[2]

Around the world, the development of public social welfare boosted academic interest in the subject. Research tended to group around three main topical areas: first, the social and political foundations of welfare expansion (the origins of the welfare state);[3] second, the connections between the political and ideological orientation of governments and welfare design and outcomes ("welfare regimes" *a la* Esping-Andersen);[4] and third, the quantitative assessment of the evolution of the public social budget from a macro perspective.[5] This piece of research connects these three areas of welfare investigation and simultaneously introduces the dynamics of history and policy implementation, which were often missing in standard analyses of both motivational foundations and models of welfare.

PENSION REGIMES AND DISTRIBUTIONAL PRINCIPLES

The analysis of pension regimes moves the focus of research away from the "black box" of social expenditures, towards the distributional principles guiding old-age policy. The mechanisms by which a given pension scheme is set out to allocate rights, benefits and costs across individuals can indicate the equity priorities underpinning policy design. With the use of a dynamic conceptual framework which, unlike existing welfare typologies, is well equipped to capture specific distributional trajectories in pension policy (in other words, policy change rather than stability), and the systematic analysis of social security legislation, this research was able to identify and differentiate the three distributional models that have existed over the history of pension policy

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I would like to thank Colin Lewis, Paul Johnson, Peter Lloyd Sherlock, and Nicholas Barr for the comments and suggestions they made to parts or all the historical, conceptual, and empirical research on which this paper is based. Errors of fact or interpretation remain my own.

[1] See, for example, Mesa-Lago, "Social Security."

[2] See Ministerio de Economía, "Caracterización y evolución del gasto público" for Argentina; and ECLAC "Panorama social" for Latin America.

[3] See, for example, Mishra, *Society and Social Policy*.

[4] Esping-Andersen, *Three Worlds of Welfare*. Alternative welfare typologies can be found in Titmuss, *Social Policy*; Palme, *Pension Rights*; Ferrara, "Four 'Social Europes'"; and Castles et al., "Worlds of Welfare." See also George et al., *Welfare and Ideology*, on the connection between ideology and the nature of welfare institutions.

[5] This refers mostly to official reports on the evolution and distribution of public social expenditures. For Argentina see, for example, Ministerio de Economía, "Impacto distributivo de la política social."

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in Argentina, each one embedded in the political and ideological logic of the government of the period.

The first pension regime originated with the schemes created at the beginning of the century, and consolidated with the welfare expansion in the 1940s and 1950s. Over the first half of the century, a particularistic distribution of pension rights restricted benefits to workers in occupations that were either economically or politically strategic for the government (notably, civil servants, journalists, and banking employees in the first few decades, and industrial workers later on, with the ascendance of Peronism). Even after the expansion of pension coverage to previously uncovered groups (in the second half of the century), benefit levels and eligibility conditions continued to vary across occupational categories, creating intergroup inequalities that often reflected the bargaining power of each group.[6] Within occupational categories, however, intragroup solidarity prevailed, especially over the 1940s and 1950s. Progressive benefit formulas granted higher relative-to-wages benefits to lower income workers. This transfer of resources occurred only within occupational groups, in a typical corporatist organization, which indicates the principles of distribution that underpinned the design of the system over this period.

The second pension regime emerged after a substantial reform applied in 1968/69, under the so-called bureaucratic-authoritarian state.[7] The military government that took power in 1966 (with General Onganía in the presidency), aimed to dismantle the type of corporatist organization inherited from the Peronist past, and to concentrate power in a central state operating top-down. Pension reform in this period reflected the new political orientation. The previously fragmented structure of pension provision was centralized and fully administered by the state. This canceled most of the particularistic features of the system. Eligibility conditions and benefits were largely standardized across occupational groups (with the exception of the military, who kept their privileges).[8] A single replacement rate was set as the basis for benefit calculation for all workers, thus reducing particularism but also simultaneously eliminating intragroup solidarity and progressive redistribution within occupational categories. The system concentrated on an income-replacement scheme, and left narrower scope for income redistribution.

The third and currently existing pension regime was adopted with a structural reform in the 1990s, which redefined the entire mechanism for benefit administration and distribution. After the pension crisis in the mid 1980s, it was clear that something had to be done to put pension finances back on track, and to rebuild the crumbling social trust in the system. The shape the reform would take was molded by the economic orientation of Carlos Menem's government, a Peronist with a wide neo-liberal reform agenda. As part and parcel of the overall package of structural reforms applied during this administration, the pension reform passed in 1993 (and implemented in 1994), partly abandoned pay-as-you-go for a system of individual funded pension accounts, in a local version of what the World Bank has named the "three pillar model."[9] The reform partly followed the Chilean experience as well as the new policy directions coming from the most influential intergovernmental organizations towards an individual-

[6] Mesa-Lago, "Social Security"; and Malloy, *Authoritarianism and Corporatism.*

[7] O'Donnell, *Modernization and Bureaucratic-Authoritarianism* and *Estado Burocrático-Autoritario.*

[8] Some other so-called special regimes were also maintained, and some created later for very specific occupational categories, typically those performing dangerous or unhealthy activities, but also sometimes simply influential groups.

[9] World Bank, *Averting the Old-Age Crisis*.

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ized model of resource distribution. Choice, self-reliance, and individual equity consolidated as the new normative features guiding pension policy. Eligibility became more strongly based on contributory capacity and compliance, and benefit levels more closely reflected individually made contributions. Redistribution via pension policy was reduced further, and workers were transformed into "savers."

LIFECYCLE DISTRIBUTIONAL IMPACTS OF PENSION REFORM

Over the second half of the century, successive reforms have affected the relative gains and losses of different generations of workers. The political relevance of pension policy often means that reforms involving losses for large or influential groups tend to be applied only relatively far in the future, in order to contain public resistance.[10] This generally implies that, given a particular pension system design, if the evolution of economic and demographic variables leads towards financial imbalances in the long-run, younger generations of workers will be more likely to bear the costs of adjustment (with the consequent intergenerational inequalities this generates). This is a pattern that has been found in many countries where the process of population ageing has pressed governments to introduce parametric or structural reforms to their pay-as-you-go systems. In the Argentine case, the distributional impacts of pension reform operated both inter- and intragenerationally. Over history, reform was not just a way to balance the accounts; it was also a mechanism by which the distributional principles of the system were redefined. The paced adoption of an individually actuarial type of system (where benefits depend on individually made contributions) tended to reduce intra-generational redistribution. The progressivity of the system was concentrated at the very bottom, only for the covered population, in the form of a state-provided basic flat-benefit.

In order to evaluate gains and loses for individuals living and working under different institutional contexts, the pension rules existing throughout the entire lifetime of each worker (rules of eligibility, benefits, contributions, and so on), were combined with data on wages, labor market patterns and other demographic indicators. This lifecycle approach is a substantial methodological advantage over most common analyses of resource distribution in cross-section, because it captures the essence of pension policy as a system that transfers resources over the lifecycle. The calculation of pension gains and losses by each worker or generation provided virtually the first piece of evidence on the distributional impacts of the pension system from a historical viewpoint, and showed that pension policy in Argentina had more significant redistributive impacts than those deriving from risk-pooling.

Intergenerational income transfers were substantial. Cohorts retiring during the early stages of the system were relative gainers, whereas later cohorts, who experienced tougher eligibility conditions, were relative losers. A mean-wage worker born in 1910 could obtain real returns on pension contributions that were up to ten times higher than those obtained by workers born in the 1940s. Intragenerational transfers were both horizontal (between gender groups) and vertical (between income brackets). Women tended to obtain higher returns than men (as a result of higher life expectancies and lower retirement ages), although the value of their benefits was often lower than those for men, due to lower wages and shorter contributory histories. Low-income groups benefited from higher returns if retiring before the 1960s, when progressive benefit calculation formulas prevailed. Although some redistribution was

[10] See, for example, the seminal works on pension politics and path dependence by Pierson, *Dismantling the Welfare State?* and *New Politics*.

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maintained after the introduction of individual funded accounts in 1994, low-income workers (who often spend long periods of their working lives in the informal sector) were more directly affected by the longer contributory periods required.

IMPLEMENTATION PROCESSES AND OUTCOMES

While distributional principles and distributional outcomes were analyzed following the rules for the calculation and allocation of pension benefits, these rules were not always applied as written. In periods of substantial economic decline and fiscal crises (for example, during the 1980s), ad hoc adjustments were introduced as emergency measures. Changes in the context of implementation (labor market, prices, economic activity, and so on), also influenced the outcomes of the system. Indeed, the process of implementation can have substantial effects in redefining the distributional impacts of the pension system. The idiosyncratic enforcement of pension rules as well as changes in the political context or socio-economic environment may make initial distributional projections or expectations unworkable. This is particularly important in the case of developing countries where the socio-economic context is less stable and predictable and the rule of law does not always prevail.

Over the history of pension policy in Argentina the process of implementation was found to substantially affect the outcomes of the system, over and beyond the actual dictates of the legislation. Pension policy outcomes were found to be a function of the interaction of pension system design with the context for policy implementation. Contemporary socio-economic environment, policy-feedback from previous policies, and political pressures have affected the application of pension rules as written, and often created what have been called "policy gaps" between observed and expected outcomes.[11]

Four major "policy gaps" were found over the history of pension policy in Argentina.[12] First is the "coverage gap" of a system that claims to be "universal" and "standardized" (that is, to provide equal access and equal treatment) but that, by the year 2000, in fact covered only 52 percent of the working population, and in which uncovered workers were more likely to be women, poorly educated, and low income. Second is the "pre-1968 funding gap." Although up to 1968 the pension system was supposed to be funded, already by 1958 it was dedicating roughly 80 percent of revenues to pay benefits. Accumulated funds fell sharply in only a few years due to inflation and poor investment, eroding the basis of the funded system and making it operate, in practice, as a pay-as-you-go system well before the legislation established the change in the mechanism of resource administration. Third is the "post-1968 financing gap." The pension system was always designed as contributory and self-financed, but in the mid 1980s, transfers from the general budget represented over 40 percent of pension expenditures, a figure that rose to 60 percent in the year 2000, rapidly eroding the basis of "self-financing" and with it the justification of coverage exclusions based on individual contributory histories. Fourth is the "benefit indexation gap": although benefits were supposed to follow wage levels—to allow pensioners to share the increases in standards of living enjoyed by workers—the real value of benefits fell by half in the late 1980s as a result of the inadequate application of benefit indexation rules in a context of high inflation.

[11] See Arza, "Policy Gaps."

[12] Given the short period of implementation of the last pension regime (established in 1994), it was not fully included in the evaluation of policy gaps. For an analysis of the performance of the post-1994 system see Arza, "Aims."

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The existence of significant "policy gaps" in key areas of system performance raises the issue of policy failure and points to the operation of informal policymaking mechanisms, which work beyond the written rules, but can shape policy outcomes. Thus especially in countries where significant "policy gaps" exist, the process of implementation becomes a key variable to consider when designing and evaluating policy performance. As implementation contexts and practices differ across countries, this also means that no single "best practice" model of pension policy is likely to produce "best" outcomes everywhere—"best practice" policy learning need not only operate at the level of policy design, but crucially, at the level of the interaction between design and implementation.

CONCLUSION

This piece of research has shown that the models of stratification underpinning social policy may not only differ across countries, as comparative analyses have shown. They can also change historically, in a given country, in spite of the institutional constraints and path dependencies involved. The nature of policy change and the trajectories of social policy in any given national setting could be thus broadly conceived as indicating changes in the ideas, priorities, and methods of social policymaking. In distributional terms, there has not been a single pension regime over Argentine history. Instead, alternative models have been applied over time to realize different policy priorities. These dynamics are essential to an evaluation of policy change, not only with regards to distributional principles, but also to the actual distributional impacts of pension policy within and between generations. The outcomes of pension institutions are also not simply dependent on the pension rules applicable at a given moment in time (for example, at retirement age). Instead, they depend, for each generation of workers, on the evolution of rules over their whole lives (working and retirement periods), as well as on the specific mechanism by which these rules were implemented, and the context of implementation. In countries such as Argentina, where institutions are less resilient to political and economic change, the impacts of subsequent reforms on different generations of workers have been substantial. This piece of research has contributed to unveiling some key changes in the distributional principles and outcomes of pension policy from a historical viewpoint—an area where empirical research remained rather limited in spite of the substantial reform processes that have taken place in Argentina—and their importance for policy learning in countries pursuing similar reform paths.

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The Making of Steam Power Technology: A Study of Technical Change during the British Industrial Revolution

Writing in 1845 Friedrich Engels (and with him many other informed contemporaries) had few hesitations in pointing out the driving forces of the epochal transformation he was witnessing:

> The history of the proletariat in England begins with the second half of the last century, with the invention of the steam engine and the machinery for working cotton. These inventions gave rise, as is well known to an industrial revolution, a revolution which altered the whole civil society; one, the historical importance of which is only now beginning to be recognized.[1]

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[1] Engels, *Condition of the Working Class,* p. 15

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This view of the early phases of the industrial revolution, ascribing a central role to the steam engine, as a driver not only of economic growth, but also of other dramatic changes such as the rise of factory system was (and still is) resumed in a major part of the historical literature. Traditional accounts of the British industrial revolution have frequently adopted periodizations that tend to conflate the economic significance of steam power technology with its early development.[2]

More recent research has suggested that such a direct link between steam power technology and the early phases of industrialization is indeed spurious. The available shreds of evidence on the diffusion of the steam engine suggest that the late-eighteenth-century and early-nineteenth-century British economy was still dominated by the widespread use of animal, wind, and water power.[3] Furthermore, the economy-wide repercussions of the adoption of steam technology remained circumscribed until at least the 1840s.[4]

Against the background of this previous research, which has been mainly concerned with the economic and social impact of technical change, this thesis examines the process through which steam power technology first emerged and then grew into a major industrial technology over a period going approximately from the early eighteenth century to the mid nineteenth century. The focus of the thesis is on the *sources* and the *dynamics* of technical progress in steam engineering, rather than on its *effects*.

Chapter 1 and 2 of the thesis contain a broad overview of previous research in this field, which provides the reader with the necessary preliminary background for the inquiry that follows.

Chapter 3 employs an updated version of the data set of eighteenth-century steam engines compiled by J. W. Kanefsky to provide new estimates for the timing, pace and geographical spread of steam power adoption during the eighteenth century.[5]

Overall, the pattern of diffusion appears to be the outcome of a complex set of factors acting simultaneously both on the supply and the demand side. In coal mining and neighboring locations where coal was cheap, the most obvious choice of technique was for a long time represented by Newcomen type of engines by virtue of their simplicity of construction and low maintenance costs. In other areas, where coal was expensive, the low fuel efficiency of Newcomen engines severely limited their use. In these locations, in the last quarter of the eighteenth century, Watt engines rapidly became the favorite option because of their superior fuel efficiency. It should be noted that even if the global profile of engine adoption seems to have been by and large dictated by the level of coal prices, the growth of steam power in each individual county was clearly shaped also by a number of "idiosyncratic" factors, such as the economic structure of the county and the existing capabilities in mechanical engineering. The relative importance of these factors is assessed by means of the estimation of an econometric model of engine adoption.

On the basis of the findings of the diffusion study carried out in chapter 3, chapter 4 provides a general reinterpretation of the development of steam power technology during the eighteenth century.[6] The main contention is that in the second half of the eighteenth century, steam engine technology was characterized by the emergence of dis-

[2] See, in particular, Rostow, *Stages*, p. 60, which links explicitly Britain's industrial take-off (1783–1802) with the commercialization of the Boulton and Watt engine

[3] Kanefsky, *Diffusion*, especially pp. 188–233.

[4] Von Tunzelmann, *Steam Power,* chapter 6; and Crafts, "Steam."

[5] Kanefsky, *Diffusion.* For a condensed version of chapter 3, see Nuvolari, Verspagen, and von Tunzelmann, "Diffusion."

[6] Chapter 4 has been published as Frenken and Nuvolari, "Early Development."

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tinct "design families," each adapted to the requirements of a specific application sector. Interestingly enough, over time this variety of designs, subjected to different sets of selection pressures gave rise to divergent technological trajectories. This persistent variety of designs is a feature that would characterize a good deal of the history of steam engine technology. In chapter 4 this process is accounted for by means of a formal evolutionary model in which technical change is represented as a "localized" search process on a rugged fitness landscape. [7]

A particularly good illustration of the influence of specific historical contexts on the development of the technology is provided by the case of the Cornish pumping engine, which is the subject of the second part of the thesis (chapters 5, 6, and 7).[8] The development of the Cornish steam engine can be studied in close detail because from 1811, Cornish mining entrepreneurs sponsored a monthly publication containing detailed reports on the performance of the engines at work in Cornish tin and copper mines. Joel Lean, a highly respected mine "captain," was entrusted with the compilation of the first reports, and the publication was generally known as *Lean's Engine Reporter.* Concomitantly with the publication of *Lean's Engine Reporter*, Cornish engineers, in an attempt of reaping further gains in fuel efficiency, experimented rather successfully with high pressure designs. These new designs were produced in a historical context that fits very well in R. C. Allen's notion of "collective invention."[9] The available evidence shows that Cornish engineers in the first half of the nineteenth century did not protect their inventions by means of patents. Instead, technical improvements were deliberately and actively popularized, not least also by means of *Lean's Engine Reporter.* This practice of knowledge sharing established by Cornish engineers exerted a very favorable impact on the rate of innovation. This process of "learning from others" was also reinforced by more familiar processes of "learning by doing" and "learning by using" leading to a sustained improvement of the thermodynamic efficiency of Cornish engines throughout the first half of the nineteenth centuries. Informed contemporary observers had no doubt in regarding Cornwall as the leading region in steam engineering in the first half of the nineteenth century. It is interesting to note that this remarkable progress was attained without the guidance of a full-fledged understanding of the working of the steam engine. Systematic collection and analysis of performance data allowed Cornish engineers to individuate a set of sound design principles that could successfully be used to project efficient steam engines, by-passing their imperfect understanding of the actual operation of the technology. [10]

Finally, the thesis examines the issue of the prolonged technology gap in steam engineering between Cornwall and the other steam using regions of Britain. Although Cornish achievements had been widely popularized, the high pressure expansive engine did not find widespread application in other steam-using regions (in particular in Lancashire), where the favorite option remained the Watt low pressure engine.

Although the delayed adoption of the high pressure engine can be seen to reflect, at least to a certain extent, a different set of economic conditions (specifically the lower price of coal prevailing in the manufacturing districts of the North), the thesis argues that the major obstacle was represented by factors of cognitive and engineering na-

[7] The model is an adaptation in the field of technical change of Stuart Kauffman's NK model, which represents the process of evolutionary adaptation of a complex system in theoretical biology, see Kauffman, *Origins of Order.*

[8] A condensed version of chapter 5 is published as Nuvolari, "Collective Invention."

[9] Allen, "Collective Invention."

[10] This procedure of extrapolation has also been pointed out by Vincenti in his studies of design activities in the aircraft industry, see Vincent, *What Engineers Know,* chapter 5.

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tures. In other words, technological improvements matured along the Cornish technological trajectory could not be readily transplanted to other applications. In this sense, the delayed adoption is to be regarded as a period of "acclimatization" of Cornish innovations in new contexts.

The concluding chapter of the thesis is devoted to a consideration of the broader implications of the research. Recent research in economics has been devoted to the analysis of the development and diffusion of "general purpose technologies" (GPT), that is technologies that can be employed in a wide array of industrial sectors.[11] In this way, these technologies performs the function of "engines of growth" in specific historical phases. Steam, electricity, and information and communication technologies are most frequently put forward as clear-cut examples of GPTs. Although this conceptualization of economic growth has undoubtedly a historical appeal, in most models the development and diffusion of a new GPT is represented by means of rather mechanical schemes of innovation and diffusion. There is the risk that such deterministic abstractions may actually be too general for being useful in historical research. One of the salient features of the "making of steam power technology" that has emerged from our research is the fundamental role of local circumstances in generating technological variety. Over time, this variety led to the emergence of differentiated technological trajectories characterized by uneven rates of technical progress. The factors underlying progress along these trajectories were quite specific to local procedures of engineering knowledge accumulation, so that each trajectory tended to display an "evolutionary logic" of its own. This implies that accurate historical studies (aimed at reconstructing the procedures guiding the search for innovations in each application domain) are indeed a necessary prerequisite for the individuation of the "doors" through which pervasive technologies can spread across various application sectors. The implication of these considerations for modeling exercises is rather straightforward: it is necessary to incorporate into growth models a richer and more accurate representation of the process of accumulation of engineering knowledge in its multifarious forms.

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[11] See the essays collected in Helpman, *General Purpose Technologies*.

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The Business of Transatlantic Migration between Europe and the USA, 1900–1914

The relocation of Europeans across the North Atlantic during the first decade and a half of the twentieth century was the culmination of the longest-lived and most widely documented transoceanic migration of modern times. This enormous population transfer was a great human drama, a major international demographic shift, and a massive historical experiment in cultural transformation during a period of unprecedented globalization. This migration was also a complex and powerful travel business containing both risks and rewards for its three fundamental participants: the movers, the moved, and the sovereign authorities on either side of the borders being traversed. Prior studies have not adequately explained this business nor appreciated the extent to which the various strategies for dealing with its associated risks were crucial, largely congruent, and self-reinforcing elements of the overall migration process.

The mechanisms underlying mass migration across the North Atlantic from 1900 to 1914 incorporated accumulated experience and development built up over a "long nineteenth century" of relative political stability, rapid technological change, and persistent economic expansion. Between 1900 and 1914, the motivations for considerable human movement from a heavily populated Europe to a labor-scarce United States were strong and stable, while political and cost barriers to such movement were relatively predictable, stable, and low. This favorable environment for self-selected voluntary relocation on a massive, ethnically diverse, geographically broad, and transparently documented scale, makes the period and region excellent loci for isolating and explicating the essential causes of modern international mass migration.

The goal of this dissertation is to help improve our understanding of the general factors and processes shaping international migration, by comprehensively and systematically spotlighting the one indispensable common denominator of market-mediated mass transatlantic migration a century ago: the commerce in the physical relocation of people in large quantities across what was then regarded as vast distances.[1] This is a

This Ph.D. dissertation was completed at the University of California, Berkeley in May 2005 under the direction of Gerald Feldman, Jan de Vries, Jon Gjerde, Richard Sutch, and with substantial advice and assistance from many others.

[1] Other "businesses of migration" less vital or ubiquitous across the overall relocation (such as inland rail travel services and the activities of booking agents, labor agents and other intermediaries) are treated selectively in this study, whenever they strongly overlap with the business of the oceanic crossing.

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history of the 11 million European-born migrants who made 19 million ocean crossings on the 18 thousand voyages of several hundred vessels of two dozen steamship lines plying between Europe and the principal ports of the United States during the years 1900 to 1914, and an analysis of how the those crossings were operated as a complex, privately owned business, generating, by the end of that period, roughly $70 million in annual revenues to North Atlantic passenger steamship lines.[2] Migrant traffic provided about half of those transport firms' revenues, and even larger shares of both profits and variability in profits.

Although relocation to America offered clear, substantial, widely recognized, and readily accessible economic advantages and was almost completely unrestricted during this period, most Europeans chose to stay in Europe. Previous analyses have suggested that costs were the principal constraint on this migration, that outlays for oceanic travel dominated such costs, and that transport companies' strategies were mainly based on competing for migrant passengers on price, or colluding to overcharge them, or economizing on costs by packing westbound migrants into the vessel space emptied of eastbound bulk freight exports. This dissertation presents evidence contradicting these assumptions and reveals a hitherto underappreciated set of interrelated risk management strategies.

Traditionally, the causes of migration have been cataloged as "pushes" and "pulls," which roughly means the benefits of moving out of one area and into another. Costs of migrating have received far less attention in previous historical literature. But even a full treatment of costs and benefits yields only a kind of "expected return," not an indication of the variation in that return. By looking at mass migration as a business, and focusing on the strategies of its key participants (migrants, shipping companies, and government regulatory agencies), it becomes evident that this was an inherently risky activity for those involved with it. Containing those risks was crucial to their strategies for dealing with the migration. The most important forms of such risk amelioration were congruent and cooperative measures amongst and between the transporters, the transported, and their regulators.

This study is the first to make systematic use of both shipping and migration sources from both sides of the Atlantic and to comprehensively examine the entire migration between Europe and the United States in its peak years before the First World War. As a consequence, a number of prior assumptions about migration and transport during this period come out in need of substantial revision.

Scrutiny of a multiplicity of quantitative and qualitative, and macro- and micro-level primary sources yields conclusions not always consistent with popular assumptions about migration. Statistics on passenger fares, for example, show—consistently across several major shipping lines—that passage rates were in a gradual upward secular trend over the period (somewhat similar to trends in costs), and were generally positively, not inversely, related to migrant passenger flows (because fare-cutting was more likely during recessionary periods when migration flows slumped). This is quite different from what was going on with freight rates in the nineteenth century, for example.[3] Comprehensive measurement of total passenger carrying capacity patterns—by line, by route, travel class, voyage, year, etc.—shows that while shipping lines maintained levels of capacity well in excess of average travel demands, the percentage usage of on-board passenger berths was high in light of the highly fluctuating and un-

[2] Five and a half million crossings eastward and two and a half million westward were made by European migrants who had previously made an (initial) westward crossing.

[3] This should not be surprising, however, because migrants differ radically from sacks of flour, for example.

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predictable variation in that demand. Examination of voyages, fleet configurations, trade patterns, and deck plans shows that interchanging capacity between tourist and migrant passengers was more widespread, and a more important boost to capacity utilization, than was the stereotypical swapping out of cargo space to "backhaul" migrants.[4] Previous historians have sometimes misgauged these magnitudes, due, in part perhaps, to inconsistencies and inaccuracies in U.S. government immigration definitions and measurements, which produced a significant undercounting of the extent and regional incidence of repeat migration (and, thereby, also of the extent to which such multiple traverses were integral to the risk-based self selection processes of chain migration).

Detailed inspection of vessel procurement and deployment patterns, considered in tandem with vessel data, shows that providing reliable regular ship departures with more than adequate booking availabilities to house upper-class tourist passengers took precedence over cost-minimizing schedule curtailment during recessions. This, however, had no great adverse impact on the long-term profitability of migrant traffic, because migrants preferred the same modern, spacious ships towards which tourists were partial. Those fast, vast, "floating palaces" atop migrant hostels also allowed shipping companies the benefits of substantial scale economies (which the analysis of vessel expenses in this dissertation also confirms). A review of deck plans and contemporary newspaper accounts indicates that one reason migrants liked these newer ships was that they increasingly offered improved travel conditions, represented most notably by a growing availability of more modern, more private, more hygienic, and less uncomfortable enclosed rooms, as older bunkroom-style "steerage" quarters were gradually phased out on the newer steamers, particularly on the northern European routes favored by tourists. Enclosed rooms were a prerequisite in vessel compartments used to house migrants journeying in one travel direction and tourists in the other.

An examination of the agreements, records, and operations of the North Atlantic passenger shipping conferences (cartels), which became more widespread and effective over the period, shows that they were neither designed for, nor did they have the effect of, significantly limiting the entry of new shipping lines or of regulating the capacity growth of existing transport firms. Their primary goal and role was to provide disincentives for the outbreak of fare wars, which were guaranteed to lower the passenger segment profits of all carriers effected by any such deep cuts in ticket prices.[5] The conferences were significant in shaping the cooperative, competitive, and amalgamating strategies of the passenger transport oligopoly in this period, but their inability to regulate capacity or entry limited their influence on long-term fare trends, and the conferences' operations had little lasting effect on migration decisions or processes. Analysis of fares, capacity usage rates, and deck plan configurations indicates that migrant passengers were charged a significantly higher margin over cost than

[4] Such interchanging, one of a number of measures shipping lines took to boost capacity usage rates, took place mostly in the intermediate "second class." Comprehensive analysis and integration of shipping passenger and immigration figures show that, on average, about one-quarter of second-class passengers were American tourists and three-quarters were European-born migrants (or "remigrants"). The migrant flow peaked westward in the late spring when most tourists were heading east. This interchange of passengers was more important at least in this period of massive 700 foot long, and longer, passenger steamers with cavernous cargo-only holds taking "fine freights," and a growing incidence of freight-only vessels and freight-only lines available to handle much of America's bulk commodity export volume to Europe.

[5] Fare wars would have lowered profits because overall migrant volumes were relatively insensitive to changes in oceanic fares.

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tourists were, but this price differential was not incommensurate with the greater prestige benefits and lower cyclical volatility of tourist traffic.

Cyclical variations were a top concern for shipping executives because of the very high percentage of costs (for both maintaining and operating oceangoing vessels) that were fixed in the short and medium term (in the sense of being unaffected by changes in revenues). Analysis of annual reports, voyage accounts, and deck plans indicates that profits on migration traffic in this period averaged roughly 10 percent of revenues. Because costs hardly moved at all with revenues, a 10 percent move up or down in ticket receipts from migrant passengers would therefore be magnified into something like a 50 percent swing in bottom line profits.[6]

Analysis of politicians' strategies, government regulations, and debarment rates shows that the immigration restriction movement, which was increasingly prominent over the period, achieved no significant effect on North Atlantic migration levels prior to the First World War. The intentions and activities of policy makers and regulatory officials focused instead on reducing the political and practical risks associated with the relocation and processing of large crowds across land, sea, and through port cities.

These findings revise prior understandings about the nature of the migrant transport business, and to some degree also, therefore, the fundamental forces shaping physical migration. Shipping did not have the strong direct effects on migration that it sometimes has been assumed to have had, but transporters and the transported did share a fundamental need to prudently manage the inherent gamble of migration, which both were undertaking. Their risk management strategies shaped not only the timing, but also the incidence of migration moves.

Falling fares do not explain the several-fold rise in migration over the period because fares did not fall over the period. Furthermore, by 1900 already, the total expense of moving to America (of which the oceanic fare was roughly half) had dropped to well below what an average European migrant working in the U.S. could expect to have saved, net of living costs, six months after the move. The principal filter in transatlantic migrant self-selection, at least during this period, was risk, not cost. The most risk averse stayed in Europe, and the less risk averse who emigrated overseas relied heavily on family and community "chains" in order to diversify the hazards of relocation across multiple individuals making multiple moves.

Because European migrants in early-twentieth-century America worked disproportionately at temporary and marginal jobs and in cyclical industries, their employment prospects were highly cyclical. The marginal shift into employment associated with westward migration to the United States was even more cyclical. Fixed costs meant still further magnification of cyclical variation in the transport lines' net income.

Congruent risk management strategies ameliorated such volatility and uncertainty to no small degree, however. In coping with the U.S. business cycle by relying on kinship networks and going back to Europe during U.S. recessions, migrants reduced the cyclicality of passenger revenues for shipping lines.[7] In protecting their reputations by continuing regular departures despite business slowdowns, shipping companies enabled migrants to escape back to Europe during recessions. Migrants and shipping lines were, so to speak, in the same cyclical "boat," and their respective risk manage-

[6] This is a very crude "ballpark" estimate, which takes into account a limited ability of shipping managers to cancel some voyages, and the roughly 50 percent of revenues coming, on average, from other, less cyclical business segments, principally tourist travelers, freight transport, and mail carriage.

[7] Eastward migrant flows were countercyclical, while the larger westward movement was procyclical.

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ment strategies were more complementary than contradictory. In this era of small government and big business, a de facto bargain was also struck in which shipping lines assumed much of the responsibility for screening out the least desirable 5 to 10 percent of migrants on qualitative grounds, and assisting with "crowd control" measures, in return for policy makers averting the sort of wholesale quantitative shutdown hinted at by restrictionists in the United States before World War I, but decisively and irrevocably adopted only in the wake of that war.

Many of the "economic" findings summarized here are developed in some detail in the opening sections of the dissertation, and much of the supporting quantitative analysis behind them appears in tables, in functionally organized appendices, and in related separate articles. The larger middle part of the dissertation consists of chronologically ordered chapters highlighting key analytical examples of risk management within the context of significant narrative episodes across this 15 year history of the business: attempts to avert cutthroat competition in a politically sensitive and inherently multinational high-fixed-cost service business (chapters 3–4), how the risks of government to migration and vice versa were mitigated (chapter 5), the methods for surviving the challenges of the business cycle (chapter 6), and the hazards of the oceanic crossing itself (chapter 7). The effective end of transatlantic migration to the United States as a major business, in the early 1920s, and some possible implications for global migration processes today, are discussed in an epilogue.

Potential migrants across the North Atlantic a century ago faced neither the dauntingly high costs of prior periods, nor the severe legal barriers of later times. As a result, the fundamental processes of voluntary mass migration are more clearly traceable during this period, and offer insights applicable to both transnational migration and the evolving risks of globalization generally.

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Women's Economic Advancement in the Twentieth-Century United States

The integration of women into formal labor markets was one of the most salient changes of the twentieth century. The "female century," in the words of *The Economist*, witnessed an extraordinary transformation of women's opportunities and outcomes both in and outside the household.[1] My dissertation explores both the causes and the consequences of women's move from home to market in the United States during three episodes of rapid change. It begins by documenting demand-side shifts during the 1940s that increased the earnings and occupational choices of African-American women; then demonstrates the impact of contraceptive technology on the extent and intensity of women's participation in the formal labor market after 1960; and, finally, estimates the consequences of shifts in women's labor supply for the growth of earnings inequality in the United States during the 1980s.

This dissertation was completed in 2005 in the Department of Economics at Vanderbilt University under the supervision of Professors Robert A. Margo (chair), Jeremy Atack, Katherine Anderson, Dale Ballou, and William J. Collins. Financial support was provided by the Economic History Association, the National Science Foundation, the National Bureau of Economic Research, the University of Illinois Foundation, and Vanderbilt University.

[1] *Economist*, "Dorothy's Dream," 9 September 1999.

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The first chapter (joint with William J. Collins) examines women's earnings growth during the 1940s. While the decade is widely regarded as a watershed in the labor market gains of black men and especially, given the iconic depictions of "Rosie the Riveter," in the labor-force participation of white women, it also marked a turning point in the economic opportunities for black women.[2] Within ten years, the average real weekly wages of African-American women nearly doubled, and the racial earnings gap among working women narrowed by a full 15 percentage points.[3] At the same time, the proportion of employed black women holding formal sector jobs nearly doubled, increasing from 27 to 50 percent.[4]

Using various sources of microdata, the analysis documents and analyzes the sources of wage gains among women by race over the decade.[5] We find that African-American women's wage gains during the 1940s were not continuations of preexisting trends, nor were they reclaimed by employers in the aftermath of World War II. In fact, the wage gains among black women during this decade persisted beyond the 1940s and rival those commonly associated with the Civil Rights Era.[6] Central to explaining these wage increases is our finding that wages grew more rapidly in occupations that were historically dominated by black women. For instance, domestic service jobs recorded the largest earnings gains during the 1940s, whereas clerical occupations, relatively more populated by white women, recorded the smallest gains. But even within job categories after accounting for observable characteristics, black-specific wage gains account for approximately 38 percent of the decade's total convergence in mean weekly wages.

Shifts in African-American women's employment and wages are consistent with substantial increases in the relative demand for their labor in the formal sector.[7] While changes in black women's human capital were important, the wartime economy appears to have opened new opportunities for black women outside of agriculture and domestic service and ushered in an era of changing labor market integration that lasted well beyond the exceptional years of World War II.

[2] For the importance of the 1940s for black men, see Maloney, "Wage Compression"; and Margo, "Explaining Black-White Wage Convergence." For the importance of the 1940s for women, see Goldin, "Role"; and Fernández et al., "Mothers."

[3] The figures are calculated using the wage income variable of the Integrated Public Use Microdata Series, using the consumer price index for deflation. The average weekly wage for black women rose from $13 to $24 (1950 dollars). The black-white ratio increased from 0.44 to 0.59. Cunningham and Zalokar in "Economic Progress" report results of a similar magnitude (0.44 to 0.64) for estimates of hourly wages. Ad hoc adjustments for cost of living differences between metropolitan areas and nonmetropolitan areas (discounting metro area income by 20 percent) have little effect on the magnitude of the wage gains. Furthermore, the bulk of the absolute and the relative gains were not explained by selection into the labor force.

[4] The term "formal sector" denotes all occupations outside agriculture and private household service.

[5] We employ the Integrated Public Use Microsamples from 1940 and 1950, the industry-level average wage series from *Historical Statistics of the United States*, and the Palmer Data. The Palmer Data are taken from the Palmer Survey, also known as the "Six-City Survey." It collected work histories in 1951 for more than 4,000 female workers residing in Chicago, Los Angeles, New Haven, Philadelphia, San Francisco, or St. Paul and is the only known dataset that contains retrospective information on women's labor market experiences during the 1940s. We thank Claudia Goldin for sharing the data with us.

[6] Changes in black women's wages were larger in absolute terms during the 1940s than the 1960s, but the gains relative to white women were approximately the same in each decade.

[7] See Collins, "Race" and "Labor Market," for more on antidiscrimination legislation and its effects during the 1940s.

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The second chapter examines the effects of oral contraception on women's lifecycle labor-force participation. Although popular accounts and social histories afford "the pill" a great deal of credit in changing women's options over childbearing and market work, economists have been hesitant to draw this conclusion. With few exceptions, the existing economic literature largely dismisses the pill's role.[8] Gary Becker summarizes a view held by many prominent scholars, in his *Treatise on the Family*: "the 'contraceptive revolution' . . . ushered in by the pill has probably not been a major cause of the sharp drop in fertility in recent decades."[9] Furthermore, disentangling the treatment effect of the contraceptive pill from other contemporary factors poses a daunting empirical problem. Its introduction in 1960 and subsequent diffusion corresponded to the resurgence of the women's movement, the spread of labor-saving household technologies, the enactment and increasing enforcement of antidiscrimination legislation, and the social unrest associated with the Civil Rights Movement and Vietnam. Abortion also became increasingly available around the time many young women gained access to the pill.[10]

My results challenge this conclusion. Time-series evidence suggests that dramatic reductions in first birth rates among 18 to 21-year-olds and increases in the labor-force participation rates among young women in their twenties correspond closely to the diffusion of oral contraception among younger women. In the June Supplements to the *Current Population Survey*, for instance, among women born too early to have had legal access to the pill before age 21 (women born before 1940), approximately 62 percent of those giving birth report having their first child by age 22. For women born around 1955—almost all of whom had access to the pill under the law—the fraction giving birth by age 22 had declined to 44 percent. For the same cohorts, trends suggest a rapid transformation in women's lifecycle labor-force participation profiles as well. Whereas women born during the first 40 years of the century tended to withdraw from the labor-force during their twenties, the ages traditionally associated with highest fertility, and return to work after their children had grown, this "fertility dip" in labor-force participation had disappeared for women born after 1955. Among these younger women, labor-force participation rates were 24 percentage points higher at age 25, and 20 percentage points higher at age 30, than those of women born in 1940.[11] Thus, the most rapid, intercohort shift in young women's labor market participation during the twentieth century occurred precisely over the same period that younger and unmarried women gained legal access to oral contraceptives.

[8] Two notable exceptions are Michael and Willis, "Contraception"; and Goldin and Katz, "Power."

[9] Becker, *Treatise*, p. 143.

[10] Further weakening the argument for the pill is that recent quasi-experimental research suggests that declining numbers of children can explain remarkably little of the longer-term changes in women's market work. See Bronars and Grogger, "Economic Consequences"; Jacobsen et al., "Effects"; Hotz et al., "Economics"; and Angrist and Evans, "Children." Angrist and Evans conclude that since 1950, "the increase in female labor-force participation has been so large that declining fertility can explain only a small fraction of the overall change." Between 1970 and 1990, the same authors suggest that the decline in childbearing beyond the second child among women ages 21 to 35 can account for roughly 2 percentage points (of the total 16.8 increase) in employment. If changes in fertility explain little of the increase in women's labor-force participation, it is difficult to argue why the pill should.

[11] Smith and Ward, "Time Series Growth," p. S65, also note that for women born after 1950, there is no observable employment decline over the childbearing years. Goldin, "Rising (and Declining) Significance," notes in figures 4 and 5 that these trends are borne out for married women as well, although the labor market integration of college graduate women appears to have begun earlier.

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The most compelling evidence of the pill's effect, however, comes from comparisons within year-of-birth cohorts for women from 1940 to 1955. Most similar to the approach taken by Claudia Goldin and Lawrence Katz, I exploit variation in access stemming from broad, state-level changes from 1960 to 1976 that expanded the legal rights of individuals ages 18 to 21.[12] While the timing of these changes appears unrelated to a host of state-level characteristics in 1960, they appear significantly related to younger women's ability to consent to medical care and, by extension, obtain oral contraception without parental consent. Access to the pill before age 21 reduced the likelihood of becoming a mother before age 22 by 14 to 18 percent and increased the extent of 26- to 30-year-old women's labor-force participation by approximately 8 percent. At the intensive margin, women with early access worked at least 68 more annual hours at ages 26 to 30. The overall pattern of findings is consistent with the notion that the pill catalyzed changes in labor-force participation through birth timing, a mechanism not recognized in previous empirical work. By providing a low cost means of delaying childbearing, oral contraception allowed women to remain in school, pursue longer-term careers, and work more in the paid labor-force during ages historically associated with childrearing. Changes in the timing of births associated with the diffusion of the pill can explain roughly 15 percent of the increase in market employment among younger women between 1970 and 1990.

The third chapter shifts focus from the factors causing women's rapid integration in the labor-force to one possible consequence of these changes. As both black and white women made inroads into traditionally male occupations, acquired more formal education, and worked more hours per week and more weeks per year on average than their predecessors, they may have increased labor market competition for certain jobs. Specifically, the growing pool of capable women workers may have depressed the earnings of men at the lower end of the earnings distribution.[13] Consistent with this hypothesis, the dramatic rise in young women's labor-force participation from 1970 to 1990 in the U.S. corresponded to the largest increase in earnings inequality among men of any developed country.[14]

Although previous studies have examined the effect of women's shifting labor supply on the wage distribution, no consensus has emerged on the relative importance of competing explanations.[15] The causal link between female labor supply and male wage inequality has proven difficult to measure, as many factors influencing women's labor supply decisions are also correlated with determinants of men's wages. Women may have entered the workforce to offset absolute and relative declines in the earnings

[12] Goldin and Katz, "Power."

[13] For other papers discussing this argument, see Topel, "Regional Labor Markets" and "Factor Proportions"; Fortin and Lemieux, "Are Women's Wage Gains"; and Acemoglu et al., "Women."

[14] For cross-country comparisons of changing earnings inequality, see Autor and Katz, "Changes in the Wage Structure," 1463–555. See also Card and DiNardo, "Skill Biased Technological Change."

[15] The most prominent of these explanations include skill-biased technological change (see Bound and Johnson, "Changes"; and Katz and Murphy, "Changes"), international trade (see Borjas and Ramey, "Time-Series Evidence"; and Feenstra and Hanson, "Global Production Sharing"), immigration (see Card, "Impact"), labor market institutions (see Fortin and Lemieux, "Institutional Changes"; and DiNardo, Fortin and Lemieux, "Labor Market") and the increasing participation of women (see Topel, "Regional Labor Markets" and "Factor Proportions"; and Juhn and Kim, "Effects.").

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of their husbands or in response to a heightened probability of divorce. Another (and related) explanation emphasizes that gender-biased technical change raises the earnings power of women relative to men and may have induced more households to send women to work outside the home.

To overcome these difficulties, the final chapter of my dissertation employs a strong and valid instrumental variable for women's labor-force participation. The instrument is constructed using cross-state and year variation in fertility rates from 1940 to 1956 and heterogeneity in the timing of legal changes that allowed younger, unmarried women to obtain oral contraceptives. Evidence put forward in chapter two of my dissertation as well as in other studies suggests that these legal changes provide exogenous variation in access to the pill and that they are strongly associated with changes in women's labor-force participation.[16]

Using data from the 1960 to 2000 Integrated Public Use Data Microdata Series (IPUMS), the results in the second stage suggest that the greater labor-force participation among women induced by early access to the pill had two primary effects on male wage inequality during the 1980s.[17] Rather than decreasing the wages of men at the lower end of the distribution, relative supply shifts tended to *increase* the wages of men at the ninetieth percentile. These women's skills—perhaps clerical or administrative—may have been more complementary to the skills of men in certain skilled occupations and enhanced the productivity of those at the upper end of the earnings distribution. Second, accretion in the number of weeks worked by women functioned to depress wage growth at the mean. Thus, while changes in the actual experience of the average woman worker during the 1980s was one of the most important factors contributing to the decline in the gender gap, changes in their labor supply tended to mitigate the wage gains of women as a group.[18] The point estimates imply that the gender gap in wages would have been roughly half as large in 1990 in the absence of the epochal changes in women's labor supply—a particularly remarkable figure as the 1980s experienced the largest declines in the gender gap since World War II.

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[16] See Goldin and Katz, "Power" and "Career."
[17] Ruggles et al., *Integrated Public Use Microdata Series.*
[18] See Blau and Kahn, "Swimming Upstream"; and O'Neill, "Gender Gap."

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Commerce and Arms: The Federal Government, Native Americans, and the Economy of the Old Northwest, 1783–1807

This dissertation argues that the federal government played an essential role in the shaping of the western economy. American expansion necessitated not only that land be opened up, but also that the regional economy be reorganized. Specifically, the federal government did so in three ways. First, the military wrested control of the western economy from the tribes of the Northwest Territory through warfare, both during the Indian wars of the 1790s and later during the War of 1812. Second, the federal government sponsored the construction of roads throughout the region. Finally, colonial agencies of the federal government attempted to transform the Native American economy from one focused on fur trading to one centered on sedentary commercial agriculture.

Historians have not viewed the region in such economic terms before.[1] The military presence in the Old Northwest has long been a centerpiece of the narrative of American expansion.[2] Ethno-historians responded to these American-centered arguments and provided greater insight into the diverse Native America cultures, as well as their struggles with and against imperial powers.[3] This project attempts to merge these histories while also altering the debate by looking at Native Americans not just as a cultural or racial category, but also as an economic category. At its core, this dissertation reflects recent works that have suggested that conflict and war have at times resulted from the different ways Native Americans and settlers organized and used space, or land.[4] My work builds on these studies by suggesting that American expansion depended heavily on the ability of the western economies to supply their armies.[5] Although some scholars have suggested that the federal government played an important

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[1] Recent scholarship has tended to focus on political relationships. See, White, *Middle Ground*; and McConnell, *Country*. Eric Hindraker has approached the region from an economic perspective by looking at trade as an extension of imperial policy, but we have reached very different conclusions regarding the period considered in this project. See Hinderaker, *Elusive Empires*. Other regions have received more attention regarding their economic transformations. See, for instance, Prucha, *Broadax*; White, *Roots*; Worster, *Rivers*; Limerick, *Legacy*; and Usner, *Indians*.

[2] Turner, "Significance"; Wildes, *Anthony Wayne*; Horsman, *Frontier*; Nelson, *Anthony Wayne*; Sword, *President Washington's Indian War*; Hurt, *Ohio Frontier*; and Gaff, *Bayonets*.

[3] Weslager, *Delaware Indians*; Edmunds, *Potawatomis*; Van Kirk, *Many Tender Ties*; Howard, *Shawnee!*; Carter, *Life*; Rafert, *Miami Indians*; Sioui, *Huron-Wendat*; and Sleeper-Smith, *Indian Women*.

[4] This argument has been made very creatively in recent years. See, Cronon, *Changes*; Anderson, *Creatures*; and Coleman, *Vicious*.

[5] Francis Paul Prucha has most successfully presented this thesis, but without a substantial integration of a Native American perspective. See Prucha, *Broadax*.

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role in shaping the West, they have done so largely in political terms.[6] This dissertation attempts to show the economic impact the federal government had in the region and how their efforts shaped not only war but also peace. In so doing, it also suggests an earlier periodization for the beginning of the transportation revolution and emergent market economy in the West than historians have previously argued.[7] Ultimately, this dissertation seeks to understand better the relationship between economies, the federal government, and the American legacy of expansion.

Settlers who moved west of the Appalachians during the 1770s and 1780s ran afoul of an economy controlled by Native Americans, including the Shawnee, Delaware, Wyandot, Ottawa, Miami, among many others. At the risk of overly simplifying this economy, it can be fundamentally described as a fur-trading, semisubsistence economy. Villages and tribes jealously guarded usufruct rights to vast territories and the furbearing game therein. Although tribes of the Old Northwest negotiated territorial boundaries north of the Ohio River, Kentucky largely remained contested hunting ground between northern, as well as southern tribes, such as the Cherokee and Chickasaw. As warriors and hunters, men defended territorial claims and supplied furs and meat for their families and villages. Native American women supplemented this trade with intensive agricultural production of corn and other vegetables. These foods facilitated the economic and political relationships that bound trader and empire to these communities, as well as provided food for hunting and warfare expeditions.

Americans who moved across the Appalachians sought to reconfigure the western economy by redefining the landscape. Where Native Americans saw hunting ground and contested territory, Americans saw wastelands. Settlers and speculators sought to transform earth into a commodity, selling it off to become farmland and grazing pastures. As settlers and artisans moved to Kentucky and along the Ohio River Valley, they fostered an increasingly diversified economy built on commercial agriculture. But from a Native Americans perspective, settlers illegally seized contested land. They took up valuable space and displaced game, making their efforts to secure a livelihood more difficult. From the start, these two economies chaffed against each other, often violently. By the 1780s, an extended property war gripped the region.

As settlers moved into Kentucky and along the Ohio River valley during the 1770s and 1780s, Native American warriors targeted the newcomers' property. They stole and shot horses, cattle, sheep, and hogs. They burned or destroyed fields, homes, tools, merchandise, and other property settlers brought with them. Warriors hoped to make life for the emigrants financially burdensome and to force a reverse migration. But their efforts proved only marginally successful and emigrants continued to flood into the region. Still, the American economy there sputtered as militias drew valuable manpower from productive practices, and frequent warrior incursions caused widespread and expensive damage to farmers.

To retaliate Native American raids, settler militias responded in kind, destroying Native American fields, villages, and property. These expeditions undermined the livelihood of those villages by destroying their ability to produce food and furs for

[6] Andrew Cayton argues that the federal government played a significant role in shaping Ohio's political world. See, Cayton, *Frontier Republic*. Eric Hindraker likewise contends that governmental decisions affected the economy of the Great Lakes Region. This dissertation differs significantly from Hindraker in that he believes the American government helped create a flourishing western economy by not interfering in its development, while this project argues that the federal government became directly involved in that economy. Hinderaker, *Elusive Empires*.
[7] See, for instance, Taylor, *Transportation Revolution*; Goodrich, *Government Promotion*; Scheiber, *Ohio Canal Era*; Sellers, *Market Revolution*; and Malone, *Opening the West*.

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themselves. In response, especially by the early 1790s, dislocated villages of different tribes began to form larger composite communities, farther from American settlements. These new towns provided residents with a number of benefits, including greater agricultural productivity to support the war effort and greater protection from American incursions.

During the 1780s financial problems, disorganization, and lack of power prevented Congress—at this point under the Articles of Confederation—from enacting a strong western policy. Instead, defense of the frontiers was left to the states and, in the case of Kentucky and the Ohio Valley, local militias. Ratification of the Constitution gave the American government greater authority to wage war, a power they quickly utilized. During the first half of the 1790s, the United States ramped up its presence in the West but failed in two campaigns to end the conflict.

Despite continued difficulties the military had in acquiring supplies, especially food, the regional economy responded to the extended federal presence in the West. Farmers and merchants began to produce crops and livestock known to be in demand by the military. And the State of Kentucky began to fund internal improvement projects designed to deliver goods from the Bluegrass Region to Cincinnati and the Ohio River, even before it made efforts to improve transportation networks to the East. Nevertheless, the regional economy continued to limit military options in the region. Poor roads and short supplies prevented troops from deploying for an extended campaign far from their supply source.

Still, in 1794, when Major-General Anthony Wayne attacked the northern tribes, he found success because the western *economies* had changed in two important ways. First, the American economy had expanded adequately to sustain the military for a large, but short campaign. Second, by forming composite communities, Native American had concentrated their productive power and left them exposed to greater economic destruction. As a result, when American troops overran their communities, they razed thousands of acres of crops needed to support families and warriors. Wayne's army shattered the economic heart of the Native American resistance and peace soon followed. Federal military intervention ended the property war and forced the western tribes to relinquish a sizable chunk of their territory (approximately two-thirds of present day Ohio) when they signed the Treaty of Greenville in 1795. These new lands quickly opened up to settlers, speculators, and a revitalized American market economy.

In the decade and a half following the war, trade and immigration to the West increased remarkably. An expansion in the number of roads stretching through the region facilitated the movement of people and goods. Although private toll roads opened up, post roads proved more important to the region. An initial jagged web of post roads constructed in the West during the early 1790s expanded rapidly through 1815, when 5,933 miles of post roads connected communities from Pittsburgh to the Mississippi River, and from Tennessee to the hearts of Ohio and Indiana. Postmaster Generals argued for road construction in the West, pointing to the economic benefits these transportation routes brought to the region. In fact, the Post Office was more willing to construct roads to in the West than in the East because they anticipated greater population and economic growth there.

If the western economy had only just sprouted by 1790, it blossomed after the turn of the century. In southern parts of Ohio, corn, wheat, and rye fields stretched along river valleys and aside roads crisscrossing the territory. Cattle, which had been transported west during the late eighteenth century to support burgeoning populations, began to be driven east over the Appalachian Mountains to markets as far away as Bal-

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timore. Still, a large portion of this interregional trade went to New Orleans. Farmers and merchants in the Ohio Valley conducted millions of dollars worth of trade to the gulf city before the United States acquired the Louisiana Territory from France in 1803. After the Louisiana Purchase, this traffic increased multifold. Even more remarkable was the fact that more than two-thirds of trade goods from the Ohio Valley were destined for ports outside of the United States, including many in the West Indies, South America, and the Iberian Peninsula. The Ohio Valley economy had stepped into the world.

Even as the federal government made efforts to bolster the western economy in the parts of the region that it directly controlled, it also attempted to transform the economy in Native American territory. Colonial agencies—such as the Indian Agency, the factory system, and territorial governments—prodded chiefs to change their subsistence strategy. One method they deployed was to try and draw Native American men into debt through the fur trade. Once in debt, American strategists believed individual Native Americans would either need to adopt commercial agriculture to pay off the debt or the tribe would have to relinquish land to clear the balance due. Either way, the United States planned to alter the economy on land yet unceded.

Native Americans, of course, largely resisted these efforts. To adopt yeoman farming techniques required them to depart radically from traditional productive practices. Agriculture had historically been a female occupation and Native American men recoiled at the idea of taking up women's work. Despite the failure of the United States to accomplish a sweeping transformation of the Native American economy, its efforts succeeded in dumping large amounts of money into the West. Much of this money tended to end up in the hands of American traders and merchants who sold manufactured goods and other items to the tribes.

By 1807 the market economy had expanded north from the Ohio River and it began to encroach again on Native American hunting areas. Thinning game populations caused, in part, by American expansion only further disrupted a Native American economy that had been languishing since the 1790s. As a way to reconcile widespread economic and social change, Native Americans increasingly embraced an internally driven millennialist movement. Spiritual leaders argued that in order to rejuvenate their society and religion, tribes needed to restructure their economy by rejecting American trade goods and returning to so-called traditional productive practices.

The most notable of these prophets was Tenskwatawa (Shawnee). At first, Tenskwatawa found open ears among tribes closer to the Mississippi River. But by 1810, continued land cessions convinced many reluctant hawks that the United States represented an impending danger to their economy. What had been a war of words became a military conflict in 1811 when William Henry Harrison moved against Tenskwatawa's settlement at Prophetstown, the opening salvo of the War of 1812. When the dust settled in 1815, the new Native American confederacy and its British allies had been defeated, but the former suffered more by the loss. The results of the war left little land in the Northwest for the tribes to pursue their fur trade economy. Most of the defeated villages in Ohio and Indiana decided to move west. The disruption of their part of the region's economy, as in 1794, again led to the expansion of the market economy in the Northwest as speculators, merchants, and settlers capitalized on seized lands, and the federal government constructed more roads.

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The Geography of Invention in High- and Low-Technology Industries: Evidence from the Second Industrial Revolution

Technological progress has long been widely recognized as a crucial source of economic growth. Many countries have, accordingly, devoted considerable resources to promote more rapid generation and diffusion of technology in their economies. Yet recent studies reveal a persistence of stark contrasts across countries and geographic space more generally, not only in productivity, but also in the generation of new technological knowledge. What accounts for these geographic disparities is not well understood.

Although there are several empirical studies of geographic variation in inventive activity, many abstract from the question of whether invention pertaining to the technology of an industry is linked to production.[1] Indeed, there has been virtually no systematic investigation of specific factors that might lead a region to be specialized in invention but not in production, nor of whether the significance of such factors varies across industries. This is unfortunate, especially because these issues have important implications for our understanding of today's global economic development. In recent years, the production of "technologically mature" industries has increasingly relocated

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[1] See, for example, Jaffe, Trajtenberg and Henderson, "Geographic Localization"; Saxenian, *Regional Advantage*; Feldman and Florida, "Geographic Sources"; and Audretsch and Feldman, "R&D Spillovers."

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from more-developed countries to less-developed countries with lower costs of labor and other inputs. It is not clear, however, whether, and to what extent, the low-wage countries that have been the recipients of such shifts in production will come to realize corresponding increases in their generation of new technical knowledge, and in so doing develop a firmer basis for long-term growth.

We may answer these questions by examining the geographic correlation between invention, production, and other factors that may also be conducive to invention. If a factor greatly stimulates invention, then the geography of invention and its evolution over time should mirror that of the factor. Nevertheless, this test may not be sufficient. For example, even if the co-location of invention and production is indeed observed, such geographic association between invention and production may not result from a direct link between invention and production. Instead, one or more resources crucial to both manufacturing and inventive activities may cause the two activities to co-locate. For instance, inventive activity may be carried out by individuals working in a capital good sector that locates in proximity to production because of high transportation costs.

Hence, to effectively evaluate the effects of production relocation on inventive activity (or more generally to identify factors that are conducive to inventive activity), we should look at inventors closely, exploring their biographical information such as their occupation, the organization they belong to, their educational background, as well as their migration patterns. In so doing, we can better understand whether the factors in question directly influence the location of invention.

Although detailed biographical information is rarely available for contemporary inventors, we can learn a great deal about early inventors from U.S. historical records such as census manuscripts and city directories. Among the information contained in these records is: year of birth, birthplace, and detailed occupation, place of business, and place of residence over the inventor's career. The United States is also a country large enough to have a great deal of interregional variation in factor endowments, but without so many confounding effects as there are from institutional difference across countries (for example, different industrial policies and patent regimes).

I therefore chose to study these issues from the U.S. historical experience. The dissertation focuses on the experience of the American shoe, textile, and electric (electrical machinery, generation, wiring, and lighting) industries during the so-called Second Industrial Revolution. During this period rapid technological changes that rival those of our own age took place. The three selected industries offer intriguing contrasts in both the level of technology and the geographic patterns of production. Two were traditional labor-intensive industries: in textiles, production migrated to a low-wage area but shoemaking remained based in New England. The electric industry was based on a radical new technology. Thus, these industries provide us with an opportunity to study whether the geography of invention (and its relation to that of production) was different for industries based on new technologies than for those relying on more mature technologies.

In order to examine the geographic patterns of invention in these three industries, I first constructed cross-sections of all shoe, textile and electric patents granted by the United States Patent and Trademark Office (USPTO) in 1870, 1890, and 1910.[2] I selected patents intended for the shoe and textile industries by reading through the de-

[2] One concern of using patent statistics is that such statistics may not fully reflect inventive activity. Moreover, discoveries associated with production involvement (learning-by-producing) might be innovations, or new applications of existing technical knowledge, rather than inventions, and thereby not patentable. Griliches, "*Patent Statistics*," however argues that patent statistics provide a reasonable, if not powerful, indicator of inventive activity.

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scription of over 72,000 patents reported in the Annual Reports of the Commissioner of Patents for the three cross-section years.[3] Whenever the description is not sufficient to identify an industry the patent was intended for, I obtained additional information such as drawings and specification of the patent from the Official Gazette of the United States Patent Office or the patent grant images in the United States Patent and Trademark Office's on-line database. For the electric patents, I used the USPTO patent classification to obtain a tentative list of electric patents. Then, I checked the information for each patent by employing the USPTO patent grant image on-line database to verify that the invention is indeed an electric patent.[4]

There are approximately 3,100 patents and 2,300 inventors in the sample.[5] Information collected from the patent records includes: name and address of patentees and their assignees (individuals or firms who purchased the ownership of the inventions before the dates that the patents were granted); and the nature of the assignment (for example, whether the patentees retained a stake in the invention after the assignment). For each patentee, I have also obtained the total number of patents he received over a seven year period centered on the year of the sampled patents (as a measure of his productivity at invention). I then enhanced the patent data with biographical information for the inventors by linking them to the U.S. census of population manuscripts from 1850, 1860, 1870, 1880, 1900, 1910, 1920, and 1930; city directories (mostly in 1890); and college records (to identify whether these inventors received a college degree). Among the variables retrieved are: year of birth, birthplace, and for all years when I can find each inventor in a census manuscript or city directory, the industry or company he worked for, whether he was an owner or an officer of a company, and place of residence.

In all three industries, I find that the geographic patterns of invention were not so closely associated with the location of production. Regional shifts in textile production from the Northeast to the South were neither accompanied nor followed by corresponding increases in invention in the South, and the center of textile invention remained in Massachusetts long after the relocation of textile production had begun. An examination of inventors' occupational characteristics further reveals that a significant number of inventors, even in the craft-based shoe industry, were distinguished by their advanced technical skills instead of direct involvement in production. In the shoe and textile industries, these individuals were machinists or those who worked in the tool and machinery sector. In the electric industry, they were those who identified themselves as electricians or electrical engineers. These results imply that appropriate technical skills rather than proximity to production were crucial to carry out inventive activity in both low-tech (shoes and textiles) and high-tech (electric) industries. Not surprisingly, the location of invention therefore appeared to have mirrored the geographic distribution of individuals with such skills.

[3] The USPTO patent classification system is of limited use for shoe and textile invention because it is based on functional use. For example, a bobbin is classified under class 242: winding, tensioning, or guiding.

[4] In contrast to the shoe and textile invention, the USPTO patent classification works fine for electric inventions.

[5] Utility and reissued patents are in the sample, but not design patents because design patents protect the appearance of the patented articles and are often overlapped with copyrights. From U.S. Patent and Trademark Office, *Technology Assessment*, the number of utility patents granted by the U.S. Patent and Trademark Office was 12,157 in 1870, 25,322 in 1890, and 35,168 in 1910. On the other hand, for the three cross-section years combined, there were only 2,262 design patents and 646 reissued patents.

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The evidence suggests that urban amenities such as access to information networks and market coordination mechanisms (such as patent agents and financial intermediaries) that promote trade and investment in technology seemed to have encouraged inventive activity, especially in the electric industry. Inventors who lived in urban centers were more likely to assign (sell) their patents. Inventors who were prolific and those who moved from other states or countries tended to reside in urban areas.

The traditional and new technology industries differed starkly in some of the characteristics of the inventors, and in the geographic patterns of where invention was taking place. Inventors in the electric industry were far more educated, younger, and geographically mobile over their careers than inventors in the traditional industries. The intriguing implication is that because individuals with the appropriate knowledge and skills to be effective contributors to new technology are often young and scarce in supply, they will be inclined to migrate to areas where demand for the technology (and rents to their scarce human capital) is high and resources to support the R&D are available. These circumstances, perhaps characteristic of new technology industries more generally, produced a weaker spatial association between invention and production. The electric industry exhibited a much more dispersed pattern of inventive activity with shifts in centers of invention over time (as opposed to the traditional industries whose centers of invention remained in the more developed regions even after textile production had begun to move elsewhere).

These findings suggest that developing countries may not emerge as centers of invention after having attracted shifts in manufacturing capacity from developed countries. They may have to wait a long time before they develop into important contributors to new technological knowledge. The challenge is certainly daunting, and it will not be surprising if many observers find the prospects gloomy. However, a more optimistic perspective on the same circumstances can be reasonably offered. An enormous gap between the technology at the cutting edge and the technology in use suggests that there is ample room for advance in a less-developed country's total factor productivity. In other words, it is still both quite possible and desirable for a follower to realize substantial productivity gains and economic growth without being responsible for shifting out the technology frontier. Even as regards developing a potential for high rates of invention, improvements in transportation and communication have made it easier for developing countries today to send their people to receive formal training abroad, or to otherwise access technological information, than it was during the Second Industrial Revolution. The examples of South Korea and Taiwan give confidence that the case for optimism is based on more than mere hope.

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Comments on Bailey, Sutthiphisal, and Bergmann

Before I provide the substance of my remarks, I would like to thank two people. The first, Farley Grubb, who convened this session at last year's meetings, so thoroughly summarized the career of Allan Nevins, that I can skip doing so by providing just a reference.[1] The second is Roger Ransom for asking me to do this. Though I was certain at this time last year that I would be able to say that only with sarcasm, two things have made my gratitude genuine. The first, a result of historical forces much larger than the Economic History Association, was the early elimination, for all practical purposes, of the Chicago Cubs from serious play-off contention. This freed up a great deal of my time in the late spring and early summer. The second was the sheer quality of the seven submissions. They made the reading more a pleasure than a chore, though they left me with one tough remaining task: choosing the three finalists. I will make a few remarks about all three as a group before offering specific comments on each.

In economic history, to a greater extent than in other areas of economics, or even in history, our work is shaped by a fundamental tension, a balance we strike in everything we do. The two opposing forces that pull at us could be called generalization and personification: extracting impersonal trends and central tendencies, but remaining aware of the circumstances faced by particular, actual people as economic actors. We

[1] This JOURNAL 65, no. 2 (2005): 543–44. The only issue in doubt after Grubb's excellent summary is how the given name of Prof. Nevins should be spelled: it appears both as "Allen" (this JOURNAL, volumes 34, 39, and 41 through 55, and in numerous reviews of his books, primarily in early-twentieth-century political science journals, e.g., *The American Political Science Review* 27 (1933): 274), and as "Allan" (Farley Grubb's summary, *The Columbia Encyclopedia* entry for Prof. Nevins, and the author's credit for each of his published books and articles). From 1996 (volume 56, no. 4, p. 928) through 2003 (volume 63, no. 4, pp. 1147–48), this JOURNAL took the unconventional compromise approach of using "Allan" when submissions are solicited for the prize competition and "Allen" when the winner of the previous year's prize is announced. In 2004 and 2005, this JOURNAL took a definitive stand—returning to the exclusive use of "Allen," though this year's on-line call for submissions introduced a new wrinkle, "Alan" (http://www.jstor.org/journals/eha.html). As for 2006, readers will have to wait for the "Editor's Notes" (or, in some years "Editors' Notes")—as an economic historian, my job it to tell you what *has* happened, not what *has yet* to happen.

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have the ability to tell interesting stories with numbers in means and frequencies and regression coefficients, even as we can animate those exercise with the stories and words of specific, historical individuals.

Each of the works in U.S. economic history presented on this panel resolves that fundamental tension in a different way. One hews quite closely to the model of modern labor economics, keeping specific individuals largely anonymous, letting them speak to us through the aggregation of their behaviors and relying on state-of-the-art econometrics and large twentieth-century datasets. It could easily be imagined appearing in *The American Economic Review*. Another relies on a detailed examination of several thousand lives followed through censuses and city directories and other records that identify individuals by name and occupation and street address, relying on careful choices of comparison groups and clever use of these original sources. It would not be out of place in any recent issue of this JOURNAL. The third is a sweeping historical epic, with a cast of hundreds, battles on a still-contested Western frontier, and a heroic corps of army engineers building roads and forts with picks and shovels as their comrades cut a swath of destruction with muskets and torches across the wooded fields of what is now Ohio. It uses no quantification—not a single table appears in its 247 pages. So enormous is its canvas that this project could not be contained in a mere journal article or even perhaps a standard book-length monograph. It could best be imagined as one of those five-part historical mini-series that network television used to do so well, with Barry Bostwick or Richard Chamberlain as Major General "Mad" Anthony Wayne, and Jonathan Pryce as a scheming agent in Britain's Indian Department. I have yet to uncover the romantic angle.

Such coarse characterizations are not meant to slight these impressive works, but rather to celebrate the diversity of approaches seen in them that economic history embraces. Different questions call for different investigative tools, and in each of the three cases we have seen here, the authors have chosen wisely, with less regard for prevailing methodological fashion than for accurately capturing important and complex historical realities.

Martha Bailey, in three largely separate essays, helps us understand one of the most important trends in the U.S. economy over the twentieth century: the increased participation of women in paid employment outside the home. In the first chapter, she asks how black women fared relative to white women over the 1940s, finding a striking degree of convergence in their experiences. What is somewhat surprising is how little of the change in black and white women's wages is explained by their observed characteristics, though the changes in the differences between them in their observables explain much of the change in the gap between them.

Her analysis prompts a few questions. The first is how were the changes seen among black women shaped by their role in The Great Migration? Black women who have moved South-to-North will show up in Northern cities with less experience than whites or black nonmigrants. The second is whether movement out of the South also impacted the ability of black women to enter nonhousehold services, retailing, and manufacturing, sectors that were often closed to them in the segregated South.

The second and third essays use differences across states in early legal access to contraceptives to explain how women's labor force participation changed, and how those changes affected inequality among men. The first exercise is a real rarity: it is easy to open a new field of research and find a few nuggets of knowledge lying on the ground, but it is much tougher to look through an area already picked over by solid scholars and find important truths lying about waiting to be discovered. This is a genuine contribution. The final essay on the impact of women's labor force participation on

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men's inequality might benefit from some disaggregation: Chapter 3 shows that "the pill" has its greatest impact in delaying women's entry into childbearing, so it alters the age of women who are entering the labor market alongside men in the 1960s and 1970s. This might change the nature of the substitution and complementarity they represent.

Dhanoos Sutthiphisal's thesis wrestles with a topic of interest to countries across the globe today as they try to lure manufacturing from developed places: can these countries also expect to see the benefits of greater inventive activity as production moves within their borders? Her use of patent records, census manuscripts, and city directories is clever and judicious. But the conclusions are not heartening to the Mexicos and Bangalores of the world. Her analysis prompts a number of questions.

The correspondence between patents and inventive activity is surely inexact. Especially in the context of relocating a site of production, improvements in process and organization that are difficult to patent may go unobserved. Another concern is that the North/South contrast on which much of the analysis rests may be too stark. A great many things (labor, capital, railroad lines) fail to flow along this axis in the nineteenth century, so perhaps industries that shifted production within the North or within the South would be illuminating as well. And what of other industries such as metals, chemicals, autos, and food processing that by the first quarter of the twentieth century have seen substantial invention and innovation? Within urban areas, are there patterns in how firms and inventors cluster? The database contains actual street addresses for both those who did the inventing and those who used their inventions. Which mattered most in enhancing the volume of inventive activity: proximity to other inventors, proximity to knowledge-generating sources (such as universities), or proximity to sites of production? Finally, what do the inventors themselves have to say? A little more of the "personification" to which I alluded earlier might help us understand why they themselves were located as they were relative to the firms and industries for which they provided innovations.

William Bergmann's thesis tells the story of the role of the U.S. Army (and later the Post Office) in setting the stage for economic growth in the Old Northwest. They did this by settling property rights certainly (at least between the indigenous population and the rapidly arriving white settlers), but they may have done even more in promoting later growth by building roads and forts and making a whole raft of internal improvements more than a decade before Albert Gallatin's much-vaunted program was presented to Congress in 1808. The thesis has semi-obscure battles (how many of us remember the location, let alone the salient details, of the Battle of Fallen Timbers from our hazy recollections of late-eighteenth-century U.S. frontier history?), political backroom dealing, a federal government often not quite sure what it was trying to accomplish, and a charismatic soldier-cum-frontier diplomat who could strategize and improvise on his feet and on the run.

The work reveals not only the role of the government (and two unlikely branches of the government at that) in integrating the Northwest into the young nation's economy, but also the crucial role of farmers and merchants in Upper Canada while the western areas remained contested terrain. The entire thesis is neatly summed up in a two week episode recounted on p. 91. On 28 August 1794, General Wayne's army methodically destroyed the productive capacity of the native population along the Maumee River as it returned to Fort Defiance, "laying waste the Villages and Corn fields for about 50 miles." On 14 September, Wayne's army made its way west toward the Maimi villages where "After just over two days of hewing a 48 mile road, the Legion arrived unmolested."

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Bergmann's focus on the military and diplomatic aspects of the government's activities in the region leaves unanswered a number of questions. The first that an economist might ask is what was the cost of all this activity? Were the roads built by the military to meet strategic objectives also suitable for civilian purposes once the region had been pacified? How were these roads engineered? When the focus shifts to the role of the Post Office, a natural question is how the road-building criteria differed from those of the military. A more quantitatively inclined reader might want to know whether we can measure the impact of the work of the military (and later the Post Office), and how the effect would compare to that of Gallatin's more famous plan. Finally, given the importance of geography to the story, some maps displaying the specific roads cut and battles fought would have been helpful.

Taken together, the three Nevins Prize finalists show a breadth of approach and a depth of scholarship that bode well for the profession. I look forward to reading the subsequent work of these young scholars and congratulate them on having so clearly shown us the vitality of a field that can embrace work so diverse.

JOSEPH P. FERRIE, *Northwestern University and NBER*

Dissertation Summary Remarks on Arza, Keeling, and Nuvolari: EHA Meetings in Toronto

Alexander Gerschenkron was a man of many talents, and eclectic interests. He was one of our profession's most venerable scholars, but also, as the statistics on graduate education published in the most recent Clio Society newsletter attest, one of our profession's most venerable educators as well. What more fitting combination could there be in the named honoree for a dissertation prize, an academic exercise that serves as both the introduction to one's scholarly career in research, as well as the culmination of one's formal education. I hope that for the three nominees for this prize brought together today, this occasion marks as much a beginning in our profession as it does closure of their graduate educations.

Any prize whose geographical scope includes the phrase "everywhere else" is bound to see a wide assortment of submissions. In the end, I read nine manuscripts; but if I had been more multilingual than I am (or willing to discriminate on the random basis of my linguistic capabilities) I could have read half again as many more. These dissertations ranged in theme from company mergers during globalization to the spread of the Great Depression across colonial empires, to social welfare policy, to the mass movement of people across oceans, to the trade journals that taught home-grown engineers how to build steam engines. Reading them all was an exercise not just in comparing apples to oranges, but to grapes and bananas as well.

In the face of such diversity I selected a few criteria to be my guide. I looked for the creative and original use of source materials to answer questions important to the enterprise of economic history; for evidence of modes of thinking that reflect interdisciplinary perspectives; and for clear, indeed beautiful, prose allowing for the easy comprehension of complex arguments and ideas.

The first dissertation presented to you today is by Camila Alejandra Arza, titled, "Distributional Impacts of Social Policy: Pension Regimes in Argentina since c. 1944." It was completed at the London School of Economics, under the direction of Dr. Colin Lewis and Prof. Paul Johnson. This study examines the emergence, expansion, and reform of old-age pension programs in Argentina across the twentieth cen-

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tury with a particular emphasis on the latter half of that period. The course of the study reveals the tenacity of the historian in the archives, the deft hand of the econometrician, and the instinct for social modeling of the sociologist. Arza utilizes both qualitative and quantitative source materials of a most copious variety to assess both the policy objectives and the de facto distributional impacts of these pension programs.

She documents three fundamental policy regimes. The earliest, dating to early in the century, was a status-based one with eligibility earmarked only for certain categories of workers, but among them providing for some progressive redistribution of resources. The second, emerging out the early Peronist period, saw a shift towards much more open rules of eligibility and towards benefits based on earnings, which were not deliberately redistributive in nature but also not entirely proportional to life-time contributions. Finally, the reforms of the last decade of the century saw a strengthening of the trend towards contribution-based access, with benefits defined primarily on an insurance or *quid pro quo* basis—that is, one withdraws only in relation to what one has paid in.

Arza then asks who benefited most from these different policy regimes governing the rules of pension allocations? To answer this, she begins with a standard cross-sectional analysis of payers and payees, which picks up evidence of intergenerational redistributions but not much else. To her credit, she does not stop there, but rather adds a much more sophisticated lifecycle analysis, which tracks relative payments and benefits over the course of a lifetime using a sequence of household surveys linked over time. Perhaps not surprisingly, the earliest cohorts to contribute to the program, that is, those born before 1920, were the biggest net gainers with the highest returns relative to their contributions. They began paying in relatively late in their working lives to a system that was initially much more generous in its payouts than was to be the case in later years. Younger cohorts faced tougher requirements and longer periods of payments before receiving any benefits. Indeed, the cohort born between 1920 and 1940, which experienced the pension crisis and reform of the late twentieth century towards the close of their working lives, were often, in fact, actual net losers from the system. The lifecycle model suggests, however, that the returns for cohorts retiring in the future should be higher than for this transitional generation.

There have been intragenerational redistribution patterns as well. Most importantly, the early pension schemes of the Peronist period were mildly progressive, with lower income groups provided with higher returns on their payments than for higher income groups. This element had fully disappeared under the provisions of the late-twentieth-century reforms, as the system now pays benefits that more or less replicate the distribution of contributions over the lifetime.

These findings raise a number of interesting questions, which Arza does not address. Most importantly, what are the political ramifications of a pension scheme that for a significant cohort of people actually depletes individual's access to lifetime earnings? That is, we have here a pension scheme that not only fails to ameliorate risk, but actually adds to it! Nor is there a full discussion of the welfare efficiency implications of either the inter- or intragenerational redistribution patterns. As she herself notes, such a study would be an undertaking worthy of its own separate project. Nonetheless, we can only hope that she, or one of her colleagues in Argentinean economic history, has that on their agenda for the near future.

The second dissertation under consideration was written by Drew Keeling at the University of California at Berkeley. It is titled "The Business of Transatlantic Migration between Europe and the USA, 1900–1914" and was completed under the direction of Gerald Feldman, Jan de Vries, Richard Sutch, and Jon Gjerde. Here we find an

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old and much traversed topic of economic history, but examined with a totally new approach to the subject.

This too is a study of economic risk, first and foremost: risk on the part of migrants, but also on the part of the shipping companies that carried them, and the governments that authorized, or at least tacitly permitted, the free movement of labor. Only tangentially does this dissertation ask why it was that people migrated, or how they chose where they should migrate to, or whether those migration decisions paid off in material benefits, or how migrants affected labor markets in the places they left, or the places they arrived. In other words, all of the usual questions we tend to associate with studies of migration are not at the forefront here. Yet, this is squarely a study of migration—indeed the literal process of migration, and the business that made it possible.

This broad definition of the problem at hand allows Keeling to set straight the record on all sorts of things that historians of migration as conventionally understood have asserted without proof thus far. For example, it is often asserted that migration levels were particularly sensitive to changes in the transatlantic fare, but Keeling demonstrates that they were not. Rather they were very sensitive to changes in the American labor market, and for repeat voyages anyway, to the conditions of passage on the steamships themselves. Moreover, the specific timing of migration might be very sensitive to economic conditions for employment in the United States, while the overall demand for migration services was rather steadier. But for the shipping companies, timing was everything, given their very high fixed costs for capacity, schedule maintenance, fuel, and crew employment. The rise of second-class tickets and accommodations, and the differentiation in steerage between closed- and open-berth accommodations, both worked to diversify risk for the shipping companies. It gave them flexibility to switch their capacity (not between people and freight as is so commonly assumed but did not in fact happen as Keeling shows definitively). Instead companies could switch business between tourists and migrants, or between the westbound poor, huddled masses and eastbound returnees, either having made something of themselves, or fleeing employment recession. Finally, the improvements in conditions represented by these additions were not driven by government regulation, but by incentives on the part of the shipping companies themselves to induce repeat customers and to give themselves more flexibility to respond to times of revenue crises. Keeling's careful reconstruction of the direction and timing of migrant passages allows him to tease out nuances in the decision-making process that have been obscured until now. Moreover, he takes seriously for the first time, the actual business of moving people for its own sake.

Nonetheless, he could say more about the myriad ways that risk could be diversified. For example, he only touches briefly on how the migration chain of family/friend networks could mitigate risk. His econometric analysis of pricing schemes, particularly those permitted by class differentiation, could also have been more comprehensive. Perhaps the pricing structure had a somewhat accidental character to it (as in the undesirable fare wars, which emerged from time to time), but his analysis should not carry too much of that same sense of accidentalness. Finally, I wanted to know more about how the episode of the Titanic actually impacted pricing—not just safety regulations and advertising.

The final dissertation under consideration is that written by Alessandro Nuvolari, titled, "The Making of Steam Power Technology: A Study of Technical Change During the British Industrial Revolution." It was written at the Eindhoven University of Technology, the Netherlands.

This project is somewhat unusual in its inclusion here with more standard works of economic history, both for coming out of a technical university and for its sophisti-

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cated eighteenth-century engineering content. (I for one have finally learned how a simple steam engine actually works.) But this project is much more than just a technical history of engineering development. Indeed, it is fundamentally about the economics of technical diffusion. And if one does not understand the technical differences between alternative engine types, it is not possible to properly understand the economic forces that spread those engine types in different directions and with different timings.

At its most basic formulation, Nuvolari argues that we cannot simply chart engine developments from lesser prototypes to better ones. Rather, different types of engines used more or less coal for the same power, were easier or harder to repair on site, were better for pumping or better for rotary movement, etc. There is no one process of the diffusion of improved technology then, but rather extensive regional and industrial variation of what constitutes best practice. The latter can thus only be assessed in its immediate context. Econometric "adoption" equations reveal that proximity to coal mines, the price of coal, the alternate availability of water power, and previous technical experience with steam engines all impacted significantly the timing, shape, and direction of the diffusion process.

Nuvolari also offers us an alternative reading of the inducements to technical innovation from the increasingly standard view that secure property rights were critical to this process. He argues instead for the inclusion of something he calls "collective invention settings," which stress the historical significance of anonymous incremental technical advances. His close reading of the Cornish monthly publication *Lean's Engine Reporter* allows him to trace in quantitative detail the evolution of a particular technology, as well as the activities of the engineers responsible for it. There can be little doubt that "learning from others" was a critical part of the drive to technical advance.

This observation, while compelling on its own terms, is not ultimately reintegrated into a discussion of the by now very mature intellectual property rights literature. In particular, how might we understand the forces of "learning from others" and the desire to protect one's own ideas working together, or at least simultaneously? This is a question of endless timely import. We ask it all the time in our own universities and research centers. How can we benefit from collaboration and stimulate individual effort at the same time?

If these three young scholars of great promise put their minds to such fundamental questions, our profession, and indeed all intellectual endeavor, will be the richer for it.

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