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Summaries of Doctoral Dissertations

Mechanization, Transportation, and the Location of Industry in Germany, 1846–1907

This dissertation investigates the question: why do some regions industrialize and others do not? The large variation in industrial development across countries and across regions within these countries has long been of interest to economists. Increasing regional disparities in the emerging economies of India and China suggest that this debate is still relevant for modern industrial development. My dissertation looks at an example of successful catch-up growth from the nineteenth century that provides an opportunity to compare very different regional experiences within a large economy. The German Empire of 1871 transformed from a mostly agricultural economy into an industrial leader over the second half of the nineteenth century, but industrial growth was concentrated in a few regions and several areas lost traditional manufacturing centers in the process.

The central thesis of this dissertation is that technological change in manufacturing and transportation contributed to the regional concentration of industrial development. In other words, the industrialization process itself caused regional disparities. Specifically, the adoption of steam-powered machinery created incentives for manufacturers to concentrate production in central areas and around coal fields. At the same time, the railroad boom lowered transport costs, making it feasible to serve distant markets from these central locations. As a result, the Ruhr Area gained industrial employment in large numbers while regions in Bavaria and East Elbia lost traditional manufacturing centers.

The first chapter focuses on the transition from water to steam and later electric power in manufacturing and its impact on the regional concentration of employment. Water-powered establishments had to locate on streams with sufficient power and away from neighbors to avoid conflict over water rights. A new establishment could diminish the power that was available to upstream neighbors if it created too much backwater. Similarly, downstream wheels could be hurt by water storage if dams reduced the water flow while they filled up reservoirs. Evidence that such conflicts existed in Germany comes from Hunsrueck Mountains, where at least sixteen neighboring ironworks fought repeatedly over water rights in the eighteenth century, and Bergneustadt, where the Prussian water authority resolved similar complaints over storage levels in the early twentieth century (Nicke 1999, pp. 110–11; and Schmitt 1961, p. 174).

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The transition to steam power ended this potential for conflict among neighbors and introduced new incentives for manufacturers to form industry clusters. The introduction of steam engines created dependence on coal, which was expensive to transport, encouraging the location of manufacturing plants near coal mines. Installation and maintenance of steam engines and machinery also required the help of trained technicians, who were still scarce in Germany in the middle of the nineteenth century (Redlich 1944, p. 123). This suggests that manufacturers had an incentive to locate near mining and manufacturing centers with enough demand for machines and repair services to attract skilled engineers.

To empirically test the impact of mechanization on industry location, I compute indices of geographic concentration and co-location with coal mining for 124 manufacturing industries in 1875, 1895, and 1907 (Ellison and Glaeser 1994). These indices are regressed on measures of industrial power use with industry-fixed effects to control for unobserved characteristics. The results show that industries with larger water power establishments were geographically less concentrated, substantiating the claim that water power operations prevented the formation of industry clusters. In contrast to water wheels, the use of steam engines raised the geographic concentration of manufacturing industries. In some industries like machines, artificial dyes, and rubber, the growth of industry clusters away from coal mining regions suggests that this rise in concentration was not necessarily connected to cost savings for the transportation of fuel. Instead, it is likely that these industries became more concentrated because manufacturers took advantage of agglomeration economies to reduce the costs of introducing powered machinery. In industries like iron production, screws, and cotton spinning, new clusters were located in coal mining regions, which suggests that geographic concentration was the result of cost savings for the transportation of coal.

Lastly, the regression analysis indicates that the introduction of electric motors lowered the geographic concentration of industries. This suggests that the adoption of electric power did not contribute to the formation of industry clusters, but instead allowed manufacturers to spread out across more regions. One explanation for this finding is that the introduction of electricity led to a revival of manufacturing in southern regions that did not have coal deposits but possessed large water power sites which could be used for electric power generation.

The second dissertation chapter focuses on the importance of cheap coal for regional industrialization in the nineteenth century. The main goal of this chapter is to separately identify the impact of access to coal and access to the population centers that formed around coal mines. The introduction of steam engines and coke smelting created dependency on coal in manufacturing but it also contributed to the formation of new urban centers around coal mines. Especially in industries like textile production, where coal was a relatively minor input, these new population centers might have been the real reason for firms to locate production close to coal mines.

To separate these two factors, I estimate a location choice model in which firms decide to locate their employees in a particular district based on its profitability. This profitability is a function of the district's access to coal and its access to consumer markets. Digital maps of these districts and Germany's transportation network allow me to calculate the costs of shipping coal from each mining district to a potential manufacturing site. Similarly, I calculate the cost of shipping manufactured output to regional consumer markets in Germany and neighboring countries. Data on manufacturing employment and transportation costs from 1846, 1861, 1875, and 1882

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allows me to exploit variation across districts and over time as transportation costs fell and manufacturing employment expanded.

Railroad construction likely responded to the regional demand for transportation services, which raises concerns about the endogeneity of shipping costs. I address these concerns by using instrumental variables that are based on the straight line distances between districts and the growth of the national transportation network as a whole. An additional concern arises from the possibility of spatial spillovers between neighboring districts. I extend the methodology of Steven T. Berry, James Levinsohn, and Ariel Pakes to estimate the combinatorial logit model by Chaushie Chu, which offers a convenient way to allow for spatial autocorrelation in this setting (Berry, Levinsohn, and Pakes 1995; Chu 1989).

The results show that access to coal was more important than access to consumer markets for the location of employment in metal production and textiles. It is not surprising that coal mattered more than consumer markets for metal production, where fuel was the most important input measured in volume. It is surprising that textile production was concentrated in regions with cheap access to coal because fuel is generally not considered a major input for this sector. The explanation might be found by looking at machine tool making.

For machine tool makers, access to coal mattered more than access to consumer markets during industrial take-off between 1846 and 1861, but consumer markets became more important between 1875 and 1882. This finding matches the historical narrative about the German machine tool industry, which was tightly connected to mining during its early development but branched out to serve other industries later on (Redlich 1944). The result also suggests an explanation for the location of textile makers in coal mining regions. The mechanization of textile production required access to trained technicians. The fact that many of these technicians worked in coal mining might have been sufficient motivation for textile makers to locate in the same areas as well.

The third chapter takes a closer look at the effect of the railroad boom on industrial growth, paying attention to the different experiences of existing manufacturing centers and peripheral regions with low levels of industrial employment. On the one hand, transportation improvements could have promoted the growth of industry in peripheral regions where land and labor were presumably cheaper than in industrial areas. A reduction in transport costs could have attracted manufacturers to the periphery by making it cheaper to ship output back to markets in industrial regions.

On the other hand, transportation improvements could have increased the value of existing manufacturing centers, leading to more concentration in industry. It is possible that high transportation costs before the railroad boom acted as a protective barrier around regional markets. If location specific endowments or economies of scale and agglomeration in existing manufacturing centers were more valuable than cheap factor inputs in the periphery, removing this barrier could have led to a decline of manufacturing in regions with relatively low levels of industrial employment.

I test these predictions using a growth regression with per capita employment in manufacturing on the left-hand side and access to consumer markets on the right-hand side. The level of employment in manufacturing across all industries serves as a measure of industrial development in this setting with relatively large regions that each had a mix of employment in industry, agriculture, and services. The index of market access provides a convenient measure of transportation costs that considers all regional connections within the economy. An interaction term of growth in market

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access with the level of per capita manufacturing allows the impact of transportation improvements to vary across regions with different levels of industrial employment.

The results show that improvements in market access had a negative impact on manufacturing growth in regions with below median levels of per capita manufacturing. For regions above this mark, the impact of improved market access was positive. The finding indicates that transportation improvements did not support industrialization in regions without a strong manufacturing base but instead contributed to the geographic concentration of manufacturing.

Together the three dissertation chapters show that the regional concentration of early industrialization in Germany can be explained in part by technological change itself. One factor in this process, the dependence of manufacturers on coal, was specific to the era of steam engines. Most modern industries use electric motors, so they no longer need to have direct access to coal. The consequences of the railroad boom are more directly relevant for today's developing economies. Transportation investment is often used as a public policy tool to promote development in economically lagging regions by making it easier for them to participate in national markets. The findings in this dissertation caution against this use of transportation investment as a tool for regional convergence and suggest instead that regional imbalances may be an integral part of industrial development.

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Bullion, Bills, and Arbitrage: Exchange Markets in Fourteenth- to Seventeenth-Century Europe

Markets are critical to economic growth. As claimed by Smithian growth theory, markets encourage the division of labor and specialization. Compared with other factors, such as investment and technology, markets played an even more important role in economic development in the early modern era, when the economy was dominated by agriculture and manufacture operated on a small scale often under the control of guilds. In markets, surpluses could be sold, demand for various commodities satisfied, and people could obtain signals for their production and consumption decisions. The ability of markets to encourage economic development greatly depended on the degree of their integration and efficiency.

Compared with the grain market, in which degree of integration is susceptible to nonmarket factors (Aloisio 2007; Studer 2009; Howell 2010; Pfister, Uebele, and Albers 2011), financial markets come close to satisfying the conditions of arbitrage: trading in homogeneous goods and much freer from constraints imposed by regulations and transportation. Hence, it provides a better ground from which to study market integration and efficiency than does the grain market. Perhaps owing to the availability of data, most studies examine financial market development only from the eighteenth century onwards. Recently, by analyzing the difference between the nominal exchange rates of currencies and their mint parity, scholars have extended the quantitative study of financial market integration back to the late medieval and early modern period. They reveal that though progress in integration was noticed in the early sixteenth century, financial markets in fourteenth-to-sixteenth century Europe took quite a long time (approximately one year) to adjust (Volckart and Wolf 2006; Bernholz and Kugler 2008; Kugler 2009; Chilosi and Volckart 2011). However, these findings are based on low-frequency, i.e. annual, data, and do not provide a benchmark for judging whether the degree of integration, in terms of the speed of adjustment, was high or low *by the standards of the time*. Therefore, it is difficult to identify whether the great length of adjustment is due to the use of annual data, which probably gives upwardly biased results; (Federico 2012, p. 487) or reflects technological determinants of integration in the contemporary conditions, e.g., the speed of transportation and communication; or indicates genuinely poor market integration.

Because of these two problems, research has not yet offered a satisfactory assessment of the integration and efficiency of financial markets in the late Middle Ages and early modern era, nor of what factors determined the degree of integration and efficiency and whether later financial innovations had any impact on them. In order to answer these questions and to show long-term development, this thesis employs foreign exchange rates, which enable us to construct a high-frequency data set, e.g., monthly and weekly entries, to estimate the degree of financial market integration in late medieval and early modern Europe. Moreover, the thesis takes the

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contemporary speed of communication as a benchmark by which to judge market performances, since the flow of information was crucial to financial arbitrage.

This thesis is composed of three self-contained research papers. A contextual chapter (chapter 1) is included to address some fundamental issues shared by the three papers and illustrates how they together deal with the main theme of this thesis. Chapters 2, 3, and 4 investigate foreign exchange markets in terms of integration and efficiency in three subperiods of the late medieval and early modern eras. Chapter 2, using Datini's data, considers market integration against the backdrop of the great increase in the cost and risk of conducting business in such a hostile environment as fourteenth-century Europe, when warfare and plague were rampant. Taking advantage of the Great Debasement, 1544–1551, chapter 3 examines the impact of information asymmetry on the effectiveness of exchange arbitrage. Chapter 4 investigates northern European exchange market integration during the Franco-Dutch war, and shows that because of the financial innovations introduced at the turn of the seventeenth century, the costs associated with financial transactions fell substantially.

Originally, bills of exchange were devised to transfer money between different places with different currencies. Due to slow communication at the time, they began to function as credit instruments. Consequently, from late mediaeval times sale credit was granted through exchange dealings, the problem of temporary liquidity was solved, and capital could be more easily allocated (De Roover 1963). The dual function of bills of exchange—as means of payment and instruments of credit—rendered them indispensable in long-distance trade. Hence, the effectiveness of arbitrage on exchange markets can be used to measure how efficiently capital would have been allocated internationally in the late medieval and early modern eras.

The choice of period is, to a great extent, data-driven, but nevertheless each period reflects different stages in the development of foreign exchange markets and the political and economic circumstances of the time. Except for those that appear in the fragmentary seventeenth-century price currents, mercantile documents such as correspondence and merchants' account books and ledgers are the richest source of information about exchange rates before the eighteenth century. The data set used to study foreign exchange markets contains some published series and some new materials collected from the archives. For the late fourteenth century, this thesis employs the published exchange rates extracted from Datini's commercial documents.[1] In contrast with the exchange rates from around 1400, based entirely on a single source, the sixteenth-century series is a new collection of exchange rates compiled from various mercantile documents. The series of exchange rates for the seventeenth century is composed of those recorded in the Marescoe-David letters, with the addition of two other commercial documents.

Owing to transaction costs, the law of one price is held as long as the price differentials between two places remain in the band of transaction costs for arbitrage. The more integrated markets are, the quicker the adjustment will be and thus the shorter the time that the law of one price is violated. The threshold cointegration model is applied to measure the speed of adjustment and transaction cost of arbitrage. Due to slow communications, the estimated speeds of adjustment are deemed to be slow and will appear inefficient by modern standards. In order to properly interpret the results of the estimations, since arbitrage and price adjustment critically depended

[1] The exchange rates quoted in Venice can be found in the Medieval and Early Modern Data Bank (MEMDB), http://www2.scc.rutgers.edu/memdb/index.html (the last visit to the website was on 31 July 2012). The exchange rates of Bruges and Barcelona are reported in De Roover 1968, pp. 105–54.

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on the flow of information, the speed of communication in each period is used as a benchmark showing whether the foreign exchange markets in late medieval and early modern Europe were integrated and efficient.

This thesis finds that late medieval financial markets, as far as foreign exchange is concerned, were better integrated than existing studies have shown and arbitrage operated rapidly to exploit the profitable opportunities created by the government's interventions in exchange dealings. Looking at long-term developments, the degree of market integration was in close accordance with the contemporary speed of communication from the late fourteenth century to the late seventeenth century. However, the transaction costs associated with arbitrage on foreign exchange declined greatly, possibly due to the following financial innovations developed in the sixteenth and seventeenth centuries: discountability, negotiability and the endorsement of foreign bills, regular publication of exchange rates, and the establishment and engagement of public banks in handling bills of exchange (Neal 1990, pp. 1–43; Quinn and Roberds 2006). Together the results suggest that exchange markets in the late Middle Ages and early modern era were capable of allocating capital efficiently and bridging the demand and supply of funds effectively within the limits of contemporary conditions, particularly communication speeds. Consequently, though faced with the prevalent anti-usury doctrine, commercial ventures were financed in an economical way.

However, the thesis also shows that exchange market integration was temporarily hampered by warfare and monetary alterations. In the short term, market integration was disturbed by warfare which led to high transaction costs and interrupted trade. The effect of monetary alterations on market integration largely depended on the degree of information asymmetry. When information about monetary alteration was implicit and required some time to process, exchange markets could not adjust efficiently and a long interval elapsed before the restoration of equilibrium. The flow and quality of information critically determined the degree of financial market integration and efficiency in the period under survey.

In sum, this thesis advances two major contributions to the literature on financial markets. First, it uses monthly and weekly data in a medieval context and takes to a new level the quantitative analysis of late medieval financial markets. The high frequency data produces a more precise measurement of the degree of integration and, in contrast to the existing studies, the results do indicate that a high level of integration was achieved in the late Middle Ages. Second, this thesis takes the speed of communication into account and uses it to judge the estimated speed of integration. As financial integration was already known to be associated with the fall in information cost, (Chilosi and Volckart 2011) this thesis further connects the flow and quality of information to the speed of price adjustment. This is a new and useful idea in judging how well financial markets performed, since the flow of information plays an important role in financial arbitrage.

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Monetary Policy and Credit Policy During France's Golden Age, 1945–1973

My dissertation studies the policy of the French central bank (*Banque de France*) from 1945 to the early 1970s, during the so-called Golden Age of European growth (Crafts and Toniolo 1995; Eichengreen 2006). Contrary to the common view which describes this policy as passive and only determined by fiscal policy objectives, I show that central bank's actions were decisive in maintaining mild inflation as well as in easing access to credit and fostering investment and production growth.

Two main features are very important to understand the policy of the Banque de France—and more generally of European central banks—during this period. First, it relied on the direct management of quantities of money and credit (quantitative controls) rather than on their prices (interest rates). Second, credit policy, banking regulation, and monetary policy were constantly intertwined.

Conclusions of this dissertation shed new light on our understanding of French and West European economic growth, policies and business cycle during the "Golden Age" and offer a new interpretation of monetary policy under the Bretton Woods system.

The first chapter, *The Institution of Credit in France, from the End of World War II to the Early 1980s* is a long narrative of the policy of the Banque de France. It addresses important issues in French economic and political history such as the continuity between the Vichy regime and the democratic system, the new postwar institutions and their evolution, the sources of the Great Inflation of the 1970s, and the subsequent financial liberalization. It aims to provide an institutional analysis of French monetary policy over 35 years. Rather than merely describing the Banque de France as an institution or organization, I study monetary policy in a broad perspective: the institutionalization of credit, that is the set of laws, norms, social practices, and representative committees that established credit in a new way starting 1945. This process, named "nationalization of credit" at that time, was much wider than the nationalization of the central bank and commercial banks. It organized a complete network of institutions (private and public banks, semi-public credit institutions, the Treasury, the Planning Office, the Commission of Banking control, and the National Credit Council) whose main goal was to ensure that credit was allocated in line with "national and social priorities." In other words, credit policy was "embedded" in the social and political process. It was an essential component of what John Ruggie (1982) famously called "*Embedded* Liberalism" to characterize the postwar economic system.

I characterize three main dimensions of the "institution of credit" and I study how they evolved over time. The first is *legal*: what were the laws that enabled the state to control banks and markets, and how were they enforced? The second is *collective*: what were the common beliefs and practices that sustained the institution? The third is the *self-constraint*: how can an institution implements rules that avoid undermining its stability and efficiency?

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This third dimension provides an interpretation of the role of credit controls as a tool of restrictive monetary policy. When imposing credit controls in order to fight inflation, the Banque de France protected the French interventionist system of credit allocation against price instability. In the same time, credit controls were a means to pursue "selectivity" and to maintain the fundamental principles of the *dirigiste* system. Thus, there was no opposition between temporary credit restrictions for monetary purposes and state intervention in the allocation of credit for growth-enhancing purposes. This policy started to be questioned only in the early 1970s when the controls were deemed insufficient and when the selectivity of credit started to be viewed as creating inefficient rents and increasing too much heterogeneity between sectors.

The paper, *Monetary Policy Without Interest Rates. An Evaluation of French Monetary Policy, 1945–1973,* studies the use of direct quantitative controls on credit and money. It is the core of the dissertation as it shows quantitatively that interest rates were not a policy tool of the Banque de France and proposes a general method to estimate the effect of monetary policy when quantitative tools are the main instruments of monetary policy.

The main contribution of the paper is to show and explain why standard econometric methods (VAR using interest rates) are not able to account for the stance of monetary policy when quantitative controls are the main instruments of the central bank. I use a simple model to show why quantitative controls negate the role of interest rates and why, by nature, they involve the use of many instruments that change over time to adapt to banks' avoidance of the previous set of instruments. Using interest rates to estimate the effects of French monetary policy over the period does not provide any consistent result indeed.

Following the seminal works by Milton Friedman and Anna Schwartz (1963) and Christina and David Romer (1989), I thus implement an alternative method to measure and identify monetary policy shocks. This method, called the "narrative approach," relies on historical research and archival records in order to identify when policymakers decided to impose monetary restrictions. I construct a dummy variable that takes the value 1 when monetary policy is restrictive. The Bank of France implemented six restrictive episodes of a rather similar magnitude between 1945 and 1973.

Estimating the impact of monetary shocks in a VAR (vector autoregressions) using this accurate measure proves that monetary policy was an important determinant of production and prices fluctuations over the period. It explains around 40 percent of the variance of these variables. After two years, a monetary shock decreases money, production, and prices by about 5 percent. Moreover, the impulse response functions show a pattern very similar to standard VAR studies despite the sample, the country, the type of monetary policy, and the identification method being all quite different. Once monetary policy is appropriately measured, the French postwar experience with quantitative controls shows that usual results about the effects of monetary policy are obtained although interest rates were not the main instrument of the central bank.

The method and analytical framework developed in this paper can be extended to the many countries where the central bank has used or still uses quantitative controls.

The chapter, "The Quantities vs. Prices Tradeoff in Monetary Policy: An Interpretation of Credit Controls" provides a theoretical model that aims to explain why a central bank would use direct credit controls rather than relying on discount rate's changes. The model assumes that the choice of monetary policy instruments is

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not determined by macroeconomic disturbances but by the nature of the interaction between the central bank and the banks.

The paper shows that when the interest rate is not a market-clearing price then quantitative instruments and interest rates are not equivalent. The main intuition of the model is that the interest rates set by central banks have a dual role: they allocate credit and money but they also provide an incentive for investment. Then the interest rate set by the central bank also works as a signal that may exclude banks from the market. The main mechanism is that the central bank can run a restrictive monetary policy at a relatively low interest rate using credit controls and then exclude less banks (and then less projects) from the market. Compared to the market clearing case (first best), there are more banks receiving credit at the equilibrium but the high type bank receives a lower amount of credit. The rationale for such a choice could be either a political economy argument (maximizing the number of entrepreneurs), a policy to favor financial development through an increase in the number of banks, or a willingness to increase investment if the investment function has decreasing marginal returns to credit. Under some conditions, quantitative controls can thus be associated with financial development rather than financial repression. In an expansionary monetary policy, when the central bank commits to refinance all the banks whatever their demand (full allotment), the interest rate is fixed and does not play any role but the central bank adjusts the quantity of credit in function of the demand.

The model sheds light on French monetary policy from 1945 to 1973. First, the Banque de France did not follow a Taylor rule (the interest rate does not respond to variations in production, unemployment, inflation) but it followed a "quantity rule" ("Mc Callum rule) where the money supply is reacting to variations in production and prices. Second, the quantitative policy of the Banque de France can be interpreted as a second best equilibrium that increased investment and credit development but created rents. Rent creation explains the difficulties to reform the system in the 1970s.

The short fourth chapter, "France, the Dollar and the Bretton Woods System, 1960–1965," offers a new explanation of the French influential proposals to reform the international monetary system in the early 1960s. This topic is widely debated by historians and political scientists, but without taking into account the actual functioning of French monetary policy. The French views on the dollar during the 1960s cannot be deemed only as a political exploitation of the U.S. balance of payments deficit by the President de Gaulle. I study the making of a consistent French views on the failures of the Bretton Woods system and explains how it led to reform proposals aimed to define new "rules of the game" for monetary discipline and central bank cooperation. The paper deals with the functioning of the *gold pool*, the collective reserve unit proposal and Banque de France's policy between 1960 and 1965. It demonstrates that the economic motivations of French political postures have to be found in the interwar international monetary negotiations, in the reactions towards forms of cooperation led by the United States as well as in the new policy tools used by the Banque de France. The success of credit controls in 1958/59 and 1963–1965 in France is key to understand French views on the international monetary system and foreign policies at that time.

The last paper, "Financing a Planned Economy: Institutions and Credit Allocation in the French Golden Age of Growth (1954–1974)," investigates the role of monetary policy in the allocation of credit during the highest period of sustained growth in French history. This research is motivated by the fact that whereas the importance of financial development for growth has been extensively studied and documented by many historians and economists, the recent literature about postwar European growth

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and the catch-up process has largely ignored the financial factors and institutions that supported this tremendous growth. Most of all, interventionist measures of the early postwar period are often associated with financial repression whereas France, as well as other European countries, actually experienced financial deepening and growth.

I especially highlight how the central bank was largely involved in the *dirigiste* credit allocation process. The Banque de France used its discount window and other means of credit selectivity to favor priority sectors. It regulated the banks and other credit institutions and provided both general guidelines and the legal framework for credit allocation. Credit policy was closely related to the Plan and industrial policy but pursued its owned objectives with different instruments. The government and the Banque focused their interventions on medium- and long-term credit through rediscounting medium-term bills at the central bank and through the financing and supervision of semi-public credit institutions specialized in long-term loans. Medium- and long-term loans were registered as "investment credit" (*crédit d'investissement)* by the central bank. Credit selectivity also worked through many exemptions of credit controls during restrictive policy.

In order to assess the effects of this *dirigiste* allocation of credit, I construct a new database that matches the amount of short-term credit and "investment credit" in 49 sectors to corporate tax sectoral statistics between 1954 and 1974. I find a significant positive relationship between "investment credit" (medium and long term) and the marginal product of capital (MPK). Such a correlation is not observed with short-term credit. All over the period, there was convergence in the MPKs across sectors and an increase in the access of the smallest sectors to "investment credit." Using GMM (General methods of moments) estimations, I find that the effect of "investment credit" on investment and turnover growth is significant and positive, contrary to short-term credit's which did not play any role for investment. The planned financial system thus managed to allocate medium and long-term credit in a way that supported investment in sectors where capital was more marginally productive. I argue that this was a key factor for postwar catch-up growth. I also find that the effect of contractionary monetary policy is very different across sectors: the six biggest sectors of the economy (which were also monopolistic public sectors) did not suffer from credit restrictions over the period. I finally discuss the development of misallocations and debt overhang at the beginning of the 1970s.

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Essays in Education and Immigration Throughout the Twentieth Century

My dissertation addresses two issues in the history of human capital accumulation: education and immigrant assimilation. I focus on historically disadvantaged groups, including blacks in the U.S. South, ethnic white immigrants arriving in the United States during the Age of Mass Migration, and black South Africans after the imposition of Apartheid policies.

My dissertation consists of three papers. My first paper analyzes the relationship between access to schooling in childhood and criminal behavior later in life for black children born in the U.S. South and educated between 1920 and 1940. Specifically, I use the introduction of Rosenwald schools which increased access to schools for black children.

The second paper,[1] which is jointly authored with Ran Abramitzky and Leah Boustan, concerns the extent of immigrant assimilation in the U.S. labor market during the Age of Mass Migration, a period in which the United States maintained an open border to all European immigrants and experienced large immigrant in-flows. We construct panel data sets to estimate the occupational trajectories of immigrants relative to natives between 1900 and 1920.

Finally, the third paper is interested in language of instruction in education and looks at a natural experiment in South Africa in the 1950s. The question of whether to instruct students in their mother tongue is a question that is relevant to immigrant schooling in the United States today.

In the following sections, I outline the three papers.

ACCESS TO SCHOOLING AND THE BLACK-WHITE CRIME GAP IN THE EARLY TWENTIETH-CENTURY U.S. SOUTH: EVIDENCE FROM ROSENWALD SCHOOLS

In the United States, blacks have been incarcerated at higher rates in the United States since 1920 and this pattern goes back as far as the first post-slavery censuses. During the early twentieth century, blacks were 3.2 times more likely to be incarcerated than whites. The racial incarceration gap increased dramatically in the 1970s, but the focus of my paper is on the historical antecedent to this episode: my paper focuses on the evolution of this gap between 1920 and 1960.

The racial incarceration gap could have many causes, including discrimination in arrest and sentencing, differences in family background, lack of job opportunities for blacks, higher urbanization rates of blacks, and differences in educational attainment. This paper explores the role of one of these factors—disparities in education—in explaining the historical roots of the racial gap in crime. In particular, I analyze the relationship between access to education and the probability of incarceration between 1920 and 1940 among southern-born black men in the United States. I use the construction of almost 5,000 schools in 15 southern states for rural black

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[1] A version of this paper is Abramitzky, Boustan, and Eriksson (*forthcoming*).

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students between 1913 and 1931, sponsored in part by northern philanthropist Julius Rosenwald, as a quasi-natural experiment which increased the educational attainment and literacy of blacks born in the South.[2]

I build a new data set that matches the full universe of southern-born male prisoners from the 1920–1940 U.S. Censuses, along with a comparison sample of non-prisoners, to their birth families in a previous census earlier in life. Based on their location in childhood, I assign to these men their likely exposure to a Rosenwald school, defined as the number of years between the ages of seven and thirteen that a Rosenwald school was present in his county. I also construct an alternative measure of exposure, which is weighted by the probability that any child could have obtained a seat in the school in each year. That is, if a child had a school in his county for one year, but it could only serve half of the students, he would be assigned one-half of a year by this measure.

I find that access to education reduces crime later in life among adults. Exposure to a Rosenwald school for one year during childhood reduces the probability of being incarcerated for blacks by between 0.05 and 0.1 percentage points or 10–15 percent of the mean incarceration rate for blacks. This finding is robust to different comparison groups and alternative specifications. I find that most of the effect is among students whose county received a school when they were between seven and nine rather than between ages ten and thirteen.

Identification of the effect of Rosenwald schools on crime depends on variation in school construction across cohorts and races within a given county. I use county-fixed effects in my estimation and utilize white men as a control group. Potential threats to identification can arise from characteristics of counties that change over time in a way that was correlated with both the construction of new schools and with subsequent criminality. I address this concern by constructing a different measure of exposure which is based on the distance of a household from a school within a county; this design compares children within a certain distance from the school to those who did not grow up close to a school but who grew up in the same county.

Finally, I collect data from non-census sources in North Carolina to look at some potential mechanisms which might explain my main result. I collect data on juvenile crime and categories of adult crime. I find that the number of black juvenile court cases decreases in counties with exposure to Rosenwald schools. One year of exposure reduces juvenile court cases by about 15 percent of the mean. These results present some suggestive evidence that schools reduced juvenile transgressions which could have led to criminal activity in adulthood. I also collected archival data from the state prison registers in the North Carolina State Prison which include information about type of crime committed. Within a multinomial Logit framework, I show that Rosenwald schools reduce all categories of crime and that the effect is not restricted to the types of "nuisance" crimes for which blacks were regularly imprisoned in the Jim Crow South.

A NATION OF IMMIGRANTS: ASSIMILATION AND ECONOMIC OUTCOMES IN THE AGE OF MASS MIGRATION

In the second paper, we study the assimilation of European immigrants in the United States labor market during the Age of Mass Migration (1850–1913), one of the largest migration episodes in modern history. Almost thirty million immigrants moved to the United States during this period; by 1910, 22 percent of the U.S. labor force was

[2] Aaronson and Mazumder (2011) consider the effects of this school-building program on education outcomes of children.

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foreign born, compared with only 17 percent today. At the time, U.S. borders were completely open to European immigrants. Yet, much like today, contemporaries were concerned about the ability of migrants to assimilate into the U.S. economy. Congress fought with various presidential administrations about whether to tighten immigration policies for over thirty years before finally imposing strict quotas in 1924, putting an end to the era of open borders.

Our paper challenges conventional wisdom and prior research about immigrant assimilation during this period. The common view is that European immigrants held substantially lower-paid occupations than natives upon first arrival, but that they converged with the native born after spending some time in the United States. Using newly assembled panel data for 21,000 natives and immigrants from 16 sending European countries, we instead find that, on average, long-term immigrants from sending countries with real wages above the European median actually held significantly *higher-paid* occupations than U.S. natives upon first arrival, while immigrants from sending countries with below-median wages started out in equal or lower-paid occupations. We find little evidence for the commonly held view that immigrants converged with natives, but rather document substantial persistence of the initial earnings gap between immigrants and natives (whether positive or negative) over the lifecycle. In other words, regardless of starting point, immigrants experienced occupational upgrading similar to natives, thereby preserving the initial gaps between immigrants and natives over time. Furthermore, this gap persisted into the second generation; when migrants from a certain source country outperformed U.S. natives, so did second generation migrants, and vice versa.

Prior studies used cross-sectional data, which confounds immigrant convergence to natives in the labor market with immigrant arrival cohort effects and the selection of return migrants from the migrant pool. Indeed, when we use cross-sectional data, we confirm the findings of prior studies. When contrasting these findings with those using our panel data, we conclude that the apparent convergence in a single cross-section is driven by a decline in the quality of immigrant cohorts over time and the departure of negatively selected return migrants (see Lubotsky 2007 for a discussion of these sources of bias in contemporary data).

We conclude that the notion that immigrants faced a large initial occupational penalty during the historical Age of Mass Migration is overstated. Even when U.S. borders were open, the *average* immigrant who ended up settling in the U.S. long-term held occupations that commanded similar pay to U.S. natives upon first arrival. These findings suggest that migration restrictions or selection policies are not necessary to ensure strong migrants' performance in the labor market.

DOES THE LANGUAGE OF INSTRUCTION AFFECT LABOR MARKET OUTCOMES? EVIDENCE FROM SOUTH AFRICA

The language of instruction in primary school and beyond is a subject of debate, both in the United States in the context of Hispanic students and in post-apartheid South Africa where schools must choose between the mother tongue and English or Afrikaans for black students. The language of instruction could directly influence language skill and literacy, but could also directly or indirectly affect other important outcomes, such as wages and educational attainment.

Instruction in a student's native language could have multiple effects. It could help build skills such as numeracy and literacy, but also could make school more accessible to students. There could also be positive school quality effects whereby teachers are

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more effective at teaching in their native tongue and parents are more able to assist their children with school. On the other hand, teaching in English could increase English language skills, the language of most market transactions.

Estimating the effect of the language of instruction is difficult because it is often an endogenous choice that parents can make on behalf of their children. This paper uses a difference-in-difference framework in the context of an exogenous change in the language of instruction to identify the effect of increasing a student's potential years of mother tongue instruction from four years to six years.[3] In 1953 the new *apartheid* government in South Africa passed the Bantu Education Act which mandated eight years of mother tongue instruction for all black students. Prior to the law, instruction was in the student's mother tongue for less than eight years. Before the policy change, mother tongue instruction lasted for four years in the Transvaal, Cape, and Free State provinces and for six years in the Natal province. I use the 1980 South African census to examine labor market and other outcomes of men and women aged 28 to 48 who were affected by the reform.

My results indicate that increasing exposure to mother tongue instruction had small positive effects on male wages of 1–4 percent. I find that literacy and education levels increase in response to the policy change and that the wage increase is mostly through these channels. I also examine results for women and find smaller effects on wages despite increases in education and literacy. I interpret my results as evidence that school quality increased after the policy change so that students stayed in school longer which resulted in higher wages.

[3] See Angrist and Lavy and Angrist, Chin, and Godoy for similar identification strategies in the context of Morocco and Puerto Rico, respectively.

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New Deal Policies and Recovery from the Great Depression

The U.S. recovery from the Great Depression was nearly as exceptional as the Depression itself. When Franklin Roosevelt took office in March 1933, the unemployment rate was 21 percent, real GNP per capita was lower than it had been in 1907, and much of the banking system had collapsed.[1] Seven years later, in 1940, the unemployment rate had fallen to 9.5 percent and GNP per capita had grown 54 percent. Productivity had advanced at an unprecedented pace (Field 2011). But recovery had not been uniform. It was interrupted by a severe recession in 1937/38 in which the unemployment rate rose more than 3 percentage points.

Economic historians have long been interested in what caused the 1929 to 1933 U.S. downturn, but comparatively little work examines the recovery that followed.[2] This dissertation helps fill this gap. It adds to our understanding both of the rapid recovery and of the double-dip recession. I consider three episodes that illuminate the role of fiscal policy, unionization, and devaluation in this period. The first chapter examines the effects of a 2 percent of GDP fiscal stimulus program, the veterans' bonus of 1936. I document that fiscal policy worked: veterans spent a large share of their bonus. The second chapter examines the causes of the severe recession that followed the boom year of 1936. I show that a supply shock in the auto industry helps to explain this recessions' severity as well as its timing and geographic incidence. Finally, in the third chapter, I consider the sources of recovery during Franklin Roosevelt's first months in office. Just as a shock to the relative price of autos helped cause the 1937-38 recession, I suggest that an increase in the relative price of farm products helped cause the rapid recovery in spring 1933.

In addition to its focus on a common time and place, two themes unify this work. First, all three chapters show the importance of non-monetary factors during the 1930s. GDP growth of 13 percent in 1936 and –3 percent in 1938 can only be explained by the interaction of monetary factors with fiscal policy and exogenous developments in the auto industry. Chapter three suggests that rapid recovery in spring 1933 was due in part to the relative price effects on farmers of dollar devaluation. To be clear, none of these chapters disputes the primary importance of monetary factors. Rather, I show that at crucial times, non-monetary factors mattered.

The second theme of this dissertation is the role of the auto industry as an amplifying mechanism for demand and supply shocks. The veterans' bonus had large effects because veterans used their money to buy cars. Unionization in 1937 interacted with price-setting practices in the auto industry to create a large macro shock. And in spring 1933, auto production grew far more rapidly than industrial production as a whole, in part spurred by the car purchases of farmers enjoying higher crop prices.

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[1] The unemployment rate is from Darby (1976). Real GNP data are from Romer (1989) and NIPA table 1.7.6. Population data are available online from http://www.census.gov/popest/data/national/totals/pre-1980/tables/popclockest.txt.

[2] Exceptions include Cole and Ohanian (2004), Eggertsson (2008), and Romer (1992).

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Typically such industry-specific factors are absent from economists' accounts of this period. The existing literature emphasizes either the economy's automatic recovery mechanisms or the importance of monetary policy. Some authors argue that output growth after 1933 reflected the disappearance of temporary negative shocks (DeLong and Summers 1988) or the economy's strong self-correcting mechanisms (Bernanke and Parkinson 1989; Friedman and Schwartz 1963). Other authors dispute that there was anything natural or inevitable about rapid recovery post-1933. Barry Eichengreen and Jeffrey Sachs (1985) do not focus on the U.S. experience, but their finding that across countries devaluation was positively correlated with recovery suggests that monetary factors were important. Christina Romer (1992) forcefully articulates the case for a monetary explanation of U.S. recovery. She complements earlier work by Peter Temin and Barrie A. Wigmore (1990) who argue that the departure of the United States from the Gold Standard in April 1933 was a monetary regime change.[3]

Just as expansionary monetary policy is often thought to explain rapid growth from 1933 to 1937, contractionary monetary policy is the most popular explanation for the 1937/38 recession.[4] The Federal Reserve raised reserve requirements in August 1936 and again in March and May 1937. And in December 1936 the Treasury began sterilizing gold inflows. There is an emerging consensus that the key shock was the Treasury gold sterilization rather than the increase in reserve requirements. Douglas A. Irwin (2012) estimates that absent gold sterilization, in 1937 the monetary base would have been as much as 10 percent larger.

This brief tour of the literature suggests a unified monetarist interpretation of the 1930s: when money growth was rapid, as it was from 1933 through 1936, and again after 1938, growth was rapid. When money growth slowed, as it did in 1937/38, so did growth. We shall see that this story is too simple.

My first chapter considers fiscal policy. Economists have generally accepted E. Cary Brown's (1956) statement that, "Fiscal policy . . . seems to have been an unsuccessful recovery device in the 'thirties-not because it did not work, but because it was not tried"' (pp. 863–66). In fact, this chapter demonstrates that fiscal policy, though inadvertent, was tried in 1936, and a variety of evidence suggests that it worked. In June 1936, a deficit-financed veterans' bonus provided 3.2 million World War I veterans with cash and bond payments totaling 2 percent of GDP; the typical veteran received a payment equal to annual per capita personal income, enough money to buy a new car.

This chapter uses cross-sectional data to identify the effects of the bonus. I examine four sources of quantitative evidence: a detailed household consumption survey, cross-state and cross-city regressions, aggregate time-series, and a previously unused American Legion survey of veterans. The evidence paints a consistent picture in which veterans quickly spent the majority of their bonus. The point estimate of the marginal propensity to consume is 0.7, with at least half this spending on cars and housing. Combined with a reasonable estimate of the multiplier, this suggests that the bonus added 2.5 to 3 percentage points to 1936 GDP growth.

[3] Eggertsson (2008) formalizes this argument.

[4] See, for example, Roose (1954), Friedman and Schwartz (1963), Eichengreen (1992), Romer (1992), Velde (2009), and Irwin (2012). Some authors have also considered contractionary fiscal policy as a possible cause of this recession. See chapter 2 of my dissertation.

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This chapter contributes both to the economic history of the 1930s, and to the literature on the consumption effects of fiscal transfers. In particular, I show that the marginal propensity to consume can be high even when transfer payments are very large. I argue that features of the 1936 economy, some unique to the time, some generally present in economic recoveries, were conducive to large effects from a transfer payment. Liquidity constraints were pervasive and were made binding by expectations of higher future income. Stocks of autos and housing were low, so many households chose to buy a car or house rather than save their bonus. Indeed, receiving the bonus made veterans 22 percentage points more likely to purchase a car. Finally, since interest rates were at the zero lower bound, the spending multiplier is likely to have been high.

Thus the effect of the bonus was not independent of the state of the economy. In particular, it mattered that the share of the population that owned cars was large and growing.[5] In chapter two, I argue that the size of the auto industry also played a central role in the 1937/38 recession. The conventional wisdom blames the double-dip recession on monetary contraction, and to a lesser extent on the backside of the veterans' bonus and the instatement of social security taxes. But while these factors were undoubtedly important, I show that there are in fact timing, geographic, and sectoral anomalies in the recession not easily explained by macro policy. Specifically:

- The decline in industrial production from September to December 1937 was the largest three-month decline in the history of the Federal Reserve and Miron-Romer series going back to 1884.
- Manufacturing employment rose in eight states despite a 12 percent decline nationwide.
- There was a lack of comovement between components of GDP. Durables consumption fell over 17 percent while nondurables consumption rose.

My analysis points strongly to a role for the auto industry in explaining the unusual features of the recession: manufacturing employment fell most in Michigan, and auto production fell by nearly 50 percent. Furthermore, auto prices rose while the economy-wide price level fell. In the second half of the chapter, I ask what explains the peculiar behavior of the auto industry, and how exogenous developments in this industry affected the rest of the economy. I argue that a cost shock and consequent auto price increases explain the collapse of car sales and production. Unionization and an increase in raw material costs led auto manufacturers to raise prices in fall 1937. Equally important, the increase in costs combined with nominal rigidity to make the price increase predictable. Expectations of price increases brought auto sales forward and thus sustained sales during the summer and early fall of 1937, despite negative monetary and fiscal factors. When auto prices did increase in fall 1937, sales plummeted. Narrative evidence confirms this story.

To quantify the effect on auto sales, I perform a forecasting exercise. Using criteria that penalize overfitting, I choose the model that best matches the monthly pre-recession behavior of auto sales given fiscal and monetary factors and overall economic conditions. As expected, the model underpredicts sales in the summer of 1937, when consumers expected auto prices to soon increase, and overpredicts

[5] In 1935 there was roughly one car on the road for every 6 people in the country; the population was 127 million and there were 22.5 million cars registered. Population data are from http://www.census.gov/popest/data/national/totals/pre-1980/tables/popclockest.txt. Car registration data are from NBER macro history series a01108.

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sales in 1938. This exercise implies that without the expected increase in auto prices, the fall in auto sales between 1937 and 1938 would have been 0.8 million rather than the actual 1.6 million. Using data on the price of cars sold and an estimate of the multiplier, I find that positive price expectations added 0.3 percent to GDP in 1937, while the subsequent drop-off in sales subtracted 1 percent from GDP in 1938: absent the shock, the output decline in 1938 would have been more than a third smaller.

This chapter contributes to our understanding of the severe 1937/38 recession and provides an unusually clear example of how supply shocks can affect the economy. Perhaps surprisingly, the 1937/38 recession may also help us understand the 1933 recovery. My third chapter considers the causes of U.S. growth in the immediate aftermath of Roosevelt's inauguration. From its low point in March 1933, seasonally adjusted industrial production rose 57 percent in four months.[6] The existing literature has emphasized two explanations for the economy's emergence from the Depression in spring 1933: first, the effects of Franklin Roosevelt's words and actions on inflation expectations, and second, the direct effects of the dollar's devaluation on farmers. Both explanations can in theory explain the economy's turnaround and the concentration of the recovery in durable goods industries, particularly autos.

It has been difficult to know whether there was a distinct channel leading to recovery through agriculture absent high frequency geographically disaggregated data. We have not known whether recovery proceeded more or less rapidly in North Dakota or in New York. The contribution of this chapter is to provide such data and to use it to test whether recovery proceeded more quickly in agricultural states. I exploit a previously unused data set of monthly, state-level auto sales to examine whether the share of a state's population engaged in farming was correlated with auto sales recovery in spring 1933. I find that it was. A one-standard-deviation increase in the share of a state's population living on farms is associated with roughly a 25 percentage point increase in auto sales growth from late winter to early summer 1933. My results imply that the recovery, at least as measured by auto sales, might have been as much as 50 percent slower if farm demand had not grown more rapidly than demand in the economy as a whole.

As in 1937 price expectations may have been an important transmission channel. I hypothesize that although higher crop prices only directly benefited the 25 percent of the population in agriculture,[7] they may have contributed to consumer expectations of future price increases. This in turn could have boosted consumer demand in both urban and rural areas.

This dissertation is unified both by themes and by methodology. Throughout I use disaggregated data to shed light on macro questions. I examine the micro implications of macro hypotheses: if the veterans' bonus was effective, households with veterans ought to have spent more; if an auto shock contributed to the 1937/38 recession, employment ought to have fallen most in Michigan; and if higher crop prices contributed to recovery in spring 1933, recovery ought to have proceeded most rapidly in agricultural states. Of course, such micro tests are no panacea. The challenge is often to interpret what the micro results say about the macro question. What does a household level marginal propensity to consume reveal about the aggregate effect of the veterans' bonus? What might the geographic dispersion of auto sales say about

[6] FRED series INDPRO.

[7] The share of the population in agriculture is taken from the 5 percent IPUMS sample of the 1930 Census (Ruggles *et al.* 2010).

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aggregate recovery in spring 1933? The mapping from the micro data to such macro questions often requires further assumptions. But while inevitably subject to debate, this approach has great promise for future research.

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From Memory to Mastery: Accounting for Control in America, 1850–1880

In 1855 G.W. Fisher published the fourth edition of *Scribner's Ready Reckoner*. Ready reckoners—the pocket calculators of antebellum America—typically contained a short introduction, a table of contents, and pages upon pages of simple mathematical tables designed to aid in daily computations. Most were tiny: despite being "enlarged and improved" from prior editions, *Scribner's* measured just 5 inches tall, conveniently sized for a shopkeeper, a merchant, a butcher, or even a workman to slip into his coat pocket. If Fisher's sales figures can be trusted, *Scribner's* was a bestseller. The 1855 edition touted sales in excess of 100,000; the 1866 edition 300,000; and the 1872 edition more than 450,000. *Scribner's* was only one of dozens of similar books published around the country, and ready reckoners are but one artifact of the ascendance of commercial calculation in eighteenth- and nineteenth-century America (Scribner 1855, 1866; *New Hampshire Register and Business Directory*, p. 172).

From Memory to Mastery: Accounting for Control in America charts the development of commercial arithmetic and accounting in America and the English-speaking Atlantic world between 1750 and 1880. The dissertation draws on a wide array of quantitative and partially quantitative documents—from manuals and textbooks to time books, journals, and ledgers, to trial balances and casual calculations scribbled on scraps of paper. These sources survive in incredible numbers, occupying many thousands of feet of shelf space in archival collections. Together they offer a window into the reasoning of eighteenth- and nineteenth-century economic actors, revealing how they used numbers to make sense of the increasingly complex world around them. Accounting, bookkeeping, and commercial arithmetic offered a language for weighing values—both moral and monetary. An extraordinary range of people used this numerical language, condensing, classifying, and ordering information in new ways. They strove to make their businesses more profitable, to stretch their wages to cover their rent, to extract more labor from slaves, and to better understanding almost every aspect of the increasingly complex economy around them.[1]

From Memory to Mastery makes two important contributions to our understanding of the role of commercial calculation in early America. First, it adds to research that explores the shift from accounting as recordkeeping (an aid to "memory") to accounting as a tool for an analysis and negotiation (an instrument of "mastery"). Throughout the project, I explore the ways Americans not only collected data but also began to put it to use. Second, the study reorients the history of quantitative business practices to focus attention on slave plantations. Many histories of this period continue to emphasize northern factories over southern plantations, which Alfred Chandler

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[1] Among many works cited in the dissertation, the project draws methodological guidance from cultural histories of numeracy such as Cohen 1982; histories of accounting such as Previts and Merino 1998; and histories of business practices such as Levenstein 1998; and Yates 1989.

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described as a "fundamentally ancient form" of production (Chandler 1977, pp. 63–64). The dissertation compares practices on slave plantations with those in free factories, showing that in some cases plantation bookkeeping techniques advanced ahead of those in northern factories. Planters' control over their laborers made data both easier to collect and easier to put to use. The harsh power relations of slavery enabled sophisticated planters to adopt strict labor regimes, allocating and reallocating labor from task to task and speeding up production. By contrast, the mobility of workers in free northern factories made detailed recordkeeping necessary for tracking wages but relatively futile for detailed benchmarks and comparisons. Unlike slaves, free workers confronted with speedups and intrusive management practices could quit, and high levels of turnover thwarted efforts to collect and use productivity data.[2]

The dissertation is structured in three parts, each of which explores a different aspect of the development of commercial numeracy. Part 1 (chapters 1 and 2) describes the development of quantitative practices on southern and West Indian plantations. Part 2 (chapters 3 and 4) contrasts this history with the development of numerical management in northern factories, where a wider array of men and women made use of commercial calculation, but few matched consistency and fervor evident in the most comprehensive southern account books. Finally, Part 3 (chapter 5) closes the dissertation with a statistical analysis of accounting practices among Massachusetts corporations. This section makes use of a unique data set to both clarify and complicate the qualitative close readings of account books elsewhere in the project.

Chapter 1 opens on a mid-sized plantation in Mississippi, following an individual planter as he refined his accounting techniques, eventually adopting Thomas Affleck's "Plantation Record and Account Book." First published in the late 1840s, Affleck's journals contained every record necessary for a year of cotton or sugar planting. With the appropriate version of this fill-in-the-blanks journal, anyone who could write and add could keep sophisticated records. The book contained fifteen distinct forms, ranging from accounts of daily productivity, to records of crop yields, inventories of slaves, and an annual balance sheet. Affleck and other accounting advocates popularized a range of sophisticated techniques, including the evaluation of depreciation, the grading of slaves into fractional hands, and the measurement of productivity. They also shared the results of their efforts in the lively southern agricultural press.[3]

Plantation accounting in the American South did not develop in isolation, and chapter 2 situates antebellum bookkeeping practices in a longer Atlantic story. Eighteenth-century networks of numerical expertise connected England and Scotland to the West Indies and North America. Here I draw on manuscript account books to reconstruct the management structure of sugar plantations in Jamaica and Barbados. Large sugar plantations might employ as many as six or seven bookkeepers who kept a wide array of records, including daily work logs, balance sheets of births and deaths, records of boiling, inventories of livestock, and complex abstracts to be sent back to England. They were middle managers in complex hierarchies: above them were overseers and attorneys, and below them enslaved drivers and the men who toiled

[2] Other work that has begun to explore the links between slavery and modern management includes Van der Linden 2010; Cooke 2003; On plantation accounting more narrowly, see Fleischman, Oldroyd, and Tyson 2011.

[3] For an easily accessible example and advertisement, see Clark and Affleck (1860) and Weld & Company (1847).

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in the fields. As planters, agents, overseers, and bookkeepers moved through the Atlantic world, they carried accounting practices with them. Jamaica and Barbados became the center of an exchange of ideas just as important as the trade in commodities.

Chapter 3 turns to numerical practices in free northern factories, focusing on New England and the Mid-Atlantic. Here too, the early to mid-nineteenth century was a time of innovation and experimentation, and entrepreneurs applied accounting practices to the operations of their businesses. As textile mills and iron forges grew, managers adapted a wide array accounting methods to meet their needs: they tinkered with the form of the ledger, the process of closing the books, the management of labor turnover, and the setting of piece and wage rates. These helped them to continue to know about their workers even when they no longer knew them. In many aspects northern accountants kept more complex and extensive records than elite southern planters, but in the analysis of labor productivity they sometimes lagged behind. I argue that their more rudimentary practices reflected workmen's ability to negotiate terms and quit when they were dissatisfied. The type of control possible on southern plantations was simply impossible in textile mills and iron forges that often struggled to maintain staff. Further, with capital invested in machinery rather than men, stoppages were costly. Therefore many managers and accountants focused on keeping enterprises running rather than pushing down labor costs or speeding up production.

Chapter 4, "Schools, Books, and Book-keeping," explores the dissemination of accounting knowledge. The expanding scope for commercial calculation required a growing class of clerical workers. These men (and increasingly women) learned accounting both in school and independently using a wide array of textbooks and manuals. Common schools increasingly taught commercial arithmetic to children, and older students could attend commercial colleges to learn accounting. The spread of for-profit commercial colleges was particularly dramatic: hundreds of these schools opened across the United States, typically offering short courses in various business skills. Armed with certificates and skills from these colleges, a growing numbers of men and women went to work for large corporations, helping to organize unprecedented quantities of business information. The expansion of recordkeeping accompanied escalating division of responsibilities among clerical and information workers. Where previously the categories of clerk, bookkeeper, and accountant had been overlapping and sometimes interchangeable, firm professional boundaries came to divide highly skilled accountants from bookkeepers and clerks, the least of whom often only needed to be able to write and add.

Finally, chapter 5, "Effectiveness and Unevenness," steps back from the close readings of individual account books elsewhere in the dissertation to assess bookkeeping practices in the aggregate. How common were bookkeeping techniques? And did entrepreneurs' attempts to be more "rational" actually improve the performance of their businesses? Though no national data is available, in 1875 the state of Massachusetts required corporations to report their assets and earnings on a preformatted balance sheet. Analyzing how well firms completed these forms and where they committed errors offers a window into their overall level of accounting expertise. In 1875 approximately one-third of corporations failed even to balance their balance sheets, and two-thirds did not consider depreciation. The proportion balancing their books increased steadily from year-to-year, while the use of depreciation remained stable. Interestingly, those firms correctly completing the forms survived longer than their counterparts who did not. This finding—that firms using proper accounting survived longer—is robust to controls for size and industry, though

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difficulties in identification prevent any causal conclusions. What is clear is those firms that used "correct" accounting were among the most important and long-lived corporations in Massachusetts Together with the close readings of account books elsewhere in the dissertation, this data suggests that accounting practices were incredibly diverse but also fundamental to firm survival (Massachusetts 1876).

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Comments on Gutberlet, Li, and Monnet

THERESA GUTBERLET

Theresa Gutberlet's dissertation is on the economic history of Germany during the nineteenth century. The main focus is on the spatial patterns of industrialization. Gutblerlet seeks to explain where steam power was adopted and where industrial activity grew the most. The literature suggests that coal deposits and the construction of railroads were two important factors, but it does not give definitive estimates as to how important they were. The topic speaks to broader themes in economics, where there is a debate about the importance of endowments versus access to population centers in determining the scale of a region's manufacturing sector. In three chapters, Gutberlet addresses the following questions concerning Germany's industrialization:

1. How did the adoption of steam power in the nineteenth century affect the geographic concentration of industry?
2. How did access to coal and access to population centers affect industrial employment?
3. How did railroads affect the growth of manufacturing employment differently in regions depending on their initial level of manufacturing employment?

Gutberlet uses German manufacturing and employment censuses at various dates from 1846 to 1907. The data are particularly rich defining employment in various sectors across regions. Power sources are also given like the use of water or steam. Gutberlet also uses Historical Geographic Information Systems or HGIS which provide maps of railroads and navigable waterways at the same dates. The HGIS data is particularly useful in creating variables for access to coal and markets. The maps are used in conjunction with network software that identifies the cheapest route between any two locations. The cost of the cheapest route is then used as the transport cost.

Gutberlet's approach to measuring market access is one of the most innovative aspects of her dissertation. The variables incorporate features of the transport network which standard dummy variables for railroad access cannot. For example, having a railroad to large city like Berlin is more valuable than a railroad to a mid-sized market town. If a city gains access to Berlin by railroad then under Gutberlet's measure their market access will have increased more than if they gained access to a smaller city by railroad. A similar argument applies to different types of coal. If a city gains better access to hard coal, which is more useful for industrial purposes, then it is likely to have different industrialization prospects compared to a city that gains better access to soft coal.

In the second chapter of the dissertation, Gutberlet takes up the important question of where industrial activity grew the most in Germany. Gutberlet starts with a theoretical model to help frame the data. It relates industrial employment in each region to measures of access to coal and access to population centers. Gutberlet argues that ordinary least squares regression of regional employment shares on access variables is likely to generate biased results. One problem is spatial autocorrelation, in which unobservable characteristics are similar in nearby regions. Another problem is endogeneity of access which is composed of endogenous population changes and endogenous network formation. Following the lead of Stephen Berry (1994), Gutberlet proposes a paired combinatorial logit model. Gutberlet also proposes an instrument for

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access which uses distance to other population centers interacted with the size of the national transport network, and lagged values of other cities population. In the case of market access, the idea is that a city is most likely to first get a railroad to its largest and closest cities and only later does it get railroads to smaller and more distance cities. The instrument works well in predicting access but it is unclear to this reader whether it meets the exclusion restriction. As it turns out, the model with instruments does not yield significantly different results from the OLS model, but the pairwise combinatorial model does yield quite different results. My own takeaway is that the specification of the model is likely to be more important than endogeneity concerns in this case.

What does Gutberlet find? Access to markets and access to coal are both important, but the effects are not the same across sectors. Perhaps most surprising is that textile and machinery production are more impacted by access to coal and metal goods are more impacted by access to population centers. One might have thought the opposite pattern would be found as energy is not a large cost in textile production. Putting the sectoral differences aside, the larger implication is that the likelihood of industrialization in Germany was greatly enhanced by domestic coal deposits and transport improvements. However, neither of these factors is truly exogenous. Coal deposits are discovered and transport networks are created and operated by historical actors. It is noteworthy that Germany was one of the first countries to use the regulatory power of the state to pressure railroads into charging low freight rates on coal. Had it done otherwise access to coal would have been more limited in Germany and hence its industrialization might have been less rapid.

Gutberlet's other chapters are of equal quality, but space limitations preclude more than a brief discussion of their findings. In the last chapter dealing more directly with railroads, Gutblerlet documents an interesting pattern: regions that had greater manufacturing around 1846 experienced a larger increase in manufacturing from the construction of railroads in subsequent decades. In other words, railroads contributed to greater spatial divergence in manufacturing activity. The finding contributes to a growing literature in economics which documents the uneven distributional impacts of transport improvements.

In closing, Gutberlet's dissertation provides a number of new insights into German industrialization. The methodological advances associated with measuring market access are also significant and will provide a model for future scholars.

LING-FAN LI

Ling-Fan Li applies the latest econometric techniques to some very old data and some classic questions in European economic history. Li's aim is to measure the degree of market integration in Europe during the late middle ages and early modern periods. This era is defined by the economic rise of northwestern Europe and especially the financial centers of Antwerp and Amsterdam. These financial markets were becoming increasingly sophisticated in the use of bills of exchange and other financial instruments. Market development in northwestern Europe is remarkable given the poor state of communications at the time. Moreover, markets were periodically ravaged by war and debasements of the currency which lead to redistribution and financial ruin. To get some sense of the problem, imagine you were a merchant who just signed a contract to sell goods in Flemish money today and get repaid in English money at a future date. But now the English coin loses 40 percent of its silver value because of a debasement by the king. You are likely to be in trouble

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as are other traders operating in the market. The debasement could result in a trading breakdown which ultimately leads to wide price differences across markets and lengthy periods before prices return to pre-shock levels.

With these broader issues in mind, Li's three chapters address the following questions:

1. To what degree were the markets of Venice, Bruges, Paris, and Barcelona integrated c.1400?
2. To what degree were London and Antwerp's markets integrated during the Great Debasement of King Henry c.1545?
3. To what degree were the markets of London, Hamburg, and Amsterdam integrated during the Franco-Dutch War c.1670?

Li addresses these questions using new data on weekly exchange rates in each of these markets. The data come from merchant accounts which are one of the few sources in this period. Li checks their reliability against printed sources whenever possible and finds them to be reliable. Li then calculates direct exchange rates say between London and Amsterdam's currencies and cross exchange rates, say from London to Hamburg's currency and then from Hamburg to Amsterdam's currency. In a well-integrated market, one would expect the direct and cross exchange rates to evolve together and Li uses these two series to study integration. The high frequency of the data (weekly observations) is also important in estimating the econometric model. As Li argues, the use of monthly or annual data gives different results.

In terms of methodology, Li uses threshold error correction models (TARs), which are the latest technique for studying market integration. TARs give two important statistics: the market transaction cost, which measures the costs of engaging in financial trades, and the speed of adjustment, which measures the time to eliminate half of any price difference exceeding the transaction cost. Theoretically these are exactly the parameters one would like to know in judging the integration of markets and in evaluating various historical shocks.

What does Li's data and methodology show? First, we learn that war and currency debasements create more market disintegration. For example, the Franco Dutch War led to greater transaction costs and slower speeds of adjustment between London, Hamburg, and Amsterdam. Interestingly in this and the other cases, Li studies war and debasements are largely temporary shocks as the markets generally recover to their pre-shock level of integration. The findings raise some general questions about the long-term effects of war in Europe. I am tempted to conclude that wars introduced only a temporary shock, but I wonder whether there is a sample selection problem in judging the effects of war. In some cases, like the Spanish blockade of Antwerp, the markets may not recover but we don't observe these cases. More research should be done to give a general quantitative assessment of wars.

Secondly, Li's analysis shows that some financial markets were highly integrated in the early modern period, particularly London and Amsterdam in the 1670s. In these two markets, estimated transaction costs are around 0.5 percent and the half-life is around a week. To show how remarkable these statistics are consider that London and New York are estimated to have similar transaction costs and half lives in the late nineteenth century. What explains the different levels of integration across time and space? Throughout the thesis, Li emphasizes the cost of communication as being a key factor. Clearly, it was in the case of London and Amsterdam which were a short distance and had good transport links. One of the future tasks for Li is to identify the

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role of communication costs and to separate them from other factors like commodity trade and institutions. What I found to be especially interesting is that London and Amsterdam's markets were highly integrated despite the uncertainty surrounding Britain's changing institutions and war in the north Atlantic. Perhaps merchants relied on informal institutions to enforce their contracts, and were less affected by political shocks.

More broadly, Li's research shows how modern econometric techniques can be applied to very old data. It is often suggested that the Middle Ages are data scarce and that little "cliometric" analysis can be carried out for this period. Li shows this is not the case and provides a guide for others interested in measuring the degree of market integration and its determinants.

ERIC MONNET

Eric Monnet's dissertation offers a new perspective on macroeconomic history. Monnet studies French monetary and financial policy from 1948 to 1973. He makes the provocative argument that France used quantitative controls rather than prices to conduct monetary policy. The work adds to a growing literature seeking to understand monetary policy and its economic effects in the post-World War II world. Much of this literature deals with the United States and assumes that central banks controlled interest rates. Vector Auto Regression (VAR) models are then used to study the link between output and interest rates. Monnet departs from this framework by studying quantities. A quantitative control is any policy lever that affects the quantity of money or credit rather than interest rates. One example is a ceiling on bills discounted by the central bank. Another is a fixed allocation of credit to each sector. In several chapters, Monnet addresses the following questions:

1. How did periods of restrictive quantitative controls affect macroeconomic indicators like output, employment, and prices?
2. Can quantitative controls be justified by economic theory?
3. Did government-influenced credit flows generate inefficiency?

To address these questions, Monnet uses a variety of sources. The most innovative are the minutes of the General Council of the Bank of France. From this source, Monnet identifies periods of more restrictive quantitative controls. Here Monnet is following the approach of Milton Friedman and Anna Jacobson Schwartz (2008) and more recently Christina Romer and David Romer (1994) who pioneered the so-called "narrative approach" for measuring monetary policy. Like previous scholars, Monnet is open to the criticism of subjectivity, yet he does a good job convincing the reader why one period is defined as restrictive. Monnet also breaks company with the Romer and Romer in assuming the narrative measure of monetary policy is endogenous. Monnet assumes that quantitative monetary policy is a function of past values of prices and output. Monnet addresses this issue specifically in his chapter on the effects of quantitative controls. The approach is to estimate a structural VAR model, the simplest including output, prices, and the narrative measure of monetary policy coded as zero or one. Identification comes from the assumption that monetary policy simultaneously affects output and prices but is not itself simultaneously affected by output and prices. The assumption seems reasonable in the context of France c.1960, although a skeptical referee might need more convincing. The results are strikingly clear and show that following periods of restrictive quantitative controls

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French prices and output fall. In other words, by restricting monetary quantities the French Central Bank produced similar economic responses as the U.S. Federal Reserve today when it raises interest rates. To make this point more directly, Monnet also shows that there is no significant relationship between prices, output, and French interest rates in a comparable VAR model. The bigger lesson is that there are very different ways of conducting monetary policy.

Why would the French Bank use quantitative controls and not interest rates? Monnet takes up this difficult question in a later chapter. The standard explanation in the literature is financial repression. The government aims to ensure a market for its bonds and gain seignorage. Monnet offers an alternative explanation in which information asymmetries and sunk costs give credit controls the possibility of raising welfare. Although plausible this alternative theory is no more consistent with the data than financial repression. More evidence is needed.

The last chapter analyzes whether financial policies influencing credit flows were inefficient. One challenge is that Monnet cannot distinguish between government directed credit flows and those chosen by banks without government direction. Nevertheless, Monnet offers evidence that financial policies were not necessarily inefficient. Monnet finds that long-term credit flowed to sectors with a higher marginal product of capital and helped to increase investment. Thus Monnet can rule out what I would call gross inefficiencies: loans which yielded no investment or went to sectors where capital generated lower returns. However, Monnet finds that short-term credit flows did not have these properties. In other words, credit did not flow to the sectors with the highest marginal product of capital. As short-term credit flows were the main tools of monetary policy, it raises questions about the efficiency of monetary policy. The issue of efficiency is of course quite important as it helps give an overall evaluation of French monetary policy. Earlier chapters focused on smoothing volatility which has efficiency implications. This chapter focuses on the intersectoral allocation of capital. What is missing is an efficiency metric that brings the two together.

In summary, Monnet offers an insightful account of French monetary and financial policy. I am most impressed by Monnet's detailed archival work. Culling the minutes of the General Council of the Bank of France and related sources was no simple task, but it produced quite interesting results. Monnet's work provides a model for others doing similar comparative work especially in Asia.

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Comments on Eriksson, Hausman, and Rosenthal

All of the theses submitted for consideration for the Allan Nevins Dissertation Prize are drawn from a self-selected group. Research that is not of a quality that has already far surpassed the expectations of the authors' supervisors, external examiners, colleagues and classmates, and in many cases, journal editors and referees, is never sent to the dissertation session conveners. This makes the job of selecting a short list of just three dissertations tremendously difficult. If one consults the conveners' comments published in the *The Journal of Economic History* from the recent past, one can identify a set of fairly consistent criteria that have been used to assess the work submitted for consideration. Authors selected for inclusion on the short list are expected to have provided proof that they are exemplary historians, carefully accumulating new evidence, recognizing that it matters where data comes from, and worrying about context across both time and space. But that is not enough. We also want those included on the short list to show us that they are also exemplary economists, deploying the tools of theoretical and empirical economics in sensible ways, acknowledging the limitations that economists' assumptions impose, all while working to meticulously distinguish causes from effects. Given the job of selecting just three theses for the short list for the Allan Nevins Prize, one quickly discovers that dissertations that do not meet these criteria are simply never submitted for consideration. In short, to be invited to participate in the dissertation session authors must do more than demonstrate their potential as exciting, energetic, and thoughtful historians *and* economists.

Naomi Lamoreaux aptly described the "extra something" that all of the short-listed theses have as a "spark" of originality and creativity. These sparks show themselves in strong narratives that carry through entire dissertations, and in the authors' ability to link their narratives to those originating in other contexts, thereby making connections and drawing readers in to their specific time and place. And as if these criteria do not set the bar high enough, I was also looking for evidence that the authors were not blinded by their own strengths and creativity. I wanted the caveats and the weaknesses of their work to be recognized and the reader's skepticism to be anticipated and met head-on, even if this meant establishing the conditions under which one should question the authors' conclusions. Katherine Eriksson, Joshua Hausman, and Caitlin Rosenthal were not the only authors who submitted their work for consideration who successfully told compelling stories, found connections, probed their own work with a critical eye, and showed off the skills and tools of a talented economic historian, but theirs are the three dissertations that time and again met and surpassed these demanding expectations.

KATHERINE ERIKSSON

Of the three dissertations on the short list for the Nevins Prize, Katherine Eriksson's, "Essays on Education and Immigration throughout the Twentieth Century" at first seems to be the most unabashedly structured as three stand-alone essays, with little in the way of a coherent narrative arc connecting them. However, there are a set of common themes that Eriksson uses to not only link the disparate topics of her three chapters, but to link her work to a diverse body of literature. Her research focuses on groups of individuals who typically occupy the lower part of the distribution of

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incomes, occupations, and education; she cleverly identifies "natural experiments" embodied in changes in targeted policies; and she pays careful attention to historical context when drawing more contemporary policy lessons.

In her first chapter, Eriksson uses differences in the timing of the introduction of Rosenwald schools into rural counties throughout the U.S. south between 1913–1931 to identify the impact of education on black adult male incarceration rates. Since the late nineteenth century, black men have been disproportionately represented in the prison population in the United States. One of the more common explanations for this is the presence of large differences in educational attainment for black and white men. However, there is a problem with this explanation because the black-white education gap narrowed over the twentieth century, but the black-white incarceration gap did not. Eriksson has found a natural experiment that allows her to assess the impact of additional education opportunities on future incarceration rates. Black men may have been "treated" by the building of a Rosenwald school in their home county during their youth. White men in the same counties are used as a control group. Eriksson finds that the presence of a Rosenwald school in a black man's county during his youth significantly reduces his likelihood of ending up in prison, and the effect is stronger if the school is available at younger ages.

The great threat to Eriksson's ability to identify a link between education and incarceration is the possibility that the timing of the building of Rosenwald schools was not random. This is a particular concern given that the schools were built where communities were willing to "buy-in" and invest local funds in the building and operation of the schools. If communities that were most willing to buy-in were those that were anticipating improvements in social conditions, reductions in rural-urban migration, or improvements in race relations, or if counties with schools systematically attracted migrants less prone to incarceration, then the correlation Eriksson identifies may be spurious. To Eriksson's great credit, she faces this threat head-on, looking carefully at the county characteristics that predict the timing of school building, including county-fixed effects to control for time-invariant differences, including census year-fixed effects, and comparing parents' literacy and average incomes across counties. A bit more attention paid to the impact of rural-urban migration and population density on the effects Eriksson identifies, and the consideration of more targeted controls for differences in social engagement, such as church attendance, volunteer participation, voting behavior, or charitable giving, could have extinguished virtually all identification concerns. But these suggestions are simply asking for slightly different approaches to problems Eriksson has already acknowledged and addressed.

In the second chapter of Eriksson's thesis, co-authored by her supervisor Leah Boustan and Ran Abramitzky, the focus is on immigrant assimilation. It is well understood that self-selection among return migrants and changes in the composition of migrant flows over time will affect any assessment of assimilation rates based on a single cross-section of individuals. The neat trick employed by Abramitzky, Boustan, and Eriksson is to use differences in Timothy Hatton's (1997) measure of assimilation when derived from a single cross-section, multiple cross-sections, and a panel of individuals linked across the 1900–1910–1920 Censuses, to infer the impact of negative selection among return migrants and the decline in immigrant quality over time. The authors find that in their 1920 cross-section, immigrants face a large initial occupation-based earnings gap that closes over time. Using repeated cross-sections the initial earnings gap is reduced by half, and again assimilation over

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time is nearly complete. However, a panel that follows specific individuals over time reveals virtually no earnings differentials between foreign- and native-born workers. A more finely detailed look at Norwegian return migrants confirms the presence of negative selection.

An obvious criticism of Abramitzky, Boustan, and Eriksson's findings, that is admittedly a bit unfair given their focus on U.S. migrant flows, is that they cannot identify income or wage convergence—this information is unavailable in the U.S. Census during their period of study. They are, instead, identifying occupation assimilation. As this implies, any convergence between native- and foreign-born workers' incomes within occupations cannot be captured, and by using mean occupation earnings from 1950 as their income proxy, they are measuring income differentials after mass migration flows have differentially affected occupation-specific labor supplies. One could extend Abramitzky, Boustan, and Eriksson's findings by applying their approach to a receiving nation that does have individual earning data to investigate the possibility that differential earning was occurring within occupations, even if it was absent across occupations. Using annual earnings, Alan Green and Mary MacKinnon (2001), for example, find large initial income gaps and slow assimilation among Canadian immigrants during the early twentieth century. Another issue that the authors recognize, but do not fully pursue, is the concern that because of the linking procedure used to construct their panel, the individuals included are not randomly selected—the occupation-based earnings of the foreign born in their panel, for example, are nearly $370 higher than the foreign born U.S. population as a whole. Selection into the panel, therefore, could account for some of the differential initial earnings gap identified when comparing the repeated cross section and panel estimates. Again, the authors' ability and willingness to identify these weaknesses in their evidence merely emphasizes the meticulous nature of the quantitative and historical research.

In her third and final chapter, Eriksson shifts her focus from the United States to South Africa, again finding a nice, sharply defined natural experiment in education policy. In 1953 the apartheid government of South Africa passed a new education act that required all students to be taught in their mother tongue for the first eight years of school. Using the imposition of this new policy, and the fact that it implied differential treatment across provinces because of pre-policy differences in mother tongue instruction in the province of Natal, Eriksson finds that the move to mother tongue instruction improved adult male wages, literacy and education attainment, but had virtually no impact on female outcomes. From an identification perspective, the great advantage in this setting is the exogenous nature of the change across provinces, schools, and families.

JOSHUA HAUSMAN

Joshua Hausman's thesis, "New Deal Policies and Recovery from the Great Depression," revisits the tangled web of cause and effect that characterizes the American macroeconomy during the 1930s. His topic requires that he overcome the fatigue that many readers may feel when confronted with yet another research project focused on the Great Depression in the United States (Alumina, Bénétrix, Eichengreen, O'Rourke, and Rua 2010; Fishback 2010; Garrett and Wheelock 2006). Hausman dispels this fatigue early in his thesis in convincing fashion. He introduces at least three new insights and, more importantly, does a very nice job linking these insights to contemporary policy questions.

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In the first chapter of his thesis, Hausman argues that the United States did, in fact, successfully utilize fiscal policy during the Great Depression in the form of a World War I veterans bonus that was paid starting in June 1936. His primary data source is a household expenditure survey that was completed in 1935 and 1936. The great advantage of this survey is that some of the respondents reported expenditures for the period before the provision of the bonus, while others reported post-bonus expenditures. The great disadvantage of this survey is that respondents were not asked if they were veterans, or if they received the veteran's bonus. Hausman overcomes this problem by using micro-data from the 1930 U.S. Census to estimate the probability that household heads were veterans on the basis of their age, race, and location. Using predicted veteran status, he then identifies changes in expenditure patterns following the distribution of the veteran's bonus, as reported in the 1935/36 expenditure survey. There are a couple of issues that could be problematic with this approach. If we consider the prediction of veteran's status in 1930 to be the first stage in a two-stage identification strategy, then age, race, and location—the veteran's status predictors—must be uncorrelated with changes in expenditure patterns after the payment of the bonus. It is certainly possible to think of reasons why this might not have been the case. One might also worry that changes, particularly in urban and rural characteristics, that occurred between the 1930 Census and the 1935/36 expenditure survey could affect the probability of veteran's status. Of course, some of these changes, such as rural-urban migration patterns, population density, or the provision of public transport services, could be controlled for in the second stage. The strongest part of this chapter stems from where Hausman takes us after establishing his estimate of veterans' marginal propensity to consume out of their bonus. He looks carefully at expenditure patterns before and after the payment of the bonus, finding that automobile sales and servicing are disproportionately represented in the increases in consumption.

Chapter 2 pushes Hausman's view that the auto sector was key to the U.S. experience during the 1930s even further, arguing that the double-dip recession of 1937/38 was triggered by unionization at General Motors and rising raw material prices for U.S. automakers. He points out that a standard monetarist explanation for the recession—the sterilization of gold inflows—simply does not fit the geographic or sectoral patterns in the contraction. The variation in employment—more specifically manufacturing employment—is much greater during the 1937/38 recession than during any other interwar business cycle, and the decline in durables consumption was dramatically deeper than the change in nondurables consumption, which actually rose slightly during the recession. A reduced form forecast model underpredicts automobile purchases during the months leading up to the downturn, and overpredicts purchases during the start of the recession.

More finely detailed information on relative price movements over the summer and fall months of 1936, particularly auto prices relative to nondurables, investment goods, and other durable goods, would give us a better sense of the size of the idiosyncratic supply shock faced by the auto sector. A careful consideration of the price increases for the 1937 model year documented by Hausman could also be revealing, given that his evidence implies inelasticity in demand, which is surprising if cars during the 1930s were big-ticket, luxury good purchases for most consumers. On a related point, it would also be interesting to track the impact of input price changes on mark-ups, equity prices and returns to capital among the automakers —was the impact of these supply shocks asymmetrically distributed between consumers and capital owners? What might the macroeconomic consequences

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have been of any asymmetry? While the narrative is compelling in this chapter, the narrow focus on a single industry in a relatively small sector of the macroeconomy requires us to accept the presence of large general equilibrium multiplier effects (Fishback and Kachanovskaya 2010).

Turning his attention to the very bottom of the trough in 1933, Hausman's third chapter is a tightly contained test of two possible explanations for recovery in the United States. Gauti Eggertsson (2008) argues that Roosevelt's policy stance triggered a sharp rise in inflation expectations, lowering expected real interest rates and spurring investment. Peter Temin and Barrie Wigmore (1990) also focused on inflation, but their view was that devaluation of the U.S. dollar after abandoning the gold standard in early 1933 raised the relative price of internationally traded goods, particularly agricultural products, and this raised farmers real incomes, spurring demand in agricultural states and counties. Hausman uses monthly state-level automobile sales to test for differential demand shifts between primarily agricultural states and states dominated by industrial or service sector production. He finds that automobile sales increased earlier in states with more farmers.

There are a couple of points in Hausman's narrative that remain a little less than crystal clear. If the key trigger for recovery was a change in inflation expectations, then the leading sectors should be investment goods and consumer durables, but decisions about automobile purchases in the 1930s seem rooted in very different objectives and constraints than firms investment decisions, or households decisions about the purchase of other durable necessities. It also seems that if the Depression hit states dominated by agricultural production hardest, then pent-up demand for automobiles may be greater in these states. In this environment, even uniformly distributed inflation expectations might release this pent-up demand asymmetrically across states. And finally, although agricultural goods are the obvious export product to focus on, if Temin and Wigmore's hypothesis is correct, then other major export producers should also have experienced increases in their real incomes following devaluation, and hence asymmetric demand shifts. It would be interesting to look at monthly auto sales in states with large mining, forestry, or petroleum sectors for corroboration.

CAITLIN ROSENTHAL

Caitlin Rosenthal's thesis, "From Memory to Mastery: Accounting for Control in America, 1750–1880," is every bit as intellectually disciplined as Katherine Eriksson's and Joshua Hausman's work, her prose deftly draws the reader in to her narrative, and her attention to documentary detail and historical context is finely honed, but her methodological approach stands apart from the other two candidates. Rosenthal has immersed herself in the daily account books of late eighteenth- and nineteenth-century plantations in the U.S. South and the Caribbean, she has poured over the ledgers and time books used by northeastern U.S. manufacturing establishments, she has sifted through early accounting textbooks and manuals, and she has searched newspaper and periodical advertisements that sought to match individuals with employers seeking accounting and numeracy skills. Her goal is to not only identify the purposes served by quantification in record keeping, but to understand how these purposes affected the pace and pattern of adoption across economic environments.

In her first chapter, Rosenthal argues that large farmers in the U.S. South were early adopters of "book farming." A careful reading of account books from southern slave

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plantations reveals that the bookkeepers were almost exclusively interested in the physical output of labor. There is little effort to track profitability or investment returns, in the sense that prices do not seem to play much of a role, other inputs are not tracked in the same meticulous way that slaves are tracked, and costs—depreciation, maintenance, replacement, enforcement—do not seem to be explicitly or quantitatively traded off against changes in labor productivity. The problem the plantations' account books sought to solve was not profit maximization, but, as Rosenthal claims, the maximization of physical effort. An opportunity missed in her study of these account books is the chance to delve more deeply into the nature of the choice some farmers made to adopt book farming, in a time and place where the majority of farmers, and virtually all small farms, scorned the quantitative approach. The characteristics of the farms and farmers who used account books could tell us much about the value these books provided in an environment where the extraction of effort from investments in human capital was a key to efficient and profitable production.

Turning to bookkeeping on West Indian plantations, farm size and complexity again seem to provide an impetus for quantification, but the physical distance separating land owners from production plays an even bigger role. Caribbean plantations were typically owned by wealthy, nonresident Europeans, and the keeping of account books by resident clerks facilitated monitoring and enforcement. The maximization of labor effort and the assessment of incentive schemes may have been a happy by-product, but it seems that the efficient transfer of information was the primary objective motivating quantification. Rosenthal emphasizes that "best practice" in bookkeeping flowed east and west, from Europe to the Caribbean and the U.S. South, and back. Rosenthal sees the U.S. northeast as a lagging region in the adoption of the new organizational technologies embodied in quantification.

The two key arguments put forward by Rosenthal in her thesis are articulated more explicitly in this chapter. Specifically, she believes that the organizational technology embodied in quantification was transferred through human capital, and the institution of slavery and the presence of bound-labor rewarded quantification more than the presence of other irreversible investments, such as physical capital or land. A little rigorous empirical analysis might help Rosenthal push these themes even further. Were clerks with experience in the Caribbean or U.S. South sought after in European or northern U.S. labor markets? Did they ask for and receive higher wages than those with a purely formal education, or those with only local experience? Did the premium paid to attract skilled bookkeepers to New World plantations cover the disamenities they faced, or in other words, what was the cost of the investment these clerks were making?

Rosenthal turns her attention to the use of ledgers and time books by northeastern factory owners in her third chapter. Quantification again appears to have been focused on labor, but here the problem being solved was one of coordination. When labor is mobile and complementary in production to fixed capital, tracking and monitoring workers is vital for efficient capital utilization. This is the coordination problem introduced by complexity and increasing capital intensity, and Rosenthal provides us with finely detailed case studies that reveal the channels through which numerically intensive organizational technologies facilitated the internalization of market transactions characterized by Alfred Chandler's (1977) "visible hand." As with the Southern plantations, knowing which factory owners adopted and which resisted this transition would tell us much about why quantification had value. One suspects

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that if coordination was key, then differences among industries, locations, and firms in the availability of literate and numerate clerks, skilled artisans, and relatively unskilled laborers, and the degree of complementarity between these worker-types and fixed capital, could imply testable hypotheses related to the timing of the adoption of numerically rigorous bookkeeping practices.

The supply of clerical skills occupies Rosenthal in her fourth chapter. Searching through textbooks, accounting manuals, ready reckoners, and the curricula of commercial colleges, Rosenthal finds that standardization, certification, and simplification all contributed to the supply of human capital. Unfortunately, we cannot learn much about the returns to human capital because Rosenthal's textbooks and "help wanted" advertisements do not reveal wage profiles or evidence on the costs to acquire the required numeracy skills. It also seems like a missed opportunity when Rosenthal tells us little about the role of women in the supply of literate and numerate workers. Claudia Goldin (1992) saw women as the key to the organizational transformation described by Chandler. But, again, Rosenthal's sources do not lend themselves to an easy assessment of gender based wage gaps or labor market conditions.

In her fifth and final chapter, Rosenthal uses balance sheet information from firms incorporated in the state of Massachusetts between 1871–1881 to identify a relationship between sound accounting practices and firm survival. She finds that corporations that correctly balanced assets and liabilities, and correctly measured depreciation enjoyed higher survival rates, but surprisingly, they did not have higher investment returns. One might reasonably be concerned that firms facing greater transactions costs on external markets, or firms with more invested in the maintenance of their reputation, might also be firms who invest more in numerically intense organization technologies. Access to information about local labor markets and human capital supplies might allow one to instrument for accounting practices, and thereby avoid this endogeneity. It would also be a nice complement to her earlier chapters if a more careful accounting for industrial density and local diffusion spillovers could be undertaken. However, these quibbles should not take away from Rosenthal's efforts to tie her largely qualitative narrative about the adoption of quantification, to a more empirically grounded assessment of growth, development and performance outcomes. The empirical exercise that concludes the thesis does a very nice job providing some connection between Rosenthal's narrative and the "big picture" concerns of development economists and economic historians.

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