Commerce, Coalitions, and Factor Mobility: Evidence from Congressional Votes on Trade Legislation

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The extent to which political conflict over U.S. trade policy has led to clashes between broad-based class coalitions has varied significantly over time during the past two centuries. I argue that much of this variation can be explained by changes in economywide levels of interindustry factor mobility. Class distinctions between voters are more economically and politically salient when interindustry mobility is high; when mobility is low, industry distinctions become more critical and tend to split apart broader political coalitions. I report evidence indicating large changes in levels of labor and capital mobility over the last two centuries. These changes coincide with significant shifts in the character of American trade politics. Analysis of congressional voting on 30 major pieces of trade legislation between 1824 and 1994 provides evidence of large swings in coalition patterns.

History has shown that international trade can generate intense class conflict, pitting capital against labor, or farmers against industry, and making the tariff the central policy issue in electoral competition between political parties. In the United States, at the turn of the twentieth century, the trade issue did ignite a fierce political contest between protrade farmers and protectionist urban interests, and the tariff became the focal point for the parties in virtually every election fought between 1888 and 1914. But this type of intense class warfare was not the norm in American trade politics prior to the Civil War, when battles over policy were dominated by regionally specific, industry-based groups (Pincus 1977), nor has it continued in more recent times, when policies have been shaped in large measure by the lobbying efforts of industry associations, labor unions, and political action committees, and the trade issue has all but vanished at election time (Destler 1992).

In what circumstances does international trade deepen class cleavages in politics? When do narrower, industry-based coalitions tend to flourish instead? The existing scholarly literature is largely silent on the question and strangely polarized. While Rogowski (1989) presents evidence that trade can create class divisions that are so fundamental that they can reshape entire political systems, much of the recent analysis of American trade politics follows Schattschneider (1935) in placing industry-based lobbies at center stage (Baldwin 1985; Grossman and Helpman 1995). This division mirrors a more fundamental divide between Marxist political economy, in which all politics is class politics, and pluralist-style approaches to American politics that focus on the activities of interest groups. Bridging the gap is vital for understanding the political–economic origins of not only trade policy, but a vast range of regulatory, industrial, and monetary policies that can create class antagonisms and yet also affect the relative fortunes of different industries. What is at issue is the definition of the basic building blocks of political economy: the alignment of preferences that creates political coalitions.

I argue here that variation in coalition patterns can be explained in large measure by changes in economywide levels of interindustry factor mobility: that is, the ease with which owners of factors of production (land, labor, and capital) can move between industries. Class distinctions between voters are more economically and politically salient when interindustry mobility is high; when mobility is low, industry distinctions become more critical and tend to split apart broader political coalitions. I report evidence indicating large changes in levels of labor and capital mobility over the last two centuries. These changes coincide with significant shifts in the character of American trade politics. Analysis of congressional voting on 30 major pieces of trade legislation between 1824 and 1994 provides evidence of large swings in coalition patterns. The findings carry important implications for political–economic studies of economic policymaking in general, for the future direction of U.S. trade policy, for future economic growth, and for arguments in favor of adjustment assistance programs that would raise levels of interindustry factor mobility.

TRADE THEORY, COALITIONS AND FACTOR MOBILITY

According to the Stolper–Samuelson (1941) theorem, trade increases real returns for owners of the factor of production with which the economy is relatively abundantly endowed, while real returns for owners of the scarce factor decline. This result depends critically on the assumption that factors of production, while immobile internationally, are perfectly mobile within the domestic economy.[1] The logic is simple enough: Increased trade lowers the price of the imported good, leading to a reduction in its domestic production and

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[1] Factors are identified as broad categories of productive inputs and include at least labor and capital. Traditional studies focus on land, labor, and capital, though the case has been for subdividing these into narrower categories (Leamer 1984).

freeing up more of the factor it uses relatively intensively (the scarce factor) than is demanded elsewhere in the economy at existing prices. When factor prices adjust, returns to the scarce factor fall even further than the price of the imported good, while returns to the abundant factor rise even further than the price of the exported good. The interindustry mobility of the factors assures that trade affects owners of each factor in the same way no matter where they are employed in the economy. This is the insight that encouraged Rogowski (1989) to anticipate broad-based conflict among owners of land, labor, and capital in trade politics.[2]

Very different results are generated by alternative types of models (often referred to as "Ricardo–Viner" models) in which one or more factor of production is assumed to be immobile between industries (Jones 1971; Mussa 1974, 1982).[3] In these models, the returns to "specific" factors are tied closely to the fortunes of the industry in which they are employed. Factors specific to export industries receive a real increase in returns due to trade, while those employed in import-competing industries lose in real terms.[4] Factor specificity thus drives a wedge between members of the same class employed in different industries. The implication is that political coalitions form along industry lines, and this has guided much of the empirical analysis in the "endogenous policy" literature in economics that relates variation in import barriers across industries to the relative political strength of different industry-based groups (e.g., Anderson 1980; Lavergne 1983).

The Stolper–Samuelson and Ricardo–Viner models examine extreme, or polar, cases, in which productive factors are either perfectly mobile or specific.[5] Factor mobility is better regarded as a continuous variable, affected by a range of economic, technological, and political conditions. Allowing that factors can have varying degrees of interindustry mobility, the simple prediction is that broad class-based political coalitions are more likely where factor mobility is high, while narrow industry-based coalitions are more likely where mobility is low. The trade issue—and, in fact, any policy issue that affects relative commodity prices—will divide an economy into very different types of coalitions if there is substantial variation in levels of interindustry factor mobility (see Appendix A for a formal, general-equilibrium treatment).

EVIDENCE OF TRENDS IN FACTOR MOBILITY IN THE U.S. ECONOMY

Measuring Interindustry Factor Mobility

Given the obvious importance of interindustry factor mobility in determining the income distribution effects of trade (and, hence, the politics of trade), it is vexing, as Grossman and Levinsohn (1989) have pointed out, that very few attempts have actually been made to assess levels of mobility empirically. The most direct evidence has been provided in work on industry wage differentials (e.g., Krueger and Summers 1988), the response of stock-market returns to import price shocks (Grossman and Levinsohn 1989), and prices in secondary markets for capital equipment (Ramey and Shapiro 1998).[6] All these studies suggest significant factor specificity and sizable industry rents in U.S. manufacturing in recent years, but we do not have a historical standard of reference with which to compare these findings.[7]

To compare levels of factor mobility in the U.S. economy in different periods, I have examined the variation between rates of return for factors employed in different industries. This is simply an application of the "law of one price." If factors are highly mobile (i.e., movable), return differentials should be arbitraged away by (actual or potential) factor movement. Smaller differentials in wages and profits across industries are thus indicators of higher levels of mobility. The magnitude of the differentials will reflect the costs of moving factors between industries, which are influenced by a range of economic and political variables, including the specificity of human and physical capital to particular firms and industries, any factor market regulations that affect firm entry and exit and hiring and firing, any policies that assist relocation and retraining, and the costs of transportation and communication. Different versions of this type of measure have been used previously in a wide range of studies of labor and capital mobility.[8]

[2] Classes are defined here simply in terms of factor ownership: Each factor class comprises those individuals well endowed with a factor relative to the economy as a whole. This definition allows for the fact that individuals often own a mix of factors (Mayer 1984).

[3] The original model was introduced independently by Jones (1971) and Samuelson (1971): The former christened it the "specific-factors" model, while the latter named it the "Ricardo–Viner" model.

[4] Again, the logic is straightforward: A decrease in the domestic production of an imported good releases any mobile factors for employment elsewhere in the economy and thus renders factors specific to the import-competing industry less productive, driving down their real returns. Returns on the mobile factor rise relative to the price of the imported good but fall relative to the price of exports, so that the income effects of trade for owners of this factor depend on patterns of consumption.

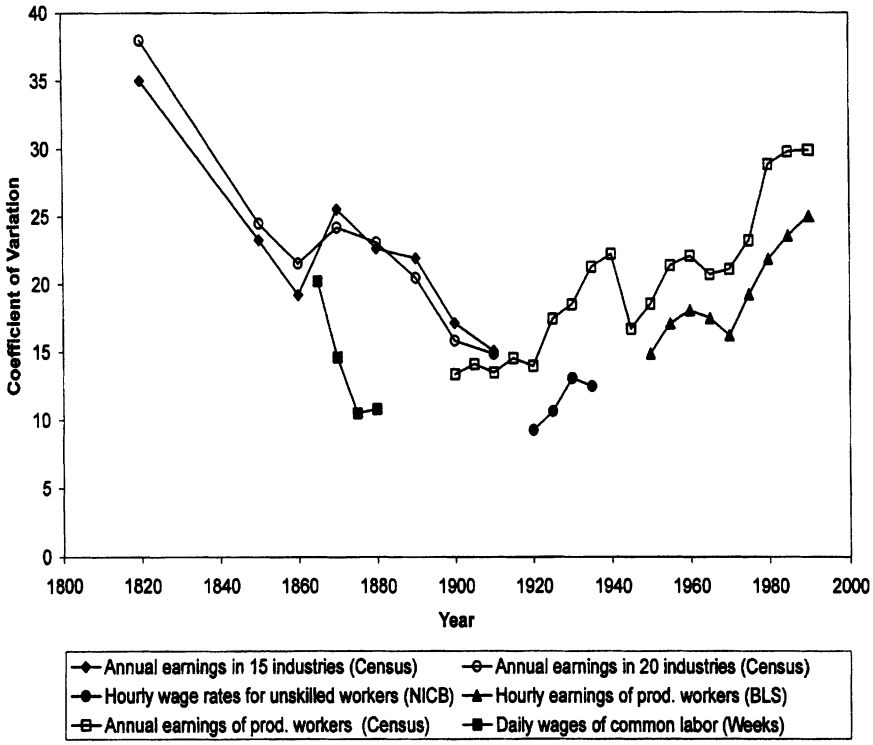
[5] The bifurcation is generally considered unproblematic in the economics literature: Specific-factors effects are regarded as important in the short term but not the long term (Caves et al. 1990, 146–49; Krugman and Obstfeld 1988, 81; Mussa 1974). It is simply assumed that, over time, all factors are perfectly mobile. But this ignores politics: Factor owners do not just choose between accepting their returns in one industry and moving to another, they can also lobby to influence policy (and hence returns).

[6] Magee (1980) examined the "revealed preferences" of industry groups to make inferences about mobility in his much-cited study of testimony by labor unions and management groups before the House Ways and Means Committee on the Trade Act of 1974.

[7] In contrast, a great deal of empirical work has been done on the inter*regional* mobility of labor and capital in the American economy aimed explicitly at uncovering historical trends, with much of the attention focused on the geographic integration of the markets for labor and capital during the nineteenth century (e.g., Coelho and Shepherd 1976; Davis 1965; Lebergott 1964; Odell 1989; Rosenbloom 1990).

[8] On industry wage variance in recent years, see Dickens and Katz 1987, Gibbons and Katz 1992, Katz and Summers 1989, and Krueger and Summers 1987, 1988. Almost all the work on the geographic integration of U.S. labor and financial markets has focused upon regional differences in wages and interest rates, and rate-of return differentials have also been used to gauge the level of international capital mobility (e.g., Frankel 1991).

FIGURE 1. Interindustry Variation in Wages



There are good reasons for exercising caution when examining wage and profit differentials, since they may partly reflect other features of factor markets besides mobility (these issues are discussed further below). It is the size of industry rents that is key for the political story here, however, and wage and profit differentials are the clearest measure we have of whether such rents actually exist.[9]

Interindustry Variation in Wages and Profits

Following Long (1960) I use data on wage payments reported in the decennial census to calculate annual wages for workers in major manufacturing industries (approximates of the modern two-digit Standard Industrial Classification [SIC] categories) for each census year beginning in 1820.[10] I also calculated average daily wages of "common laborers" in each of these industries from the payroll records of firms compiled in the Weeks report of 1886.[11] After the turn of the century, evidence on annual wages of production workers in two-digit SIC industries is readily available from the Department of Commerce,[12] hourly earnings for production workers are calculated after 1947 by the Bureau of Labor Statistics (BLS),[13] and separate data on hourly wages for unskilled workers between 1920 and 1937 were compiled by the National Industrial Conference Board (Glasser 1940, 36).

Using each of the data series to calculate coefficients of variation across industries yields an interesting set of results. The data, shown in Figure 1, indicate two broad trends: a general decline in interindustry variation in wages over the course of the nineteenth century, consistent with a marked rise in interindustry labor mobility, and a general increase in wage variation beginning sometime between the 1910s and the 1930s, indicating a steep decline in interindustry mobility more recently. These different trends have been noted separately by analysts focusing on particular eras (e.g., Atack, Bateman, and Margo 2000; Bell and Freeman 1991), and the evidence of sizable differences in wages across industries in recent years is also consistent with much recent work by labor economists using more detailed survey data on individual workers (e.g., Dickens and

[9] Hiscox (2002) provides a detailed discussion and treatment of these measurement issues and a more detailed analysis of all the available evidence on historical trends in U.S. factor mobility.

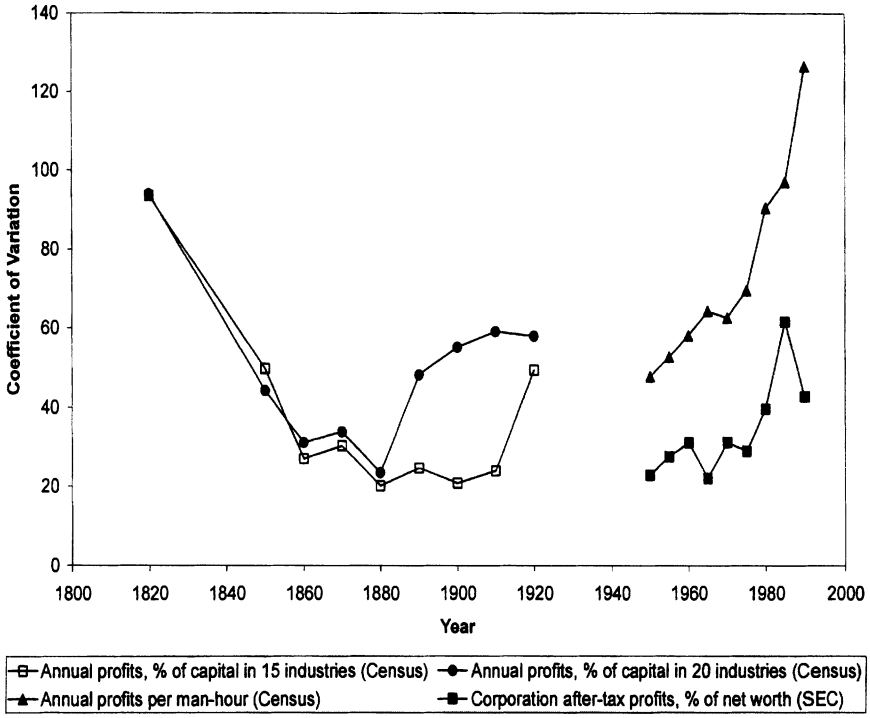
[10] I began with the 17 industries examined by Long (1960, 72–73) for the period 1860 to 1890, amending the list to extend the series for 15 of these industries for which data are available over the period 1820 to 1910. I then created a separate series for 20 industries, adding five categories that were excluded from Long's study but for which data exist over the full span of years. All lists, and original data, are available from the author.

[11] The Weeks report was published as U.S. Congress, House (1886). I calculated simple averages across firms in Massachusetts, New York, and Pennsylvania only (since all data were entered manually for each firm).

[12] See the U.S. Department of Commerce's, *Census of Manufactures* and *Annual Survey of Manufactures* (various years). Beginning in 1900, earnings data are reported for 15 two-digit SIC industries; from 1947, they are reported for 19 industries.

[13] See the U.S. Bureau of Labor Statistics' *Employment and Earnings* (various years).

FIGURE 2. Interindustry Variation in Profits



Katz 1987; Krueger and Summers 1988).[14] As Figure 1 indicates, the size of these much-discussed "industry rents" trended downward markedly during earlier stages of industrialization and upward only more recently.[15]

There is very little direct evidence on firm profits in different industries prior to 1909, when federal taxes were first imposed on corporate incomes (Epstein and Gordon 1939, 122). Beginning in 1933, data from annual reports on corporation profits (as percentages of net worth and equity) are available from the U.S. Securities and Exchange Commission (SEC), categorized according to their main activities into two-digit SIC industries.[16] For earlier years, following Bateman and Weiss (1981), I used census manuscripts to calculate profits (value-added minus wage costs) as a percentage of the capital invested for firms in each of the major manufacturing industries in each census year. After 1919, the Department of Commerce ceased reporting data on capital invested, but from 1947 reports total man-hours consumed per year for each industry, and these can be used as a proxy for total investments.[17]

Figure 2 charts coefficients of variation in profits across manufacturing industries using these different data series. The results generally match the pattern exhibited in the wages data. There was a general decline in interindustry variation in profits over most of the nineteenth century, indicating a sharp rise in capital mobility, but then a long-term increase in profit differentials beginning some time between the 1880s and the 1910s, indicating a significant decline in interindustry capital mobility since then.[18] The evidence suggesting high levels of capital specificity in recent years matches

[14] Only very basic controls can be applied in the aggregate data to account for heterogeneity in skill levels across industries. There is strong evidence, however, that interindustry differences in skill mixes are quite stable over time and controlling for a greater range of individual skill variables is not important for estimating the *relative* size of differentials over time. See Hiscox 2002 and Krueger and Summers 1987.

[15] Note too that the latter trend fits with evidence of a long-term decline in quit rates among manufacturing workers since 1919 (Hiscox 2002; Ragan 1984) and with survey data on job tenure that show that the number of years spent on the same job by the average worker rose substantially between 1950 and 1990. Workers aged 55 to 64 were at their jobs an average of 16.0 years in 1991, compared with 9.5 years in 1951; those aged 45 to 54 had been at their jobs an average of 12.2 years in 1991, up from 7.9 years in 1951; and for those in the 35 to 44 age bracket the average tenure rose to 7.9 years in 1991 from 4.3 years in 1951. Data are from the Employee Benefits Research Institute; see *The Economist*, January 28, 1995. Economists have noted that these data clash violently with the widely held perception that the U.S. workforce has become increasingly mobile in response to globalization and technological change; see reports in *The Economist*, January 28, 1995, and in *The New York Times*, April 1993.

[16] The data are reported by the U.S. Securities and Exchange Commission, in *Survey of American Listed Corporations: Corporation Profits* (various years), and the U.S. Department of Commerce, in *Statistical Abstract of the United States* (various years).

[17] This follows Alt et al. 1999. Note that the industry lists used for calculations of profit variation are identical to those used in the analysis of wages.

[18] There are no controls here for cross-industry differences in risk or demand shocks, but Hiscox (2002) reports matching results using measures of profits disaggregated to the four-digit SIC level to estimate equations and control for industry-specific risk and demand-side variables.

the findings of Grossman and Levinsohn (1989), based upon a study of stock-market returns in the 1970s and 1980s, and conclusions reached by Ramey and Shapiro (1998), based upon prices in secondary markets for capital equipment.[19]

Industrialization and Factor Mobility

The evidence indicates that there have been substantial changes over time in general levels of interindustry labor and capital mobility in the U.S. economy. The pattern that emerges—rising mobility during most of the nineteenth century, falling mobility in recent decades—can be explained by the technological transformations associated with industrialization. Historical accounts of American economic development have emphasized a range of technological changes that combined to make the economy more fluid during the early stages of industrialization in the nineteenth century (e.g., Sokoloff and Villaflor 1992). Major innovations in systems of water, rail, and road transportation drastically lowered the costs of factor movement and lessened the importance of geography to economy (Davis, Hughes, and McDougall 1961, 276–96). Labor migration and capital flows grew markedly (Perloff 1965). Agricultural producers were affected too, as distance from markets and resources became less important for the location of production. At the same time innovations in manufacturing technology had profound implications for interindustry mobility. New mills and factories replaced craft shops and home manufacture, and the old skills of the artisan class were rendered obsolete (Sokoloff and Villaflor 1992). Much of the new factory technology was readily adaptable to use in alternative industries (Landes 1969, 293–94) and created a vast demand for unskilled labor, making it far easier for industrial workers to shift between jobs in different industries (Sokoloff 1986).[20]

Around the turn of the century, however, technological changes in manufacturing began to reverse these trends. Most important was the growing complementarity between labor skills and the newest technology (Bartel and Lichtenberg 1987; Griliches 1969; Hamermesh 1993). The key change appears to have taken place in the 1910s and 1920s with the move from assembly-line to continuous-process technology—the latter requiring more skilled workers in the management and operation of highly-complex tasks (Cain and Paterson 1986; Goldin and Katz 1996). Growth in the demand for specialized human capital has been concomitant with continued technological improvements since that time (Mincer 1984). Job tenure rose along with training in firm-specific skills (Carter and Savocca 1990; Sundstrom 1988). Meanwhile, barriers to exit and entry for manufacturing firms appear to have risen markedly along with the growing importance of specialized technologies (Ramey and Shapiro 1998) and as a function of the higher start-up costs and increased investments in physical capital associated with the general growth in the scale of production (Caves and Porter 1979).[21]

COALITION PATTERNS IN U.S. TRADE POLITICS: CONGRESSIONAL VOTES, 1824–1994

Expectations and Evidence

In light of the evidence that levels of interindustry factor mobility have varied substantially in the American economy over time, the question remains as to whether these changes have produced the expected changes political coalitions. If the argument advanced above is correct, the formation of broad factor-owning class coalitions should have been most likely during periods when interindustry factor mobility was relatively high (between the 1880s and the 1920s), while narrow industry-based coalitions should have been most likely in periods when interindustry mobility was relatively low (earlier in the nineteenth and later in the twentieth centuries).[22]

These expectations do fit with some of the stylized historical facts of American trade politics. According to standard accounts, trade politics was a predominantly local, group-based affair at the beginning of the nineteenth century. The emerging political parties were split over the tariff issue along regional lines and trade legislation reflected the competing pressures placed on Congress by a vast array of locally organized groups (Pincus 1977; Stanwood 1903, 240–43; Taussig 1931, 25–36). In the years following the Civil War, however, trade became *the* partisan issue in American politics, as Republicans, drawing broad support mostly from business and labor, supported high protectionist tariffs over the vehement opposition of Democrats and their largely rural constituency (Stewart 1991, 218; Taussig 1931, chaps. 5–8; Verdier 1994, 108–15).

[19] Note too that increasing capital specificity in recent decades is evidenced by growing rates of investment in research and development by firms—a popular indicator of specificity since it captures the emphasis placed by firms on developing their own technologies (Acs and Isberg 1991). Spending by U.S. manufacturing companies on R&D rose from about 0.5% of sales in 1950 to over 3% in 1990 (see U.S. Department of Commerce, *Statistical Abstract of the United States*, various years).

[20] Goldin (1990, 115) has argued that, by the turn of the century, the market for labor in the manufacturing sector was essentially a spot market, with most jobs easily handled by the average worker. See also Gordon, Edwards, and Reich (1982, 112–28).

[21] While the evidence that scale economies alone act as powerful barriers to entry in practice is not strong (Scherer 1980), there is more evidence that larger capital requirements mean that fewer individuals or groups can secure the funding needed for entry (Geroski and Jacquemin 1985). Strategic considerations also tend to inhibit exit when scale economies are large (Ghemawat and Nalebuff 1990).

[22] For simplicity, levels of mobility are treated as general to all factors here. One might prefer to differentiate measures of mobility for each factor, but the evidence indicates that technological forces have affected levels of mobility in a very similar fashion for all factors. From Figures 1 and 2 it does seem that levels of interindustry capital mobility may have peaked earlier than levels of labor mobility, and one might thus anticipate that industry-based schisms among owners of capital would predate similar divisions among workers late in the nineteenth century. For an extended formal treatment of the consequences of allowing different rates of change in capital and labor mobility, see Hiscox 1997.

Regional divisions began to yield to a growing class cleavage that separated landowners (especially in the South and West) from urban interests and helped to generate the Granger and Populist movements.[23] At the height of the conflict, the Republican tariff of 1890 was denounced as the "culminating atrocity of class legislation" in the Democratic party platform, and the two parties squared off on the trade issue at each election. Growing rifts over the trade issue within the parties became more apparent in the 1920s and 1930s, however, and by the 1960s there were deep divisions in both parties and in the peak associations representing labor, business, and rural classes (Destler 1992, 176–77; Turner and Schneier 1970, 71).[24] Meanwhile, lobbying by industry groups appeared to intensify (on both sides of the trade issue) and played a key role in shaping policy outcomes (Baldwin 1985; Destler 1992, 189–96; Lavergne 1983).[25]

Congressional Voting

We can better assess temporal changes in coalition patterns (and the relative utility of class and group-based models) by examining congressional votes on major pieces of trade legislation in different historical periods. The presumption here is that legislators' voting decisions reflect their response to pressures from societal coalitions. If the theory is correct, voting decisions should more clearly reflect legislators' responses to demands by broad factor classes when levels of interindustry factor mobility are relatively high and demands from protectionist and free-trade industries within their districts when mobility levels are relatively low.

A number of studies of congressional votes on trade policy have appeared in the literature to date. Most of these have been limited to examining a specific piece of legislation, usually in recent years (see Baldwin and Magee 2000). They include studies of votes on automobile domestic content legislation in 1982 (Coughlin 1985; McArthur and Marks 1988), the Trade Act of 1974 (Baldwin 1985), textile quota legislation in 1985 (Tosini and Tower 1987), the Export Facilitation Act of 1987 (Uri and Mixon 1992), and the omnibus trade legislation of 1987 (Marks 1993). The votes on the NAFTA have been given special attention in recent work (Baldwin and Magee 2000; Holian, Krebs, and Walsh 1997; Kahane 1996; Steagall and Jennings 1996; Uslaner 1998). Conybeare (1991) looks at votes in earlier times, and Gilligan (1997) provides an excellent analysis that covers 12 bills in Congress between 1890 and 1988.

The findings from these studies shed some light on the coalitions issue, but only indirectly. In analyses of recent trade votes, measures of the importance of import-competing industries in districts have significant, positive effects on the likelihood that legislators vote in favor of protection. Dependence on export industries in electoral districts, on the other hand, tends to raise the likelihood that legislators vote for liberalizing bills. These relationships, which fit well with the industry-based approach to trade politics, appear much less clear in the studies of earlier votes: Conybeare (1991) finds evidence of industry effects, but Gilligan (1997) indicates that such effects are quite weak. Evidence on the importance of factoral or class variables is even less clear. Recent studies have indicated that votes against NAFTA in 1993 were positively associated with the degree to which legislators relied upon campaign contributions from labor political action committees (Baldwin and Magee 2000; Steagall and Jennings 1996). But it is difficult to draw clear inferences from this without knowing the extent of the bias in the industry composition of contributing labor groups—labor-intensive import-competing industries tend to be more unionized and, thus, are likely to be the primary source of contributions.

To compare the relative utility of class and industry-group models, I take a simple approach here, relating voting patterns among members of the Senate and House over time to measures of the class and industry makeup of their constituencies. The dependent variable is the legislator's vote for protection (1 = for a protectionist bill or against a liberalizing bill, 0 = against a protectionist bill or for a liberalizing bill).[26] Votes on 30 major pieces of trade legislation between 1824 and 1994 are examined (Appendix B provides a detailed list of these bills).

The explanatory variables are measures of the class or industry characteristics of each state in each year in which a vote was taken. For factor classes, I derived several measures from the available census data.[27] As a basic measure of the importance of farmers in each state, I have used the total value of agricultural production as a fraction of state income. As a measure of the importance of labor, I used total employment in manufacturing as a proportion of each state's population. Measuring the importance of capital poses somewhat greater problems, since the census data on capital

[23] As one simple indicator of the trend, the proportion of states in which two senators split their votes on trade legislation rose from 0.09 in the final votes on the Tariff Act of 1824 to 0.22 in votes on the Tariff Act of 1842 and 0.32 for the Trade Act of 1875. Meanwhile the average party cohesion (Rice indexes) for votes on major trade bills in the House rose from 2.8% in 1824, to 44.1% in 1842, and to 66.1% in 1875. Later votes became even more polarized along partisan lines as Republicans and Democrats went head to head: average cohesion registered 98.7 (in 1890), 90.2 (1894), 98.0 (1897), 97.4 (1909), and 94.3 (1913). See Appendix B for the full list of tariff bills.

[24] Average party cohesion indexes for House votes on major trade bills were only 43.9 (in 1955), 43.3 (1962), 36.3 (1974), 33.0 (1993), and 33.0 (1994). See Appendix B for the full list of tariff bills.

[25] Destler and Odell (1987) document a marked rise in political activity among both groups opposed to and groups supporting product-specific trade protection in the 1970s and 1980s.

[26] All models are estimated using probit in STATA 7.0.

[27] The state data on factors are drawn from decennial censuses (prior to 1919) and the U.S. Department of Commerce's *Census of Manufactures*, *Census of Agriculture*, and *Census of Mining* (afterward) for years closest to the years in which each vote was taken. For years prior to 1840 the state data are extrapolated from the time series on later observations. State income data are from the U.S. Department of Commerce, Bureau of the Census (1989), *State Personal Income* (various years), and Kuznets et al. (1960). State population data are from the U.S. Department of Commerce, Bureau of the Census, *Statistical Abstract of the United States*.

invested in manufacturing industries ends in 1919. Using total manufacturing production in each state is one possible approach, but this does not permit distinctions between the amounts of capital and labor engaged in production. Instead I used profits earned by capital in manufacturing (measured as value-added minus wage payments) as a fraction of the state income, on the assumption that these profits vary from state to state largely as a function of the total magnitude of investments.[28] To measure the industry characteristics of each state I examined the size of the leading exporting and import-competing industries in each state using data on trade from the Department of Commerce and census data on production in manufacturing, mining, and agricultural sectors. For each state I calculated total production in the 10 leading exporting and import-competing industries in each year as a proportion of the state income.[29]

The analysis includes dummy variables for each bill, to account for individual characteristics of particular bills (or years) when examining votes in favor of protection.[30] On the other hand, I have not included controls for the party affiliations and regional locations of members of Congress, even though previous work indicates that both types of variables have been good predictors of voting patterns on trade at different times. I exclude them here to provide the clearest imaginable test between the class and the industry-group models. Party affiliations and regional locations are both strongly correlated with the measures of the class and industry characteristics of states at different levels in different periods. This in unsurprising: The competing parties have appealed to very different class-based constituencies over the years and to supporters in different geographical regions, and those regions themselves have often displayed marked differences in their economic composition in terms of both factor classes and trade-affected industries (see Kim 1998). In the antebellum years, for instance, the Jackson Democrats in Congress were elected mainly from Southern states in which farming outweighed manufacturing interests and exporting industries were far larger than import-competing concerns. My main concern here is not to muddy the water when comparing the performance of the class and group-based models by inadvertently including class effects in the group-based model, or vice versa.

I have divided the main analysis into five parts, pooling the votes taken in five historical periods: 1824–60, 1875–1913, 1922–37, 1945–62, and 1970-94. The aim is simply to provide some clear comparisons over time.[31] The estimations of each model have also been performed on a bill-by-bill basis and the conclusions are substantively identical to those reported below.[32] The class and industry models are estimated separately, and their performance in different periods is then compared and evaluated using Davidson and MacKinnon's (1981) "J test."[33]

The "class model" includes the three indicators of the importance of different factor classes in each state: the value of agricultural production, employment in manufacturing, and profits earned by capital in manufacturing. According to the basic class-based approach, we should expect that the value of farm production is negatively related to votes for protection over the entire time span, since the U.S. economy has been relatively well endowed with land, compared to other nations, and owners of land should thus have favored freer trade (in accord with the Stolper–Samuelson model).[34] Owners of labor, on the other hand, should have favored protection, since the economy has been relatively poorly endowed with labor compared with its trading partners, and thus employment in manufacturing in states should be positively related to votes for protection. And, finally, according to Rogowski (1989, 29), the United States is properly regarded as a capital-scarce economy for most of the period prior to 1914, transforming into a capital-abundant economy sometime before the First World War. We should thus expect a change in the policy preferences of owners of capital sometime between the second and the third periods examined here (or perhaps even earlier), with a shift away from support for protection. In terms of the estimated effects, that means that total profits earned by capital in each state

[28] The measure is strongly correlated (at 0.92) with the total capital invested as a fraction of the state income for the period (1840–1919) for which data on the latter are available. I have performed the analysis using a range of alternative measures of the class variables, including the total value of land in agriculture and total land area (for farmers), aggregate wages in manufacturing (for labor), and total manufacturing production and production per worker (for capital). The key results, discussed in the next section, are substantively identical regardless of which combination of measures is employed.

[29] The 10 leading exporting and import-competing industries in each year in which a vote occurred were identified using figures for exports and imports drawn from the U.S. Department of Commerce's *Commerce and Navigation of the United States*. This approach follows that used by Gilligan (1997), though the set of votes/years differs in that my analysis includes the antebellum period as well as many bills after 1870 that have been excluded from previous studies. The full lists if the top 10 export and import-competing industries in each year are available from the author.

[30] I have also examined specifications of each model that include variables such as dummies for bills with provisions delegating authority to the president to negotiate tariff reductions with other nations and for bills that ratified trade treaties already negotiated. The key substantive results are identical to the ones reported below so the simplest specifications have been presented.

[31] The division of the post-1945 period just recognizes that U.S. trade patterns were quite volatile in the immediate postwar period, as the European and Japanese economies were rebuilding, and (not coincidentally) the two political parties switched sides on the trade issue in the 1960s.

[32] Note that since some members of Congress vote on more than one bill in each of the pools considered, all observations are not independent and so the estimated standard errors are biased in a downward direction in that analysis. I am grateful to an anonymous reviewer for making this point. Results for the bill-by-bill analysis are available from the author.

[33] The various class and industry variables are collinear in ways and degrees that differ over time, so including them all in one estimation would actually make it very difficult to interpret the size and significance of their competing effects on voting.

[34] See Rogowski (1989) for quantitative evidence on U.S. factor endowments, with deductions about class preferences on trade derived from the Stolper–Samuelson theorem. Rogowski's designations are applied here.

TABLE 1. Probit Estimations for Senate Votes on Trade Bills—Class Model

	Estimation Result (Dependent Variable = Vote for Protection)[a]					Effect of Individual Variables on Probability of Vote for Protection[b]				
	1824–60	1875–1913	1922–37	1945–62	1970–94	1824–60	1875–1913	1922–37	1945–62	1970–94
Value of farm production	−0.84	−0.82*	−1.57**	2.84**	−1.26	−0.46	−0.62	−0.64	0.82	−0.31
	(0.50)	(0.38)	(0.53)	(0.73)	(0.77)	(0.09)	(0.07)	(0.06)	(0.10)	(0.10)
Employment in manufacturing	9.32**	16.02**	9.38**	3.00	2.11	0.53	0.69	0.74	−0.32	0.42
	(2.21)	(2.64)	(3.27)	(3.40)	(4.12)	(0.04)	(0.03)	(0.04)	(0.07)	(0.27)
Profits in manufacturing	−6.04**	−8.69**	−2.89*	−2.02	0.08	0.12	0.68	0.64	−0.38	0.34
	(2.10)	(2.03)	(1.43)	(2.01)	(1.59)	(0.38)	(0.04)	(0.11)	(0.08)	(0.30)
N	372	532	367	280	382					
log-likelihood	−225.25	−324.51	−219.96	−121.49	−241.43					
Pseudo-R^2	.1246	.1189	.1288	.1329	.0270					

[a]Estimations include constant and dummy variables for individual bills (not shown). Standard errors in parentheses. *$p < .05$; **$p < .01$.
[b]Effects estimated for change in each variable from minimum (0) to maximum (1) values for equations including only that variable and bill dummies using *Clarify* (King, Tomz, and Wittenberg 2000).

should be positively associated with votes for protection in the first period and most of the second period and negatively thereafter.

Table 1 reports two sets of results. On the left are the estimated coefficients and pseudo-R^2 statistics from the probit estimations of the class model in each period, which can be compared (see Table 5 below) with the results from the alternative industry-group model. On the right, to give some idea of the magnitude of the different effects, are the first differences in the probability of voting for protection when each of the class variables changes from its theoretical minimum to its theoretical maximum value (from 0 to 1). Interpreting the estimated coefficients in the full model (on the left) is rather difficult here because employment and profits in manufacturing are so highly collinear across states (they are correlated at about 0.7 in each period). Both directly reflect the size of the manufacturing sector in each state and the separate effects of the different class variables are thus difficult to discern.[35] An interesting part of the problem here is that when both employment and profits are included in the one model, the estimated coefficients will also measure the effects of variation in labor and capital *intensities* in manufacturing production (using more labor with the same amount of capital, and vice versa). As a partial corrective here I have simply calculated the first differences for each variable (on the right) when other class variables are excluded from the model. The separate effects are less important, in the end, than the overall performance of the class model in each period and how it compares with the industry-group model, so this is not a crucial issue.

The value of farm production is negatively associated with votes for protection, as anticipated, in all but the fourth period. The votes taken in the immediate post-1945 years may be anomalous in this regard due to the new rural reliance on farm support programs introduced in the 1930s. The estimated effects of farming on votes (shown on the right) are smallest in the first and last periods; the largest negative effects appear in the periods between 1875 and 1937. Manufacturing employment is positively associated with protectionist votes, as expected, although the results are again less clear between 1945 and 1962, the postwar boom period for all kinds of U.S. manufacturing exports. While the class model anticipates that owners of capital favored protection up until at least 1914, the coefficients for the profits variable in the first three periods are negative. Since employment and profits are highly collinear, however, this may simply indicate that highly capital-intensive producers were less supportive of protection than others. The effects of profits on votes, calculated with employment excluded from the estimation (on the right), are positive until 1937, and largest between 1875 and 1937, as are the effects of employment on votes.[36]

Table 2 presents the results of estimations for the same set of votes on trade legislation in the Senate, but now using indicators of the importance of exporting and import-competing industries in each state as the explanatory variables. In line with a simple industry-group model, we anticipate that the importance of

[35] For a discussion, see Gujarati 1995, 327–35. The problem is not just inefficiency, though the standard errors for the estimates more than double when all three variables are included in the model rather than one alone. It is also a question of effective sample size: There are hardly any observations, for instance, in which state employment in manufacturing is high while state profits in manufacturing are low (or vice versa).

[36] I have tried variants of the basic class model for the recent periods that include measures of the skill level of the workforce in each state assuming, in line with Midford (1993) and Scheve and Slaughter (1998, 2000), that skilled workers, viewed as a separate class, oppose protection. Yet models that include measures of the proportion of the state's adult population with high school diplomas or higher levels of education perform no better than the basic specification in Table 1. In none of the estimations are the coefficients on these variables significant, and often they take the wrong (positive) sign. Since such data are unavailable for previous periods, I have reported only the simplest model here to provide straightforward comparisons over time.

TABLE 2. Probit Estimations for Senate Votes on Trade Bills—Industry Group Model

	Estimation Result (Dependent Variable = Vote for Protection)[a]					Effect of Individual Variables on Probability of Vote for Protection[b]				
	1824–60	1875–1913	1922–37	1945–62	1970–94	1824–60	1875–1913	1922–37	1945–62	1970–94
Exporting industries	−2.30**	−1.09**	−3.55**	−2.80**	−4.79**	−0.73	−0.48	−0.50	−0.26	−0.54
	(0.31)	(0.25)	(0.43)	(1.06)	(1.41)	(0.05)	(0.07)	(0.04)	(0.05)	(0.10)
Import-competing industries	1.27	1.27*	1.70	1.24	3.45*	0.65	0.52	0.47	0.46	0.73
	(1.03)	(0.56)	(1.06)	(0.92)	(0.79)	(0.04)	(0.06)	(0.09)	(0.26)	(0.06)
N	372	532	367	280	382					
log-likelihood	−199.80	−347.00	−226.24	−129.36	−229.52					
Pseudo-R^2	.2249	.0578	.1041	.0768	.0750					

[a]Estimations include constant and dummy variables for individual bills (not shown). Standard errors in parentheses. *$p < .05$; **$p < .01$.
[b]Effects estimated for change in each variable from minimum (0) to maximum (1) values for equations including only that variable and bill dummies using *Clarify* (King, Tomz, and Wittenberg 2000).

TABLE 3. Probit Estimations for House Votes on Trade Bills—Class Model

	Estimation Result (Dependent Variable = Vote for Protection)[a]					Effect of Individual Variables on Probability of Vote for Protection[b]				
	1824–60	1875–1913	1922–37	1945–62	1970–94	1824–60	1875–1913	1922–37	1945–62	1970–94
Value of farm production	−1.36**	−0.53**	−0.03	2.69**	−1.72**	−0.40	−0.68	−0.52	0.28	−0.49
	(0.26)	(0.11)	(0.31)	(0.43)	(0.43)	(0.03)	(0.03)	(0.04)	(0.12)	(0.04)
Employment in manufacturing	6.47**	8.46**	15.57**	8.95**	4.04**	0.64	0.73	0.81	0.81	0.69
	(1.07)	(1.17)	(2.06)	(1.53)	(1.73)	(0.02)	(0.02)	(0.02)	(0.04)	(0.03)
Profits in manufacturing	−2.25*	−1.32	−2.46**	−0.31	0.19	0.45	0.80	0.71	0.68	0.45
	(0.99)	(1.00)	(0.72)	(0.87)	(0.68)	(0.10)	(0.02)	(0.05)	(0.12)	(0.11)
N	1,584	2,656	1,565	1,262	2,480					
log-likelihood	−985.28	−1,658.12	−909.46	−754.86	−1,605.73					
Pseudo-R^2	.1001	.0992	.1552	.0504	.0638					

[a]Estimations include constant and dummy variables for individual bills (not shown). Standard errors in parentheses. *$p < .05$; **$p < .01$.
[b]Effects estimated for change in each variable from minimum (0) to maximum (1) values for equations including only that variable and bill dummies using *Clarify* (King, Tomz, and Wittenberg 2000).

exporting industries should be negatively related to votes for protection, since individuals employed or invested in those industries benefit from trade liberalization, while the importance of import-competing industries should be positively related to votes for protection.

As expected, in each period the estimated coefficients for the exporting industries variable are negative, and the coefficients for import-competing industries are positive. Again, we must exercise care here in interpreting the size and significance of the separate effects, since these two variables appear quite collinear across states in early periods. Again (on the right), I simply calculated the first difference effects on the probability of voting for protection for a change in each variable from its theoretical minimum to its theoretical maximum (0 to 1) when excluding the other industry variable from the estimation. Here the pattern in the size of effects over time is the reverse of that for the class variables: Both industry variables have larger effects on voting in the first and last period and smaller effects on votes in between.

Overall, the results of the analysis of the Senate votes are quite consistent with expectations based upon changes in factor mobility over time. Voting decisions more closely reflect Senator's consideration of the interests of broad factor classes when levels of mobility were higher (in the years between 1875 and 1937) than when mobility levels were lower (in the periods between 1824 and 1860 and from 1945 to the 1990s). The pattern works just the other way when we examine the responsiveness of Senate voting to demands from free-trade and protectionist industries within each state.

Tables 3 and 4 report the results of the analysis of House votes for each model. These must be treated with a little more caution since the measures of the importance of classes and industries are available only at the state level, rather than the district level, and so we are relying on an assumption that the class and industry composition of districts within states are similar.

The results are very similar to those obtained from the analysis of Senate votes. The estimated coefficients are comparable for each class and industry variable

TABLE 4. Probit Estimations for House Votes on Trade Bills—Industry Group Model

	Estimation Result (Dependent Variable = Vote for Protection)[a]					Effect of Individual Variables on Probability of Vote for Protection[b]				
	1824–60	1875–1913	1922–37	1945–62	1970–94	1824–60	1875–1913	1922–37	1945–62	1970–94
Exporting industries	−1.86**	−0.82**	−3.21**	−0.73*	−2.16**	−0.65	−0.37	−0.47	−0.22	−0.58
	(0.11)	(0.10)	(0.40)	(0.30)	(0.53)	(0.03)	(0.03)	(0.04)	(0.11)	(0.05)
Import-competing	1.62*	1.27**	0.63	1.34**	2.56**	0.63	0.46	0.41	0.41	0.64
industries	(0.73)	(0.36)	(0.63)	(0.48)	(0.29)	(0.02)	(0.02)	(0.14)	(0.15)	(0.03)
N	1,583	2,656	1,565	1,262	2,480					
log-likelihood	−880.49	−1, 727.72	−941.91	−782.01	−1,576.60					
Pseudo-R^2	.1954	.0614	.1250	.0163	.0808					

[a]Estimations include constant and dummy variables for individual bills (not shown). Standard errors in parentheses. *$p < .05$; **$p < .01$.
[b]Effects estimated for change in each variable from minimum (0) to maximum (1) values for equations including only that variable and bill dummies using *Clarify* (King, Tomz, and Wittenberg 2000).

TABLE 5. Comparison of Performance of Class and Industry Models

	1824–60	1875–1913	1922–37	1945–62	1970–94
		A. Senate Votes			
Ratio of pseudo-R^2 in class vs industry group model	0.55	2.06	1.23	1.73	0.36
Results of *J* tests[a]					
α_i	3.93**	−0.53	1.90**	3.79**	3.17**
	(0.52)	(0.71)	(0.67)	(1.44)	(0.63)
α_c	0.53	3.21**	2.41**	3.06**	0.49
	(0.71)	(0.49)	(0.53)	(0.68)	(1.45)
Model rejected	Class	Industry	Neither	Neither	Class
		B. House Votes			
Ratio of pseudo-R^2 in class vs industry group model	0.51	1.62	1.24	3.09	0.85
Results of *J* tests[a]					
α_i	3.95**	−0.30	1.54**	1.34	2.92**
	(0.29)	(0.39)	(0.43)	(0.92)	(0.34)
α_c	−0.16	3.18**	2.76**	2.80**	1.26
	(0.39)	(0.26)	(0.30)	(0.37)	(0.87)
Model rejected	Class	Industry	Neither	Industry	Class

Note: Specifications as listed in Tables 1–4.
[a]α_i and α_c are estimated coefficients for predicted values from industry and class models, respectively, in linear combination with the alternative model. Model test applies the 95% confidence interval. Standard errors in parentheses. **$p < .01$.

in each period. The only clear difference is that the estimated effects of employment and profits on voting in the immediate postwar years, between 1945 and 1962, are positive rather than negative (Table 3), suggesting that members of the House from states heavily dependent on manufacturing did not switch positions on trade as quickly after the war as senators. Again, the estimated effects for the maximum possible change in each of the class variables are largest in the second and third periods, between 1875 and 1937. And again, the estimated effects of changes in each of the industry variables indicate a complementary result: They are largest in the earliest and latest periods and smaller in the periods in between.

A simple way to gain a better sense of the relative utility of the class and industry models involves a comparison of the pseudo-R^2 values in each period (see Table 5). For votes in both the Senate and the House the pattern is the same: The class model performs much better than the industry model in periods two through four, while performing far worse than the industry model in periods one and five.

Table 5 also reports the results of formal tests to discriminate between the two competing models. Davidson and MacKinnon's (1981) "*J* test" is used to assess H_0 (the class model is appropriate) against H_1 (the industry model is appropriate) by an indirect linear combination of the two models. The test is conducted by estimating a combination of the class model and the predicted values from the industry model, where α_i is the weight on the industry model. If H_0 is true, then the true value of α_i is zero. We can then test for $\alpha_i = 0$ to judge whether H_0 can be rejected. The procedure is simply reversed to test for whether H_1 can be rejected. Clearly the industry model dominates the class model in periods one and five, in both the Senate and House;

the class model dominates the industry model in period two in both chambers; while a clear winner (or loser) does not emerge in periods three and four. The votes in period four, between 1945 and 1962, seem especially difficult for the models: While the class model appears to explain more of the variation in both the Senate and the House votes, the effects of two of the three class variables (farming production and profits in manufacturing) actually go counter to the direction anticipated in standard class-based accounts.

It should be clear that these cross-time comparisons provide only an indirect test of the factor mobility hypothesis. We are tightly constrained by the availability of data. If we had data on levels of factor mobility *by electoral district* for a substantial period of history, so that we could allow for spatial differences in mobility levels as well as temporal ones, we could do much more with the analysis of roll call votes and test the theory more directly. But the data on general levels of mobility reported in Figures 1 and 2 represent the first systematic measurement of interindustry factor mobility over any span of time in the literature—an astounding fact given the centrality of mobility (and its converse, specificity) in theories of political economy. It is enough to provide us with a set of basic predictions about how the relative utility of the class and group-based models should fluctuate over time. That these predictions are confirmed by the analysis of congressional voting patterns strongly suggests that further analysis of factor mobility holds real promise for helping to bridge the large gulf that exists between competing theoretical models currently used in political economy.

CONCLUSIONS

While the possibility of relating variation in factor mobility to variation in coalitions has been discussed by a number of scholars in the past (see Alt et al. 1996; Magee 1980), no systematic empirical study of the relationship has been furnished to date. The evidence presented here suggests that mobility levels in the United States have varied markedly with different stages of industrialization over the last two centuries. These changes coincided with significant shifts in trade politics: Voting decisions in both the Senate and the House more clearly reflected class-based considerations when interindustry mobility was relatively high but were more in line with industry-based pressures when mobility was relatively low.

These results do not, of course, approximate the final word on the matter. Using legislative votes as the dependent variable here has the advantage that it is "where the action is" when it comes to the making of trade policy, but it is at least one step removed from the social cleavages and coalitions that are at issue. Alternative evidence should be considered. One possibility involves the use of data from public opinion surveys to measure the policy preferences of individuals. In recent work, Scheve and Slaughter (1998, 2001) have examined responses to a question about the desirability of new limits on imported goods included in National Election Studies surveys in 1992 and 1996, relating them to the occupational characteristics of respondents.[37] They conclude that a basic class characteristic of respondents (their skill level) was a better predictor of their opinions on trade policy than the competitive position of the industry in which they were employed, a conclusion that runs counter to the results from the analysis of recent congressional trade votes reported above.[38] Pursuing this type of evidence further, and the apparent disjuncture between public attitudes and congressional politics, might be extremely fruitful, although reliable survey data are available only for very recent years.[39]

More work on the issue is clearly warranted. But the findings reported here do suggest a relatively simple solution to the persisting division in the scholarly literature between class and group-based models. Both types of approaches can be justified under different conditions. For the study of political economy more generally the findings have some wide-ranging implications. Depending upon the assumptions one makes about levels of interindustry mobility, general equilibrium models produce very different predictions about the distributional implications of any policy that affects relative commodity prices, and thus the demand for different factors of production, and any policy that affects the supply of those different factors. The distributional effects of a vast range of policies thus hinge upon levels of mobility: exchange-rate policy, controls on foreign investment (both outward and inward), all forms of industrial policy and industry regulation (subsidies, tax incentives, and labor and environmental laws), and immigration policy. The extent to which these policy issues generate class conflict, rather than industry-based rent-seeking, will hinge critically upon levels of factor mobility in the economy.

There are important implications, too, for the direction of U.S. trade policy. When levels of interindustry mobility decline, as in recent years, the evidence suggests that policymakers will have less incentive to stake out a coherent free trade (or protectionist) position on trade, aimed at capturing support from a broad class-based coalition, and instead they will be more inclined to adopt incoherent policy positions that balance competing demands from the most powerful industry

[37] Gabel (1998) has employed data on public support for European Union membership from recent Eurobarometer surveys in a similar fashion.

[38] Interestingly, however, Scheve and Slaughter have also found that respondents in counties in which import-competing industries accounted for larger shares of employment tended to have more protectionist views. This seems like a reasonable confirmation of the strength of industry-based coalitions, although they argue that it reflects calculations the respondents are making about the effects of international trade on housing values in the counties.

[39] Much also appears to depend on the wording of the particular survey question examined and the context in which it has been posed. Bauer, Pool, and Dexter (1972, 81–84) argue forcefully that public attitudes toward the trade issue are especially poorly informed and unstable, changing drastically in accord with small changes in the wording of questions. Context may also be critical. In 1992 and 1996, for instance, survey responses are likely to have hinged upon attitudes toward NAFTA that had some very particular characteristics (e.g., the potential effects on foreign direct investment).

groups on both sides—supporting multilateral trade negotiations with one hand, for instance, while generously applying nontariff barriers to imports in key sectors with the other. If mobility levels continue to decline, this raises the specter of a kind of Olsonian nightmare in which a growing share of the economy's resources are squandered on zero-sum distributive battles instead of being invested in productive activities (Bhagwati 1982; Olson 1982).

Class-based political battles are no picnic, of course. They can be a tumultuous and disruptive force, producing sharp fluctuations in policy as first one side, then another, gains control of government. But broad-based class coalitions are also more encompassing of society as a whole, as Olson (1982) famously noted, and thus more interested in policies that expand the size of the national "pie" rather than simply divide it. Establishing some kind of stable compromise between broad class coalitions along Swedish lines is an obvious solution, providing for efficiency-enhancing types of economic policies and methods of compensation. But maintaining such a broad-based compromise requires programs that discourage industry rent-seeking by supporting and promoting high levels of interindustry mobility among owners of labor and capital. In the end, a strong case may thus emerge for more extensive forms of adjustment assistance to workers and firms that would enable them to respond to changes in the international economy in more efficient, nonpolitical ways.

APPENDIX A. A MODEL OF THE INCOME EFFECTS OF TRADE WITH VARIABLE FACTOR MOBILITY

The model developed here builds upon Jones's (1971) three-factor model. It is a modified version of the traditional, 2×2 general-equilibrium model used in the trade literature. Consider an economy in which two commodities, X_1 and X_2, are produced, and sector i uses only factors specific to it, L_i and K_i. Since only relative prices matter in this two-commodity model, X_1 is chosen as the *numeraire* for the analysis. Equilibrium is described by full employment of each factor (Equations 1 to 4) and competitive profits (Equations 5 and 6):

$$a_{L11}X_1 = L_1, \tag{1}$$

$$a_{K11}X_1 = K_1, \tag{2}$$

$$a_{L22}X_2 = L_2, \tag{3}$$

$$a_{K22}X_2 = K_2, \tag{4}$$

$$a_{L11}w_1 + a_{K11}r_1 = 1, \tag{5}$$

$$a_{L22}w_2 + a_{K22}r_2 = p, \tag{6}$$

where a_{Lj} and a_{Kj} are the quantities of L_i and K_i required per unit output of X_j, w_j and r_j are returns to labor and capital in industry j in terms of the first commodity, and p is the relative price of the second commodity in terms of the first. Full employment requires that techniques of production are variable, and since competition ensures that unit costs are minimized, each a_{ij} depends upon the ratio of factor prices in industry j: $a_{ij} = a_{ij}(w_j/r_j)$.

Solving Equations 1 and 2 for X_1, and Equations 3 and 4 for X_2 yields:

$$\frac{a_{L11}}{a_{K11}}K_1 = L_1, \tag{7}$$

$$\frac{a_{L22}}{a_{K22}}K_2 = L_2. \tag{8}$$

Equations 5 to 8 provide a set of four relationships in the four unknown factor prices. Commodity prices are exogenous, and for the moment, endowments of specific factors are treated as parameters. The structure of the model is best examined by describing the manner in which the equilibrium is disturbed by changes in commodity prices. After differentiating totally, we can solve for the percentage change in each of the factor returns (results are stated in percentage terms to indicate, not only directions, but relative magnitudes of changes).

$$\frac{dw_1}{w_1} = -\frac{\theta_{K11}}{\sigma_1}\left(\frac{dL_1}{L_1} - \frac{dK_1}{K_1}\right), \tag{9}$$

$$\frac{dr_1}{r_1} = \frac{\theta_{L11}}{\sigma_1}\left(\frac{dL_1}{L_1} - \frac{dK_1}{K_1}\right), \tag{10}$$

$$\frac{dw_2}{w_2} = \frac{dp}{p} - \frac{\theta_{K22}}{\sigma_2}\left(\frac{dL_2}{L_2} - \frac{dK_2}{K_2}\right), \tag{11}$$

$$\frac{dr_2}{r_2} = \frac{dp}{p} + \frac{\theta_{L22}}{\sigma_2}\left(\frac{dL_2}{L_2} - \frac{dK_2}{K_2}\right), \tag{12}$$

where σ_j is the elasticity of substitution between labor and capital in industry j, θ_{Lj} and θ_{Kj} are the distributive shares of factor i in the value of output of industry j, and we have utilized the relation

$$\theta_{Lij}\left(\frac{da_{Lij}}{a_{Lij}}\right) + \theta_{Kij}\left(\frac{da_{Kij}}{a_{Kij}}\right) = 0,$$

which is implied by the cost-minimizing choice of a_{ij} (Jones 1971, 6).

To analyze the effects of factor mobility we can consider each of the specific factors to be themselves outputs of productive processes whereby L_1 can be converted into L_2 and K_1 into K_2 at increasing opportunity costs. Total factor endowments, L and K, are fixed exogenously (where $L = L_1 + L_2$ and $K = K_1 + K_2$), but the ratios L_2/L_1 and K_2/K_1 respond positively to relative returns, w_2/w_1 and r_2/r_1, respectively. Mobility is then defined interms of the elasticities of substitution, ϕ_L and ϕ_K, along the transformation loci connecting L_2 and L_1 and connecting K_2 and K_1, respectively.

$$\phi_L = \frac{d(L_2/L_1)/(L_2/L_1)}{d(w_2/w_1)/(w_2/w_1)}, \qquad \text{and also,}$$

$$\phi_K = \frac{d(K_2/K_1)/(K_2/K_1)}{d(r_2/r_1)/(r_2/r_1)},$$

where $\phi_L, \phi_K \geq 0$.

These relationships can be used with Equations 9 to 12 to derive full solutions for the percentage change in factor returns as a function of the percentage change in commodity prices ("hats" indicate percentage changes):

$$\hat{w}_1 = \left[\frac{-\theta_{K11}\sigma_2(\phi_K\tau_{K2} - \phi_L\tau_{L2}) - \theta_{K11}\phi_L\phi_K\Omega}{\Delta}\right]\hat{p}, \tag{13}$$

$$\hat{r}_1 = \left[\frac{\theta_{L11}\sigma_2(\phi_K\tau_{K2} - \phi_L\tau_{L2}) + \theta_{L11}\phi_L\phi_K\Omega}{\Delta}\right]\hat{p}, \tag{14}$$

$$\hat{w}_2 = \left[\frac{-\theta_{K11}\sigma_2(\phi_K\tau_{K2} - \phi_L\tau_{L2}) + \phi_K(\sigma_1\tau_{K1} + \sigma_2\tau_{K2}) + \sigma_1\sigma_2 - \theta_{K11}\phi_L\phi_K\Omega}{\Delta}\right]\hat{p}, \tag{15}$$

$$\hat{r}_2 = \left[\frac{\theta_{L11}\sigma_2(\phi_K\tau_{K2} - \phi_L\tau_{L2}) + \phi_L(\sigma_1\tau_{L1} + \sigma_2\tau_{L2}) + \sigma_1\sigma_2 + \theta_{L11}\phi_L\phi_K\Omega}{\Delta}\right]\hat{p}, \tag{16}$$

where $\Delta = \phi_L(\theta_{K22}\sigma_1\tau_{L1} + \theta_{K11}\sigma_2\tau_{L2}) + \phi_K(\theta_{L22}\sigma_1\tau_{K1} + \theta_{L11}\sigma_2\tau_{K2}) + \sigma_1\sigma_2 + (\theta_{L11} - \theta_{L22})\phi_L\phi_K\Omega > 0,$

$\Omega = \tau_{L1}\tau_{K2} - \tau_{L2}\tau_{K1},$

where τ_{Lj} and τ_{Kj} are the fractions of total labor and capital employed in industry j. Ω describes factor intensities: It is positive (negative) when production of X_1 is relatively labor (capital)-intensive.

Equations 13–16 show that the relationships between p and factor returns depend on the levels of labor and capital mobility. The Ricardo–Viner and Stolper–Samuelson results appear here as special cases. If we assume that capital is completely specific, as in the standard Ricardo–Viner derivation, $\phi_K = 0$ and the solutions yield the standard results. Specifically, if p rises ($\hat{p} > 0$), both wage rates also rise but at a slower rate: $\hat{p} > \hat{w}_2 > \hat{w}_1 > 0$. (Note that $\hat{w}_2$ approximates $\hat{w}_1$ as ϕ_L rises.) Further, the return on capital in the second industry increases at a faster rate than p, while in the first industry it falls: $\hat{r}_2 > \hat{p} > 0 > \hat{r}_1$. If we assume that labor and capital are infinitely mobile, as in the Stolper–Samuelson approach, $\phi_L = \phi_K = \infty$ and the model yields the familiar outcome: An increase in the relative price of the labor(capital)-intensive commodity produces a larger rise in wage rates (profits) and a decline in profits (wages). Specifically, if p rises, $\hat{w}_2$ and $\hat{w}_1$ are greater than $\hat{p}$ (<0), and $\hat{r}_2$ and $\hat{r}_1$ are negative ($>\hat{p}$), if and only if $\Omega < (>)0$.

The key relationship that concerns us here describes how the mobility of a factor influences class solidarity, as indicated by the difference between the effects of a price change on returns to the factor in each industry. For any change in p, the absolute difference between $\hat{w}_1$ and $\hat{w}_2$ is inversely related to ϕ_L; that is, $\partial(|\hat{w}_1 - \hat{w}_2|)/\partial\phi_L < 0$. Likewise, the absolute difference between $\hat{r}_1$ and $\hat{r}_2$ is inversely related to ϕ_K; that is, $\partial(|\hat{r}_1 - \hat{r}_2|)/\partial\phi_K < 0$. The implication is that, for any change in relative prices induced by a shift in trade policy or trade flows, the income effects for workers (capitalists) in different industries will be more similar when labor (capital) mobility is higher, all else equal.

APPENDIX B. CONGRESSIONAL VOTES ON TRADE LEGISLATION

The full list of trade bills included for the House and Senate and how they have been coded is given in Table A1. I selected major pieces of legislation that directly raised or lowered barriers to imports. Approximately two bills for each decade were selected, for a total of 30 altogether. I excluded product-specific legislation (e.g., the 1988 Textile and Apparel Act) on the grounds that voting decisions on such bills are less representative of preferences with regard to the trade issue in general and are also more prone to logrolling. I also excluded bills that were unclear or controversial in nature and difficult to interpret as either protectionist or liberalizing. The 1870 and 1872 Tariff Acts and the 1883 "Mongrel Tariff," in which Republicans cut some duties in response to surplus revenues with the aim of defending protection generally, are prime examples (Taussig 1931, 178–89, 232–50). The omnibus trade legislation voted upon between 1986 and 1988, to which was attached a wide array of non-trade-related provisions, is another. I included the protectionist Trade Remedies Reform Act of 1984 rather than the omnibus Trade and Tariff Act of the same year, into which it was ultimately incorporated, since the latter contained a mixture of liberal and protectionist measures. Finally, I excluded some rare "hurrah" votes, on the 1979 Trade Agreements Act that implemented the Tokyo Round agreement, the 1988 Canada–U.S. Free Trade Agreement, and the Senate vote on the 1974 Trade Act, on the grounds that there is almost no variation in the dependent variable.

Several other general pieces of trade legislation might have been included. The protectionist tariff bill of 1820 was excluded in favor of the more famous 1824 Tariff Act. Ratification votes on reciprocity treaties with Canada in 1854 and 1910, and the 1864 resolution to abrogate the former of these, were excluded since their impact was limited to a narrow range of imported raw materials. The 1877 Mills Resolution that the tariff should be used only for revenue purposes was excluded since 146 representatives did not cast a vote. The 1878 Wood bill to reduce duties on manufactures was more important, but it was defeated by a motion to strike out the enacting clause in the House. The ill-fated Morrison bills of 1886 were excluded in favor of the more successful, and almost identical, 1884 bill. I included only two of the numerous post-1945 votes on RTA extension bills, excluding the votes of 1948, 1949, 1951, 1953, 1954, and 1958. The 1948, 1949, and 1951 votes are somewhat ambiguous in their liberalizing character since they introduced the "peril-point" and Escape Clause provisions designed to ensure that trade treaties would do no harm to domestic industries and thus were supported by many protectionists (Pastor 1980, 96). The 1987 Gephardt Amendment to the omnibus trade bill of that year, requiring action against nations running large trade deficits with the United States, might have been included, although in political substance it approximates the 1984 Trade Remedies Reform bill that made the list. The 1993 vote to extend the president's authority to complete the Uruguay Round of GATT negotiations was excluded to make way for the 1994 vote to implement the actual agreement.

TABLE A1. Selected Trade Bills

Legislation	Coded
Tariff Act 1824	Protectionist
Tariff Act 1828	Protectionist
Adams Compromise Tariff 1832	Protectionist
Clay Compromise Tariff 1833	Liberal
Tariff Act 1842	Protectionist
Walker Tariff Act 1846	Liberal
Tariff Act 1857	Protectionist (House)/ Liberal (Senate)
Morrill Tariff Act 1861	Protectionist
Tariff Act 1875	Protectionist
Morrison Bill 1884	Protectionist (House only)
Mills Bill 1888	Liberal (House)/ Protectionist (Senate)
McKinley Tariff 1890	Protectionist
Gorman Tariff 1894	Liberal
Dingley Tariff 1897	Protectionist
Payne–Aldrich Tariff 1909	Protectionist
Underwood Tariff 1913	Liberal
Fordney–McCumber Tariff 1922	Protectionist
Smoot–Hawley Tariff 1930	Protectionist
RTAA 1934	Liberal
RTA Extension 1937	Liberal
RTA Extension 1945	Liberal
RTA Extension 1955	Liberal
Trade Expansion Act 1962	Liberal
Mills Bill 1970	Protectionist (House only)
Trade Reform Act 1974	Liberal (House only)
McIntyre Amendment 1974	Protectionist (Senate only)
Trade Remedies Reform 1984	Protectionist (House only)
Disapprove Fast-Track 1991	Protectionist
NAFTA 1993	Liberal
GATT Uruguay Round 1994	Liberal

Most of the coding decisions were straightforward. The "Adams Compromise" act of 1832 is coded protectionist, in accord with Taussig's (1931, 109–10) interpretation, since while it did cut revenue duties and remove the "minimums" system, it retained all of the protective duties of 1828 and was thus widely regarded as an endorsement of the "American system" of tariffs as permanent policy (Stanwood 1903, 383–86). The "Clay Compromise" of 1833, in contrast, provided for large (albeit gradual) cuts in protective duties. For the Tariff Act of 1857, I treated the House and Senate versions separately. In the House, the Campbell bill (known as the "manufacturers' bill") attempted to deal with the problem of surplus revenues by removing only duties on raw materials. In the Senate, the Democratic majority substituted Hunter's bill mandating cuts in protective duties. I also split the House and Senate bills of 1888: The Mills bill in the House proposed large tariff reductions, but the Senate revised it completely, formulating a protectionist bill that became the blueprint for the McKinley tariff of 1890.

For each bill the votes used in the analysis are those on final passage, since votes on amendments and procedural questions are more likely to be affected by idiosyncratic and strategic concerns. The source for all voting data was Rosenthal and Pool (2000).

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