Economic Globalization, Industrialization and Deindustrialization in Affluent Democracies

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Abstract
This study reexamines the relationship between economic globalization and manufacturing employment in affluent democracies. After reviewing past research, including the well-supported Rowthorn model, we propose a differentiation-saturation model that theorizes that globalization has a curvilinear relationship with manufacturing employment. Using two different techniques, we analyze the most comprehensive sample of 18 affluent democracies from 1960-2001. We examine 12 globalization measures and provide the first analysis of the curvilinear relationship between globalization and manufacturing employment. We find that some aspects of globalization have linear effects on manufacturing employment, most of which are positive. We find more evidence, however, that globalization has a curvilinear, inverted U-shaped relationship with manufacturing employment. The evidence for the Rowthorn model is mixed. GDP per capita and its square do not have robust effects, but agricultural employment is one of the most important causes. Including globalization in the model weakens the evidence for the Rowthorn model. There is some evidence that globalization has different effects across different varieties of capitalism, regions and historical periods. Ultimately, our analyses partially support both the Rowthorn model and our differentiation-saturation model.

One of the most dramatic social changes of the past half-century has been the decline of manufacturing employment in affluent democracies. As Figure 1 shows, manufacturing employment as a share of the labor force declined substantially from 1960 to 2001 in the 18 affluent democracies in our study. In the early 1960s, manufacturing employment averaged nearly 40 percent across these countries. In addition, the maximum value countries (Germany and Switzerland) approached 50 percent. Even Ireland, the least industrialized in 1960, had more than 22 percent employed in manufacturing. By 2001, massive deindustrialization had occurred across all 18 affluent democracies. The most industrialized country had fallen to less than 30 percent manufacturing employment, the average was below 25 percent, and the least industrialized country was below 20 percent.

Certainly, the widespread decline of manufacturing was not uniformly linear. From 1960 to 1975, the least industrialized countries experienced growth in manufacturing employment – the minimal value rose from 22.2 in 1960 to 28.7 in 1973. During that period, heavily industrialized countries reached a plateau. The maximum value remained above 48 percent until 1971. Partly driven by manufacturing growth in the less industrialized among these countries, the mean peaked slightly above 38 percent in 1965 and remained above 36 percent through

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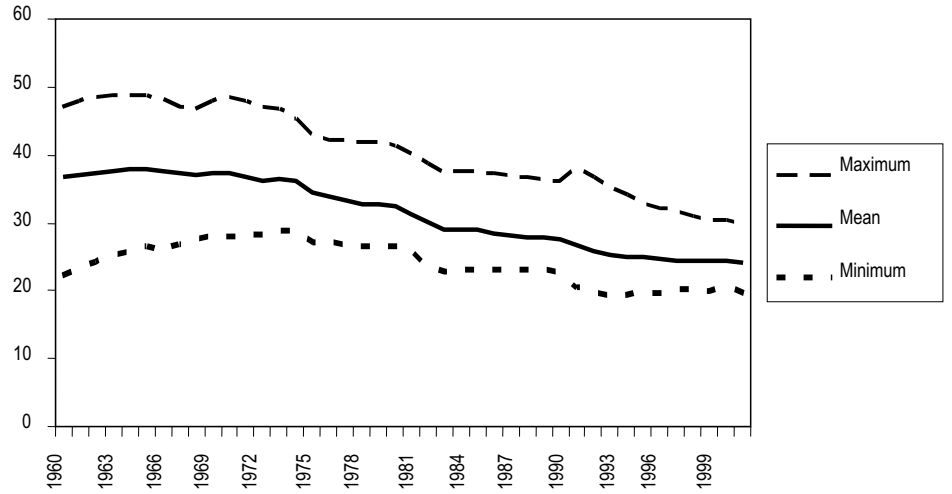
Figure 1. Trends in Manufacturing Employment as a Percent of Labor Force in 18 Affluent Democracies, 1960-2001



1974. Nevertheless, manufacturing employment has experienced a secular decline at least since the mid-1970s. The average has declined almost every year, and by 2001, no country had even 30 percent manufacturing employment.

What caused this dramatic social change? In debates on deindustrialization, one of the most controversial explanations has been the impact of economic globalization. While early researchers called attention to economic globalization and even suggested it was a central cause, subsequent empirical research was more skeptical. Following a substantial body of research, most analysts have converged on what can be called the Rowthorn model. This model emphasizes that deindustrialization is mainly caused by rising economic development and productivity. By contrast, economic globalization is not very influential and may actually augment manufacturing employment. Hence, the scholarly consensus has been that economic globalization has not had a very substantial influence on deindustrialization.

In this study, we revisit this controversial debate, providing new evidence and scrutinizing the relationship between economic globalization and deindustrialization. While controlling for the Rowthorn model, we comprehensively test economic globalization's potential effects by considering 12 indicators. We examine whether economic globalization has linear effects and provide the first test of whether economic globalization has curvilinear effects. We now review past research and then propose a theoretical model suggesting that economic globalization may have curvilinear effects on manufacturing employment.

Past Research

The concept globalization has been deployed for wide-ranging purposes (Guillén 2001a; Sklair 1999, 2001). We make no claim to capture all dimensions of the

diverse globalization literature. It is beyond our study to examine cultural, political and legal globalization, the longer history of international economic integration that marks the rise of the modern capitalist system in the 16th century or developing countries. Rather, we strictly concentrate on globalization as it has been discussed in the literature on deindustrialization in the latter half of the 20th century in affluent democracies. Solely for the purposes of studying deindustrialization, we conceptually define economic globalization as international economic exchange and the flow of goods, services and capital across international boundaries. We operationalize economic globalization as international trade and investment. Henceforth, we simply refer to "globalization."

Bluestone and Harrison (1982:6) coined the term "deindustrialization" and defined it as the "systematic disinvestment in a nation's core manufacturing industries." They were concerned with the wave of plant closings and the decline of manufacturing that was occurring in the United States in the late 1970s and early 1980s (Wallace and Rothschild 1988). Though they offered a broad explanation for deindustrialization – including declining profits, anti-union management, the avoidance of taxation and welfare responsibilities, and shifting power relations between capital and labor (Grant and Wallace 1994, Schwartz and Zukin 1988) – Bluestone and Harrison argued that one cause was a "globalization gambit." The globalization of production was undertaken partly to replace domestic manufacturing (Harrison and Bluestone 1988). Early research was supportive, illustrating how globalization undermined manufacturing in affluent democracies (Bluestone 1984). For example, Stopford and Turner (1985) showed that the outward FDI of British firms contributed to the loss of manufacturing jobs in the United Kingdom.

Wood (1994) provides one of the more persuasive accounts of the globalization-deindustrialization link. Wood contends that trade with developing countries and the associated rise in demand for unskilled labor contributes to deindustrialization. Along with greater free trade, enhanced transportation and communication facilitate the movement of production to developing countries (Dicken 2003, Wallace and Brady 2001). Mixing new evidence with the argument that developing countries have capitalized on their comparative advantage in less-skilled, cheap labor, Wood concludes that trade with developing countries contributes to deindustrialization. In the most sophisticated test of these matters, Alderson (1999:718) concludes that, "Globalization [manufactured exports +, outward foreign direct investment -, and manufacturing imports from developing countries -] has played an important, independent role in the deindustrialization of advanced industrial countries." (See also Alderson 1997.)

Despite these contributions, several compelling critiques have emerged. First, globalization has probably been too small to be the main cause of deindustrialization. Though globalization has increased in all affluent democracies, globalization remains small relative to the size of the economy in countries like the United States (Bairoch 1996, Gordon 1994, Krugman 1996, Wade 1996). Second, the image of globalization that motivated these earlier studies was an unrepresentative portrait of international economic exchange. Imports from or investment fleeing to developing countries is a relatively small part of total

globalization, and most international economic exchange occurs among and between the developed democracies (Dicken 2003, Gilpin 2001, Guillén 2001a, Hirst and Thompson 1996). Third, studies emphasizing globalization's impact on deindustrialization often failed to acknowledge the role of rising economic development (except Alderson 1997, 1999). Without considering rising economic development, it is unclear whether the relationship between globalization and deindustrialization is spurious or causal.

These critiques contributed to the formation of an alternative general explanation for the rise and decline of industrialization in affluent democracies – the Rowthorn model (Rowthorn and Wells 1987; Rowthorn and Ramaswamy 1997, 1998). In this model, deindustrialization is principally caused by rising productivity as measured by an inverted U-shaped relationship between GDP per capita and manufacturing employment. As a country develops economically, agricultural employment is replaced by industrial employment (Bluestone and Harrison 2000:72, 227). This occurs until a country reaches a point of industrial maturity, after which service jobs replace manufacturing jobs and service sector growth outpaces that of the industrial sector. Wolf (2004:178) explains: "If growth of labour productivity is higher than the growth of output, employment must shrink. If growth of productivity is sufficiently higher in manufacturing than in the rest of the economy, the employment share of manufacturing will fall, even if the employment level does not." Hence, deindustrialization mainly occurs because fewer manufacturing workers are needed to produce manufacturing goods (Baumol 1989, Bluestone and Harrison 2000:227-29). Rowthorn and Ramaswamy (1997) explain, "Deindustrialization is not a negative phenomenon, but is the natural consequence of the industrial dynamism in an already developed economy." This account offers a parsimonious and powerful explanation focusing on internal factors instead of globalization.

Recent research supports the Rowthorn model (Dewatripont et al. 1999, Feinstein 1999, Rowthorn and Ramaswamy 1998). Rowthorn and Ramaswamy (1997) show that the declining share of manufacturing employment has mirrored the decline in the share of manufacturing value added in the economy. After controlling for development and rising productivity, globalization has, at most, very small effects on manufacturing (Dewatripont et al. 1999, Golub 1999, Wolf 2004). Burtless and colleagues (1998) show that had the United States never experienced a trade deficit from 1964-1992, manufacturing trends would have been almost identical. Though they acknowledge that North-South trade may explain slightly less than one-fifth of deindustrialization in advanced economies, Rowthorn and Ramaswamy (1998) contend that internal factors like rising productivity are the paramount causes. While finding that globalization does matter, Alderson (1999) concludes that deindustrialization is mainly caused by the Rowthorn model and would have occurred without globalization. At this point, the Rowthorn model probably represents the consensus explanation in studies of deindustrialization.

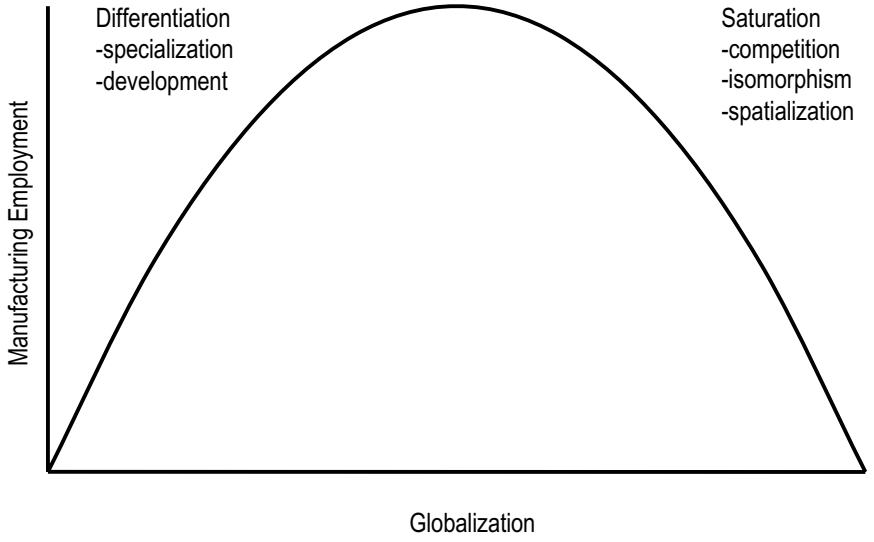
The Differentiation-Saturation Model

Despite the value of the Rowthorn model, we suggest three unexplored limitations. First, we question the naturalistic imagery of rising worker productivity

mechanically leading to firms and countries evolving away from manufacturing jobs. While firms often respond to increasing productivity by adjusting work forces, we are skeptical that economic phenomena function so simply and mechanistically as to preclude other influences. Second, while the Rowthorn model concentrates on the internal dynamics of firms – e.g., technology and rising productivity – economic sociologists have demonstrated that external factors drive much firm behavior (Fligstein 2001). We advocate for a sharper focus on the relations among manufacturing firms, through competition and isomorphism, for example. Third, the Rowthorn model presumes a linear relationship between globalization and manufacturing across all countries and historical periods. To our knowledge, no study has tested a curvilinear relationship. In every study we could locate, only the linear effect of globalization was considered. This is an important omission, and there are good reasons to expect a non-linear relationship, such as qualitative changes in how globalization operates as it grows.

Theoretically, we propose that globalization should be modeled with a

Figure 2. Conceptual Model of Curvilinear Relationship between Globalization and Manufacturing Employment



curvilinear relationship. Initially, globalization will cause a growth of manufacturing employment's share of the labor force. The globalization of a domestic economy at low levels will foster a *differentiation* of manufacturing industries that actually cultivates an increasing specialization of manufacturing employment across different countries. Subsequently, greater levels of globalization will cause a decline of manufacturing employment. As economies move from moderately to highly globalized, *saturation* will undermine manufacturing employment. While rising productivity may contribute to deindustrialization, we argue that

globalization has played a role as well. We present a conceptual model of this causal relationship in Figure 2.

Differentiation

At lower or initial levels, globalization has the potential to cause increased manufacturing employment (Gordon et al. 1982). Obviously, this can occur if we are referring to globalization as exports and inward investment. For example, Alderson (1999) finds that net manufactured exports significantly increase manufacturing's share of the labor force. Rowthorn and Ramaswamy (1997) find that total exports and exports to developing countries boost manufacturing employment. If countries are selling their manufactured goods to other countries, it is clear that globalization can boost manufacturing employment (e.g., Japan, Gao 2001).

Beyond this, globalization can boost manufacturing employment if globalization entails the total flows of goods, services and investment across national boundaries and enhances the capacity of domestic manufacturers to specialize in certain products. The idea of specialization has been longstanding in the economics of trade. The Heckscher-Ohlin (or H-O) model of trade postulates that countries specialize in different products based on their comparative costs and advantages relative to other countries (Gilpin 2001:206). Indeed, Rowthorn and Ramaswamy (1998:11) acknowledge, "The pattern of trade specialization in manufacturing among the advanced countries is an important factor that accounts for the variation in the structure of employment from one advanced country to another."

For example, the United States might be able to increase manufacturing employment in durable goods if manufacturing firms can acquire parts and components for cheaper prices from other countries. With the extra revenue and stable profits from such transactions, U.S. manufacturers may be able to retain current manufacturing employees and invest in personnel, equipment and facilities. In turn, manufacturing employment could remain stable or actually increase while worker productivity increases, albeit in a specialized area.

The other countries supplying parts and components need not be developing countries. While much of the research on the H-O model presumed a comparative advantage in manufacturing would result from a surplus of cheap labor, a comparative advantage can come from a variety of sources. Countries can have a comparative or competitive advantage in manufacturing because of state policies, public investments and institutionalized traditions (Porter 1990). Many countries maintain a specialization in certain manufactured products even after their labor has become more expensive and productive. In part, this reflects countries' distinct, historical trajectories of economic development (Berger and Dore 1996). Guillén (2001a:246) explains, "German, French, Japanese, and American firms are competitive in the global economy, but rarely in the same industry and market segment." Guillén elaborates that Germany specializes in high-quality engineering intensive industries such as machinery, luxury automobiles and chemicals (Streeck 1991); France specializes in large-scale technical industries including high-speed trains, satellites, rockets and nuclear

power (Storper and Salais 1997); and Japan specializes in assembled goods, i.e., household appliances, electronics and automobiles (Gerlach 1992). Economic sociologists have demonstrated that a country's comparative advantage reflects institutional histories (Orru et al. 1997). Biggart and Guillén (1999) and Guillén (2001b) show that countries specialize in certain manufacturing industries as a result of matching their institutionalized patterns of authority and organization to global markets. Because of these sociological comparative advantages, countries at many levels of development can sustain a manufacturing presence through globalization (Guillén 2001b).

As stated above, most of the goods and services that flow into the United States do not come from developing countries (Gilpin 2001:207). Rather, countries supplying parts to U.S. manufacturers simply need to be countries that can specialize in cheaply producing those parts because of a comparative or competitive advantage. Those advantages need not emerge solely from cheap labor, but can emerge from a host of alternative sources. As Gilpin (2001:208) explains, "Most trade has taken place, contrary to H-O theory, between countries with similar factor endowments; most exports of industrialized economies go to other industrialized countries."

Another reason specialization characterizes the relationship between globalization and manufacturing is because much of the international exchange we observe involves transfers within multinational corporations. As Gilpin (2001:210) explains, "A substantial proportion of world trade now takes place as intra-firm transfers at prices set by the firms and as part of global corporate strategies. . .In the late 1990s, over 50 percent of American and Japanese trade was intrafirm trade." Gilpin (2001:297) even reports, "One-half of all imports and exports in the world economy are estimated to be transactions between parent corporations and subsidiaries." Following the prior example, a multinational corporation might import components from Mexico into the United States, where U.S. manufacturing workers might perform the final assembly. If this firm is behaving efficiently, the cheaper components from the Mexican division might lead to manufacturing job retention in the United States.[1] Regardless of the specific transactions, this process involves a division of labor between countries, as each uses comparative and competitive advantages to specialize in different manufacturing products. At the same time, globalization can enhance countries' capacities to sell their products in other countries by using those advantages (Doner 1991).[2] If this differentiation characterizes the relationship between earlier or lower levels of globalization and manufacturing employment, we can expect a positive linear effect of globalization on manufacturing employment.

Saturation

As affluent democracies move to higher levels of globalization, we expect manufacturing employment will decline. At these subsequent, higher levels of globalization, saturation characterizes the relationship between globalization and manufacturing. Three complementary and interrelated processes are involved in saturation: competition, mimetic isomorphism and spatialization. These

processes only take hold at higher levels of globalization; competition, mimetic isomorphism and spatialization are less likely to occur at modest levels.

First, when globalization exceeds a certain threshold, domestic manufacturers begin to face heightened international competition. In recent decades, more countries generated the institutional infrastructure to facilitate the development of manufacturing firms that can compete internationally (Dicken 2003:44, McMichael 2000:164). As a result, domestic manufacturers faced a greater density of competitors and found it more difficult to maintain the same employment levels (Carroll and Hannan 2000:Ch.19).[3] With higher levels of globalization, developing countries have further expanded their manufacturing workforces. These younger firms in industrializing countries can produce manufacturing goods more efficiently partly because of lower labor costs. Just as important, however, are modern facilities and technology. Rather than upgrading or refurbishing older facilities, industrializing countries can expand manufacturing with more recent investments in modern technology (e.g., South Korean steel). For example, in the boom of Japan's peak globalization, cheaper imports and parts from Southeast Asia – fueled by Japanese financial investment and speculation – undercut small- and medium-sized Japanese manufacturing firms (Gao 2001). Moreover, this competition from greater globalization facilitates exchange between developed countries, which can further undermine the manufacturing sector.

Our view of this competition is consistent with earlier research that suggested that globalization reduces manufacturing's share of the labor force (Wood 1994). However, we expect that this competition only undermines manufacturing employment when globalization reaches higher levels (Rodrik 1997). Lower levels of globalization have little potential to reduce manufacturing employment substantially. Competition will be reflected in traditional measures of globalization's "threat" to developed countries: imports and outward investment (direct and portfolio), for example. As imports and outward investment reach higher levels, domestic manufacturing firms will have more difficulty competing and will likely experience deindustrialization.

Second, when globalization reaches higher levels, a process of mimetic isomorphism may contribute to a decline of manufacturing employment (DiMaggio and Powell 1983). Mimetic isomorphism occurs when firms in an industry copy each other's practices (Han 1994, Haveman 1993). Globalization creates an environment of greater uncertainty for manufacturing firms: the breakdown of traditional Fordist production regimes, volatile costs and revenue with currency fluctuation and speculative investment, higher rates of business failure, and an increased velocity of transactions. In this uncertain context, manufacturing firms may mimic the practices of other firms in their fields (Guillén 2001b, Guler et al. 2002, Martin et al. 1998).[4] For example, the adoption in the United States of Japanese just-in-time production practices highlights the wider observable field a U.S. firm has in a highly globalized context (Womack et al. 1991). When a few leading manufacturing firms reduce employees or outsource production to other (not necessarily developing) countries, others may copy this strategy. When some manufacturers shift to more technologically intensive production

that utilizes fewer employees, other firms can pay close attention and at least consider doing the same.

This mimetic isomorphism can occur with or without heightened competition for all manufacturing firms. As Haunschild and Miner (1997:474) explain, "It is precisely the larger number of other organizations enacting a practice that enhances legitimacy or endows a practice with a taken-for-granted status." In a highly globalized environment, if some manufacturers face greater competition or greater uncertainty and reduce their workforces, other firms, confronting that same uncertainty, may follow suit, and a broader process of deindustrialization can result (Haunschild and Miner 1997:491). Measures of trade (exports + imports) and investment openness (inward + outward) or what we term "total globalization" below should gauge this notion of a highly globalized environment. When these measures of economic openness reach a higher level, manufacturing firms will be operating in an environment where most firms are engaging in higher levels of international economic exchange. These manufacturing firms are likely to be exposed not just to competition, but also to a cross-fertilization of ideas, technology and management strategies. We suggest this highly globalized environment will result in the mimetic isomorphism of manufacturing decline.[5]

Third, higher levels of globalization may trigger what Wallace and Brady (2001) call spatialization. Spatialization is their term for the most recent institutional environment of capitalist development and management-labor relations – what Gordon et al. (1982) call a social structure of accumulation. Spatialization centers on employers' quest for the optimal spatial or global arrangement of their operations and the use of relocation or threats of relocation to control workers and limit their demands (Grant and Wallace 1994). In a highly globalized economy, the use and threats of relocation enhance managerial power relative to that of labor (Brady and Wallace 2000, Harrison 1994). In such a globalized context, these threats of relocation and relocation by other manufacturing firms have greater credibility, and in turn, influence (Wallace and Brady 2001). As a result, management can force labor (and especially organized labor) to accept downsizings and flexible work arrangements, limit workforce expansions, and compel the fewer remaining workers to increase hours and productivity (Sallaz 2004).

The core manifestation of spatialization is outward investment (direct and portfolio) (Grant and Wallace 1994). Brady and Wallace (2000) also find that inward investment undermines labor, and this might leverage managers' power in reducing manufacturing jobs. As firms close facilities in a home country and invest in new facilities in a host country, manufacturing obviously declines in the home country. The sheer economic openness also involves spatialization as it reflects the optimal efficient strategy of managers and owners to maximize production while cutting back employment. Hence, as trade and investment openness increase, deindustrialization is likely to occur because of the weaker position of labor in protecting manufacturing jobs. Ultimately, a highly globalized economy allows managers and capitalists to force through contractions in manufacturing employment. Along with competition and mimetic isomorphism, spatialization should lead to deindustrialization.

Methods

Our analysis includes 18 affluent democracies from 1960-2001 (Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Ireland, Italy, Japan, Netherlands, Norway, New Zealand, Sweden, Switzerland, United Kingdom and United States). The unit of analysis is the country-year. Because of missing data, the models with several of the globalization variables include less than the maximum number of cases. Thus, we note the number of cases for every model below. As a more temporally balanced sensitivity test, we re-estimated all models with the years 1975-2001 only, and the results and conclusions were consistent. Our study has the largest, longest and most up-to-date sample for any study of this kind.[6]

OLS regression is inappropriate for this data because of unmeasured time-invariant heteroscedasticity across countries and serial correlation between years. Directly following similar studies (Alderson 1999; Rowthorn and Ramaswamy 1997, 1998), we estimate fixed effects models with a first-order autocorrelation correction (FE-AR1). In addition, we present a second technique. Since most of the time series of the variables are non-stationary, we detrend all variables by taking the first differences (X_t-X_{t-1}). After first differencing, we use Beck and Katz's (1995, also Beck 2001) technique of OLS with panel corrected standard errors (OLS-PCSE). After first differencing, these models do not contain serial autocorrelation, so we do not need to correct for it in the OLS-PCSE models. OLS-PCSE is increasingly popular in political science and sociology, even though, to our knowledge, it has not been used to estimate models of manufacturing employment.[7] All analyses were conducted in Stata.

The descriptive statistics, number of cases and sources for all variables are presented in the Appendix. Because our time-period and number of cases sometimes varies across models, we present the descriptive statistics for all possible cases 1960-2001 and for the 1975-2001 sub-sample. The proximate source for many of our variables was Huber et al. (2004).

The dependent variable is *manufacturing employment as a percent of the total labor force*. This is the same dependent variable from the same source as other recent studies (Alderson 1999). This consistently collected and standardized variable provides cross-nationally and historically comparable data on the share of the labor force employed in industry.

Our independent variables begin with a basic set of controls reflecting the Rowthorn model. All independent variables are measured in the current year. Our first three variables replicate Alderson's (1999) model. First, we include *gross domestic product (GDP) per capita* and *GDP per capita squared*. Measured in real purchasing power parity dollars, this variable assess the level of economic development and productivity. According to past research, the main GDP per capita term should have a positive effect, while its square should have a negative effect. Second, we include *unemployment* measured as the percent of the labor force unemployed. Unemployment should have a negative effect.

We also innovate beyond past studies by supplementing the Rowthorn model with two variables. As discussed above, these variables were discussed within the Rowthorn model, but past analyses have not included them. Our

third control variable is *agricultural employment as a percent of the total labor force*. Manufacturing grew as a percent of the labor force as a function of the decline of agriculture's share.[8] In turn, we expect agricultural employment to be negatively related to manufacturing employment. Finally, we control for *inflation* measured as the annual rate of change in the cost of living index.[9] Along with unemployment, inflation controls for the business cycle.

Our study aims to improve upon existing studies of globalization and manufacturing employment. Hence, three concerns guide our operationalization of globalization (Brady et al. 2005). First, we only examine actual economic exchange and are not interested in just the political or legal possibility of economic exchange.[10] Like past research (Alderson 1999), we concentrate on the actual flows of finance, goods and services across international boundaries.

Second, we focus on the largest dimensions of international economic exchange. Thus, we do not limit our focus to exchange with developing countries. Sometimes, analysts do so in order to test precise hypotheses concerning investment fleeing to or imports from developing countries (Alderson 1999; Rowthorn and Ramaswamy 1997, 1998). Unfortunately, doing so omits the vast majority of globalization experienced by affluent democracies. Most international economic exchange occurs among affluent democracies, so it is essential to incorporate investment in and trade with all countries (Gilpin 2001, Hirst and Thompson 1996).

Third, we attempt to provide a comprehensive analysis of the multiple facets of globalization. Often, globalization has been measured with only a few convenient indicators like trade openness. We embrace the reality that the measurement of globalization is contested, and the literature has yet to converge on a single measure (Guillén 2001a, Sklair 1999). Thus, our analysis features a wide variety of globalization indicators. This is essential because we are interested in both globalization that might directly influence manufacturing as competition (e.g., imports and outward FDI) and a highly globalized economy that might indirectly influence manufacturing through mimetic isomorphism and spatialization. We do not think it is possible (or advisable) to select only a few indicators as perfect tests of globalization's effects (Guillén 2001).

Concretely, we examine 12 indicators of international investment and trade as measures of globalization. Each is a measure of the amount of globalization in a country (i) in a year (t). For example, we have data on the level of exports in the United States in each year from 1960-2001. Each is expressed as a percent of GDP, and we examine both the actual values and their squared terms. (1) *Outward portfolio investment (PI)* is bond or equity investment that amount to less than a 10 percent ownership of foreign firms by domestic investors. (2) *Inward portfolio investment (PI)* is bond or equity investment representing less than 10 percent ownership of domestic firms by foreign investors. (3) *Outward foreign direct investment (FDI)* represents capital flows where a domestic firm acquires at least a 10 percent ownership share and management of a foreign firm or facility. (4)/ *Inward foreign direct investment (FDI)* represents foreign acquisition of at least a 10 percent ownership share and management of a domestic firm or facility.[11] (5)/ *Investment openness* is the sum of inward and outward PI and FDI. (6) *Net*

investment is the sum of inward PI and FDI minus the sum of outward PI and FDI. (7) *Exports* are the value of all goods and services flowing out of a domestic economy and into a foreign economy. (8) *Imports* are the value of all goods and services flowing into a domestic economy from a foreign economy. (9) *Trade openness* is the sum of exports and imports. (10) *Net trade* is the difference between exports and imports – positive values indicate a trade surplus and negative values indicate a trade deficit. (11) *Total globalization* sums trade openness and investment openness. (12) sums net investment and net trade, and represents the extent to which countries export more than they import and receive more investment than they send out.

We use two-tailed tests of significance for all variables. The 12 globalization indicators collectively represent our differentiation-saturation model. Reflecting differentiation, we anticipate that all 12 will have positive effects in the linear term. The different indicators should also capture the various dimensions of saturation – competition, isomorphism and spatialization – through negative effects in the squared term. Outward (portfolio and direct) investment, imports, negative net investment, negative net trade and negative net globalization reflect the concepts of competition and spatialization. Though positive manifestations of globalization and hence reflecting differentiation, inward investment, exports, positive net investment, positive net trade and positive net globalization also reflect a highly globalized environment where mimetic isomorphism of manufacturing decline may occur. Finally, investment openness, trade openness and total globalization are measures of the extent of globalization of a nation's economy and hence are direct measures of the mimetic isomorphism element of our differentiation-saturation model.

Results

We first present the basic model with the two techniques in the two periods (1960-2001 and 1975-2001). Second, we examine the linear effects of the 12 globalization indicators net of the basic model – including one globalization measure at a time. Third, we examine the curvilinear relationship between globalization and manufacturing employment net of the basic model. Finally, we analyze subsamples to explore the conditional effects of globalization in different contexts. For all variables, we present the unstandardized coefficient, the standardized coefficient in bold and italics, and the t-score in parentheses.[12]

Basic Models

In Table 1, we present models with all five control variables for two techniques (FE-AR1 and first difference OLS-PCSE) and two periods (1960-2001 and 1975-2001). Consistent with past research, our analysis provides evidence that there is an inverted U-Shaped relationship between per capita GDP and manufacturing employment. With FE-AR1, GDP per capita has a significant positive effect and the squared term has a significant negative effect for both 1960-2001 and 1975-2001. This finding, however, is less robust in the OLS-PCSE models. In the 1960-2001 period, the squared term is only near statistical significance. In the 1975-2001

period, both the linear and squared GDP measures are near, but not statistically, significant. After detrending the data and using OLS-PCSE, our study provides only limited evidence of a curvilinear relationship between GDP per capita and manufacturing employment.

Table 1: Basic Models of Manufacturing Employment as a Percentage of the Labor Force in 18 Affluent Democracies

	1960-2001		1975-2001	
	FE-AR1	First Difference OLS-PCSE	FE-AR1	First Difference OLS-PCSE
GDP Per Capita	.0003**	.0002*	.0004***	.0002
	.216	**.203**	**.326**	**.245**
	(2.31)	(1.82)	(2.69)	(1.57)
GDP Per Capita^2	-4.49 E-9**	-3.42 E-9	-9.60 E-9***	-5.02 E-9
	-.151	**-.164**	**-.316**	**-.249**
	(-2.07)	(-1.50)	(-3.03)	(-1.59)
Unemployment	-.557***	-.570***	-.502***	-.526***
	-.294	**-.625**	**-.332**	**-.666**
	(-20.45)	(-19.66)	(-17.91)	(-18.40)
Agriculture as a	-.519***	-.553***	-.260**	-.341***
% Labor Force	**-.462**	**-.266**	**-.163**	**-.114**
	(-7.60)	(-9.50)	(-2.45)	(-3.35)
Inflation	.045***	.039***	.032***	.033**
	.026	**.109**	**.026**	**.088**
	(4.58)	(3.55)	(2.61)	(2.47)
Constant	-1.469***	-.474***	16.280***	-.428***
	(-38.72)	(-11.92)	(231.08)	(-12.42)
Between R^2	.089		.091	
Within R^2	.523		.541	
Overall R^2	.013	.539	.116	.557
N	738	738	468	468

*** $p < .01$ ** $p < .05$ *$p < .10$

Notes: For each independent variable, the unstandardized coefficient, **standardized coefficient in bold**, and t-score in parentheses are displayed.

The other three variables are significant in every model. Unemployment significantly decreases manufacturing employment, and inflation has significant positive effects. Also, we find that agricultural employment has a significant negative effect. As a share of the total labor force, the decline of agricultural employment coincided with an expansion of manufacturing employment. Some countries experienced slower or delayed industrialization because of the persistence of agriculture, and the rise of manufacturing was partly influenced by the decline of agricultural employment. In turn, it is valuable to control for agricultural employment.

One can interpret the magnitude of these effects with the standardized coefficients. Unlike past research, our analysis does not clearly provide evidence that economic development and rising productivity (GDP and GDP2) are the most powerful influences on manufacturing employment. In terms of standardized coefficients, the main differences across models appear across the two historical

eras. In the 1960-2001 period, manufacturing employment is principally accounted for by the decline in agricultural employment and unemployment. Economic development has a sizable influence, but it is secondary to those variables. Inflation has a smaller effect. In the 1975-2001 period, economic development and unemployment appear to be the most influential causes, followed by agricultural employment and inflation.

In contrast to past research (Alderson 1999; Rowthorn and Ramaswamy 1997, 1998), the fit of our models is considerably weaker. This is partly because different statistical packages generate different estimates of conventional statistics like R2 (e.g., Alderson used LIMDEP; we use Stata). This also could be due to the fact that others logarithmically transform the independent variables in order to minimize the effect of outlying values. Finally, this could be due to the longer time-period we analyze and the resultant increased heterogeneity. Regardless, the FE-AR1 1960-2001 model has a surprisingly weak fit. The FE-AR1 1975-2001 model fits the data much better, but is still relatively weak. The OLS-PCSE models fit the data dramatically better than the FE-AR1 models – regardless if one is comparing the 1960-2001 or 1975-2001 models. Plausibly, the better fit of the OLS-PCSE models might suggest that these models are at least as valuable as the conventional FE-AR1 models for understanding variation in manufacturing employment.

Linear Globalization Effects Models

In Table 2, we display the FE-AR1 results from 12 different models. In each of these models, we include one of the 12 globalization measures and the five control variables. In Table 2, five of the coefficients reach statistical significance, while seven – including the total globalization summary measure – are insignificant. The significant coefficients are not in a direction that suggests that globalization is causing deindustrialization. Outward PI, imports and trade openness all significantly increase manufacturing employment. As domestic firms increase their portfolio investment abroad, as more imports flow into an economy, and as an economy experiences more total trade, manufacturing increases. Unlike earlier claims that globalization had linear negative effects on manufacturing, this suggests that globalization increases manufacturing. Even the negative effects for net trade and net globalization suggest that globalization is not initially causing deindustrialization. The more countries export relative to importing and receive rather than send out globalization, the less manufacturing employment exists. These results are consistent with our argument that globalization augments manufacturing through differentiation.

All five significant globalization variables have noticeably small standardized coefficients. With a standard deviation increase in outward PI, manufacturing employment is expected to increase by about .01 standard deviations, holding all other variables constant at their means. With a standard deviation increase in imports, manufacturing is expected to increase by .06 standard deviations. With a standard deviation increase in trade openness, manufacturing employment is expected to increase by .04 standard deviations. With a standard deviation increase in net trade and net globalization, manufacturing employment is

Table 2: FE-AR1 Models of Manufacturing Employment as a Percentage of the Labor Force on LINEAR Globalization Effects in 18 Affluent Democracies

	Outward PI	Inward PI	Outward FDI	Inward FDI	Investment Openness	Net Investment	Exports	Imports	Trade Openness	Net Trade	Total Glob.	Net Glob.
GDP	.0002*	.0002	.0003**	.0003**	.0002	.0002	.0002**	.0002**	.0002**	.0002**	.0002	.0002
Per Capita	**.211**	**.190**	**.255**	**.264**	**.168**	**.156**	**.211**	**.184**	**.193**	**.212**	**.170**	**.148**
	(1.80)	(1.59)	(2.09)	(2.26)	(1.34)	(1.25)	(2.24)	(1.97)	(2.06)	(2.29)	(1.36)	(1.19)
GDP	-5.83E-9**	-5.24E-9*	-6.59E-9**	-6.66E-9**	-4.82E-9	-4.58E-9	-4.43E-9**	-4.04E-9*	-4.19E-9*	-4.37E-9**	-4.93E-9	-4.33E-9
Per Capita^2	**-.195**	**-.177**	**-.228**	**-.234**	**-.160**	**-.152**	**-.149**	**-.136**	**-.141**	**-.147**	**-.164**	**-.144**
	(-1.97)	(-1.77)	(-2.20)	(-2.37)	(-1.51)	(-1.44)	(-2.03)	(-1.87)	(-1.93)	(-2.02)	(-1.55)	(-1.37)
Unemp.	-.534***	-.539***	-.533***	-.533***	-.540***	-.544***	-.558***	-.553***	-.560***	-.535***	-.540***	-.539***
	-.316	**-.318**	**-.302**	**-.317**	**-.303**	**-.305**	**-.295**	**-.292**	**-.295**	**-.282**	**-.303**	**-.302**
	(-19.05)	(-19.34)	(-18.31)	(-18.99)	(-18.64)	(-18.93)	(-20.22)	(-20.42)	(-20.56)	(-19.19)	(-18.72)	(-18.71)
Agric. as a	-.334***	-.339***	-.366***	-.329***	-.388***	-.393***	-.522***	-.531***	-.530***	-.511***	-.389***	-.399***
% of L.F.	**-.199**	**-.205**	**-.196**	**-.199**	**-.205**	**-.208**	**-.465**	**-.472**	**-.472**	**-.455**	**-.205**	**-.211**
	(-3.33)	(-3.40)	(-3.41)	(-3.30)	(-3.61)	(-3.67)	(-7.60)	(-7.81)	(-7.75)	(-7.55)	(-3.63)	(-3.73)
Inflation	.030**	.027**	.035***	.033***	.028**	.029**	.044***	.038***	.041***	.041***	.026**	.029**
	.021	**.019**	**.024**	**.024**	**.018**	**.019**	**.026**	**.022**	**.024**	**.024**	**.018**	**.019**
	(2.56)	(2.31)	(2.92)	(2.95)	(2.26)	(2.37)	(4.44)	(3.74)	(4.04)	(4.15)	(2.14)	(2.35)
Globaliz.	.009*	.005	-.001	-.002	.002	-.009	.004	.028***	.010*	-.040***	.002	-.011*
Variable	**.014**	**.007**	**-.001**	**-.002**	**.007**	**-.006**	**.010**	**.056**	**.043**	**-.020**	**.019**	**-.007**
	(1.68)	(.89)	(-.18)	(-.32)	(.83)	(-1.54)	(.42)	(2.85)	(1.84)	(-3.20)	(1.32)	(-1.87)
Constant	14.674***	15.182***	12.863***	12.804***	15.486***	15.776***	-1.374***	-2.899***	-2.241***	-1.919***	15.255***	15.778***
	(238.68)	(245.80)	(204.14)	(222.58)	(225.95)	(233.19)	(-35.82)	(-76.86)	(-58.80)	(-51.19)	(222.01)	(234.42)
Betw. R^2	.080	.064	.016	.042	.039	.041	.090	.092	.092	.086	.036	.041
Within R^2	.553	.557	.532	.546	.543	.545	.523	.529	.525	.530	.544	.546
Overall R^2	.083	.077	.058	.079	.055	.059	.013	.009	.010	.014	.050	.058
N	521	515	520	536	499	499	738	738	738	738	499	499

*** $p < .01$ ** $p < .05$ *$p < .10$

Notes: For each independent variable, the unstandardized coefficient, **standardized coefficient in bold**, and t-score in parentheses are displayed.

expected to decline by .02 and .01 standard deviations. The only control variable that has a smaller effect than these globalization coefficients is inflation, and this is only for two of the significant globalization coefficients. By contrast, GDP per capita and its square, unemployment and agricultural employment as a percent of the labor force (occasionally insignificant) have far larger effects than the significant globalization effects. Thus, even where globalization is significant, its effect is relatively small in comparison with other predictors of manufacturing employment.

At the same time, it is noteworthy that GDP per capita and/or its square are insignificant in some models. In the models featuring inward PI, investment openness, net investment, total globalization and net globalization, GDP per capita is near but does not reach statistical significance. In the models featuring investment openness, net investment, total globalization and net globalization, neither GDP per capita nor its square is statistically significant. Since the curvilinear relationship between GDP per capita and its square is probably the dominant explanation for deindustrialization, these non-significant results are quite surprising. Controlling for some globalization variables, GDP per capita and its square lose significance and the evidence for the Rowthorn model is weaker.

In Table 3, we analyze the linear globalization effects using OLS-PCSE. These results are remarkably consistent with the FE-AR1 results in Table 2. Again, the same five globalization variables have significant effects, while seven are insignificant. Though their t-scores are slightly different from the FE-AR1 models, outward PI, imports, and trade openness significantly increase manufacturing employment, while net trade and net globalization significantly reduce it. Again, the globalization coefficients do not show that globalization causes deindustrialization. Rather, the evidence suggests globalization entails differentiation and increased manufacturing. In the OLS-PCSE models, the significant globalization coefficients have slightly larger effects than under FE-AR1 estimation. Still, like the FE-AR1 models, the significant globalization variables are comparable with the effects of inflation and are considerably smaller than unemployment and agricultural employment. Similarly, the globalization coefficients have smaller effects than the significant GDP per capita effects.

The GDP per capita variables have even more surprising results in the OLS-PCSE models than in the FE-AR1 models. GDP per capita has a significant effect in only two of the models. In those models (featuring exports and net trade), the GDP per capita is only significant at the .10 level. GDP per capita squared does not have a significant effect in any of the models. The GDP per capita variables are only significant in two of the four models featuring trade variables with the full 738 cases. As demonstrated in Table 1, the GDP per capita variables are simply not as significant under OLS-PCSE estimation. This provides further evidence that the Rowthorn model is less robust with this alternative estimation technique.

Curvilinear Globalization Effects Models

In Table 4, we display the FE-AR1 results from the 12 different models. In each model, we include one of the globalization measures, its square and the five controls. For seven of the globalization measures, either the globalization measure

Table 3: OLS-PCSE First Difference Models of Manufacturing Employment as a Percentage of the Labor Force on LINEAR Globalization Effects in 18 Affluent Democracies

	Outward PI	Inward PI	Outward FDI	Inward FDI	Investment Openness	Net Investment	Exports	Imports	Trade Openness	Net Trade	Total Glob.	Net Glob.
GDP	.0002	.0001	.0002	.0002	.0001	.0001	.0002*	.0002	.0002	.0002*	.0001	.00009
Per Capita	**.166**	**.154**	**.208**	**.232**	**.107**	**.098**	**.189**	**.163**	**.171**	**.196**	**.106**	**.089**
	(1.16)	(1.07)	(1.24)	(1.58)	(.65)	(.60)	(1.69)	(1.48)	(1.54)	(1.77)	(.64)	(.54)
GDP	-3.40E-9	-3.11E-9	-3.86E-9	-4.36E-9	-2.17 E-9	-2.05E-9	-3.28E-9	-2.95E-9	-3.07E-9	-3.27E-9	-2.21E-9	-1.81E-9
Per Capita^2	**-.161**	**-.148**	**-.198**	**-.219**	**-.105**	**-.099**	**-.157**	**-.141**	**-.147**	**-.157**	**-.107**	**-.088**
	(-1.18)	(-1.07)	(-1.22)	(-1.53)	(-.67)	(-.63)	(-1.44)	(-1.30)	(-1.35)	(-1.44)	(-.68)	(-.56)
Unemp.	-.560***	-.564***	-.561***	-.561***	-.565***	-.568***	-.575***	-.566***	-.573***	-.551***	-.564***	-.563***
	-.714	**-.724**	**-.694**	**-.706**	**-.713**	**-.717**	**-.631**	**-.620**	**-.629**	**-.605**	**-.712**	**-.711**
	(-22.21)	(-22.18)	(-21.00)	(-19.89)	(-20.76)	(-21.01)	(-19.81)	(-19.96)	(-20.18)	(-18.59)	(-20.84)	(-20.65)
Agric. as a	-.385***	-.391***	-.381***	-.388***	-.398***	-.403***	-.558***	-.563***	-.563***	-.551***	-.397***	-.409***
% of LF	**-.135**	**-.138**	**-.124**	**-.134**	**-.132**	**-.134**	**-.269**	**-.271**	**-.271**	**-.265**	**-.132**	**-.136**
	(-4.99)	(-4.98)	(-4.39)	(-4.39)	(-4.59)	(-4.64)	(-9.59)	(-9.67)	(-9.68)	(-9.43)	(-4.61)	(-4.71)
Inflation	.024**	.021*	.027**	.026**	.022*	.024*	.037***	.031***	.033***	.035***	.021	.023*
	.062	**.055**	**.073**	**.071**	**.057**	**.060**	**.103**	**.086**	**.093**	**.099**	**.053**	**.060**
	(2.10)	(1.86)	(2.17)	(2.04)	(1.68)	(1.78)	(3.36)	(2.82)	(3.04)	(3.24)	(1.58)	(1.75)
Globaliz.	.011**	.006	-.0009	-.002	.002	-.009	.014	.032***	.014**	-.036***	.002	-.010*
Variable	**.060**	**.036**	**-.005**	**-.008**	**.027**	**-.044**	**.034**	**.090**	**.068**	**-.076**	**.043**	**-.053**
	(2.40)	(1.38)	(-.22)	(-.37)	(1.06)	(-1.47)	(1.13)	(2.80)	(2.15)	(-2.65)	(1.58)	(-1.71)
Constant	-.453***	-.450***	-.458***	-.455***	-.453***	-.451***	-.479***	-.482***	-.483***	-.470***	-.455***	-.451***
	(-14.92)	(-14.62)	(-14.19)	(-12.85)	(-13.78)	(-13.81)	(-12.16)	(-12.68)	(-12.54)	(-11.97)	(-13.84)	(-13.76)
R^2	.567	.571	.549	.558	.562	.563	.540	.546	.544	.544	.563	.564
N	521	515	520	536	499	499	738	738	738	738	499	499

*** $p < .01$ ** $p < .05$ *$p < .10$

Notes: For each independent variable, the unstandardized coefficient, **standardized coefficient in bold**, and t-score in parentheses are displayed.

Table 4: FE-AR1 Models of Manufacturing Employment as a Percentage of the Labor Force on Cuvilinear Globalization Effects in 18 Affluent Democracies

	Outward PI	Inward PI	Outward FDI	Inward FDI	Investment Openness	Net Investment	Exports	Imports	Trade Openness	Net Trade	Total Glob.	Net Glob.
GDP	.0003*	.0002	.0003**	.0003**	.0002	.0002	.0002**	.0002*	.0002*	.0002**	.0002	.0002
Per Capita	**.211**	**.191**	**.255**	**.264**	**.178**	**.152**	**.203**	**.169**	**.178**	**.206**	**.163**	**.148**
	(1.80)	(1.60)	(2.09)	(2.26)	(1.42)	(1.22)	(2.16)	(1.82)	(1.90)	(2.22)	(1.31)	(1.19)
GDP	-5.87E-9**	-5.25E-9*	-6.62E-9**	-6.69E-9**	-5.11E-9	-4.49E-9	-4.28E-9**	-3.89E-9*	-4.01E-9*	-4.08E-9*	-4.98E-9	-4.33E-9
Per Capita^2	**-.196**	**-.178**	**-.229**	**-.235**	**-.170**	**-.149**	**-.144**	**-.130**	**-.135**	**-.137**	**-.165**	**-.144**
	(-1.98)	(-1.77)	(-2.21)	(-2.38)	(-1.60)	(-1.41)	(-1.96)	(-1.81)	(-1.85)	(-1.88)	(-1.57)	(-1.36)
Unemp.	-.534***	-.541***	-.533***	-.532***	-.539***	-.544***	-.566***	-.558***	-.568***	-.534***	-.544***	-.539***
	-.316	**-.319**	**-.301**	**-.316**	**-.302**	**-.305**	**-.299**	**-.295**	**-.300**	**-.282**	**-.305**	**-.302**
	(-19.01)	(-19.28)	(-18.28)	(-18.91)	(-18.61)	(-18.91)	(-20.31)	(-20.71)	(-20.85)	(-19.17)	(-18.89)	(-18.69)
Agric.	-.336***	-.339***	-.367***	-.330***	-.380***	-.392***	-.525***	-.536***	-.535***	-.512***	-.388***	-.400***
as a % of	**-.200**	**-.205**	**-.197**	**-.200**	**-.201**	**-.207**	**-.468**	**-.477**	**-.477**	**-.456**	**-.205**	**-.212**
LF	(-3.34)	(-3.40)	(-3.41)	(-3.31)	(-3.54)	(-3.65)	(-7.66)	(-7.95)	(-7.88)	(-7.56)	(-3.64)	(-3.73)
Inflation	.030**	.027**	.034***	.033***	.028**	.029**	.043***	.033***	.037***	.041***	.023*	.029**
	.021	**.019**	**.024**	**.024**	**.018**	**.019**	**.025**	**.019**	**.021**	**.024**	**.015**	**.019**
	(2.54)	(2.32)	(2.91)	(2.92)	(2.25)	(2.38)	(4.32)	(3.26)	(3.64)	(4.20)	(1.87)	(2.34)
Globaliz.	.012	.009	.007	.005	.006*	-.010	.050*	.010***	.047***	-.043***	.010**	-.011*
Variable	**.018**	**.013**	**.006**	**.005**	**.026**	**-.006**	**.109**	**.202**	**.197**	**-.021**	**.083**	**-.008**
	(1.21)	(.99)	(.59)	(.41)	(1.68)	(-1.58)	(1.89)	(4.02)	(3.35)	(-3.35)	(2.40)	(-1.73)
Globaliz.	-4.11E-5	-9.76E-5	-9.07E-5	-7.16E-5	-1.69E-5	-.0002	-.0005*	-.0008***	-.0002***	-.001	-1.51E-5**	4.56E-5
Variable^2	**-.005**	**-.010**	**-.006**	**-.005**	**-.016**	**-.001**	**-.089**	**-.129**	**-.134**	**-.006**	**-.044**	**.0005**
	(-.36)	(-.58)	(-.79)	(-.63)	(-1.46)	(-.37)	(-1.88)	(-3.15)	(-2.85)	(-1.16)	(-2.04)	(0.14)
Constant	14.793***	15.168***	12.831***	12.800***	15.104***	15.877***	-2.211***	-4.483***	-3.820***	-1.845***	14.720***	15.789***
	(239.15)	(245.41)	(203.62)	(221.96)	(220.89)	(233.47)	(-57.52)	(-119.94)	(-100.64)	(-49.21)	(215.66)	(234.23)
Between R^2	.080	.065	.016	.041	.039	.042	.099	.102	.104	.087	.033	.041
Within R^2	.553	.558	.532	.546	.545	.545	.525	.535	.531	.531	.548	.546
Overall R^2	.082	.077	.056	.077	.052	.061	.014	.011	.012	.014	.043	.057
N	521	515	520	536	499	499	738	738	738	738	499	499

*** $p < .01$ ** $p < .05$ *$p < .10$

Notes: For each independent variable, the unstandardized coefficient, **standardized coefficient in bold**, and t-score in parentheses are displayed.

or its square is significant. In three models – featuring investment openness, net trade and net globalization – the main globalization effect is significantly positive while the squared term is insignificant. In the models for investment openness and net trade, the squared term is nearly significantly negative. Nevertheless, for these three measures, globalization appears to have a linear effect. These three findings are generally consistent with Table 2. With a standard deviation increase in investment openness, manufacturing employment is expected to increase by .03 standard deviations. With a standard deviation increase in net trade, manufacturing is expected to decline by .02 standard deviations. With a standard deviation increase in net globalization, manufacturing is expected to decrease by .01 standard deviations. All three of these linear effects are small – only comparable with inflation, and smaller than the other independent variables.

More importantly, in four models, globalization has a curvilinear effect on manufacturing employment. Exports, imports, trade openness and total globalization have a significant positive effect in the main term and a significant negative effect in the squared term. The main effect of exports has a standardized coefficient (beta) of .11 and its square has a beta of -.09. The main effect of imports has a beta of .20 and its square has a beta of -.13. The main term for trade openness has a beta of .20 and its square has a beta of -.13. The main effect of total globalization has a beta of .08 and its square has a beta of -.04. These curvilinear effects are larger than the significant linear effects above. In these models, the significant curvilinear effects are larger than inflation, but smaller than unemployment and agricultural employment. Notably, the effects for imports and trade openness are similar in size to the GDP per capita variables. Thus, imports and trade openness have similar effects to economic development and productivity. Exports and total globalization have smaller effects than the GDP per capita variables.

The analyses of curvilinear effects of globalization in Table 4 provide further scrutiny of the Rowthorn model. Consistent with Tables 2 and 3, unemployment and agricultural employment principally influence manufacturing employment. Those two have the largest standardized coefficients in most models, and are the most robustly significant. Interestingly, the GDP per capita variables have nearly identical significance levels as in Table 2. The only departure is that GDP per capita squared is not quite significant in the investment openness model. As in Table 2, either GDP per capita or its square fails to reach significance in five of the twelve models. Thus, these analyses provide further evidence that GDP per capita and its square do not have completely robust effects on manufacturing employment.

In Table 5, we display the OLS-PCSE results featuring each globalization variable and its square. The results with OLS-PCSE are very consistent with the FE-AR1 results. Again, seven of the globalization indicators have significant effects. The only difference is that both investment openness and its square are statistically significant, while the square of investment openness was previously only near significant. In addition, a curvilinear relationship between globalization and manufacturing employment is observed for exports, imports, trade openness, and total globalization. Consistent with every other table, net trade

and net globalization have significant negative effects in the main term. For those two, globalization has a relatively small effect on manufacturing (betas of -.03 and -.05). Though globalization has a curvilinear effect in five models, its various effects are only larger than inflation and occasionally agricultural employment and the GDP variables. The main term for investment openness has a beta of .10 and its square has a beta of -.09. Exports has standardized coefficients of .12 and -.10; imports has standardized coefficients of .28 and -.20; trade openness has standardized coefficients of .23 and -.17; and, total globalization has standardized coefficients of .20 and -.17.

As with the earlier tables, unemployment consistently has the most powerful effect. The beta for agricultural employment fluctuates, but is generally the second largest significant effect. GDP per capita is only significant in two models. Though occasionally near significant, GDP per capita squared is never significant. After controlling for the globalization variables and their squares in OLS-PCSE models, GDP per capita has little relevance to explaining manufacturing employment. Hence, these results challenge the Rowthorn account. Ultimately, manufacturing is shaped principally by unemployment and agricultural employment and secondarily by globalization and inflation.

Conditional Effects Across Subsamples

In Table 6, we decompose our sample into liberal/uncoordinated (LME) and coordinated market economies (CME), Europe and non-Europe countries, and 1960-1975 and 1976-2001 periods.[13] These analyses explore whether globalization has similar effects in each of these different contexts. While the effects of all 12 globalization indicators and the FE-AR1 models are consistent, we confine our presentation to total globalization in OLS-PCSE. All models control for the same variables as above (not shown).

The first rows of the first two columns show that total globalization had a positive linear effect in LMEs but did not have a significant linear effect in CMEs and the model fit is much better for LMEs. The second set of rows reveals that total globalization has a positive and negative curvilinear effect in LMEs. In CMEs, total globalization has a nearly significant positive linear term and a significantly negative squared term. In both contexts, globalization reduces manufacturing when globalization reaches higher levels. Despite many fewer LME cases, globalization appears to have more powerful effects in LMEs than CMEs.

The next two columns display the decomposition of European and non-European countries. Total globalization has a linear positive effect in European countries, and does not have a significant linear effect in non-European countries. Total globalization has positive and negative significant curvilinear effects in European countries, but does not have significant curvilinear effects in non-European countries. Interestingly, however, the model fit is much better in both sets for non-European countries.

On one hand, these results show a pattern where our differentiation-saturation model better explains the deindustrialization of LMEs and European countries. Plausibly, the Rowthorn model better explains the deindustrialization of CMEs and non-European countries. On the other hand,

Table 5: OLS-PCSE First Difference Models of Manufacturing Employment as a Percentage of the Labor Force on Curvilinear Globalization Effects in 18 Affluent Democracies

	Outward PI	Inward PI	Outward FDI	Inward FDI	Investment Openness	Net Investment	Exports	Imports	Trade Openness	Net Trade	Total Glob.	Net Glob.
GDP	.0002	.0001	.0002	.0002	.0001	.00009	.0002*	.0002	.0002	.0002*	.0001	.00009
Per Capita	**.166**	**.154**	**.208**	**.232**	**.119**	**.095**	**.183**	**.152**	**.159**	**.190**	**.102**	**.089**
	(1.16)	(1.07)	(1.24)	(1.58)	(.72)	(.57)	(1.64)	(1.38)	(1.44)	(1.71)	(.62)	(.54)
GDP	-3.41E-9	-3.10E-9	-3.90E-9	-4.39E-9	-2.45E-9	-1.98E-9	-3.20E-9	-2.90E-9	-2.99E-9	-3.03E-9	-2.34E-9	-1.82E-9
Per Capita^2	**-.162**	**-.147**	**-.200**	**-.221**	**-.119**	**-.096**	**-.153**	**-.139**	**-.143**	**-.145**	**-.113**	**-.088**
	(-1.18)	(-1.07)	(-1.24)	(-1.54)	(-.76)	(-.61)	(-1.41)	(-1.29)	(-1.33)	(-1.33)	(-.73)	(-.56)
Unemp.	-.560***	-.565***	-.560***	-.560***	-.563***	-.568***	-.581***	-.570***	-.581***	-.551***	-.568***	-.563***
	-.715	**-.726**	**-.693**	**-.705**	**-.711**	**-.717**	**-.638**	**-.625**	**-.637**	**-.604**	**-.717**	**-.711**
	(-22.19)	(-22.10)	(-20.96)	(-19.83)	(-20.91)	(-20.98)	(-19.89)	(-20.30)	(-20.56)	(-18.55)	(-21.21)	(-20.66)
Agric.	-.386***	-.392***	-.382***	-.389***	-.391***	-.402***	-.561***	-.568***	-.568***	-.552***	-.397***	-.410***
as a % of	**-.135**	**-.138**	**-.124**	**-.134**	**-.130**	**-.134**	**-.270**	**-.273**	**-.273**	**-.266**	**-.132**	**-.136**
LF	(-4.94)	(-4.98)	(-4.40)	(-4.40)	(-4.52)	(-4.63)	(-9.64)	(-9.73)	(-9.74)	(-9.47)	(-4.63)	(-4.69)
Inflation	.024**	.021*	.027**	.026**	.022*	.024*	.036***	.026**	.030***	.036***	.017	.023*
	.062	**.055**	**.073**	**.070**	**.056**	**.061**	**.101**	**.074**	**.084**	**.100**	**.044**	**.060**
	(2.09)	(1.87)	(2.17)	(2.01)	(1.70)	(1.79)	(3.29)	(2.41)	(2.72)	(3.27)	(1.33)	(1.75)
Globaliz	.012	.009	.008	.006	.006**	-.009	.049*	.100***	.048***	-.038***	.011***	-.010*
Variable	**.069**	**.049**	**.039**	**.034**	**.103**	**-.046**	**.122**	**.278**	**.230**	**-.080**	**.201**	**-.054**
	(1.59)	(.99)	(.80)	(.56)	(2.23)	(-1.49)	(1.85)	(3.91)	(3.20)	(-2.78)	(3.10)	(-1.73)
Globaliz	-.00002	-.00005	-.0001	-.00008	-.00002**	-.0002	-.0004*	-.0008***	-.0002***	-.001	-.00002***	.00003
Variable^2	**-.011**	**-.016**	**-.051**	**-.047**	**-.090**	**-.011**	**-.096**	**-.200**	**-.173**	**-.024**	**-.171**	**.003**
	(-.25)	(-.32)	(-1.21)	(-.96)	(-2.28)	(-.51)	(-1.65)	(-3.34)	(-2.84)	(-.88)	(-2.98)	(.13)
Constant	-.453***	-.450***	-.459***	-.455***	-.455***	-.450***	-.480***	-.482***	-.484***	-.470***	-.462***	-.451***
	(-14.92)	(-14.68)	(-14.24)	(-12.85)	(-14.04)	(-13.70)	(-12.28)	(-12.86)	(-12.78)	(-11.94)	(-14.18)	(-13.76)
R^2	.567	.571	.550	.558	.564	.563	.542	.552	.548	.545	.567	.564
N	521	515	520	536	499	499	738	738	738	738	499	499

*** $p < .01$ ** $p < .05$ *$p < .10$

Notes: For each independent variable, the unstandardized coefficient, **standardized coefficient in bold**, and t-score in parentheses are displayed.

it is perplexing that globalization has significant effects in LMEs and Europe, but not in CMEs and non-Europe. With the exception of Ireland and the United Kingdom, the LMEs are all outside Europe. Ultimately, the evidence is mixed and we cannot simply conclude if our differentiation-saturation model works more effectively in a discrete set of countries.

The final two columns display results for the 1960-1975 and 1976-2001 periods. Total globalization has a significant positive effect in the earlier period, but not in the later period. In the second set of rows, total globalization has a significant positive effect in the linear term in the earlier period but is not significant in the squared term. Even at higher levels, globalization does not cause any deindustrialization in the earlier period. Consistent with our differentiation-saturation model, when globalization first expanded from 1960 through 1975, international investment and trade (at lower levels) contributed to industrialization, not deindustrialization. After 1975, total globalization has significant (positive and negative) curvilinear effects. Our evidence suggests that globalization triggered deindustrialization in the latter period when globalization reached higher levels.

Discussion

This study aims to provide an improved analysis of the relationship between globalization, industrialization and deindustrialization. The study is based on the largest, longest and most recent sample of its kind and incorporates the most comprehensive set of globalization measures. Moreover, this study uniquely incorporates agricultural employment and inflation. To our knowledge, our study is the first to model a curvilinear relationship between globalization and manufacturing employment. As well, we are the first to propose a theory – the differentiation-saturation model – for why globalization should have such curvilinear effects. Ultimately, we provide a more rigorous examination of the causes of variation in manufacturing employment.

Our baseline models confirm but innovate beyond recent studies. We provide some evidence that GDP per capita has a curvilinear relationship with manufacturing employment. As others contend, this reflects the long-term trends in economic development and worker productivity. Nevertheless, some of the main models fail to support the Rowthorn model. GDP per capita and its square are less influential in the OLS-PCSE than in the FE-AR1 models. The evidence for the Rowthorn model is weaker in the longer time period (1960-2001) than in the most recent period (1975-2001). Though previous studies did not include measures of agricultural employment, we find it has a powerful impact. Much of the variation observed in manufacturing can be explained by the extent and trends in declining agricultural employment. Unemployment also has powerful effects, while inflation has a lesser influence. While previous research has converged on the Rowthorn model, our empirical analysis provides only partial support.

Our analysis shows that some aspects of globalization significantly affect manufacturing employment, though several measures of globalization fail to reach significance. Five globalization measures have significant linear effects in both FE-AR1 and OLS-PCSE models. Interestingly, none of these coefficients suggest that globalization causes deindustrialization. Rather, these effects consistently

Table 6: OLS-PCSE First Difference Models of the Conditional Effects of Manufacturing Employment as a Percentage of the Labor Force on Total Globalization

		LME	CME	Europe	Non-Europe	1960-1975	1976-2001
Linear Effect							
Total Globalization	b	.005*	.001	.003**	.007	.049***	.002
	B	**.088**	**.011**	**.062**	**.034**	**.194**	**.040**
	t	1.79	.40	1.99	.79	3.60	1.40
	R^2	.695	.481	.513	.725	.633	.581
	N	167	332	350	149	70	429
Curvilinear Effect							
Total Globalization	b	.021***	.007	.012***	.026	.070**	.008**
	B	**.353**	**.142**	**.259**	**.133**	**.276**	**.169**
	t	2.69	1.61	3.21	1.19	2.04	2.36
Total Globalization^2	b	-3.62E-05**	-1.22E-05*	-.00002***	-.0001	-1.49E-04	-1.19E-05**
	B	**-.281**	**-.141**	**-.212**	**-.102**	**-.084**	**-.139**
	t	-2.07	-1.89	-2.85	-1.07	-.73	-2.17
	R^2	.701	.484	.520	.726	.633	.584
	N	167	332	350	149	70	429

*** $p < .01$ ** $p < .05$ *$p < .10$

Note: Though not shown, each model contains GDP per capita, GDP per capita,2 unemployment and agriculture as a percentage of the labor force and inflation.

show that globalization increased manufacturing employment. We theorized that globalization cultivates differentiation and specialization, which contributes to manufacturing's share of the labor force. Outward PI, imports and trade openness have positive effects, while net trade and net globalization have negative effects. As countries send out PI, import goods and services, and engage in international trade, manufacturing increases. As countries export more than they import, and receive more than they send out international flows, manufacturing declines. These results support our differentiation-saturation model, reflecting our expectation that globalization initially breeds specialization and increased manufacturing. Though the effects are small, including the globalization measures generally weakens the influence of GDP per capita and its square. The effects of agricultural employment and unemployment remain significant.

Our analysis of the curvilinear relationship between globalization and manufacturing yields several interesting and novel findings. While a few globalization measures continue to have significant linear effects, both the main term and the square are significant for several globalization measures. Exports, imports, trade openness, investment openness (in OLS-PCSE only) and total globalization have significant positive and negative effects. These effects are larger than the aforementioned linear effects and comparable to the effects of GDP per capita and its square. These results provide evidence that low levels of globalization result in differentiation and specialization, increasing manufacturing. At higher levels, globalization subsequently results in saturation, reducing manufacturing's share of the labor force.

Our analyses of subsamples provide suggestive evidence that globalization's effects slightly differ across national and historical contexts. Globalization has significant effects in LMEs and European countries, but not CMEs and non-European countries. Globalization had positive effects on manufacturing employment in the earlier period from 1960 to 1975. In the initial stages of globalization, manufacturing expanded as international trade and investment grew. In the later period from 1976 to 2001, however, globalization and manufacturing employment had the curvilinear relationship expected by our differentiation-saturation model. Of course, these analyses of subsamples should be read with caution given the varying samples across models.

Our study partially supports the Rowthorn model and partially supports our differentiation-saturation model. As countries shifted away from agricultural employment, and worker productivity and development rose, manufacturing's share of the labor force increased. As worker productivity and development continued to rise even further, manufacturing declined. At the same time, globalization does have significant effects and the evidence for the Rowthorn model is weaker upon considering globalization. Initially, at lower levels, globalization leads to differentiation and specialization and increases manufacturing's share of the labor force. Subsequently, at higher levels, globalization results in saturation, which undermines manufacturing employment. At higher levels, globalization generates competition for domestic manufacturers, who find it more difficult to maintain their workforces. Globalization breeds mimetic isomorphism as manufacturing firms follow other globalizing firms and contract their workforces

or shift production overseas. Finally, globalization contributes to spatialization by shifting power relations in favor of capitalists and managers and against labor. The management and owners of manufacturing firms can force labor to accept reduced workforces because their threats of global relocation are more credible in a highly globalized economy. Our study suggests that low levels of globalization initially cause industrialization, and that higher levels of globalization subsequently cause deindustrialization.

Since our study is the first to explore the later 1990s and model a curvilinear relationship between globalization and manufacturing employment, more research is certainly warranted. We encourage others to scrutinize the Rowthorn model and further explore a curvilinear relationship. Several of our globalization measures fail to reach significance, and our results challenge the Rowthorn consensus. Hence, our results are ultimately cautious about general explanations of deindustrialization and implicitly call for further research. Our study is unable to evaluate the causal mechanisms (competition, isomorphism and spatialization) that we theorize underlie higher globalization's negative influence on manufacturing. One promising direction might be to study the behavior, practices and workers of manufacturing firms as their economy or environment – and not simply their production – becomes highly globalized (Guillén 2001b). Future research with alternative modeling techniques that allow for conjunctural causation and multiple causal pathways could be another avenue of research. Also, more research can be done on the national-level like most previous studies and ours (Alderson 1999). At the very least, our study shows it is mistaken to dismiss globalization as a possible influence on deindustrialization.

Notes

1. Doner (1991) argues that when Japanese firms invested in Southeast Asia, the result was boosted consumer demand in Southeast Asia for Japanese products and lessened decline of manufacturing jobs in Japan.

2. Gilpin (2001:209) notes, "Americans, for example, traditionally like big cars, and Europeans, small ones; Americans have tended to possess a comparative advantage in the former and Europeans in the latter. Yet, there is a market in the United States for small European cars and vice versa."

3. Consistent with our argument that early globalization increases manufacturing employment, Carroll and Hannan (2000:9-11) suggest that globalization may enhance the development of manufacturing firms when density is low in a domestic economy. Globalization may spread the cultural legitimacy of a manufacturing industry, so "late" countries can benefit by institutionalizing those industries more rapidly. At high levels of globalization, however, domestic manufacturing firms face heightened international competition as organizational density rises.

4. We appreciate that mimetic isomorphism connotes the copying of formal organizational structures (frequently decoupled from "on the ground" practices) under conditions of uncertainty and in order to achieve legitimacy from

some third party. However, we also believe mimetic isomorphism can involve the copying of practices (e.g., downsizing) under conditions of uncertainty (e.g., rising globalization). Firms may copy others in order to behave "strategically" in order to impress shareholders, competitors, creditors and suppliers, or simply to follow the leaders. To be clear, we do not observe firm behavior as that is beyond the scope of this paper.

5. Within a highly globalized environment, there is likely to be a shift in practices, such as global outsourcing and a focus on core competencies, and a growing attention to how firms in other countries manufacture (e.g., the implementation of just-in-time manufacturing, etc.), all of which should be reflected in manufacturing decline.

6. Our analysis includes a maximum of 738 cases and a minimum of 499. At our minimum, the number of cases is comparable to Rowthorn and Ramaswamy's (1998) 510 cases, dwarfs Rowthorn and Ramaswamy's (1997) 145 cases and is greater than Alderson's (1999) roughly 400 cases. Most previous studies include 18 affluent democracies (Alderson 1999, Rowthorn and Ramaswamy 1998) while Rowthorn and Ramaswamy (1997) analyzed 21 countries. Previous studies had a shorter time-period and none included data after the early 1990s.

7. Because the sample includes more years (42) than countries (18), Beck (2001) would argue that the dataset should be considered a pooled time series rather than a panel. This is the main reason we supplement the panel analysis technique (FE AR1) with this pooled time series technique (OLS-PCSE).

8. Rowthorn and Ramaswamy (1998:11) acknowledge, "The rising share of employment in manufacturing in the industrialization stage of development represents to a large degree the movement of employment from agriculture to industry."

9. In analyses available upon request, we estimated all models while excluding agricultural employment and inflation. Doing so does not change our findings for the globalization variables. At the same time, however, GDP per capita and its square would actually have less robustly significant and smaller effects.

10. We do not analyze legal measures of investment or trade openness. We experimented with a dummy for fixed exchange rates (available upon request). If added to the models in Tables 2-5, this dummy is never significant in the FE-AR1 models but is occasionally significantly positive in the OLS-PCSE models. This variable did not substantially improve the model fit, and most of its effect is captured by our globalization indicators.

11. Our delineation between types of investment distinguishes between controlling interest (direct) versus investment that is more likely to be speculative, short-term and without an ownership stake (portfolio) (Brady and Wallace 2000).

12. We calculate standardized coefficients by multiplying the coefficient by the standard deviation of the independent variable and dividing by the standard deviation of the dependent variable.

13. We code Australia, Canada, Ireland, New Zealand, the United Kingdom and the United States as liberal/ uncoordinated (Hall and Soskice 2001). Descriptive statistics for the subsamples are available on request.

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Appendix: Descriptive Statistics, Number of Cases and Sources for Variables

	1960-2001		1975-2001		Sources
	Mean (Std. Dev.)	N	Mean (Std. Dev.)	N	
Dependent					
Manufacturing Employment	31.395 (7.005)	756	28.196 (5.370)	486	OECD, Labor Force Statistics
Basic					
GDP Per Capita	18,854.390 (5,975.680)	756	20,011.440 (4,412.091)	486	OECD ECO-SANTE, Health Data CD-Rom, 2003
GDP Per Capita^2	391,000,000 (235,000,000)	756	420,000,000 (177,000,000)	486	OECD ECO-SANTE, Health Data CD-Rom, 2003
Unemployment	5.116 (3.695)	756	6.688 (3.551)	486	OECD, Labor Force Statistics
Agricultural Employment	8.660 (6.236)	756	6.099 (3.374)	486	OECD, Labor Force Statistics
Inflation	5.225 (4.090)	756	5.335 (4.462)	486	IMF, International Financial Statistics
Globalization					IMF, International Financial Statistics (All below)
Outward PI	3.297 (9.614)	539	3.769 (10.235)	468	
Outward PI^2	103.129 (765.796)	539	118.747 (820.821)	468	
Inward PI	3.204 (8.467)	533	3.592 (9.030)	462	
Inward PI^2	81.825 (588.196)	533	94.264 (630.947)	462	
Outward FDI	2.193 (5.468)	538	2.430 (5.858)	461	
Outward FDI^2	34.654 (384.650)	538	40.145 (415.340)	461	
Inward FDI	2.051 (5.469)	554	2.186 (5.882)	476	
Inward FDI^2	34.063 (409.270)	554	39.304 (441.374)	476	
Investment Openness	10.881 (26.138)	517	12.128 (27.899)	447	
Investment Openness^2	800.287 (5,725.602)	517	923.704 (6,149.387)	447	
Net Investment	-0.287 (3.870)	517	-0.471 (4.078)	447	
Net Investment^2	15.032 (46.808)	517	16.814 (50.090)	447	
Exports	29.814 (15.102)	756	32.859 (16.179)	486	
Exports^2	1,116.647 (1,218.677)	756	1,340.928 (1,403.704)	486	
Imports	29.207 (14.230)	756	31.604 (14.927)	486	
Imports^2	1,055.297 (1,073.286)	756	1,221.193 (1,216.133)	486	
Trade Openness	59.021 (29.143)	756	64.463 (30.906)	486	
Trade Openness^2	4,331.704 (4,530.852)	756	5,108.723 (5,181.227)	486	

Appendix *(continued)*

Net Trade	0.607	756	1.254	486
	(3.440)		(3.738)	
Net Trade^2	12.183	756	15.519	486
	(30.906)		(35.428)	
Total Globalization	71.648	517	75.408	447
	(49.583)		(51.602)	
Total Globalization^2	7,587.202	517	8,343.145	447
	(17,612.1)		(18,801.17)	
Net Globalization	1.055	517	1.067	447
	(4.078)		(4.299)	
Net Globalization^2	17.714	517	19.582	447
	(62.543)		(67.028)	