

THE MARKET STRUCTURE OF THE U.S. ECONOMY IN 1997

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ABSTRACT

This paper assesses the market structure of the U.S. economy using a corrected four-firm concentration ratio. The correction is done to the published 1997 CR₄, using the NAICS, and addresses four areas: overaggregation, underaggregation, market locality, and international trade. The paper finds the U.S. economy to be fairly competitive. Excluding agriculture, 66.1% of the

U.S. economy operates in competitive markets, 19.8% operates in loose oligopoly, 13.4% operates in tight oligopoly, and 0.8% operates in monopoly markets. Moreover, the only sectors where some industries operate as monopolies are transportation and warehousing and utilities. **JEL classifications:** L10 and L11.

INTRODUCTION

Shepherd [1982] examined the market structure of the U.S. economy and found that the structure in 1980 was as follows: 76.7% effectively competitive, 18% tight oligopoly, 2.8% dominant firm, and 2.5% pure monopoly. Moreover, Shepherd compared the market structure of the U.S. economy over the years 1939, 1958, and 1980 and found that it became more competitive, with most of the changes happening between 1958 and 1980. In particular, Shepherd found that the competitive share of the U.S. economy increased from 56.3% in 1958 to 76.7% in 1980, while the monopoly share decreased from 3.1% to 2.5% over the same period. The oligopoly share decreased by about one-half: from 35.6% in 1958 to 18% in 1980.

The 1960s and 1970s witnessed many research studies assessing the structure of the U.S. economy. Stigler [1950] classified the U.S. economy in 1939 as follows: 62.8% competitive, 27.7% monopoly, 2.9% "compulsory cartel," and 6.7% "not allocable." Nutter and Einhorn [1969] assessed the structure of the U.S. economy using 1939 and 1958 data. They classified the U.S. economy into three structures: "workably competitive" with its share increasing from 59.1% in 1939 to 62% in 1958, "government supervised" with its share increasing from 20.2% in 1939 to 21.5% in 1958, and "effectively monopolistic" with its share decreasing from 20.4% in 1939 to 15.9% in 1958.

While not classifying the U.S. economy into different structures, Weiss and Pascoe [1986] adjusted the published four-firm concentration ratio (CR₄) in the manufacturing sector for its shortcomings using 1972 and 1977 data. With their detailed work and thorough explanation of every step, their research paper is one of the best references for anyone interested in that topic.

During the late 1970s and early 1980s, the U.S. Census Bureau stopped publishing much of the data needed to correct the published CR₄ for its shortcomings,

so the research on the structure of the U.S. economy ended as well. Shepherd [1982] remains the latest research on that topic. Due to lack of data, a later study by Pryor (2001) assessed only five sectors of the U.S. economy, leaving the other five sectors unexamined.

Over the ensuing decades, the U.S. economy has witnessed some changes. The agriculture, mining, and manufacturing sectors' shares of the gross domestic product (GDP) decreased from 2.2%, 4.1%, and 20.8% in 1980 to 1.6%, 1.6%, and 16.9% in 1997, respectively. On the other hand, finance, insurance, and real estate; and the service sectors' shares of the GDP increased from 15% and 13.6% in 1980 to 18.6% and 20% in 1997, respectively. The agriculture, mining, and manufacturing sectors' shares of the GDP continued to decline over the years; in 2004, their shares of the GDP were 1%, 1.3%, and 12.7%, respectively, while the finance, insurance, and real estate; and the service sectors' shares of the GDP continued to increase to 20.7% and 25.1%, respectively, in 2004 [Bureau of Economic Analysis www.bea.gov]. In addition, the 1980s and 1990s witnessed two movements: The large merger movement of the 1980s and the increase in imports. The former increased concentration while the latter decreased it. Furthermore, there were large cut-backs in antitrust activities and increases in deregulation during the 1980s, especially during the Reagan administration. Antitrust activities increased slightly during the 1990s but were still considered weak.

As such, an update of Shepherd's work is needed, and that is the focus of this paper. Doing so will enable us to see whether the U.S. economy has become more or less competitive than it was in 1980. Note, however, that this research uses 1997 data, which is organized and classified using the North American Industry Classification System (NAICS). This system was first introduced in 1997. Earlier data (1992 and prior years) are organized and classified using the Standard Industry Classification (SIC) system.

Assessing the structure of the U.S. economy is important as it relates to its performance through the traditional structure-conduct-performance (SCP) paradigm. Highly concentrated industries tend to be less efficient than the less concentrated ones: They charge higher prices, employ fewer factors of production, reduce output, have higher profits, and higher price-cost margins. The inefficiency of the concentrated industries is of two types: X-inefficiency resulting from the increase of actual cost over the minimum cost and allocative inefficiency resulting from a decrease of consumer surplus as a result of charging a price higher than the marginal cost. These inefficiencies cause a redistribution of income from the consumer to the owners of these concentrated industries, which ultimately results in an increase in income inequality since consumers usually have lower income than the owners of the concentrated industries. In addition, the stock prices of these concentrated industries tend to increase as the profits increase, creating wealth as well as income redistribution [Shepherd and Shepherd 2004]. Moreover, research has found that market structure is related to human capital, workers' quality, workers' wages, and the firm's systematic risk and cost of capital.

In assessing the market structure, I use the 1997 four-firm concentration ratio (hereafter CR₄). Knowing its shortcomings as a measure of market structure, correction methods will be used to remedy these shortcomings. Four corrections are used to address overaggregation, underaggregation, market locality, and international trade. The modified concentration ratio—in conjunction with other criteria—is used to analyze the market structure of the U.S. economy.

Comparing my results to Shepherd's [1982], I find that the U.S. economy has become more competitive than it was in 1980. In particular, I find that, excluding agriculture, 66.1% of the U.S. economy operates in competitive markets, 19.8% operates in loose oligopoly, 13.4% operates in tight oligopoly markets, and 0.8% operates in monopoly. Moreover, confirming Shepherd's results, the only sectors where some industries operate as monopolies are transportation and warehousing and utilities. Note, however, that in 1980 utilities and transportation were included in just one sector.

The paper proceeds as follows: Section two describes the data used to calculate the concentration ratio; section three discusses the concentration ratio, its shortcomings, and the methodology used to correct for these shortcomings; section four presents the results; and section five concludes the research.

NORTH AMERICAN INDUSTRY CLASSIFICATION SYSTEM (NAICS)

In 1997, the North American Industry Classification System (NAICS) replaced the Standard Industry Classification (SIC) system. The NAICS is a combined effort of the U.S. (Bureau of Economic Analysis BEA, Bureau of Labor Statistics BLS, and the Census Bureau), Canada, and Mexico. This provides comparable statistics among the three North American Free Trade Agreement (NAFTA) trading partners. The NAICS implemented profound structural improvements over the SIC system and identified 358 new industries for the whole economy. The NAICS is supposed to be reviewed every five years to reflect any changes in the economy. Since the introduction of the SIC system in the 1930s, it has been revised or updated every 10 to 15 years to reflect new developments in the economy and address concerns identified by data users and others. The last change in the SIC system was done in 1987. The NAICS, however, has been revised twice, in 2002 and 2007, since its inception in 1997.

Some of the major changes introduced by the NAICS are:

1. The NAICS doubles the number of sectors in the economy to 20, compared with 10 in the SIC system.
2. The NAICS introduces a new numbering system. The NAICS industries are identified by a 6-digit code, compared with a 4-digit SIC code. The longer code allows for more flexibility in defining subsectors and industries. The international NAICS code identifies the first five digits of the code only, leaving the sixth digit for an individual country's use. Therefore, the six-digit NAICS codes in the U.S. may not be the same as their counterparts in Canada or Mexico, while the 5-digit codes are the same among the three countries.

The structure of the NAICS is as follows:

2-digit code identifies *sector* (20 sectors are identified)

3-digit code identifies *subsector* (96 subsectors are identified)

4-digit code identifies *industry group* (313 industry groups are identified)

5-digit code identifies *industry*

6-digit code identifies *U. S. industry* (5- and 6-digit codes include 1170 industries)

If the country's 6-digit NAICS industry code does not differ from the 5-digit international industry code, then the country will add a *zero* to the 5-digit international industry code. For example, ice cream and frozen yogurt has an international 5-digit industry NAICS code of 31152. The U.S. industry is no

different from this, so its NAICS code is 311520, signifying no difference between the ice cream and frozen yogurt industry in the U.S. and its counterparts in Canada and Mexico. If the country's 6-digit industry code is different from the 5-digit international industry code, then the country will add 1, 2, 3,..etc to reflect its own industries. For example, dairy product has an international 5-digit industry NAICS code of 31151. The U.S. has different industries: Milk (NAICS 311511); butter (NAICS 311512); cheese (NAICS 311513); and dry, condensed, and evaporated dairy product (NAICS 311514).

3. The NAICS introduces a different classification principle than that used by the SIC system. SIC classification is based on the primary type of activity undertaken by the firm and all units of the firm are classified under the same industry. The NAICS, however, is based on the production process or the supply function of the firm. Therefore, different units of the same firm may be classified under different industries. In addition, if an establishment produces products classified in more than one industry, the establishment is classified in the industry with the largest product value.

This change, while substantial in its effect, did not change 75% of all industries nor the broad structure of many sector groups. With these changes, the NAICS is still comparable to the SIC system. In the manufacturing sector, for example, 40% of the NAICS industries exactly match the SIC, 38% are combinations of two or more SIC industries, and 22% are subsets of the SIC industries.

The structure of the NAICS in 1997 Table 1 is presented in Table 1, we see that the manufacturing sector is the largest sector by far, with 474 industries. Each of the other sectors, except wholesale trade, has less than 100 industries. The size of the manufacturing sector is reflected in other areas as well: It is the only sector with three sector NAICS codes (31, 32, and 33), and it has the largest number of subsectors, industry groups, and industries among all sectors. From Table 1, we also see that the number of subsectors in each sector is small, less than ten with the exception of the manufacturing and the retail trade sectors.

Table 1
The Structure of the NAICS in 1997

Sector Name	Sector 2-digit NAICS code	Subsector 3-digit NAICS code	Industry Group 4-digit NAICS code	Industry 5-digit NAICS code	U.S. Industry 6-digit NAICS code**
Mining*	21	3 (NAICS 211 - 213)	5 (NAICS 2111 - 2131)	10 (NAICS 21111 - 21311)	29 (NAICS 211111 - 213115)
Utility	22	1 (NAICS 221)	3 (NAICS 2211 - 2213)	6 (NAICS 22111 - 22133)	22 (NAICS 221111 - 221330)
Construction*	23	3 (NAICS 233 - 235)	14 (NAICS 2331 - 2359)	28 (NAICS 23311 - 23599)	28 (NAICS 233110 - 235990)
Manufacturing	31-33	21 (NAICS 311 - 339)	89 (NAICS 3111 - 3399)	183 (NAICS 31111 - 33999)	474 (NAICS 311111 - 339999)
Wholesale Trade	42	2 (NAICS 421 - 422)	18 (NAICS 4211 - 4229)	69 (NAICS 42111 - 42299)	146 (NAICS 421110 - 422990)

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Retail Trade	44-45	12 (NAICS 441 - 454)	27 (NAICS 4411 - 4543)	61 (NAICS 44111 - 45439)	89 (NAICS 441110 - 454390)
Transportation & Warehousing	48-49	9 (NAICS 481 - 493)	27 (NAICS 4811 - 4931)	42 (NAICS 48111 - 49319)	90 (NAICS 481111 - 493190)
Information	51	4 (NAICS 511 - 514)	9 (NAICS 5111 - 5142)	28 (NAICS 51111 - 51421)	35 (NAICS 511210 - 514210)
Finance & Insurance	52	5 (NAICS 521 - 525)	10 (NAICS 5211 - 5259)	26 (NAICS 52111 - 52593)	39 (NAICS 521110 - 525930)
Real Estate and Rental and Leasing	53	3 (NAICS 531 - 533)	8 (NAICS 5311 - 5331)	19 (NAICS 53111 - 53311)	25 (NAICS 531110 - 533110)
Professional, Scientific, and Technical Services	54	1 (NAICS 541)	9 (NAICS 5411 - 5419)	35 (NAICS 54111 - 54199)	60 (NAICS 541110 - 541990)
Management of Companies and Enterprises*	55	1 (NAICS 551)	1 (NAICS 5511)	1 (NAICS 55111)	3 (NAICS 551111 - 551114)
Administrative and Support and Waste Management and Remediation Services	56	2 (NAICS 561 - 562)	11 (NAICS 5611 - 5629)	29 (NAICS 56111 - 56299)	46 (NAICS 561110 - 562998)
Educational Services	61	1 (NAICS 611)	7 (NAICS 6111 - 6117)	12 (NAICS 61111 - 61171)	31 (NAICS 611110 - 611710)
Health Care and Social Assistance	62	4 (NAICS 621 - 624)	18 (NAICS 6211 - 6244)	30 (NAICS 62111 - 62441)	70 (NAICS 621111 - 624410)
Arts, Entertainment, and Recreation	71	3 (NAICS 711 713)	9 (NAICS 7111 - 7139)	23 (NAICS 71111 - 71399)	56 (NAICS 711110 - 713990)
Accommodation and Food Services	72	2 (NAICS 721 - 722)	7 (NAICS 7211 - 7224)	11 (NAICS 72111 - 72241)	25 (NAICS 721110 - 722410)
Other Services (Except Public Administration)	81	3 (NAICS 811 - 813)	12 (NAICS 8111 - 8139)	24 (NAICS 81111 - 81399)	64 (NAICS 811111 - 814110)
Public Administration*	92	8 (NAICS 921 - 928)	8 (NAICS 9211 - 9281)	29 (NAICS 92111 - 92812)	29 (NAICS 921110 - 928120)
* No Concentration Data Available for this sector					
** This also includes 7-digit product NAICS code when available					

METHODOLGY FOR CORRECTING THE CONCENTRATION RATIO

In assessing the structure of the U.S. economy, I use the CR₄.¹ The published CR₄ is calculated for U.S. industries classified with a 6-digit NAICS code, where each successive digit implies a narrower classification. The concentration ratio is calculated from the value of shipments by domestic producers. As such, it has some limitations.

Overaggregation: Some industries are broadly defined, as they include noncompeting products. For example, specialty canning is broadly defined, as it includes noncompeting products such as canned baby food, canned soups and stews, canned dry beans, and other canned goods. Canned baby food is not a substitute for canned soups and stews. In addition, the canned baby food market is dominated by Gerber with 70% market share in 2002, while the canned soups market is dominated by Campbell Soup with 75% market share. Other examples include but are not limited to pharmaceutical manufacturing; aircraft manufacturing; motorcycle, bicycle, and parts manufacturing; and many others. The improvements in industry classification introduced in the NAICS did not eliminate all the overaggregation industry definition problems, albeit reducing them. For example, specialty canning (NAICS 311422) is broadly defined, as it was under the SIC system.

To correct for overaggregation, I use the weighted average four-firm concentration ratio with the value of shipment used as weight. The weighted average CR_4 is based on the products' (7-digit NAICS) CR_4 s and their values of shipment. Data for the products' values of shipment are obtained from the 1997 Census Bureau industry series publications. The Census Bureau publishes an industry series publication for each 6-digit NAICS industry. These industry series publications contain detailed statistics regarding different products produced by the industry. Eighty-three industries have been modified for this shortcoming. The technical appendix² contains more details about calculating the modified CR_4 .

Underaggregation: Since the boundaries of an industry are not well-defined, we might find competition between two products in different industries, such as in the copper and aluminum industries. The copper industry is highly concentrated (it had a CR_4 of 94.5% in 1997), but since aluminum competes with copper in many applications, this reduces the concentration in the copper industry (in 1997, its corrected CR_{4C} was 77.1%).

The NAICS classification is broadly defined in some cases but narrowly defined in others. As with overaggregation, the NAICS made some improvements over the SIC system regarding the underaggregation problem but does not completely eliminate it. To adjust for underaggregation, I'll use a combined four-firm concentration ratio [Weiss and Pascoe (1986)]. To calculate the combined CR_4 , I divide the summation of the values of shipments by the largest four companies in the two (or more) affected industries by the total values of shipments in these industries. Thirty-two industries have been modified for this shortcoming and combined into fourteen industries.

Geographical Coverage of the Market: The concentration ratio pertains to the nation as a whole. Some markets are highly localized, such as ready-mix concrete with a CR_4 of 7% in 1997, suggesting a very competitive market. However, because of its high transportation cost, a local market exists, and it is highly concentrated. Products with high transaction cost usually have local or regional markets, and for them, the published concentration ratios tend to understate the actual concentration.

The modification for market locality is based on the distance shipped for most of the shipment. Weiss [1972] compares the distance shipped indices to the dispersion indices as a measure of the geographical market size and finds that the former supersedes the latter. Lunn [1984] uses the ratio of the sum of exports and imports to the value of shipment—which is the trade-intensity ratio, but Lunn did not use this term—to judge the locality of the market. As the ratio gets smaller, it signals a local or regional market. In doing so, Lunn finds that the industries with local or

regional markets are the same as the ones identified by Schwartzman and Bodoff [1971]. In addition, comparing the local and regional industries identified by Schwartzman and Bodoff [1971] with those identified by Weiss and Pascoe [1986], I find that they are basically the same.

Assessing the distance shipped is based on data from the 1997 Commodity Flow Survey (CFS) published by the Department of Transportation. CFS uses the Standard Classification of Transportation Goods (SCTG) coding system. Therefore, each SCTG commodity is matched to its NAICS code for consistency.

The optimal correction for regional and local markets is the weighted averages of local or regional four-firm concentration ratios [Weiss and Pascoe (1986), and Schwartzman and Bodoff (1971)]. To do so, we need the local or regional concentration ratios for the affected industries. However, the Census Bureau no longer publishes this information. The last year for which the Census Bureau published the aforementioned data is 1963. To that end, an alternative method is used. Following Weiss [1991], I correct for market locality using a constant factor approach—explained in the technical appendix—derived from the average CR₄ of local, regional, and national industries.

International trade:

Imports: The concentration ratio accounts for domestic production. This causes an upward bias of concentration in the U.S. markets, as it does not account for imports. In general, imports increase sales and consequently lower the concentration ratio.

Exports: The value of U.S. exports is calculated in the producer concentration ratio, but they do not reach U.S. consumers. If large producers export more of their output than small producers—which seems to be the case—then this causes an upward bias in the producer concentration ratio. In general, exports reduce domestic sales and consequently increase concentration.

The automobile industry is a good example. In 1997, the CR₄ for automobile manufacturing in the U.S. was 79.5%. Taking international trade into consideration reduces it to 41.4%. Data for exports and imports are obtained as a special tabulation from the U.S. Department of Commerce. Since there is no published data about the 1997 U.S. exports and imports by 6-digit NAICS industry, a special tabulation has to be made.

To adjust the concentration ratio for international trade, I use the following:³

$$CR_{4T} = \left(\frac{S_4 - CR_4 \times X}{S + M - X} \right) \times 100$$

where: S₄: value of shipment for the four largest firms in the industry⁴
 S: total value of shipments in the industry
 X: the value of exports
 M: the value of imports

Procedures for Adjusting the Concentration Ratio:

The manufacturing sector is the one that needs the majority of corrections to its concentration ratios. In adjusting the manufacturing CR₄s, I'll proceed as follows:

1. Estimate the withheld concentration ratios.⁵
2. Adjust the CR₄ to reflect the industry definition problem, when applicable.
3. Adjust the CR₄ to reflect the market locality problem, when applicable.
4. All CR₄s are adjusted for exports and imports.

The corrected CR_4 (hereafter CR_{4C}) will then be used to assess the market structure as follows (Note that these are the traditional market structure demarcations, but they are arbitrary.):

- **Competitive:** If $CR_{4C} < 40\%$, low barriers to entry, and the leading firms do not have enough market power to control the market.
- **Loose Oligopoly:** If $40\% \leq CR_{4C} \leq 60\%$, the leading firms have more market power than those in a competitive market but less than those in a tight oligopoly, with low barriers to entry.
- **Tight Oligopoly:** If $CR_{4C} > 60\%$, the leading firms have significant market power with high barriers to entry.
- **Monopoly:** If CR_{4C} is very close to 100%, there is evidence of monopoly power with significant barriers to entry.

In addition, in judging a competitive market, I use the criteria outlined by Shepherd and Shepherd [2004]. They mentioned that effective competition has three basic elements: The existence of at least five strong competitors in the market, no dominant firm, and easy entry to the market. The first element—the existence of at least five strong competitors in the market—is especially important, as it reinforces the Department of Justice (DoJ) criterion for judging horizontal merger acquisitions using the HHI. If the HHI exceeds 1,800, the DoJ considers this market to be highly concentrated, and they tightly scrutinize any merger acquisition in that market. The HHI of 1800 approximates the existence of five competitors in the market (if a market has five competitors with equal market shares, the HHI will be 2,000, close to the DoJ guidelines). As the number of competitors increases, the HHI decreases below the DoJ benchmark (if the market has six competitors with equal market shares, the HHI is 1,666.7). As the number of competitors decreases, the HHI increases well above the HHI benchmark (at four competitors with equal market shares, the HHI is 2,500 and at three competitors with equal market shares, the HHI is 3,333.3).

RESULTS

Table 2 presents the CR_{4C} for different sectors of the U.S. economy in 1997. Looking at Table 2, we see that the majority of the U.S. economy is competitive. Excluding agriculture, 66.1% of the U.S. economy is competitive, 19.8% is loose oligopoly, 13.4% is tight oligopoly, and 0.8% is monopoly. Moreover, the only two sectors within which some industries operate as monopolies are utility, and transportation and warehousing. This finding agrees with Shepherd's finding [1982].

As expected, some sectors are very concentrated while others are very competitive. Utilities; transportation and warehousing; and Information are examples of concentrated sectors whereas professional, scientific and technical services; health care and social assistance; accommodation and food services; and other services (except public administration) are examples of competitive sectors.

A close examination of some sectors reveals interesting results. For example, the wholesale trade sector is basically competitive: 80.8% of its industries are competitive, 13.7% are loose oligopoly, and 5.5% are tight oligopoly. In 1997, the Census Bureau reported the concentration ratio for that sector broken down into three

different groups: Merchant wholesalers; manufacturers' sales branches and sales offices; and agents, brokers, and commission merchants.

**TABLE 2
CORRECTED FOUR-FIRM CONCENTRATION RATIO IN 1997**

Sector (NAICS Code)	1997 Corrected Concentration Ratio			
	<40%	≥ 40 to □ 60%	> 60 to □ 95%	> 95 to 100%
Manufacturing (NAICS 31-33)	61%	24%	14%	1% Oligopoly
Information* (NAICS 51)	28.6%	45.7%	25.7%	
Real Estate & Rental & Leasing (NAICS 53)	72.0%	20.0%	8.0%	
Health Care & Social Assistance (NAICS 62)	82.9%	8.6%	8.6%	
Educational Services (NAICS 61)	64.5%	22.6%	9.7%	3.2% Oligopoly
Professional, Scientific & Technical Services (NAICS 54)	90.0%	6.7%	3.3%	
Accommodation & Food Services (NAICS 72)	84.0%	16.0%		
Administrative & Support & Waste Management & Remediation Services (NAICS 56)	73.9%	17.4%	8.7%	
Other Services (Except Public Administration) (NAICS 81)	90.6%	9.4%		
Arts, Entertainment & Recreation (NAICS 71)	78.6%	12.5%	8.9%	
Transportation & Warehousing (NAICS 48-49)	54.4%	17.8%	24%	1% oligopoly, 3% Monopoly
Utilities (NAICS 22)	4.6%	18%	45.5%	31.8% Monopoly
Finance & Insurance (NAICS 52)	64.1%	25.6%	7.7%	2.6% oligopoly
Retail Trade (NAICS 44-45)	68.9%	16.7%	13.3%	1.1% oligopoly
Wholesale Trade (NAICS 42)	80.8%	13.7%	4.8%	0.7% oligopoly
Mining** (NAICS 21)	27.6%	37.9%	34.5%	
Construction** (NAICS 23)	46.4%	28.6%	25.0%	
Total	66.1%	19.8%	12.7%	1.4%

(*) For some industries within the information sector, some CRs were not available for 1997, I used the 2002 CRs instead. These industries are: Newspaper publishers (NAICS 511110), Periodical publishers (NAICS 511120), Book publishers (NAICS 511130), Directory and mailing list publishers (NAICS 511140), Greeting card publishers (NAICS 511191), and all other publishers (NAICS 511199).

(**) Estimated.

+Merchant wholesalers sell goods on their own account. They do not keep inventory. They have their own warehouses where they handle the goods for their customers. Manufacturers' sales branches and sales offices, on the other hand, sell goods manufactured or mined by their parent company in the United States. Agents, brokers, and commission merchants operate from offices and do not own nor handle the goods they sell. They simply arrange for the buying or selling of goods owned by others for a commission or fee.

These three different types of wholesalers have different market structures. Merchant wholesalers operate in a very competitive market: 84.9% of its industries are competitive, 9.6% are loose oligopoly, and 5.5% are tight oligopoly. Manufacturers' sales branches and sales offices, on the other hand, operate in a very concentrated market: 11.7% of its industries are competitive, 20% are loose oligopoly, and 68.2% are tight oligopoly. Agents, brokers, and commission merchants operate in a less concentrated market: 59.1% of its industries are competitive, 18.9% are loose oligopoly, and 22% are tight oligopoly.

In 2002, the Census Bureau changed the organization of the NAICS data for the wholesale trade sector: The NAICS code changed in addition to a minor change in inclusion/exclusion of industries. In 2002, the wholesale trade sector was divided into three subsectors: Merchant wholesalers, durable goods (NAICS 423), merchant wholesalers, nondurable goods (NAICS 424), and wholesale electronic markets and agents and brokers (NAICS 425). The two merchant wholesalers' subsectors (NAICS 423 and 424) are presented according to two types of operations: Merchant wholesalers, except manufacturers' branches and offices, and manufacturers' sales branches and offices

The educational services sector is less competitive than I expected, with 64.5% competitive, 22.6% loose oligopoly, and 12.9% tight oligopoly. The concentration in that sector stems from the establishments that are exempt from federal income tax. The establishments that are subject to federal income tax operate in a competitive atmosphere, with 86.7% competitive and 13.3% loose oligopoly, with no tight oligopoly or monopoly.

The establishments that are exempt from federal income tax, on the other hand, operate in a concentrated atmosphere: 43.8% competitive, 31.3% loose oligopoly, and 25.1% tight oligopoly. Within the tight oligopoly segment, one industry is very concentrated. It is the cosmetology and barber schools (NAICS 611511), where there are two establishments in the industry with only one operating for the entire year (1997). While this industry had only one operating firm in 1997, it is not classified as a monopoly since there are other firms that are subject to federal income tax, there are substitutes to this service, and entry to the industry is not blockaded (in 2002, CR₄ for this industry dropped to 48.3%, which supports my conclusion). Note, however, that cosmetology and barber schools that are subject to federal income tax (with the same NAICS code) operate in a very competitive market with a CR₄ of 6.5%.

The retail trade sector is competitive, with only 14.4% of its structure in the form of tight oligopoly. Within the tight oligopoly segment, one industry is very concentrated and is worth mentioning: the national chain department stores (excluding leased departments), NAICS 4521103. This industry has 1,888 establishments controlling 100% of the market. Of them, 1,870 were operating for the entire year (1997). To assess this industry, I looked at the detailed data about the retail trade sector and found that there are only *three firms* operating in that market; each firm has 100 establishments or more, each has 1,000 employees or more, and each has sales of \$250 million or more (the largest value provided by the Census Bureau in each category). In addition, while not relevant in my assessment, each establishment is in the form of corporation.

The transportation and warehousing sector is concentrated with the following market structure: 54.4% competitive, 17.8% loose oligopoly, 25% tight oligopoly, and 3% monopoly. The monopoly part stems from the transit system.

Within the tight oligopoly segment, the nongovernment air traffic control industry (NAICS 4881111) is very concentrated. There are only eleven firms in that industry, with 114 establishments. Of those 11, eight firms operated for the entire year and had a concentration ratio of 99.4%, with the remaining three having a concentration ratio of 0.6%. Of the eight firms operating for the entire year, the largest three firms have 106 establishments and revenue between \$10 million to less than \$25 million. The fourth largest company has one establishment and revenue between \$500,000 to less than a million. The CR₄ (for those four firms) is 97%. The remaining four firms have four establishments and revenue between \$100,000 to less than \$500,000.

The concentration ratios for mining and construction sectors are not published. Therefore, they have to be estimated using other data using different industry series, subject series, and geographic area series data published by the Census Bureau. In the construction sector, I used all the 51 (50 states and the District of Columbia) geographic area series to be able to assess the different industries within that sector as accurately as possible. I find that, as expected, the mining sector is very concentrated with the following structure: 27.6% competitive, 37.9% loose oligopoly, and 34.5% tight oligopoly. Of all the industries in the mining sector, 28% have less than 30 firms, which are usually concentrated within few states. To be concrete, iron ore mining (NAICS 212210) has 26 firms with 32 establishments, all of which are located in three states: Michigan, Minnesota, and Missouri. Silver ore mining (NAICS 212222) has 15 firms with 16 establishments, all of which are located in two states: Idaho and Nevada. Lead ore and zinc ore mining (NAICS 212231) has 17 firms with 31 establishments, all of which are located in four states: Alaska, Idaho, Missouri, and Tennessee. The anthracite mining industry has 57 firms with 68 establishments, all located in one state: Pennsylvania.

The construction sector, on the other hand, is less concentrated, despite the existence of pockets of local oligopoly and monopoly. On the national level, this sector may seem more competitive than it actually is. While the overall number of establishments is numerous for most industries, the number of establishments in each state is not. Looking at the states' data reveals that many industries within this sector have few establishments in different states. Moreover, there are three industries with local monopolies in some states. These industries are: Industrial nonbuilding structure construction (NAICS 234930), which has *only one establishment* in Mississippi, Nebraska, North Carolina, South Dakota, and Wisconsin; and wrecking and demolition contractors (NAICS 235940) and manufacturing and industrial building construction (NAICS 233310), each of which has *only one establishment* in the District of Columbia. In addition, each one of these three industries has few establishments (fewer than ten) in the majority of the states.

As expected, the utilities sector is very concentrated, with 31.8% of its industries operating as monopolies. The utilities sector includes the following services: Electric power, natural gas, water supply, sewage treatment facilities, and steam supply. The monopoly part comes from electric power distribution, natural gas distribution, water supply, and sewage treatment facilities. The competitive part, on the other side, is only 4.6% and comes from fossil fuel electric power generation.

Within the finance and insurance sector, the banking industry has received the attention of many researchers, as banks allocate and invest most of the society's savings. Therefore, banks' performance and how it is affected by market concentration and competition is important. The research on that topic is abundant, but the results are inconclusive. To better assess the competitiveness of the national

and state commercial banks, I examined all 51 Geographic Series Reports. The Geographic Series Report for each state has data covering different metropolitan and micropolitan statistical areas. I examine all of them and find that none of the states has less than 10 commercial banks in each metropolitan or micropolitan statistical area.

The banking deregulations of the 1980s had a substantive effect on the structure of the U.S. banking sector. Stiroh and Strahan [2003] find that after the 1980s, interstate banking and intrastate branching deregulations, the U.S. banking sector becomes more competitive as they allow banks to enter new markets and compete with the incumbent banks in the “previously shielded markets.” Cetorelli [2002] confirmed this result, finding that the U.S. local banking market is fairly competitive and there is no evidence of collusive behavior among banks even when there are only two or three banks in the market. Further, Cetorelli mentions that the 1994 banking deregulation increased competition in the banking markets by eliminating important barriers to entry.

The information sector is relatively concentrated. The concentration part comes from the following industries: Newspaper, periodical, book, and database publishers (this includes greeting card publishers, which is very concentrated; in 1997, it was dominated by Hallmark with 42% market share and American Greeting with 35% market share); cable networks; telecommunications (the whole sector: Wired, wireless, and satellite); integrated record production/distribution; and motion picture and video distribution.

The manufacturing sector, on the other hand, is very competitive, with only 15% of its industries operating in tight oligopoly markets. Comparing the manufacturing sector to other sectors, I find only five sectors to be less competitive than the manufacturing sector. These are the sectors known to be concentrated: Information, transportation and warehousing, utilities, mining, and construction. Furthermore, I find that international trade plays an important role in keeping the manufacturing sector competitive. Correcting the CR_4 for international trade increases the share of the manufacturing competitiveness from 44.1% to 58% while it decreases the shares of loose and tight oligopoly from 27% and 28.9% to 17.5% and 24.5%, respectively. In addition, five subsectors (apparel manufacturing, leather and allied product manufacturing, machinery manufacturing, computer and electronic product manufacturing, and transportation equipment manufacturing) are more influenced by international trade than the remaining subsectors.

CONCLUSION

Research on the market structure of the U.S. economy is scarce and old. The reason behind that is the lack of data needed to correct the published CRs for their shortcomings. To be exact, to correct for market locality, we need the regional and local CR_{4s} , which are no longer published by the U.S. Census Bureau. Likewise, to correct for overaggregation, we need the product CR_{4s} , which again are no longer published by the U.S. Census Bureau. Therefore, an update to the topic is needed in order to examine how competitive the U.S. economy is. This is the focus of this paper.

In assessing the market structure of the U.S. economy, I use a corrected CR_4 . The correction to the published CR_4 is based on four elements: Overaggregation, underaggregation, market locality, and international trade. To correct for

overaggregation, I use a weighted average CR_4 with the value of shipment used as weight. To correct for underaggregation, I use a combined CR_4 . To correct for market locality, I use a constant factor approach. After these three corrections have taken place, all concentration ratios are corrected for international trade. The data used is the 1997 North American Industry Classification System (NAICS).

Using the corrected CR_4 s—in conjunction with other criteria—to assess the market structure of the U.S. economy, I find the U.S. economy to be fairly competitive. In 1997, excluding agriculture, 66.1% of the U.S. economy is operating as competitive, 19.8% is loose oligopoly, 13.4% is tight oligopoly, and 0.8% is monopoly.

Comparing the U.S. economy in 1980 (Shepherd's results) and in 1997, I find that the trend Shepherd found in 1980—increasing competition in the U.S. economy—continues but with a smaller magnitude. Between 1980 and 1997, the competitive share of the U.S. economy increased while the monopoly share decreased substantially. The only two sectors with some industries operating as monopolies are the utility, and the transportation and warehousing sectors.

Due to the length of this paper, I only assessed the market structure of the U.S. economy without examining the reason(s) behind the trend found. The latter is a topic for a new research.

Finally, I acknowledge that while the corrections to the CR_4 used in this paper are not the optimal ones due to lack of data, they lead to a better assessment of the market structure than the published CR_4 .

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ENDNOTES

¹ Weiss [1974] reviews 35 studies of the U.S. manufacturing industries and finds that the majority of them are using the CR_4 , cited in Kwoka [1981]. Kwoka [1981] mentions that recent research has supported the same trend.

² The technical appendix is posted on the author website <http://www.gbc.edu/~raouff>

³ This formula has been extensively used in the literature. For example, Coughlin and Watkins [1985], Lunn [1984], Weiss and Pascoe [1986], Utton [1982], and many others. Note that since the imports for the U.S. manufacturing sector are greater than its exports, then the denominator will be larger than that without international trade modification (i.e., value of shipment) and therefore will reduce the concentration ratio.

⁴ Exports for the four largest companies are estimated by $CR_4(X)$. This assumes that their share in exports is the same as their share in domestic production. This causes the corrected CR_4 to overstate (understate) the actual CR_4 if the four largest firms' share in exports is greater (smaller) than their share in domestic production.

⁵ In manufacturing, only two industries had their CR_4 s suppressed. In both cases, the eight-firm CRs are 100% and the number of firms in the industry is less than ten (8 and 5 to be exact). In both cases, a CR_4 of 90% is used.

