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IRS Section 936 and the Decline of Puerto Rico's Manufacturing

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ABSTRACT

This paper presents new estimates on the impact of the elimination of IRS Section 936 on the manufacturing industry in Puerto Rico evaluating its effect on employment and exports. The effects on manufacturing employment are estimated using a difference-in-difference methodology where employment in service sector industries is used as the control group. The effects on Puerto Rico's manufacturing industry level exports are estimated using mainland U.S. exports as the control group. I find evidence that the elimination of Section 936 had a large negative impact on manufacturing employment but little evidence that the elimination of Section 936 caused a significant effect on Puerto Rico's manufacturing exports. [Key words: Puerto Rico, IRS Section 936, tax exemption, manufacturing, exports, employment]

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1. Introduction

Several months before Hurricane Maria landed in Puerto Rico on September 20, 2017, the government of Puerto Rico filed for bankruptcy similar to Chapter 9 of the U.S. Bankruptcy Code (Scoria and Gillers 2017). Puerto Rico's government owes more than $74 billion dollars to creditors and 40 billion in pension liabilities (Farrant 2017).[1] Lack of spending in infrastructure may have contributed to the long and difficult recovery from the hurricane, responsible for thousands of deaths estimated to range from 1,400 to 3,000 (Campo-Flores 2018), and 94.4 million dollars in damages (Puerto Rico Junta de Planificación 2018). The economic crisis in Puerto Rico has resulted in large waves of Puerto Rican migrants to the mainland. Mora, Dávila and Rodríguez (2018) estimate that 646,932 people migrated from Puerto Rico to the U.S. mainland between 2006 and 2016. Edwin Meléndez and Jennifer Hinojosa (2017) projected that between 114,000 and 213,000 Puerto Ricans will leave the island every year from 2017 to 2019 due to the economic crisis and the devastation caused by Hurricane Maria.

The roots of the economic crisis in Puerto Rico have been traced in part to a large decline in the manufacturing industry, precipitated by the elimination of Internal Revenue Service (IRS) Section 936 tax exemption for U.S. corporations in 2006 (Krueger, Teja and Wolf 2015; Caraballo Cueto and Lara 2018). Under Section 936, any qualifying U.S. corporation could choose to receive a tax credit equal to the portion of its U.S. corporate income tax liability attributable to taxable income from activities outside the United States from the conduct of operations in a U.S. possession and from income generated by qualified investments in a U.S. possession. Under Section 936, Puerto Rico attracted large amounts of manufacturing investments (Alm 2006). The elimination of Section 936 may be one of the most important factors contributing to the decline of the manufacturing industry in Puerto Rico.

Research on the impact of the elimination of IRS Section 936 tax exemption program in the manufacturing sector, at the industry or firm level, has been limited. In previous research (Feliciano and Green 2017), we estimated the impact of the elimination of IRS Section 936 using a difference-in-difference methodology based on data from the US Census of manufactures, which is collected every five years, from 1982 to 2012. Our results show the elimination of Section 936 had the effect of decreasing average manufacturing wages in Puerto Rico by 16.7 percent compared to those in the mainland U.S. We did not find a significant impact of Section 936 on manufacturing employment or the number of manufacturing establishments in the island when the U.S. mainland was used as a control. However, we estimated that the number of manufacturing establishments decreased by 18.7 percent to 28.0 percent as a result of the phase-out and elimination of IRS Section 936 when the control group is composed of the states of Indiana, North Carolina and Oregon.

In this paper, I provide new estimates of the impact of the elimination of IRS Section 936 on the manufacturing industry in Puerto Rico evaluating its effect on employment and exports. I estimate the effects on manufacturing employment using a difference in difference methodology where employment in service sector industries is used as the control group. I estimate the effects on Puerto Rico's industry level manufacturing exports using mainland U.S. exports as the control group. I find evidence that the elimination of Section 936 had a large negative impact on manufacturing employment but little evidence that the elimination of Section 936 caused a significant decline on Puerto Rico's manufacturing exports.

2. IRS Section 936

U.S. corporations doing business in Puerto Rico received tax exemptions since the Revenue Act of 1921 (Holik 2009). However, over time the benefits given to U.S. corporations diminished. IRS Section 936 was created by the Tax Reform Act of 1976 to promote investments by U.S. corporations in U.S. territories, and to increase employment and economic activity in U.S. possessions. Under Section 936, U.S. corporations received full credit from income resulting from the conduct of trade or business in a U.S. possession. The Tax Equity and Fiscal Responsibility Act of 1982 and the Tax Reform Act of 1986 created restrictions on tax exemption for U.S. possessions corporations. To receive tax exemption, corporations doing business in a U.S. possession had to meet a direct labor or value-added test with respect to a specific product or service produced. The percentage of gross income that a corporation had to earn from trade or business in a U.S. possession was increased from 65 to 75 percent in 1986 (Holik 2009).

The Small Business and Job Protection Act of 1996 eliminated Section 936 tax exemption for U.S. possessions corporations beginning with tax years after December 31, 1995. U.S. corporations already conducting business in a U.S. possession were allowed to continue getting tax exemptions for years 1995 to 2005 (Holik 2009).

Congress eliminated section 936 in part due to the view that the job creating benefits of the program did not justify the loss of U.S. tax revenue. Moreover, many Section 936 corporations shifted intangible assets to the island to increase the amount of income that would qualify for tax exemption (Hexner and Jenkins 1995). The Small Business and Job Protection Act of 1996 eliminated Section 936 tax exemption for U.S. possessions corporations beginning with tax years after December 31, 1995. U.S. corporations already conducting business in a U.S. possession were allowed to continue getting tax exemptions for years 1995 to 2005 (Holik 2009).

While the benefits from Section 936 applied to all territories, most U.S. possessions corporations located in Puerto Rico. In 2005, 98.8 percent of the 0.9 billion dollars in tax credits awarded under Section 936 were given to U.S. possessions corporations located in Puerto Rico. Moreover, most of these corporations were engaged in manufacturing; 69 percent of tax credits were given to firms in the manufacturing industry (Holik 2009).

3. Data

To study the impact of the elimination of IRS Section 936 on Puerto Rico's manufacturing employment, I constructed data series on Puerto Rican employment by industry from the "Encuesta de Empleo Asalariado en el Sector No Agrícola," collected by the Puerto Rico Negociado de Estadísticas del Departamento del Trabajo y Recursos Humanos for the years 1990 to 2016. These data are compiled for the Quarterly Census of Employment and Wages which is collected and estimated for every state in mainland U.S., Puerto Rico and the Virgin Islands. Data are collected every quarter from establishments. The employment variable is the count of filled jobs, including both full-time and part-time workers. The industries included in the analysis are: manufacturing, retail trade-transportation-utilities, information services, professional services, education and health services, hotel and recreation services.

I also constructed panel data on industry level exports for Puerto Rico and the United States for the years 1991 to 2016. Export data for Puerto Rico are from the Puerto Rico Planning Board, Governor's Office, "Economic Report to the Governor." These data were reported at the two-digit Standard Industrial Classification (SIC) level from 1990 to 2000 and at the three-digit North American Industrial Classification System (NAICS) level from 2001 to 2016. Mainland U.S. exports are from the United Nations (UN) Comtrade Database, available at the SIC level through the World Integrated Trade Solution (WITS).

To create the panel, I used a concordance between SIC and NAICS to connect the industry series, which led to their consolidation into 12 industries.[2] Both employment and exports data include 15 years of tax exemption for U.S. corporations through IRS Section 936, including the ten-year phase-out period that started in 1995 and ended in 2005.

4. Methodology

I use difference-in-difference methodology to analyze the impact of the elimination of IRS Section 936 on Puerto Rico's manufacturing employment and exports. Puerto Rico is a territory of the United States and has no votes in the U.S. Congress. The phase out of IRS Section 936 was a policy change imposed on Puerto Rico by the U.S. Congress with the purpose of increasing tax revenue. Thus, the policy of eliminating IRS Section 936 was exogenous to economic conditions in Puerto Rico, and thus it represents a natural experiment on the impact of removing tax exemptions on US corporations located in the island.

I estimate a fixed effects regression equation of manufacturing employment in Puerto Rico using employment in service sector industries in Puerto Rico as a control group. The manufacturing sector benefited the most from IRS Section 936, accounting for 69 percent of tax benefits: thus, the elimination of tax exemption should have affected manufacturing employment more than any other sector in the economy. In the difference-in-difference estimation, the first difference is before IRS Section 936 was eliminated (1989 to 2005) and after its elimination (2006–2016). The second difference measures the difference in employment trends between manufacturing industries and a control group during the same period. It is difficult to find a perfect control group for Puerto Rico's manufacturing employment since Puerto Rico has significantly lower wages than all states in the U.S., employment in Puerto Rico's service sector industries is a good comparison group.

The employment difference in difference equation is:

$$Log(Employment_{it}) = \alpha + \beta_1 AfterTaxCredit_{it} + \beta_2 Manuf_{it} + \beta_3 Manuf_{it} * AfterTaxCredit_{it} + \sum_i Ind_i + \varepsilon_{it} \quad (1)$$

where *Employment* is the number of workers in industry i (manufacturing or a service sector) in year t. *AfterTaxCredit* is a dummy variable that equals 1 if the year is after the elimination of the IRS Section 936 (2006–2016) and zero otherwise. Manuf is a dummy variable that equals 1 if employment is in the manufacturing industry and zero otherwise. $\sum_i Ind_i$ is a series of industry dummies designating service sector industries: retail trade-transportation-utilities, information services, professional services, education and health services, hotel and recreation services. The variable ε_{it} is a random error with mean zero. The interaction term between the *AfterTaxCredit* variable and the manufacturing dummy variable captures the differences between employment in manufacturing and service sector industries during the period after the elimination of IRS Section 936. The coefficient β_3 is the difference-in-difference estimator and thus captures the impact of the elimination of IRS Section 936 tax exemption program on employment in manufacturing industries in Puerto Rico.

I estimate another fixed effects regression equation for manufacturing exports from Puerto Rico to the rest of the world for 12 industries from 1991 to 2016, using mainland U.S. exports to the rest of the world in the same 12 industries as the control group. While the mainland U.S. may differ in terms of importance of specific manufacturing industries in exports, trends in exports within industries should provide a good control group for changes in exports in Puerto Rico before and after the elimination of IRS Section 936.

The exports difference in difference equation is:

$$Log(Exports_{ijt}) = \alpha + \beta_1 AfterTaxCredit_{ijt} + \beta_2 PR_j + \beta_3 PR_j * AfterTaxCredit_{ijt} + \sum_i Ind_i + \varepsilon_{ijt} \quad (2)$$

where *Exports* is the value of exports in location j (PR or US) industry i and year t. *AfterTaxCredit* is a dummy variable that equals 1 if the year is after the elimination of the IRS Section 936 (after 2005) and zero otherwise. PR is a dummy variable that equals 1 if the observation is from Puerto Rico and zero otherwise. $\sum_i Ind_i$ is a series of industry dummies. The interaction term between the *AfterTaxCredit* variable and the Puerto Rico dummy variable captures the differences between exports from Puerto Rico and the U.S. exports to the rest of the world after the elimination of IRS Section 936. The coefficient β_3 is the difference in difference estimator since it captures the difference in trends in industry level exports between Puerto Rico and the U.S. after the elimination of Section 936. Thus, it measures the impact of the elimination of the IRS Section 936 tax on Puerto Rico's manufacturing exports.

5. Trends in Puerto Rico's Manufacturing Industry

Table 1 shows U.S. manufacturing corporations taking advantage of Section 936 by industry. Approximately half of the tax credits went to corporations in the chemicals and allied products industry, mainly in the pharmaceutical industry. The second largest industry located in Puerto Rico under Section 936 was the electrical and electronic equipment industry, accounting for 22.48 percent of Section 936 returns.

Figure 1 shows manufacturing employment for Puerto Rico and the United States based on data from the Quarterly Census of Employment and Wages. Manufacturing employment declined for both the mainland U.S. and Puerto Rico from 1990 to 2016. However, in percentage terms, the decline was larger for Puerto Rico; during this period, the island experienced a 51 percent decrease in manufacturing employment compared with a 30 percent decrease in the mainland U.S.

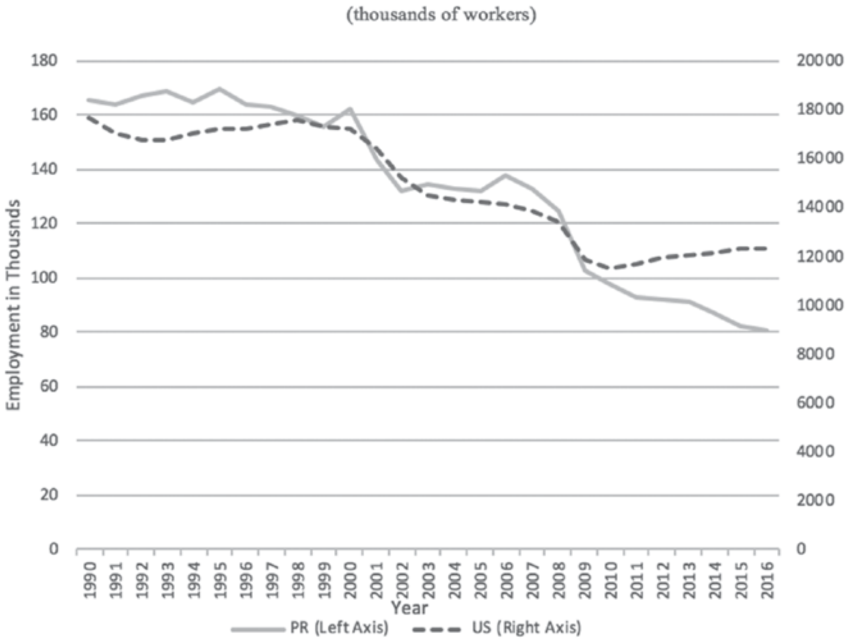
Figure 2 shows trends in Puerto Rican manufacturing employment and service sector industries from the Quarterly Census of Employment and Wages. From 1990 to 1994 employment in manufacturing had a small decline. However, starting in 1995 and coinciding with the phase-out of IRS Section 936, employment in manufacturing declined continuously and at a very rapid rate.[3] Between 1990 and 1995, employment

Table 1: Section 936 Corporations, 1993

	Number of 936 returns	Percent of 936 returns	Percent of 936 Tax Credits
Chemicals and allied products	88	23.91	49.85
Electrical and electronic equipment	46	12.5	22.48
Food and kindred products	27	7.34	12.58
Instruments and related products	41	11.14	9.5
Apparels and other textile products	49	13.32	1.73
Other Manufacturing Industries	117	31.81	3.85
Total	368	100	100

Source: US Possessions Corporations, Statistics of Income, US Internal Revenue Service, 2005.

Figure 1: Manufacturing Employment PR vs US



Source: US and Puerto Rico Quarterly Census of Employment and Wages.

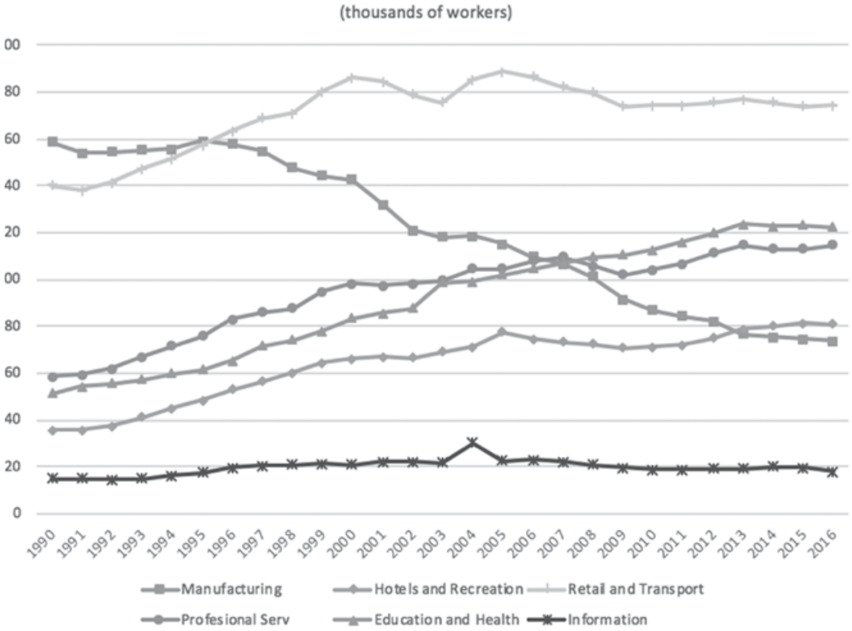
in service sector industries either stayed stable (information services) or increased (retail trade-transportation-utilities, professional services, education and health services, hotel and recreation services).

Figure 3 shows manufacturing exports for mainland U.S. and Puerto Rico between 1991 and 2016. Manufacturing goods accounted for approximately 75 percent of Puerto Rico's exports. This is higher than in the U.S. mainland, where goods accounted for 66 percent of exports (Amadeo 2018). Between 1991 and 2016, manufacturing exports grew at an annual rate of 6.8 percent in Puerto Rico and at 4.3 percent in the mainland U.S. The graph shows positive trends in manufacturing exports for Puerto Rico and the U.S. that are similar but do not exactly follow one another.

6. Estimation Results

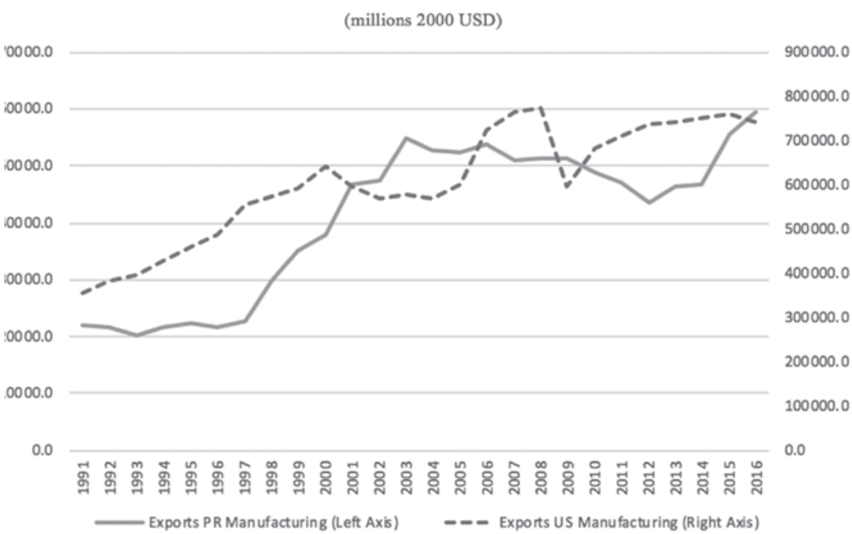
Tables 2 and 3 show estimates of the impact of the phase-out and elimination of IRS Section 936 on employment and exports. Table 2 shows estimates of the effect of Section 936 on Puerto Rico's manufacturing employment using employment in Puerto Rico's service sector industries as a control. Regression estimates in column 1 show a significant negative impact of the elimination of Section 936, seen in the

Figure 2: Puerto Rico Employment by Sector



Source: US and Puerto Rico Quarterly Census of Employment and Wages.

Figure 3: Manufacturing Exports PR vs US



Source: Puerto Rico Planning Board, Economic Report to the Governor and United Nations Comtrade Database.

Table 2: Manufacturing Employment in Puerto Rico before and after the elimination of IRS Section 936, Puerto Rico service sector is the control group.

Independent Variables	Log Employment (1)		Log Employment (2)	
End of Tax Credit (2005-2016)	.235 (.030)	**	.484 (.031)	**
Manufacturing	.923 (.056)	**	1.263 (.066)	**
Manufacturing x End of Tax Credit	-.747 (.073)	**	-1.087 (.075)	**
Tax Credit Phase out (1995-2005)			.362 (.031)	**
Manufacturing * Tax Credit Phase-out			-.495 (.076)	**
Industry Dummy Variables	Yes		Yes	
Observations	168		168	
R-Squared	.94		.97	

Clustered standard errors. * Signfiicant at the 10 percent level, ** Significant at the 5 percent level.

interaction term of the manufacturing and end of tax credit dummies (2006–2016). The coefficient is -.747 and it is significant at the 5 percent. level. This suggests employment in manufacturing declined by 75 percent after the elimination of section 936 relative to employment in service sector industries.

Column 2 shows an alternative estimation where the manufacturing dummy is interacted with a tax credit phase-out dummy (1995–2005) and the end of the tax-credit dummy. Coefficients on the interaction terms show a negative and significant impact of the phase-out and elimination of Section 936 at the 5 percent level. The coefficient on the interaction of the manufacturing and phase-out of Section 936 dummies is estimated to be -.495 and the coefficient on the interaction of manufacturing and end of tax-credit dummies is estimated to be -1.087. This suggests the phase-out and elimination of Section 936 may be responsible for a 50 percent to 100 percent decrease in manufacturing employment relative to service sector industries. The adjusted R-square in the regression shown in column 2 is .97, which suggests that almost all the variation is explained by the model. This casts some concern about this particular regression because it may reflect trends that are not causal. Regression results in column 1 are more reliable.

Table 3: Manufacturing Exports from Puerto Rico to the rest of the world before and after the elimination of IRS Section 936, US is the control group.

Independent Variables	Log Exports (1)		Log Exports (2)	
End of Tax Credit (2005-2016)	.431 (.098)	**	.666 (.111))	**
Puerto Rico	-3.370 (.536)	**	-3.274 (.537)	**
Puerto Rico x End of Tax Credit	-.405 (.321)	**	-.501 (.459)	**
Tax Credit Phase out (1995-2005)			.320 (.043)	**
Puerto Rico * Tax Credit Phaseout			-.131 (.194)	**
Industry Dummy Variables	Yes		Yes	
Observations	636		636	
R-Squared	.80		.80	

Clustered standard errors. * Signfiicant at the 10 percent level, ** Significant at the 5 percent level.

Table 3 shows estimates of the impact of the elimination of Section 936 on Puerto Rico's manufacturing exports using mainland U.S. manufacturing exports as a control. Column (1) shows the coefficient on the interaction term between the Puerto Rico, and the end of tax-credit dummies is not significant at the 5 percent or 10 percent level. This suggests there was no significant difference in exports trends for Puerto Rico and the United States after the elimination of Section 936. Estimates in column 2 show that when the phase-out and elimination of section 936 dummies are interacted with the Puerto Rico dummy, coefficients on these terms are not significant. Thus, there is no evidence the phase-out and elimination of Section 936 had a negative impact on Puerto Rico's exports.

Conclusion

In summary, my study indicates that the elimination of Section 936 had a significant impact on the Puerto Rican labor market, accounting for the loss of 75 percent of manufacturing jobs relative to service sector industries. While technological change could have been a contributing factor in the reduction of manufacturing employment relative to service sector industries, the large magnitude and timing of reductions in manufacturing employment cannot be explained away by technological change. Many of the lost manufacturing jobs were in higher paying industries such as pharmaceuticals and electrical and electronic equipment. Thus, the elimination of Section 936 was a contributing factor to the economic crisis in Puerto Rico.

My research finds no impact of the elimination of Section 936 on manufacturing exports from Puerto Rico to the rest of the world when using United States exports as the control group. One possible explanation for this result may be that technological change in manufacturing may have increased labor productivity causing output to remain at higher levels in Puerto Rico despite the large decline in employment. The counterfactual exports from Puerto Rico without technological change are not shown here. According to the *U.S. Monthly Labor Review* (Brill, Chansky and Kim 2018), U.S. multifactor productivity in the manufacturing sector grew by an average of 2.0 percent per year from 1992 to 2004. During this period, manufacturers increased their production of goods with relatively fewer inputs. From 2004 through 2016, however, manufacturing multifactor productivity declined by an average of 0.3 percent per year. An alternative interpretation of the results is that these estimates do not capture the impact of IRS Section 936 on exports because the U.S. is not a good control for Puerto Rico's manufacturing exports due to large differences in the cost of factors of production such as labor and capital between Puerto Rico and the U.S. mainland. Thus, further evidence is needed to determine the impact of Section 936 on Puerto Rico's manufacturing exports.

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NOTES

[1] The Title III process, Puerto Rico Oversight, Management and Economic Stability Act (PROMESA), established a seven-person Oversight Board, appointed by the U.S. Congress to work with Puerto Rico's creditors to renegotiate the island's debts.

[2] The concordance is available in Appendix A.

[3] The ten-year phase-out period of IRS Section 936 began in 1995 and ended in 2005. The program was eliminated in 2006.

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Appendix A: SIC to NAICS concordance

Industrial Groups	Description	SIC	NAICS
1	Food, beverage and tobacco	20, 21	311, 312
2	Textiles	22, 23	313, 314, 315
3	Leather and leather products	31	316
4	Lumber, wood, fabricated metal products	24, 25	321, 337
5	Paper and products, Printing and publishing	26, 27	322, 323
6	Petroleum and coal products	29	324
7	Chemicals and allied products	28	325
8	Rubber and misc. plastics products	30	326
9	Stone, clay and glass products	32	327
10	Primary metal industries	33	331
11	Fabricated metal products	34, 35, 36, 37, 38	332, 333, 334, 335, 336
12	Misc. manufacturing	39	339