

POLITICAL STATUS, INDUSTRIAL STRUCTURE, AND MIGRATION

Assessing the Prospects of Changes in the Puerto Rican Economy (1982 - 2000)

by

Irma L. Pérez-Johnson

Submitted to the Department of Urban Studies and Planning
in Partial Fulfillment of the Requirements for the Degree of

MASTER IN CITY PLANNING

at the

Massachusetts Institute of Technology

May 1992

© 1992 Massachusetts Institute of Technology
All rights reserved

Signature of Author _____

Department of Urban Studies and Planning
May 18, 1992

Certified by _____

Edwin Meléndez, DUSP Assistant Professor
Thesis Supervisor

Accepted by _____

Ralph Gakenheimer, Chair
MCP Committee

Rotch

MASSACHUSETTS INSTITUTE
OF TECHNOLOGY

MAY 27 1992

LIBRARIES

POLITICAL STATUS, INDUSTRIAL STRUCTURE, AND MIGRATION

Assessing the Prospects of Changes in the Puerto Rican Economy (1982 - 2000)

by

Irma L. Pérez-Johnson

ABSTRACT

The issues of self-determination for Puerto Rico and political status have recently reemerged as urgent policy issues and topics of debate in social, academic, and governmental circles. The discussion has so far centered on political and fiscal aspects of the three alternatives -- independence, statehood, or enhanced-autonomy -- without fully accounting for the impact a change in political status could have, as a consequence of changes in the industrial structure of the Island's economy, on migration.

Industrial incentives offered under Section 936 of the Internal Revenue Code of 1977 (and made possible by the political relation between Puerto Rico and the U.S.) have, in great part, been responsible for the transformation of the structure of production and labor markets in the Island. To date, 936 works as *de facto* industrial policy. However, a change in political status calls into question the insular government's ability to continue providing many of these incentives. As incentives are phased out, final demand, output and employment in subsidized industries and related branches of economic activity are likely to decline. This decline would, in turn, translate into changes in the levels and occupational structure of employment in the Island. As the economy moves towards a new balance, higher unemployment across different occupations can be expected.

Historically, migration has acted as an "escape valve" to relieve unemployment pressures resulting from rapid changes in the structure of the Puerto Rican economy. Further, the level and composition of migratory flows responds to changes in the relative employment opportunities of those in the Island. Changes in these flows could affect the skills composition of the Puerto Rican labor force which, in turn, could limit the insular prospects for future development. Effective government action would thus be necessitated to minimize the negative impacts industrial changes could have on the employment prospects of those in the Island and, consequently, on migration. The type of policy interventions available to Puerto Rico would differ under each political status option, but to

determine the appropriateness and effectiveness of particular policy interventions, the magnitude and extent of these impacts must first be determined.

I use data from a Puerto Rico Planning Board migration survey for the period of 1982 to 1988, combined with a 1982-88 Input-Output model -- developed by Prof. Angel Ruiz of the University of Puerto Rico -- to create a two-part economic model of the Puerto Rican economy. In this model I simulate the link between the industrial structure of the economy (and the resulting levels and occupational structure of employment) to the levels and composition of migratory flows from Puerto Rico to the U.S. Based on alternative scenarios for the insular economy for the year 2000 -- also developed by Prof. Angel Ruiz -- I then use the model created to estimate the potential changes on out-migratory flows resulting from changes in 936 activity.

The main finding from the research was that, from 1982 to 1988, Puerto Rican migration was driven primarily by employment opportunities -- that is, job growth and unemployment in Puerto Rico and employment opportunities in the United States -- rather than by income-earning differentials between island and mainland. In this context, the difficult challenge facing Puerto Rican policy makers by the year 2000 due to the impacts the limited growth prospects for the Puerto Rican economy could have on their own for migration is compounded by the possible impacts from a change in 936 industrial legislation.

Thesis Supervisor: Edwin Meléndez
Title: Assistant Professor, Department of Urban Studies and Planning

INTRODUCTION

With President Bush's announcement (during his 1988 presidential campaign) that he favored Statehood for Puerto Rico, the issues of self-determination and political status reemerged as topics of debate in social, academic, and governmental circles. The discussion has to a great extent centered on political and fiscal aspects of the three alternatives -- independence, statehood, or enhanced-autonomy -- with much speculation regarding the impact a change in political status could have, as a consequence of resulting changes in the industrial structure of the insular economy, on migration.

Now offered under Section 936 of the Internal Revenue Code of 1977, industrial incentives have historically included exemptions from local and federal taxes, a skilled labor force available at wages lower than in the U.S., and the absence of trade restrictions with the mainland. Acting as *de facto* industrial policy for Puerto Rico, these have played a critical role in the industrialization and development of the Island. Further, firms operating under these terms are also responsible for a non-trivial portion of total employment and income in Puerto Rico nowadays.

However, a change in political status calls into question the insular government's ability to continue providing many of these incentives.¹ As industrial incentives are phased out, final demand, output, and employment in subsidized industries (and related branches of economic activity) are likely to decline. This decline would, in turn, translate into

¹ Were the Island to become independent, trade restrictions with the U.S., for example, would most likely be imposed. Were the Island to become a State, industries in the Island would have to meet all federal regulations. Incentives not possible in any other State would have to be phased out. In the case of "enhanced-autonomy", many of the "problematic" elements of the 936-incentives as they exist today should be addressed. Changes in the nature of industrial incentives as offered today could, of course, also result from changes in the Puerto Rico's industrial policy without bearing on the political status question. For the purposes of this research changes in political status are treated as "equivalent" to changes in industrial policy. Partly, this may be the result of how the research question was originated, i.e. the possibility of a change in political status for Puerto Rico triggered my interest in potential changes in industrial policy and their impacts on migration.

changes in the levels and occupational structure of employment in the Island. As the economy moves towards a new balance, higher unemployment across different occupations can be expected. Perhaps more important, occupations previously facing a stable and large demand from 936 manufacture and related industries may experience unprecedented high rates of unemployment as a result of the "industrial restructuring" of the insular economy.

Historically, migration has been one of the ways in which transitions in the economic structure of Puerto Rico have been facilitated. The transformation of economic and social institutions in the Island -- and the imbalances caused by fast-paced development -- have thus played a crucial role in the migration decisions of hundreds of thousands of Puerto Ricans. As the economy shifted from subsistence agriculture to agrarian capitalism, to labor-intensive manufacturing and, finally, to capital-intensive manufacturing and services, migration has acted as an "escape valve" to relieve unemployment pressures in the Island. (Falcón, 1990; History Task Force, 1979) A sizeable proportion of those displaced from declining industries have chosen to migrate to the U.S. mainland. As the Puerto Rican economy has become increasingly similar to that of the U.S., others have chosen to venture out to the "land of opportunity" in hope of greater returns on their "human capital investments." Over the years, these movements has been facilitated by U.S. citizenship, the emergence of large Puerto Rican communities in the mainland, and relatively cheap means of transportation.

Given the prevailing distribution of both the labor force and employment across occupations in Puerto Rico, changes in the levels of activity in subsidized sectors of the economy could have serious implications in terms of migratory flows from Puerto Rico to the mainland. For those dislocated in greater numbers and for those facing the greatest

change in employment opportunities in the Island relative to the U.S., migration to the mainland may become a more attractive opportunity than ever before.²

Changes in the level of migratory flows and characteristics of migrants could, in turn, affect the skills composition of the Puerto Rican labor force. Often used as a proxy for labor force "quality" and "productivity", a deterioration in the skills' mix of the Puerto Rican labor force could result in a deterioration of the insular prospects for income and productivity growth. Further, it could result in a deterioration of the prospects for further development and, consequently, for improvements in the overall standard of living. Effective government action would be required to minimize the negative impacts industrial changes could have on the employment prospects of those in the Island and, consequently, on migration. The type of policy interventions available to Puerto Rico would, of course, differ under each political status option. Nonetheless, to determine the appropriateness and effectiveness of particular policy interventions, the magnitude and extent of these impacts must first be determined.

Previous studies of Puerto Rican migration (Meléndez, 1991; Falcón, 1990; History Task Force, 1979) have looked at the relationship between industrial development and migration for different stages in the history of the Island. Unfortunately, the work done in these studies stops short of establishing the relationship between the industrial structure of the Puerto Rican economy and the level and composition of migratory flows as these prevail today.

² By focussing on changes in the economic migration-motivating factors induced by changes in industrial structure and levels of 936 employment I consciously move away from examining the impact a change in political status, by itself, could have on the motivation to migrate of specific individuals. A change towards independence might, conceivably, induce those Puerto Ricans opposed to independence and/or wanting to retain their US citizenship to migrate to the US. The same scenario might hold for pro-independence islanders in the case of a change toward statehood. This type of non-economic migration would, nonetheless, be very difficult to model and, as such, is beyond the scope of this study. Also, historically, "economic" migration has been the predominant type of Puerto Rican migration. It could then be said that one of my assumptions is that "economic" rather than "political" motives will continue to dominate Puerto Rican migratory flows through the end of the century.

The goal of my research was then to simulate the link between the industrial structure of the economy, and the resulting levels and occupational structure of employment, to the levels and composition of migratory flows from Puerto Rico to the United States:

Δ industrial structure \rightarrow Δ occupational structure of employment \rightarrow Δ migratory flows

To this end, I use 1982-88 data from the Puerto Rico Planning Board (PRPB) migration survey combined with a 1982 Input-Output (I-O) model -- developed by Prof. Angel Ruiz of the University of Puerto Rico -- to create a two-part model of the Puerto Rican economy. In the first part, I use the I-O methodology to discuss how industrial changes in Puerto Rico between 1982 and 1988 were reflected in changes in the insular labor markets. In the second part, I use the PRPB survey data to create a regression model of out-migration tendencies, by occupation, given pertinent labor market conditions in Puerto Rico and the United States. Finally, I combine projections of Puerto Rican employment for the year 2000 with projections of the labor force (as well as its occupational distribution) to create potential scenarios of labor market conditions in Puerto Rico for that year. Based on the economic model developed, I then use these scenarios to discuss the potential migration implications of a reduction in subsidized industrial employment in Puerto Rico.

Parting from the assumption that economic activity in the subsidized industrial sector (or induced by it) is, and will continue to be, responsible for a significant portion of "skilled" employment in Puerto Rico, my hypothesis was that a reduction of 936 output -- without the enactment of compensatory policies on the part of the Puerto Rican government -- would lower rates of employment growth in a non-trivial fashion. I expected these employment changes to induce: (1) little or no changes among migration flows of individuals in "low-skill" occupations and (2) increased flows of those in more "skilled" occupations.

Instead, the research shows that even without a change in the 936 industrial sector, migratory outflows by the year 2000 could be of equal or greater volume than those observed for the period between 1982 and 1988, but noticeably more "skilled-occupations" biased. In the event of a reduction in 936 final demand -- as a result of the changes in employment levels and, consequently, the unemployment expected for different occupations -- migratory tendencies increase across most groups, but only slightly. Considerably higher outflows are nonetheless projected. The changes in employment and unemployment to result from a change in 936 industrial policies are also expected to have a limited impact on the overall composition of migratory flows and the relative over- or under-representation of specific occupational groups within them. It appears that, by the year 2000, these will be more reflective of the overall trends in the economy.

I have organized the research into five chapters. The first presents the theoretical background on the linkage between migration and industrial development. A brief summary, and relevant details, of the history of economic development in Puerto Rico and the role migration has played in it is offered in Chapter Two. The third chapter describes the data and methodology used to model the relation between industrial structure, occupational change, and changes in migratory flows in Puerto Rico throughout the 1980s as well as the findings from this model. In Chapter Four, I examine potential scenarios for the Puerto Rican economy for the year 2000, as developed by Prof. Angel Ruiz, and discuss the implications each could have for migration. Chapter Five summarizes the main findings of the research and examines some of their policy implications.

I. Economic Theories of Migration

I. Economic Theories of Migration

Simply defined, migration is the movement of human population across space. Historically, the causes for such movements have been diverse: from escape from hunger and political oppression, to the search for economic opportunity or adventure. As defined, the process can be voluntary or the result of coercion. Migration occurs both within boundaries of states and across international borders.

The process of migration is a complex one. For this reason, existing theories of migration do not generally attempt to encompass the process in its totality but rather concentrate on one of its aspects. Portes and Bach (1985) identify four aspects of theoretical interest. These are: (1) the origins of migrant flows; (2) the determinants of their stability over time; (3) the uses of immigrant labor; and, (4) the adaptation of immigrants to the host society. This study focuses on the first and second aspects of migration flows.

Two types of theories attempt to explain the origin and stability of migration flows: orthodox and structural. Among the orthodox, the most widely held approach is that of "push-pull" theories. Generally these consist of "a compilation of economic, social, and political factors deemed to force individuals to leave their native region (or country) and a similar list impelling them toward another." (Portes and Bach, 1985: 3) Orthodox economic theories emphasize the gap in wage incentives and employment opportunities resulting in "differentials of advantage" between sending and receiving countries. Once initiated, migration movements can then be expected to continue as long as these factors remain in place.

The underlying assumption of traditional or orthodox push-pull and economic interpretations of migration is unquestionably that there is a tendency toward equilibrium among areas that are unequal in terms of factors such as labor supply, skills, and level of

development. Migration is thus seen as an "equalizing process" which redistributes labor from areas of large supply to areas of large demand, to the benefit of all parties involved. Massive returns of migrants to their home country are expected to occur only under conditions of deliberate repatriation or severe economic depression.

Formulated primarily as a critique of orthodox theories, alternative conceptualizations of the process of migration are offered in structural arguments. For the proponents of a structural view of migration, the central difficulty with orthodox theories is not that they fail to identify important forces, but rather that they do not take into account the historical context of migration:

"For each of these theories, migration occurs between two distinct, autonomous social units: that which expels labor and that which receives it. The possibility that such flows may actually be internal to a broader system to which both units belong is not usually contemplated...

(Yet) networks of trade and information across the world, the homogenization of culture, and the extension of consumption expectations -- even to remote areas--have resulted in... inexhaustible supplies of labor... (Today) countries at the center of the system require neither force nor recruitment to meet their labor demands, but rather simply regulating a permanently available supply at their borders...

Hence, the pull from advanced economies is based not primarily on invidious comparisons of advantage with the outside world, but on the solution that migration represents to otherwise insoluble problems internal to the sending countries. ...(Migrants) leave their countries not merely to increase their earnings by X amount, but to solve problems rooted in their own national situations. For migrants, these problems seem internal ones, but in reality they have been induced by the expansion of a global economic system... The shifting character of push and pull, the obsolescence of labor recruitment, and the 'spontaneous' origins of recent migrant flows are all consequences of the development of an international economy and of the shifting modes of incorporation of countries to it." (Portes and Bach, 1985: 6 - 7).

In structural theories, migration is then conceived as a short- or intermediate-term labor market mechanism to adjust to changes in the structure of labor markets. According to this conceptualization of migration, to the extent that capital flows "freely" between two regions, like Puerto Rico and the U.S., there will prevail a tendency towards convergence

in the industrial mix and, consequently, convergence in the occupational composition of employment in both economies.¹

According to structural theorists, a dominant and subordinate economy can usually be identified in this process. The outlying "region" becomes integrated to the economic system of the dominant one and, as such, increasingly dependent and vulnerable to fluctuations in the dominant economy. Migration then tends to respond less to wage differentials and more to structural changes in the composition of industries and the resulting demand for labor.

In conclusion, structural theories propose that development generates forces that undermine the connections of sectors of the labor force to the production process. Instead of resulting from wage differentials, massive labor migration is the result of the imbalances created by the transformation of economic and social institutions that accompany fast-paced development.

In the case of Puerto Rico, migration can only be seen as an integral part of the development process of the Island. Large increases in the magnitude of flows coincided with periods of rapid industrialization and expansion of employment. As Falcón (1990: 4) points out, the "flows of Puerto Rican labor have run parallel to the realignment of economic forces through time as the Island's economy has progressively been integrated into (the United States' and) the global economy."

The process of migration has to be understood as a complex one and within its historical context. Because of its complexity, it is also possible for more than one of the

¹ In contrast, the alternative view offered by orthodox theories on what determines the industrial and occupational mix is that of specialization due to trade. That is, countries specialize in those goods for which they have a "comparative advantage".

In the case of Puerto Rico, "936" investment could be said to act as a distortion in this process. That is, "936" incentives and the resulting industrial investment may act as a "regional counter-tendency" to this convergence in industrial mix, production, and occupational structure -- in a structural conceptualization -- or to specialization according to comparative advantages -- in an orthodox conceptualization.

dynamics described above to be working at the same time. For these reasons, it is necessary to analyze not only the micro-economic, social, and political determinants of the migration decisions of individuals, but also the social, political and economic context in which these decisions occur. Further, the flows must be expected to change over time (both in their intensity and composition) in response to changes in the nature of the forces motivating them.

Keeping this in mind, in my analysis, I attempt to include -- to the extent possible -- each of these elements. I also try to use tools from both schools of migration thought. In a belief that economic factors play an important role in determining which Puerto Ricans choose to migrate to the United States, by developing an econometric migration model, my goal is to quantify the influence these factors have on the tendencies of individuals in specific occupational groups to migrate. At the same time, using the Input-Output tables for the Puerto Rican economy for 1982-88, I seek to assess the magnitude and extent of the impacts changes in the subsidized industrial sector could have for Puerto Rico. This tool is then useful in assessing how much of a "disturbance" or "imbalance" a change in the subsidized industrial sector could bring about for different sectors of the Puerto Rican economy.

**II. Migration and the Development of the Puerto Rican Economy
(1870 - 1980)**

II. Migration and the Development of the Puerto Rican Economy (1870 - 1980)

Historically, migration has been one of the ways in which transitions in the economic structure of Puerto Rico have been facilitated. As the economy shifted from subsistence agriculture to agrarian capitalism, to labor-intensive manufacturing and, finally, to capital-intensive manufacturing and services, migration has acted as an "escape valve" to relieve unemployment pressures in the Island. (Falcón, 1990; History Task Force, 1979). A non-trivial proportion of those displaced from declining industries have chosen to migrate to the U.S. mainland. As the Puerto Rican economy has become increasingly similar to that of the U.S., others have chosen to venture out to the "land of opportunity" in hope of greater returns on their human capital investments.

Over the years, these movements has been facilitated by U.S. citizenship, the emergence of large Puerto Rican communities in the mainland, and relatively cheap means of transportation. It is now also clear that Puerto Ricans who are not economically active *can* and *do* migrate, not solely in response to economic conditions (at least not directly), but also because of individual ones. "The presence of large communities -- and very likely, relatives -- in the United States makes migration a viable alternative to deal with individual and personal situations." (Falcón, 1990: 33) Thus, the dynamics underlying the migration of Puerto Ricans are no longer restricted to the economic development of Puerto Rico and the resulting pressures to migrate.

Economic factors, however, are still the main motivating factors and, as such, of great importance when trying to understand Puerto Rican migration. In the early 1980s, Puerto Rico witnessed a revival of the massive net migratory outflows of the 1940s and 1950s. "Between 1980 and 1986 a total of 218 thousand persons left the Island (and), generally, over 95 percent of the flow had the United States as a destination." (Rivera-

Batiz, 1987: 2) The deterioration of economic conditions in the Island relative to the U.S. mainland during this period must, at least partially, account for this shift.

To fully understand the connection between economic development and migration in the case of Puerto Rico one must also look at history. According to Falcón (1990), the development of the Puerto Rican economy and the role migration has played in it can be best characterized in three periods. First, the 1870-1940 period was one of transition from a primarily subsistence economy to agrarian capitalism. Second, the 1940 to mid-1960s period was one of rapid transition from agrarian capitalism to labor-intensive industrialization. Finally, in the period from the latter half of the 1960s to the 1980s, there was a shift to capital-intensive industrialization. During each of these stages, the transformation of economic and social institutions in the Island played a crucial role in the migration decision of hundreds of thousands of Puerto Ricans.

A. The First Period (1870-1940)

It was not until the early 1800s, under Spanish colonial rule, that emphasis was placed on unfolding a national economy in Puerto Rico. Prior to this, the Island served, first, "as a source of extractive minerals" and, then, "as a military outpost to protect commercial traffic between the Americas and Spain." (Falcón, 1990: 10) Up to that point, the Puerto Rican economy was primarily a subsistence one. The majority of the population lived as peasants: under conditions of impoverishment and cultivating for their own consumption.

The rise of sugar and coffee as the mainstays of the insular economy increased the need for capital and labor in the Puerto Rico of the late nineteenth century. "An increase in the number of markets for coffee stimulated the growth of this sector and generated the movement of workers toward the central and western areas where coffee was being produced." (Falcón, 1990: 5) By the close of the nineteenth century, coffee had become

the chief source of revenue to the Island's economy. Yet, "increased taxation of exports to other countries (by Spain), protectionism of Spanish producers, the imposition of tariffs, and the high cost of capital all contributed to restraining the economic expansion of the agricultural sector." (Falcón, 1990: 5) These factors set the stage for the displacement of labor as the economy moved from subsistence to agrarian capitalism.¹

According to Falcón, the U.S. invasion of the Island in 1898 "shattered the relatively advantageous position of coffee and sugar plantation owners":

Trade with nations other than the U.S. declined sharply within the first two years of U.S. rule in the Island. Coffee production, the island's leading source of revenue at that time, deteriorated due to the imposition of tariffs by the European and Cuban markets, lack of access to U.S. market, and increased competition for resources by the sugar sector. (Falcón, 1990: 6-7).

To add to the problem, hurricanes in 1899 and 1926 devastated a substantial number of the crops, making it even harder for small landowners to survive. As he points out, credit policies of the new government such as "freezing of short-term and long-term credit, devaluation of the Puerto Rican peso, and land price-fixing" all had serious consequences. (Falcón, 1990: 7) A substantial number of farmers were forced to become greatly indebted or sell their property. The main (and perhaps only) beneficiaries of this process were large sugar corporations present in the Island who were able to obtain large quantities of the best agricultural land at very low prices.

The joint displacement of small farm owners and of agricultural workers by large American sugar corporations during this period led to the creation of a mass of unemployed and underemployed laborers in the Island. While employment in the sugar economy was substantial, it never reached a level high enough to incorporate many of these displaced

¹ Quoted in Falcón (1990: 4), D.S. Massey ("Economic Development and International Migration in Comparative Perspective," in *Population and Development Review* 14, 3, 1988: pp. 383-413) highlights three mutually reinforcing processes which operate "to create a pool of displaced workers in agrarian societies: the substitution of capital for labor, the privatization and consolidation of landholding, and the creation of markets" -- all evident in the period prior to 1930 in Puerto Rico.

workers. In addition, the seasonal character of sugar production meant periods of prolonged unemployment during the non-harvesting season.

Population growth in this period also contributed to increase the pressure on the economy. "On the average, the population of Puerto Rico increased by about 18 percent during every decade between 1900 and 1930." (Falcón, 1990: 8) The labor force was growing at a much faster rate than that at which jobs were being created. During the 1930s, "an average of 8,409 new jobs were created per year while the growth of the labor force averaged 10,485 per year." Poverty, which had always been high, was now widespread "as workers were increasingly separated from the subsistence economy." (ibid.) Hunger and disease became rampant among the Puerto Rican population.

The first large-scale emigration from Puerto Rico coincides with this "realignment of the agrarian economy." According to Falcón, historical evidence shows that Hawaii, Cuba, and Mexico were the primary destinations and that labor recruitment was instrumental in channeling workers to these particular areas during this period. Further, the colonial administration sanctioned emigration as a means of alleviating "the problem of unemployment." ²

As Falcón points out, two other developments during this period were instrumental in encouraging migration to the United States. First, in the legal domain, there was a favorable decision by the US Supreme Court the 1904 case of a Puerto Rican woman detained in Ellis Island as an alien. The decision stated that "citizens of Puerto Rico are not aliens to the United States and they are entitled to enter the country without any obstruction."³ Also, the Jones Act of 1917 granted U.S. citizenship to all Puerto Ricans,

² This problem, however, was attributed primarily to "overpopulation" and not to the limited number of employment opportunities created within the emerging Puerto Rican economy of the first quarter of this century.

³ History Task Force, *Sources for the Study of Puerto Rican Migration -- 1879-1930* (New York: Centro de Estudios Puertorriqueños, 1982), cited in Falcón (1990: 10).

allowing for the relatively unobstructed passage between Puerto Rico and the mainland. Second, U.S. armed forces made extensive use of Puerto Rican draftees during the First World War.⁴ As a result of these developments, relatively large Puerto Rican communities were already in existence in New York City by 1930.⁵

B. The Second Period (1940 - mid 1960s)

With a growing labor force and high unemployment rates throughout the 1940s and 1950s, Puerto Rico's industrial development strategy emerged largely from the realization that agriculture alone could not provide the base for long-term economic growth:

"By the mid 1930s, it was clear that the sugar-based agrarian economy would not generate the needed economic conditions to sustain the Puerto Rican population. ...The first serious attempt at reorienting the Puerto Rican economy was outlined under the Chardón Plan in 1934. The result of a commission authorized by President Roosevelt, the recommendations in the report emphasized two areas. The first, *labor-intensive industrialization*, placed its emphasis on industries that could use raw materials already produced in the Island and whose output could be used by local industries. The goal was to generate the needed linkages between industries that would allow for diversified development. Second, *agrarian reform* was to be carried out by curtailing the ability of large corporations to control vast amounts of the best land and by diversifying agricultural production.

...The authors of the Chardón Plan were aware of the magnitude of the unemployment problem in the Island. Thus, the type of development envisioned in the plan required the mass migration of thousands of Puerto Ricans. Mass colonization projects to other regions were to be encouraged by the government." (Falcón, 1990: 11-12).

The Chardón Plan was never enacted as originally conceived. However, developments during the early 1940s in Puerto Rico set the stage for a rapid change in the pace of development. As Falcón points out, first, a populist party -- the Partido Popular Democrático (PPD) led by Luis Muñoz Marín -- gained control of the legislative branch of government. Second, Rexford Tugwell -- a member of Roosevelt's New Deal team -- was

⁴ Between 13 and 14 thousand Puerto Ricans were recruited by the US army to perform work at military bases and industries related to the war. (Falcón, 1990: 11).

⁵ The existence of these communities was documented by Virginia Sanchez-Korrol (*From Colonia to Community: The History of Puerto Ricans in New York City, 1917 - 1948*; 1983) -- quoted in Falcón (1990: 10).

appointed governor of Puerto Rico, placing "a supporter of social justice legislation in a top political position." (Falcón, 1990: 14)

After World War II, governmental leadership tried to take advantage of the lack of trade restrictions between the U.S. and Puerto Rico as well as of the exemption of income and profits earned in the Island from federal income taxes under the then-prevailing Jones Act. The Puerto Rico Industrial Development Corporation (PRIDCO) -- established in 1942 to foster the industrialization of the Island -- engaged in an advertisement campaign "hailing the advantages of investing in Puerto Rico." (ibid.) The campaign, however, had limited results and "made government planners aware of the need for additional incentives in order to attract investors:"

"At this point, the model of economic development became one of securing capital investment by providing a series of incentives that would make production in Puerto Rico more profitable than production on the mainland. The 1947 Industrial Incentives Act included the provisions necessary for this new orientation of the economy. The government of Puerto Rico was to assume the position of mediator in the management of the local economy. Inexpensive labor and tax inducements were to create a climate for economic growth resulting in increased employment and income. *Foreign capital was to be the key component of the prescription for Puerto Rico's economic development.*

New and continuing industries were to be provided benefits in the form of exemptions from Puerto Rican income tax law, property taxes and municipal license taxes; these benefits were to be phased out after a period of ten years. In addition, the provision of loans under favorable conditions (i.e. low interest rates), adequate physical facilities rented at below market rates, and government trained workers became part of the package to attract foreign investment. The program would exploit the tax-free access to markets in the United States and the existence of federal aid to assist the Island in its development. This development effort was to be known as 'Operación Manos a la Obra' or 'Operation Bootstrap. (Falcón, 1990: 15-16, emphasis added).

Post-war economic conditions were favorable to the establishment of new industries and, by 1952, close to 200 new firms had been established in the Island.

Increased economic activity and tangible improvement of living conditions further contributed to the popular support of the PPD. In 1947, the U.S. Congress passed legislation allowing Puerto Rico to have an elected governor. The first gubernatorial

elections were held in 1948 resulting in a clear victory for the PPD and its candidate, Luis Muñoz Marín.

According to Falcón, the PPD's consolidation of power "cemented the strategy of development based on foreign capital investment." During the next ten to 15 years there was a steady increase in the number of U.S.-owned industrial firms established on the Island: almost reaching one thousand by 1965.⁶ As a result of foreign investment, the Puerto Rican economy grew tremendously during the 1950s and 1960s. Gross national product (GNP) increased by 68 percent between 1950 and 1960, and by 97 percent between 1960 and 1970; *per capita* GNP increased by 58 percent between 1950 and 1960, and by 70 percent between 1960 and 1970.⁷ The increases in disposable personal income and personal consumption expenditures were just as dramatic.

The industrialization of the Puerto Rican economy also resulted in fast paced changes for Puerto Rican society in general. Industrialization accelerated the pace of urban growth. At the same time infant mortality rates declined, life expectancy increased. Mortality rates for the population at large also declined substantially. As a result, between 1933 and 1968, the population of Puerto Rico grew from 1.6 million to 2.6 million (i.e., 62 percent). (Falcón, 1990: 19)

While Operation Bootstrap did generate new employment, its economic development strategy had serious limitations. As Falcón points out, on the average, new industries tended to employ a limited number of workers and to require low-skill labor. In

⁶ From Manuel Pérez de Jesus (*Economía y Desigualdad en la Sociedad Puertorriqueña*, 1983), cited in Falcón (1990: 16).

⁷ Figures cited from Junta de Planificación, *Informe Económico, 1980*, -- quoted in Dietz (1986: 278) and Falcón (1990: 17, Table 5.1).

addition, these labor-intensive enterprises eventually became very sensitive to international competition.⁸

Despite the outstanding economic growth observed during the period, after 1950, the number of participants in the labor force declined and did not reach its 1950 level again until about 1965. Labor force participation rates reached their postwar maximum in 1951 at 55.5 percent; their minimum of 41 percent in 1983.⁹ Thus, "the willingness of workers to enter the labor market began to decline precisely at the time that industrialization program, implemented to provide jobs and reduce unemployment, began to take off and as industrial promotions by Fomento speeded up." (Dietz, 1986: 274)

The "vast improvements" experienced by Puerto Rican society during this period, nonetheless, were to a large extent made possible by the migration of hundreds of thousands of workers. Throughout the period of most notable economic growth (1947-1965), Puerto Rico lost close to one million inhabitants to emigration. (op.cit.) As noted by the History Task Force, the economy of Puerto Rico during this period was rather peculiar due to "the unusual spectacle of a booming economy with a shrinking labor force and... shrinking employment." During this second phase of development, the government of Puerto Rico continued the active role it had assumed in the previous period: that of making migration a viable option. Migration, i.e. releasing hundreds of thousands of idle workers, became another aspect of the development process.¹⁰

⁸ "By the 1950s, as new sources of cheap labor became available in other regions -- particularly the Asian triangle -- industries began to depart as soon as their tax exemption was about to expire. The rise in average wages that accompanied the increased standard of living of the Puerto Rican population was largely responsible for the swift departure of many labor-intensive industries. (Due to gains in productivity), the competitive edge -- cheap labor -- that the Island's economy had used to attract capital investment was slowly disappearing." (Falcón, 1990: 18).

⁹ Dietz (1986: 275, Table 5.13)

¹⁰ Falcón (1990: 22) points out that, as early as 1948, the Puerto Rican government had established a migration office in the city of New York as part of the Island's department of labor.

Agriculture was rapidly being displaced by manufacture as the main source of income in the Island. By the 1960s, agricultural production had become a secondary sector of the economy. "After 1950, Puerto Rico's development strategy was to promote only industrialization (and, later, tourism) to the exclusion of agricultural development." (Falcón, 1990: 16) The result was high unemployment and grim prospects of future employment among those previously employed in this sector.

A significant segment of the migratory flows during the 1950s and 1960s was composed of agricultural workers recruited to work in farms throughout the Northeast. According to Falcón, scattered evidence tends to support the argument that the flow of emigration during the 1950s was composed primarily of individuals of non-skilled, working class background. Thus, the outflow of laborers served as a tremendous "escape valve" to the pressing situation between jobs and labor. Factors that facilitated the movement to the mainland included the establishment of direct flights from San Juan to New York City after the end of World War II and the existence of Puerto Rican communities in this and other major destinations.

A new phenomenon during the 1960s was a notable increase in the return component of the migration. Vázquez-Calzada estimates that about 134 thousand Puerto Ricans returned to the Island during the 1960s.¹¹ The increase in return migration during the 1960s was evidence that, for Puerto Rico's economy, the migration "escape valve" was nothing more than a short- term solution to the long-term "problem" of excess-labor -- a problem created by an inadequate economic development strategy.

¹¹ Vázquez-Calzada ("Demographic Aspects of Migration" in *Labor Migration Under Capitalism*, 1979, pp. 223-237), quoted in Falcón (1990: 22).

C. The Third Period (mid 1960s - 1980)

The basis of Puerto Rico's development strategy during the 1970s and 1980s did not vary from that of the 1950s and 1960s. The role of government continued to be that of "promoter of investment based on external capital." Economic planning centered on assuring the necessary conditions for the continuous influx of capital as a way of maintaining a viable economy. For example, the 1947 Industrial Incentives Act -- intended to be a temporary measure needed for attracting the capital essential for development -- had, by 1963, been revised and given a permanent position within the development strategy. (Falcón, 1990: 22)

By the 1960s, the Puerto Rican government began to promote the establishment of industries with a high volume of capital investment. The shift was partly a response to a steady decline in the number of labor-intensive industries being attracted to Puerto Rico and of increased attrition among those already in the Island. "Since capital-intensive industries typically required a skilled labor force and, accordingly, pay higher wages, it was reasoned, these industries could contribute to a rising standard of living. It was also hoped that these industries, by providing inputs for other types of production, could further promote the location or development of other industries in the Island." (ibid.)

The government was successful in attracting many chemical, machinery, petrochemical, and pharmaceutical companies to establish on the Island. Nonetheless, the "new" type of industries attracted by industrial incentives had many of the shortcomings typical of early industries. Geared towards exports, these industries tended to have very few inputs to the local economy. Often, the wages earned by workers were the only benefits derived. Capital-intensive industries have also benefitted (and continue to benefit)

disproportionately from tax credits relative to their contribution in terms of employment.¹² While these industries did pay higher wages than other sectors of the economy, their contribution to total employment was not as significant as had been expected. Industrial employment increased by 80 thousand jobs between 1960 and 1970; during the same period, the civilian population age 14 and above grew by 227 thousand persons and the number of agricultural jobs declined by almost 70 thousand. (Falcón, 1990: 23) Most important, despite the manufacturing-oriented focus of economic development strategies by the local government, manufacturing has never approximated the level of employment once provided by the agricultural sector.

Over the 1970s, the contribution of manufacturing to Gross Domestic Product increased substantially, underscoring the capital-intensive character of the new industrialization. At the same time, however, the sector's contribution in terms of employment remained stable at around 19 percent of total employment. (ibid.) Two other sectors -- Services and Government -- experienced steady growth during the 1970s. The expansion of government employment was particularly substantial during this period, when "an influx of federal funds for social welfare generated an infrastructure of government employees to provide the services." During this period, Puerto Rico's labor force was becoming increasingly similar to that of the U.S. -- with expanding service and commercial sectors -- but it also showed "evidence of increased dependency on federal funds in the rise of the government as the primary employer." (Falcón, 1990: 26)

Following the trends of the previous period, the number of Puerto Ricans eligible to work but who were not part of the labor force had increased to over one million by 1972. Further, as Dietz points out, "high unemployment has been perhaps the most enduring

¹² For example, Falcón (1990: 23) mentions that in 1980, pharmaceuticals received about 48.1 percent of the tax credits awarded to all industries while they contributed only 19.1 percent of all manufacturing wages.

problem of the Puerto Rican economy" and "the failure of the industrialization strategy to reduce unemployment must certainly be counted as one of the major weaknesses of the Puerto Rican model." (Dietz, 1986: 281).

Unemployment remained a particularly critical problem during the 1970s and early 1980s. After falling during the 1960s and reaching its postwar minimum of 10.3 percent in 1970, unemployment hovered at about 20 percent of the labor force since 1975 -- despite the rapid decline in the rate of labor force participation.¹³ By 1983, Puerto Rican unemployment had reached 23.4 percent.

The post-Vietnam War recession, exacerbated by the oil crises of 1974 and 1979-80, played a role in this increase but cannot be considered the entire explanation. The characteristics of the unemployed also fail to explain the high incidence and persistent nature of Puerto Rican unemployment.¹⁴

Cited by Dietz, the authors of a study done for the Government Development Bank¹⁵ suggested that the natural rate of unemployment in Puerto Rico is "higher than in the United States and other countries for which evidence exists." The authors of this study speculate that this higher "natural rate" may be in part a result of the types of industries that have located on the island and suggest that one effect of their locating in the Island has been to increase Puerto Ricans' "tolerance of unemployment."

¹³ Falcón (1990: 26), and Dietz (1986: 275).

¹⁴ "The age and sex profiles of unemployment in Puerto Rico are very similar to those found in the United States. With the exception of a lower rate of unemployment for women, the young are more likely to be unemployed than older workers. Those with less than twelve years of education have a higher unemployment rate than high school graduates; white collar workers have lower unemployment rates than do blue-collar workers. However, these characteristics cannot explain the high rates of unemployment. The growth in the labor force has been most rapid among those aged 25 to 44, not among teens; the proportions of the populations 18 to 24 years of age attending college has grown from 1.4% in the 1940 school year and 4.7% in 1950 to 29.9 in the 1978 school year. Workers classified as white collar have been the fastest-growing category of workers, increasing 20.8% between 1973 and 1978 while the number of blue-collar workers was increasing by just 4.9% and the number of agricultural workers remained constant." (Dietz, 1986: 277)

¹⁵ Piore and Montiel, "Youth Unemployment and Economic Development Strategy in Puerto Rico", Paper prepared for the Government Development Bank, July 1978. pp. 17-19

A different theory trying to account for the higher unemployment rates found in Puerto Rico is that of Gutiérrez.¹⁶ In his econometric study of the substitutability of labor for capital, he found that Fomento promoted firms that tended to be more capital-intensive than similar enterprises in the United States. This he attributes to "governmental activities devoted to driving the opportunity cost of capital down by enhancing its profitability through tax exemption." (Dietz, 1986: 280) This, Gutiérrez argues, resulted in little incentive on the part of firms to create more jobs. Gutiérrez concludes that the unemployment problem is an inextricable part of the development strategy itself, especially in its second phase of capital-intensive industrialization.

As Dietz points out, to the extent that any of these theories is true, they amount to "a reproach of the development strategy, since the industrial structure, or at least an important part of it, is the outcome of Fomento's efforts." (Dietz, 1986: 278).

In the 1960s, the pace of emigration slowed somewhat but remained on balance in the direction of the United States. In some years during the decade of the 1970s, the flow was actually reversed, giving rise to concern that the "safety valve" of emigration might not be working any more. But in the last years of the decade, net emigration resumed, and soon it was again as high as it had been in the 1950s. Net migration during the 1970s was positive and reached 85 thousand persons. (Dietz, 1986: 285)

The problems of high unemployment rates and low labor force participation in Puerto Rico persist to this day. By 1983, unemployment had reached 23.4 percent while the number of Puerto Ricans choosing not to join the labor force remained above one million. Between 1980 and 1989, yearly emigration was over 260 thousand. These

¹⁶ Gutiérrez, Elias R. Factor Proportions, Technology Transmission, and Unemployment in Puerto Rico, 1977, p. 54. -- cited in Dietz (1986).

figures call attention to the fact that the conditions which led to the initial migrations have not yet disappeared. It is now also clear that the dynamics underlying the migration of Puerto Ricans are no longer restricted to the economic development of Puerto Rico and the resulting pressures to migrate. Although they represent a small fraction of total migratory flows, Puerto Ricans who are not economically active *can* and *do* migrate, not necessarily in response to economic conditions (at least not directly), but to individual ones. In this context, it is very difficult to predict what is in store for the Puerto Rican population, particularly in view of the potential decisions to migrate of thousands of workers. Only one thing is certain: Puerto Rican migration to the United States is far from over.

III. Migration and Economic Development in Puerto Rico (1982 - 88)

III. Migration and Economic Development in Puerto Rico (1982 - 88)

Previous studies of Puerto Rican migration (Meléndez, forthcoming(a & b); Falcón, 1990; Dietz, 1986; History Task Force, 1979) have looked at the relationship between industrial development and migration for different stages in the history of the Island. Unfortunately, the work done in these studies stops short of establishing the relationship between the industrial structure of the Puerto Rican economy and the level and composition of migratory flows as these prevail today. The goal of my research is then to simulate the link between the industrial structure of the economy to the levels and composition of migratory flows between Puerto Rico and the U.S.:

Δ industrial structure \rightarrow Δ occupational structure of employment \rightarrow Δ migratory flows

To this end, I use 1982-88 data from the Puerto Rico Planning Board (PRPB) migration survey combined with a 1982 Input-Output (I-O) model to create a two-part economic model of the Puerto Rican economy. In the first part of the model, I use the I-O methodology to discuss how industrial changes in Puerto Rico between 1982 and 1988 were reflected in changes in the insular economy and labor markets. In the second part, I use the PRPB survey data to create a regression model of out-migration tendencies, by occupation, given pertinent labor market conditions in Puerto Rico and the United States.

Following the methodology used, this chapter is presented in three sections. In the first section, I discuss the industrial changes that occurred in the Puerto Rican economy between 1982 and 1988 as well as the impact these had on the levels and occupational distribution of employment in the Island. The second part discusses migration developments during the period and the regression model findings. In the last section, I discuss overall findings on the connection between industrial changes and migration in Puerto Rico between 1982 and 1988.

A. Changes in the Industrial Structure and the Levels and Occupational Distribution of Employment in Puerto Rico (1982 - 1988)

To define this part of the model, the link between changes in industrial structure and changes in the levels and occupational structure of employment, my starting point is a 95-sector Input-Output (I-O) model of the Puerto Rican economy developed by Prof. Angel Ruiz.¹ Estimates of the changes in the levels of production, employment, and income to occur in the Island throughout the 1980s, both aggregated and for each of the 95 sectors, were developed using a 1982 I-O transactions table as the base model.² Figures on employment by industry are then allocated by eight occupational categories and compared with estimated and historical figures on the occupational distribution of employment in the Island from 1982 and 1988 to describe the relationship between industrial change and changes in the occupational distribution of employment.³

¹ Angel Ruiz is a Professor at the Department of Economics, University of Puerto Rico (UPR) and consultant to the Puerto Rico Planning Board (PRPB).

² Using the 1982 Input Output table and estimates of final demand per industrial sector for 1988, production figures can be obtained. From the Leontief Inverse of this table also, direct and indirect employment and income coefficients (employment and income per million dollars of output for a given industry) are calculated for each of the industries in the model. These coefficients are then applied to the 1988 estimates of output and reconciled with actual figures for overall employment in order to determine per-industry levels of employment for 1982 and 1988.

³ Estimates of the occupational distribution of employment by industrial sector are based on allocations done using a matrix of employment coefficients by 80 occupational categories for the 95 industries. This matrix was estimated for 1988 by Prof. Angel Ruiz based on data from the Department of Labor and Census of Manufacturers. For both 1982 and 1988, I apply this matrix of coefficients to the vector of I-O figures on employment by industrial sector in its most disaggregated form and, then, aggregate by the eight desired occupations and major sectors of the economy.

For both 1982 and 1988, the distribution of employment obtained from this process is somewhat different from that recorded in Department of Labor (DOL) data (used to estimate the migration regression model). Given the limited time and resources for this study, those differences could not be reconciled. All discussions of the occupational distribution of employment in Puerto Rico are based on I-O estimates, while the migration model is estimated based on DOL historical figures aggregated by quarters.

Comparing the I-O allocations and historical figures of employment in terms of proportions of total employment, the errors found remained in a fairly consistent manner. The most serious misestimation was for the Sales and Clerical occupation. The proportion of total employment within this category, in both 1982 and 1988, was overestimated by about 5 percent. The least error was in the estimate of employment in Farm occupations. The proportion of total employment within these occupations was underestimated by less than half a percent. The estimated proportion of total employment for the remaining occupations tended to be within two percent of the historical proportions. For both 1982 and 1988, employment in Professional and Technical, Managerial and Administrative, Craft, and Operative occupations was consistently underestimated; employment in Services and Laborer occupations was overestimated.

A.1. Labor Force Participation, and Occupational Employment and Unemployment

The problems of low labor force participation and high unemployment rates in Puerto Rico persist to this day. Between 1982 and 1988, however, the economy was slowly recovering from the recessionary period of the late 1970s. As a result, total employment in the economy increased and labor market prospects across all occupations improved.

Between 1982 and 1988, the number of participants in the labor force increased by over 140 thousand, almost 16 percent, surpassing the one million mark in 1988. (See Table 3A.1 and Figure 3A.1). Among occupational groups, labor force growth in the *Sales and Clerical* and *Professional and Technical* groups together accounted for more than half of overall labor force growth. Labor force growth in *Managerial and Administrative* and *Services* occupations was also marked: between 1982 and 1988 both expanded their ranks by over 20 thousand. The number of labor force participants in *Farm* occupations was the only one to fall.

The figures discussed above suggest that during the period of study a change in the occupational structure of the Puerto Rican labor force was taking place. In 1982, with 19 percent of the total for Puerto Rico, workers in *Sales and Clerical* occupations dominated the insular labor force. For the period of study, the proportion of the Puerto Rican labor force in this category grew at a rate faster than the average across all occupations. As a result, by 1988, this group accounted for an even greater proportion of total labor force participation. Further, while the proportion of the labor force in

TABLE 3A.1
PUERTO RICAN LABOR FORCE BY OCCUPATIONAL CATEGORIES

Occupational Group	1982	%1982tot	1988*	%1988tot	Δ82-88	%Δ82-88
1 Professional & Technical	119,935	13.37%	152,479	14.70%	32,543	27.13%
2 Managerial & Administrative	83,767	9.34%	110,223	10.63%	26,456	31.58%
3 Sales & Clerical	173,565	19.35%	221,642	21.37%	48,076	27.70%
4 Crafts	142,422	15.88%	152,458	14.70%	10,036	7.05%
5 Operatives	165,416	18.44%	170,062	16.39%	4,645	2.81%
6 Services	116,710	13.01%	138,363	13.34%	21,653	18.55%
7 Farm	47,548	5.30%	41,135	3.97%	-6,413	-13.49%
8 Laborers	47,446	5.29%	50,986	4.92%	3,539	7.46%
TOTAL	896,809		1,037,344		140,536	15.67%

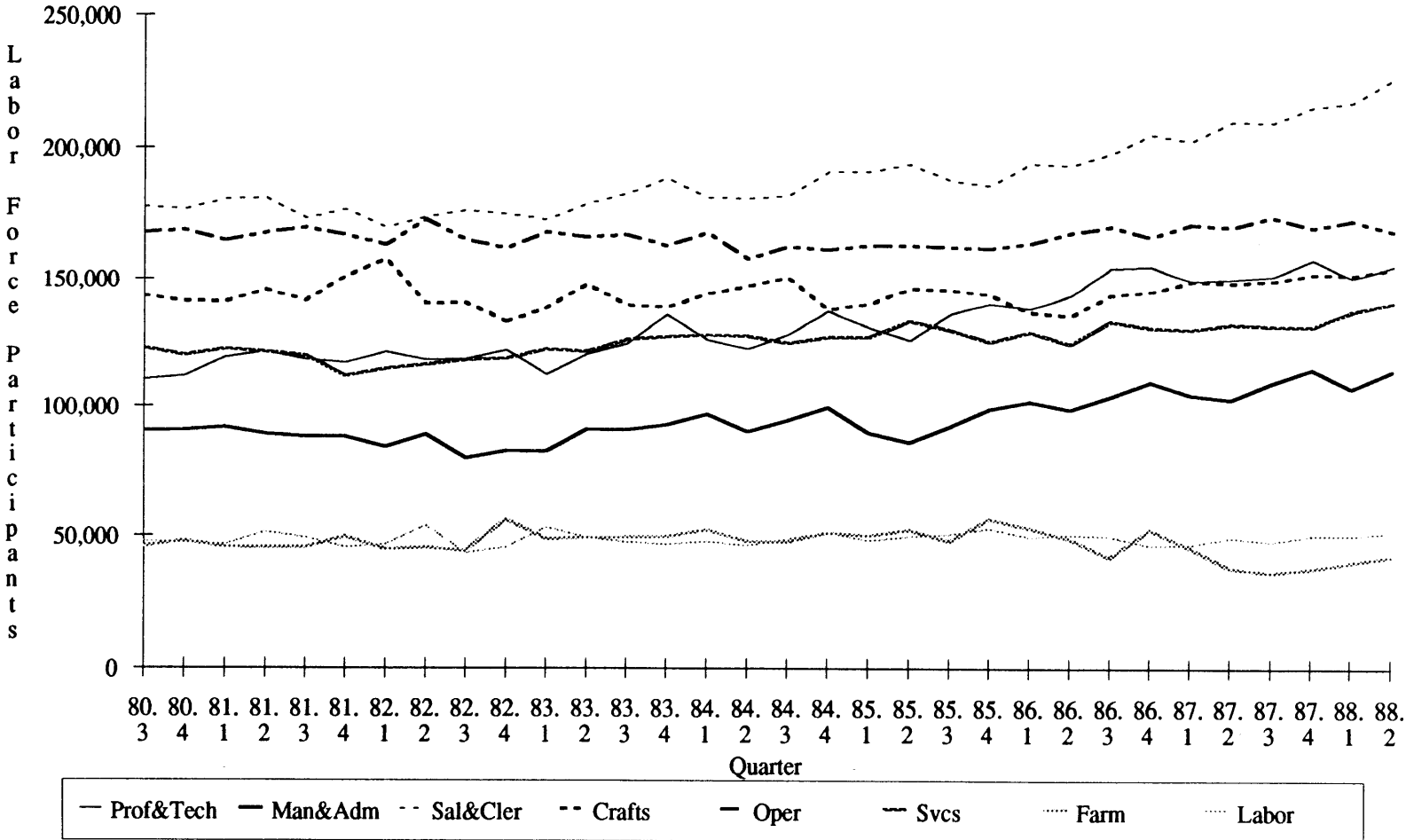
Sources:

Author's estimates based on unpublished data from the Puerto Rico Department of Labor, Household Survey

Notes:

* Figures for 1988 include data for Spring and Summer quarters only.

Figure 3A.1: Puerto Rican Labor Force by Occupation by Quarter (1980.3 - 1988.2)



Professional and Technical, Managerial and Administrative, and Service occupations was expanding dramatically, that for *Operatives and Crafts* -- also among the largest labor force groups in 1982 -- was diminishing. The Puerto Rican labor force during this period, thus, could be described as becoming more polarized: labor force growth was concentrated at either the low- or high- ends of the occupational skill-pay spectrum, while -- in proportional terms -- the middle was shrinking.

The changes observed between 1982 and 1988 in the size and composition of the labor force corresponded to a large extent to changes in employment. (See Table 3A.2 and Figure 3A.2). Total employment increased by over 175 thousand, i.e. 25 percent, over this period. Accounting for over a quarter of total employment in both 1982 and 1988, the *Sales and Clerical* occupational category was the largest in Puerto Rico during the period of study. This group was also the one to register the largest job gains. Between 1982 and 1988, close to one in every three new jobs were for individuals in *Sales and Clerical* occupations. In terms of absolute job gains, the *Sales and Clerical* group was followed by the *Professional and Technical, Services, and Managerial and Administrative* occupational categories. *Craft* occupations kept pace with overall employment growth: between 1982 and 1988, employment in this category increased by over 19 thousand. In contrast, *Operatives* -- the second largest group in terms of employment in 1982 -- increased its ranks by only 17 thousand. As a result, its share of total employment fell. The lowest shares of total employment remained among *Farm and Laborers* occupations. The former was the only occupation to register actual job losses; the latter gained 8 thousand.

Thus, very similar trends to those observed in the occupational composition of the labor force were observed for employment. *Sales and Clerical* occupations dominated most of the growth in employment, followed by growth in occupations either at the high- and low- end of the occupational spectrum.

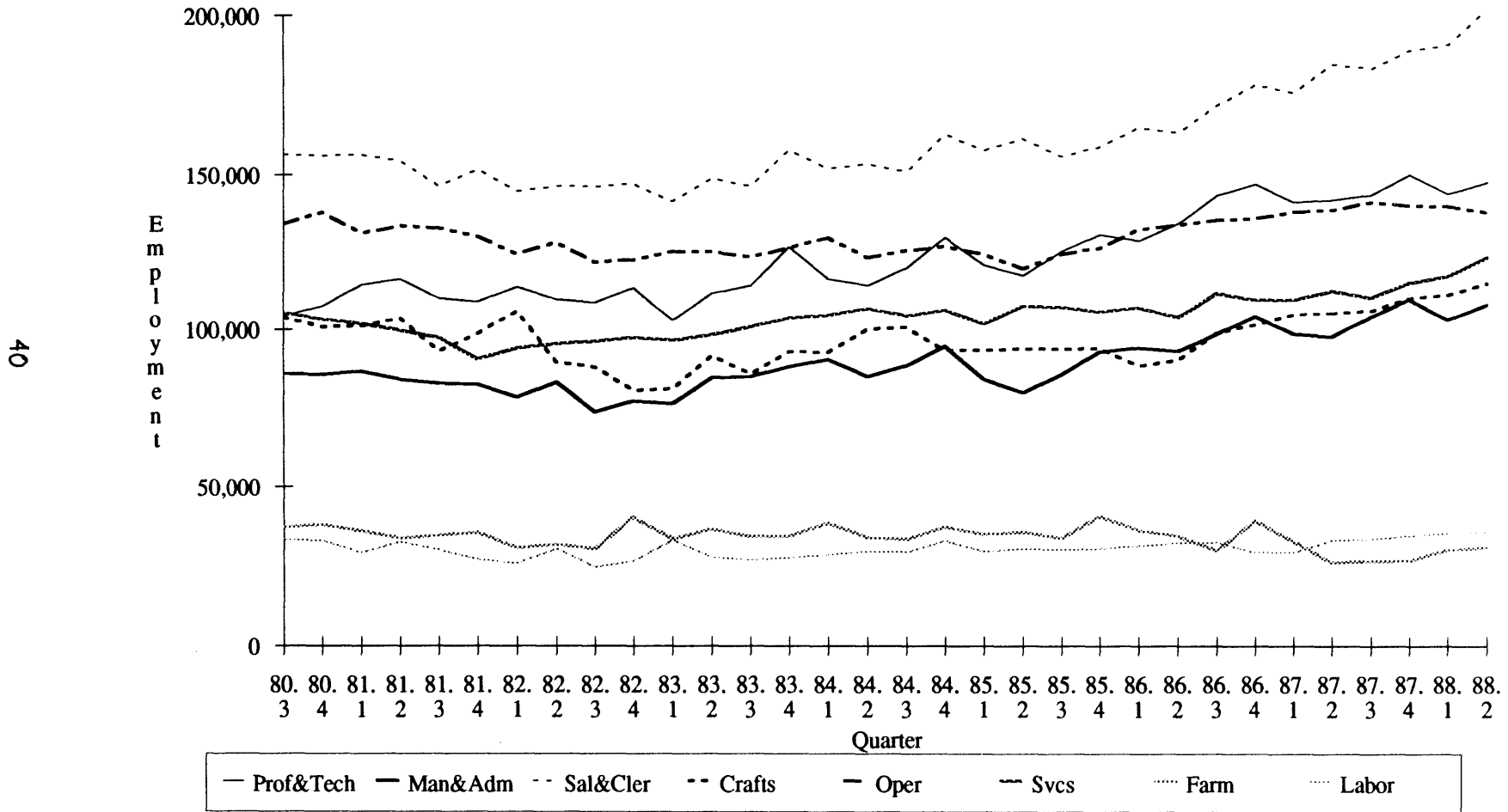
TABLE 3A.2
PUERTO RICAN EMPLOYMENT BY OCCUPATIONAL CATEGORIES

Occupational Group	1982	%1982tot	1988*	%1988tot	Δ82-88	%Δ82-88
1 Professional & Technical	108,267	15.09%	136,642	15.24%	28,375	26.21%
2 Managerial & Administrative	62,459	8.70%	83,584	9.33%	21,125	33.82%
3 Sales & Clerical	188,620	26.28%	245,416	27.38%	56,796	30.11%
4 Crafts	71,405	9.95%	90,507	10.10%	19,102	26.75%
5 Operatives	104,587	14.57%	121,758	13.58%	17,171	16.42%
6 Services	109,847	15.31%	136,016	15.17%	26,169	23.82%
7 Farm	33,736	4.70%	33,554	3.74%	-182	-0.54%
8 Laborers	38,750	5.40%	48,863	5.45%	10,113	26.10%
TOTAL	717,671		896,340		178,669	24.90%

Sources:

Author's estimates based on I-O projections of total employment and 1988 matrix of employment coefficients by occupations and industries.

Figure 3A.2: Puerto Rican Employment by Occupation by Quarter (1980.3 - 1988.2)



Over the six year period of study, Puerto Rican unemployment decreased both in absolute and proportional terms. Figures for total unemployment fell from close to 190 thousand in 1982 to around 150 thousand for 1988; the unemployment rate fell from an average of 21.1 percent for 1982 to 14.6 percent in 1988. (See Table 3A.3 and Figures 3A.3 and 3A.4). Decreases in unemployment were registered across all occupational categories. However, little changed in terms of its distribution. The highest number of unemployed persons remained within *Craft* occupations; the lowest among *Managers and Administrators*. With unemployment rates of 43 percent in 1982 and 30 percent in 1988, the highest incidence of unemployment was among *Laborers*.

Without more detailed studies, it is difficult to discern the extent to which the lowering of unemployment figures and rates across occupations may be attributed to employment gains rather than lower participation among discouraged workers. However, for most occupations, I would attribute the improvements to employment creation having exceeded labor force growth. For *Crafts* occupations, for example, absolute employment growth was almost twice that of the labor force. Similarly, for *Operative* occupations the total labor force increased by around 5 thousand between 1982 and 1988 while employment expanded by over 17 thousand. *Farm* was the only occupational group for which lower labor force participation may have played a more significant role in the lowering of unemployment. Between 1982 and 1988, the number of labor force participants in this occupational category decreased by over 6 thousand. Over the same period, total employment in *Farm* occupations declined by 182 jobs. It is also important to note that in the cases of the three occupational groups mentioned above the high unemployment rates observed at the beginning of the period of study could have acted as a deterrent to further entry. New or re-entering participants in the labor force in Puerto Rico during the period of study could have been moving away from declining occupations or occupations perceived as having a limited capacity for further growth.

TABLE 3A.3
PUERTO RICAN UNEMPLOYMENT BY OCCUPATIONAL CATEGORIES

Occupational Group	1982	%1982tot	1988*	%1988tot	Δ82-88	%Δ82-88
1 Professional & Technical Unemployment Rate	8,180 6.82%	4.31%	6,976 4.57%	4.59%	-1,205	-14.72%
2 Managerial & Administrative Unemployment Rate	5,618 6.71%	2.96%	4,512 4.09%	2.97%	-1,107	-19.70%
3 Sales & Clerical Unemployment Rate	27,599 15.90%	14.55%	25,669 11.58%	16.90%	-1,930	-6.99%
4 Crafts Unemployment Rate	51,418 36.10%	27.12%	39,276 25.76%	25.87%	-12,142	-23.61%
5 Operatives Unemployment Rate	41,163 24.88%	21.71%	31,371 18.45%	20.66%	-9,792	-23.79%
6 Services Unemployment Rate	20,855 17.87%	11.00%	18,041 13.04%	11.88%	-2,815	-13.50%
7 Farm Unemployment Rate	14,321 30.12%	7.55%	10,635 25.85%	7.00%	-3,686	-25.74%
8 Laborers Unemployment Rate	20,469 43.14%	10.79%	15,365 30.14%	10.12%	-5,104	-24.94%
TOTAL Unemployment Rate	189,624 21.14%		151,844 14.64%		-37,780	-19.92%

Source:

Author's calculations based on unpublished data from the Puerto Rico Department of Labor, Household Survey.

Notes:

* Figures for 1988 include data for Spring and Summer quarters only.

Figure 3A.3: Puerto Rican Unemployment by Occupation by Quarter (1980.3 - 1988.2)

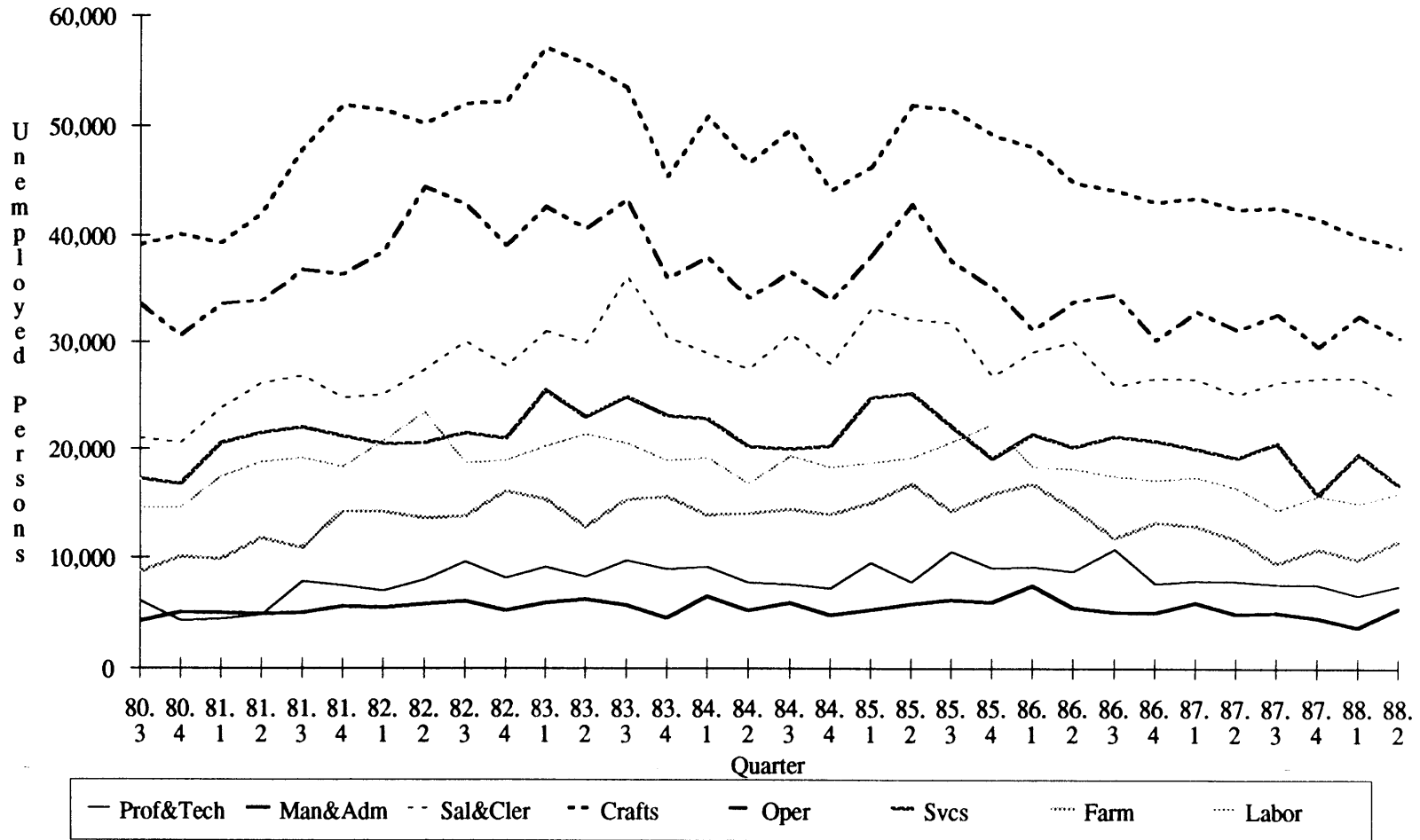
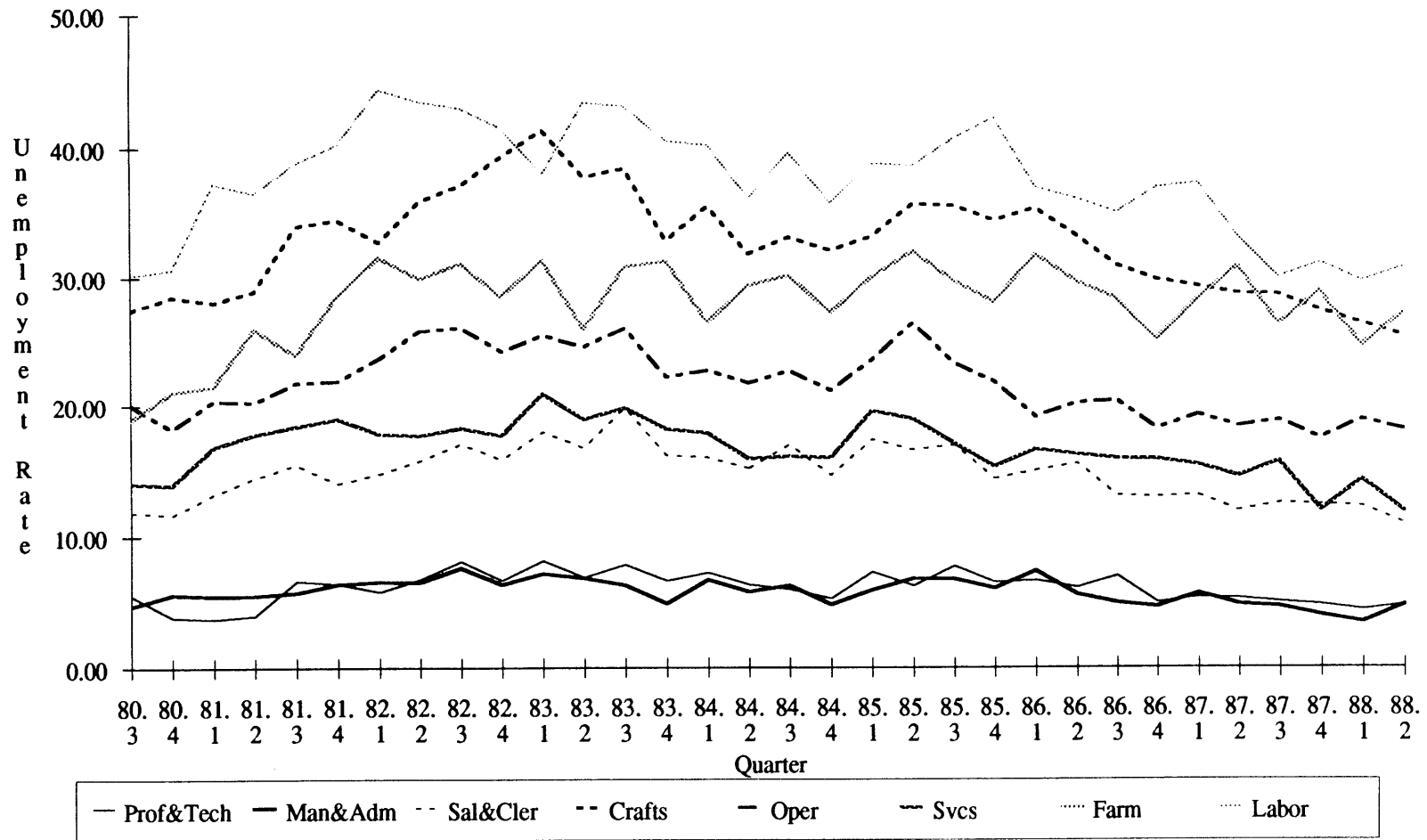


Figure 3A.4: Puerto Rican Unemployment Rates by Occupation by Quarter (1980.3 - 1988.2)

44



In conclusion, after the economic downturn of the late 1970s and early 1980s, the period from 1982 to 1988 was one of recovery in terms of labor market conditions in Puerto Rico. The number of Puerto Ricans active in the labor force increased over the period, surpassing the one million mark in 1988. Employment also grew faster than the labor force in most occupational categories resulting in noticeable improvements in unemployment: both in absolute numbers and proportion of those in the labor force.

Between 1982 and 1988, Puerto Rican employment remained concentrated in skilled rather than unskilled occupations. The statistics for labor force participation, employment and unemployment analyzed in this section, nonetheless, suggest that during the Puerto Rican labor force was undergoing a transformation. Employment and labor force growth was disproportionately concentrated within *Sales and Clerical* occupations, the largest occupational group. At the same time, the proportion of the labor force and the proportion of employment in *Professional and Technical*, *Managerial and Administrative*, and *Service* occupations was expanding dramatically. However, *Crafts and Operative* -- two other large occupational groups in 1982 -- were losing ground in terms of their shares of both total employment and participation in the Puerto Rican labor force. The Puerto Rican labor force and employment thus moved away from medium-skill occupations -- apparently the hardest hit by the recession and restructuring trends in the economy -- and towards occupations with further growth capacity.

A.2. Industrial Structure of Output and Employment

After the spectacular rates of economic growth seen in the Island for almost three decades, there was a downturn between 1974 and 1976. As a result of a recession in the United States, a decline in exports, and a slowdown in federal expenditures on the Island, production fell for the first time after 1980 and the period from 1980 to 1983 was one of

economic recession in Puerto Rico as well. By the end of the decade, however, there was some recovery and after 1985 there was economic expansion.

Reflecting this period of economic recovery (as well as the shift towards more capital-intensive manufacture), output in the Puerto Rican economy increased by over \$12 billion between 1982 and 1988. (See Table 3A.4). Compared to the 1970s -- when *Government, Services, and the Financial, Insurance and Real Estate* sectors expanded dramatically and noticeable changes in insular industrial mix were taking place -- the 1980s were a period of moderate change (or perhaps of relative stability) with respect to the industrial structure of the economy. Puerto Rico, however, did continue along its 1970s trend of transformation towards becoming a services dominated economy.

All industrial sectors expanded their total levels of output between 1982 and 1988. *Manufacturing*, the largest contributor to total output for Puerto Rico in both 1982 and 1988, increased its production by over \$5 billion. Productive gains in this sector alone were thus responsible for more than 40 percent of the output expansion for the whole economy. Output gains in the *Financial, Insurance and Real Estate* sector, however, were the most dramatic. Production in this sector increased by close to 60 percent to surpass \$5 billion in 1988. Also worth notice, the *Mining and Construction* sector expanded faster than the average for the whole economy. But although output gains for this sector during the period of study represented a gain of 53 percent, these meant an increase of less than one percentage point in its share of total output. Keeping pace with productive growth in the economy, the shares of total output for *Trade, Transportation and Public Utilities; Services, and Government* all remained stable at around 10 percent. Total (inflation adjusted) production for the Agriculture sector increased by close to \$40 million, but in terms of its share of total production this sector continued along the trend of decline observed in previous decades.

Table 3A.4: PRODUCTION GENERATED BY THE FINAL DEMAND OF PUERTO RICAN ECONOMY

Fiscal years 1982 and 1988

(in thousands of dollars: 1982 = 100)

Industrial Group	1982		1988		1982-88 Change	
	1982	1988	1982	1988	Absolute	Percent
AGRICULTURE	567,329	604,943	1.50%	1.20%	37,615	6.63%
MINING AND CONSTRUCTION	1,595,666	2,443,419	4.22%	4.84%	847,753	53.13%
MANUFACTURING	18,289,196	23,442,840	48.34%	46.39%	5,153,644	28.18%
NON-DURABLES MFG	13,200,912	16,421,408	34.89%	32.49%	3,220,496	24.40%
Apparel and clothing	974,974	1,049,454	2.58%	2.08%	74,480	7.64%
Clothing and Misc. Accessories	915,557	957,064	2.42%	1.89%	41,507	4.53%
Chemicals, Petrochemicals, and Pharmaceutic	7,853,787	9,312,428	20.76%	18.43%	1,458,641	18.57%
Pharmaceuticals	3,627,506	4,895,976	9.59%	9.69%	1,268,469	34.97%
DURABLES MFG	5,088,284	7,021,432	13.45%	13.89%	1,933,148	37.99%
Machinery, exc. Electrical	1,050,192	1,232,249	2.78%	2.44%	182,057	17.34%
Electric and Electronic Machinery	1,906,916	2,987,283	5.04%	5.91%	1,080,367	56.66%
Prof & Scientific Instruments	933,292	1,325,194	2.47%	2.62%	391,902	41.99%
TRANSPORT, COMMUN., AND PUBLIC UTIL.	3,054,577	3,985,018	8.07%	7.89%	930,440	30.46%
FINANCIAL, INSURANCE AND REAL ESTATE	3,165,052	5,031,011	8.37%	9.96%	1,865,960	58.96%
WHOLESALE AND RETAIL TRADE	3,829,454	5,130,861	10.12%	10.15%	1,301,407	33.98%
SERVICES	4,216,947	5,563,125	11.15%	11.01%	1,346,178	31.92%
Touristic Hotels and Other Rooming Services	522,112	656,202	1.38%	1.30%	134,090	25.68%
Medical/Health Services	710,811	839,947	1.88%	1.66%	129,136	18.17%
GOVERNMENT	3,117,395	4,334,831	8.24%	8.58%	1,217,437	39.05%
Total	37,835,615	50,536,049			12,700,434	33.57%

Source:

Author's allocations based on I-O tables and estimates of Final Demand done by Prof. Angel Ruiz (1988a).

According to Ruiz, within the *Manufacturing* sector, 936 industries continued to play a predominant role for the generation of production, income, and employment.⁴ For both 1982 and 1988, almost three quarters of *Manufacturing* final demand was generated by 936 industries; almost half of total output for *Manufacturing* was generated by four industries heavily dominated by 936 firms. In descending order, these were: *Pharmaceuticals, Electric and Electronic Machinery, Professional and Scientific Equipment, and Machinery, except Electrical.*⁵ (See Tables 3A.4 and 3A.5).

The period, nonetheless, proved crucial for the *Manufacturing* sector: a change in the institutional framework for the industrial incentives program came about with the approval of Section 936 as part of the Federal Income Tax Reform Act of 1976.⁶ Perhaps as a result of this change in the industrial incentives program, despite marked growth in the 1970s, *Manufacturing's* share of total production declined between 1982 and 1988. Although declining growth rates had been observed for the sector as a whole over the last two decades, the sectorial potential for expansion had apparently been weakened by the cyclical fluctuations and structural transformations of the 1980s. The phenomenon observed was more than "natural" maturation of the sector. Future growth in Puerto Rican economy seemed to be in the hands of other sectors.

⁴ According to PRPB figures published for FY 1990, cited by Ruiz (1990), the gross domestic product (GDP) of *Manufacturing* reached \$12.2 billion. This figure represented an increase of almost 10 percent from that of 1989 and constituted more than a third of the gross domestic product for the Island. In 1981, *Manufacturing* production accounted for 36.3 percent of the GDP for the Puerto Rican economy. As Ruiz points out, not only was *Manufacturing's* share of total GDP extremely high, it was also increasing throughout the 1980s. To illustrate the extent of *Manufacturing's* dominance of Puerto Rico's GDP, Ruiz mentions that Wholesale and Retail trade, the second largest sector in terms of share of GDP, accounted for only 15.5 percent of Puerto Rico's GDP for 1990.

⁵ In 1982, *Pharmaceuticals, Electrical Machinery, Professional and Scientific Equipment, and Machinery exc. Electrical* industries accounted for 19.8 percent, 10.4 percent, 5.1 percent and 5.7 percent, respectively, of total production for the *Manufacturing* sector. In 1988, the corresponding figures were 20.9 percent, 12.7 percent, 5.7 percent, and 5.3 percent.

⁶ For a detailed discussion of the main elements of Section 936 of the 1976 Federal Tax Reform Act, refer to Dietz (1986: 300-304).

Table 3A.5: FINAL DEMAND OF THE PUERTO RICAN ECONOMY

Fiscal years 1982 and 1988

(in thousands of dollars: 1982=100)

Industrial Group			Proportions of total FD		1982-88	
	1982	1988	1982	1988	Absolute	Percent
AGRICULTURE	159,552	172,102	0.62%	0.51%	12,550	7.87%
MINING AND CONSTRUCTION	1,258,745	1,992,213	4.89%	5.96%	733,468	58.27%
MANUFACTURING	13,474,641	16,059,843	52.29%	48.01%	2,585,202	19.19%
936 MANUFACTURING	9,848,518	12,464,081	38.22%	37.26%	2,615,563	26.56%
Apparel and clothing	924,700	988,085	3.59%	2.95%	63,385	6.85%
936 Apparel and Clothing Mfg	540,630	645,133	2.10%	1.93%	104,503	19.33%
Clothing and Misc. Accessories	870,122	901,817	3.38%	2.70%	31,695	3.64%
936 Clothing and Misc. Accessories	502,693	572,460	1.95%	1.71%	69,767	13.88%
Chemicals, Petrochemicals, and Pharmaceutica	5,561,476	6,537,550	21.58%	19.54%	976,074	17.55%
936 Chemical Mfg	4,358,296	5,208,649	16.91%	15.57%	850,353	19.51%
Pharmaceuticals	3,552,386	4,800,420	13.79%	14.35%	1,248,034	35.13%
936 Pharmaceuticals	3,304,457	4,355,112	12.82%	13.02%	1,050,655	31.80%
Machinery, exc. Electrical	776,916	862,753	3.02%	2.58%	85,837	11.05%
936 Machinery, exc. Electr., Mfg	718,496	810,315	2.79%	2.42%	91,819	12.78%
Electric and Electronic Machinery	1,548,039	2,474,872	6.01%	7.40%	926,833	59.87%
936 Electric and Electronic Machinery Mfg	1,251,774	2,096,930	4.86%	6.27%	845,156	67.52%
Prof & Scientific Instruments	765,023	1,092,554	2.97%	3.27%	327,531	42.81%
936 Prof & Scientific Instruments Mfg	740,451	1,001,703	2.87%	2.99%	261,252	35.28%
TRANSPORT, COMMUN., AND PUBLIC UTIL.	1,377,833	1,721,321	5.35%	5.15%	343,488	24.93%
FINANCIAL, INSURANCE AND REAL ESTATE	1,692,127	3,008,449	6.57%	8.99%	1,316,322	77.79%
WHOLESALE AND RETAIL TRADE	3,126,670	4,204,460	12.13%	12.57%	1,077,790	34.47%
SERVICES	1,678,902	2,133,124	6.52%	6.38%	454,222	27.05%
Touristic Hotels and Other Rooming Services	282,919	322,380	1.10%	0.96%	39,461	13.95%
Medical/Health Services	602,602	702,934	2.34%	2.10%	100,332	16.65%
GOVERNMENT	2,999,043	4,158,782	11.64%	12.43%	1,159,739	38.67%
Total	25,767,513	33,450,295	100%	100%	7,682,782	29.82%

Source:

Author's allocations based on I-O tables and estimates of Final Demand done by Prof. Angel Ruiz (1988a).

Sectorial output growth between 1982 and 1988 was reflected in employment gains. The latter, however, did not necessarily correspond to sectorial gains in output reflecting the different labor-intensity of specific sectors of the economy. According to the I-O figures, total employment grew 178 thousand over the six year period. (See Table 3A.6). The largest absolute increase in employment for a sector was that estimated for *Government* -- the largest employer for the period. This sector gained 46 thousand jobs between 1982 and 1988, a figure representing more than a quarter of overall employment gains. The *Financial, Investment, and Real Estate* sector, nonetheless, doubled its employment and was the fastest growing. As a result of job gains, this sector's share of total employment increased from 4 percent in 1982 to almost 7 percent in 1988. *Trade and Services* followed *Government* and *Financial, Investment, and Real Estate* in employment gains. With job gains around 30 thousand apiece, these sectors retained their individual shares of around 20 percent of total employment. *Mining and Construction* sector, a relatively small employer in 1982, also had relatively large gains. With 16 thousand new jobs in 1988, almost one in every ten jobs created in the Puerto Rico over this period were within the *Mining and Construction* sector. *Agriculture* was the only sector to lose employment. By 1988, the sector had lost around 3 percent of its already limited 1982 employment.

In employment terms, *Manufacturing* did not display the same level of dominance it had in terms of output. However, it did continue to be a key sector of the economy for employment. In 1982, *Manufacturing* employment accounted for 18.7 percent of the total generated by the economy; for 1988, the corresponding figure was 17.4 percent.⁷ Nonetheless judging by changes in the sectorial shares of total employment, its

⁷ The importance of the *Manufacturing* sector was also reflected in figures for wages and salaries: direct and indirect income generated by final demand within the *Manufacturing* sector constituted 24.3 percent and 22.6 percent of the totals for 1982 and 1988, respectively. With total wage bills of \$1.7 and \$2.0 billion in 1982 and 1988, respectively, the *Manufacturing* sector was the second largest source of labor income in the Island. (Ruiz, 1990)

**TABLE 3A.6: DIRECT AND INDIRECT EMPLOYMENT GENERATED
BY THE PRODUCTION OF THE PUERTO RICAN ECONOMY**

Industrial Group	1982	1988	Proportions of total Empl.		1982-88 Change	
			1982	1988	Absolute	Percent
AGRICULTURE	35,035	33,844	4.88%	3.78%	-1,191	-3.40%
MINING AND CONSTRUCTION	36,803	52,846	5.13%	5.90%	16,043	43.59%
MANUFACTURING	134,391	155,561	18.73%	17.36%	21,170	15.75%
NON-DURABLES MFG	85,704	93,013	11.94%	10.38%	7,310	8.53%
Apparel, clothing, and accessories	32,093	31,548	4.47%	3.52%	-545	-1.70%
Apparel and Misc. Accessories	30,232	28,902	4.21%	3.22%	-1,330	-4.40%
Chemical companies	14,599	16,525	2.03%	1.84%	1,926	13.19%
Pharmaceuticals	9,540	11,776	1.33%	1.31%	2,236	23.43%
DURABLES MFG	48,688	62,548	6.78%	6.98%	13,860	28.47%
Machinery, exc. Electrical	7,771	8,339	1.08%	0.93%	568	7.31%
Electric and Electronic Machinery	17,887	25,626	2.49%	2.86%	7,739	43.27%
Prof & Scientific Instruments	10,368	13,464	1.44%	1.50%	3,096	29.86%
TRANSPORT, COMMUN., AND PUBLIC UTIL.	42,100	49,312	5.87%	5.50%	7,212	17.13%
FINANCIAL, INSURANCE AND REAL ESTATE	30,439	60,953	4.24%	6.80%	30,514	100.25%
WHOLESALE AND RETAIL TRADE	141,001	172,775	19.65%	19.28%	31,773	22.53%
SERVICES	126,856	153,924	17.68%	17.17%	27,068	21.34%
Touristic Hotels and Other Rooming Services	9,573	10,831	1.33%	1.21%	1,258	13.15%
Medical/Health Services	50,286	54,385	7.01%	6.07%	4,099	8.15%
GOVERNMENT	171,045	217,126	23.83%	24.22%	46,081	26.94%
Total	717,671	896,341	100%	100%	178,670	24.90%

Source:

Author's allocations based on I-O tables and estimates of Final Demand done by Prof. Angel Ruiz (1988a).

employment generating capacity eroded throughout the 1980s. Reflecting the capital-intensive focus of the new industrialization, *Manufacturing* added a relatively small 21 thousand jobs to the Puerto Rican economy . Within the sector, the heavily 936-dominated *Pharmaceuticals, Machinery exc. Electric, Electric Machinery, and Professional and Scientific Instruments* were responsible for nearly two-thirds of the new manufacturing jobs.⁸

Summarizing, the period from 1980 to 1983 was one of economic recession. By the end of the decade, however, there was some recovery and, by 1988, the Puerto Rican economy experienced output and employment expansion. However, compared to the 1970s -- when *Government, Services, and the Financial, Insurance and Real Estate* sector expanded dramatically and noticeable changes in the insular industrial mix were taking place -- the 1980s was a period of moderate change. The Puerto Rican economy did continue along its trend of becoming a services-dominated economy. This was evidenced by the expansion of output and employment in the *Financial, Investment and Real Estate* sector, followed by growth in *Government, Services, and Trade*. The *Manufacturing* sector continued to be a key sector in the Puerto Rican economy but experienced losses in its shares of total output and employment. Thus, the sector's capacity for further growth had apparently been eroded by the cyclical fluctuations and structural transformations of the 1970s and early 1980s.

A.3. Industrial Structure and Changes in the Occupational Distribution of Employment

Based on the model of input-output and projections of employment by occupation by industry, we can infer that much of the growth in employment within occupations

⁸ Illustrating the capital intensity of most manufacturing firms in the Island, however, these same industries accounted for 20 percent of the economy's production in 1982 and 1988, but for little over 6 percent of total employment.

during the period between 1982 and 1988 was due to growth in sectors other than *Manufacturing*.

As previously noted, the largest occupational gains in employment between 1982 and 1988 were within the *Sales and Clerical* category, the largest occupational group. (See Table 3A.7). Of the estimated 57 thousand new *Sales and Clerical* jobs in 1988, 18 thousand were within the *Financial, Investment and Real Estate* sector. Employment growth in the *Trade* sector added an additional 18 thousand *Sales and Clerical* jobs to the Puerto Rican economy, while *Government* contributed another 11 thousand. *Manufacturing*, the third largest overall employer for the period, added a dismal 2 thousand new jobs to this occupation.

Employment gains in the *Sales and Clerical* occupations between 1982 and 1988 were followed by gains in the *Professional and Technical* category. In terms of sectorial impacts, *Government*, the sector with the largest absolute gains in employment between 1982 and 1988, was also responsible for the creation of over 14 of the 28 thousand new jobs in the *Professional and Technical* occupation category. Employing over 67 thousand professionals and individuals in technical or related occupations in 1988 -- ten times their employment within *Manufacturing* -- *Government* accounted for almost half of their total employment in the Island. The second largest contribution to employment growth within this category was due to job expansion within the *Services* sector. Over 10 of the 26 thousand new jobs created within this sector during the 1982-88 period were in *Professional and Technical* occupations. Again, the *Manufacturing* sector made a minimal direct contribution, of around one thousand, to job growth within this category.

Services occupations, with 26 thousand new jobs in 1988, closely followed *Professional and Technical* occupations in terms of employment growth. *Government* had the largest impact on the employment prospects of individuals in these occupations as well:

TABLE 3A.7: CHANGES IN EMPLOYMENT GENERATED BY THE PRODUCTION OF THE PUERTO RICAN ECONOMY (1982-88)

(Employment change by occupational group for each industry)

OCCUPATIONS									TOTAL
	Agriculture	Mining & Construction	Manufacturing Total	T.C.P.U.	TRADE	FIRE	SERVICES	GOVERNMENT	
Administrative and Managerial	-10	530	1,437	543	3,177	8,103	2,154	5,193	21,127
Professional & Technical	-10	653	1,004	739	729	943	10,077	14,241	28,376
Sales & Clerical	-25	909	2,413	2,137	17,634	18,221	4,918	10,589	56,796
Crafts	-17	7,690	4,314	1,711	2,555	449	950	1,451	19,103
Operatives	-40	1,783	9,592	1,082	1,981	390	988	1,397	17,173
Services	-23	322	822	317	3,415	1,804	7,629	11,883	26,169
Farm	-1,054	76	21	16	21	241	117	379	-183
Laborers	-10	4,081	1,566	670	2,261	363	234	949	10,114
TOTAL	-1,189	16,044	21,169	7,215	31,773	30,514	27,067	46,082	178,675

Source:

Author's allocations based on I-O tables and estimates of Final Demand done by Prof. Angel Ruiz (1988a) and 1988 matrix of employment coefficients by occupation and industry.

it provided over 10 thousand new jobs between 1982 and 1988. The remainder of the gains in *Services* occupations were primarily due to job growth within the *Services* and *Trade* sectors.

The large number of new employment opportunities for individuals in *Administrative and Managerial* occupations between 1982 and 1988 were, to a great extent, due to employment expansion within the *Financial, Investment and Real Estate* and *Government* sectors. The *Financial, Investment and Real Estate* sector was responsible for the generation of about 8 of the 21 thousand new *Administrative and Managerial* jobs. *Government*, the largest employer of Puerto Ricans in *Administrative and Managerial* occupations in both 1982 and 1988, added another 5 thousand new jobs within this category over the six year period. The *Trade* and *Services* sectors also made significant contributions to *Administrative and Managerial* employment during this period. Together, these two sectors were responsible for another 5 thousand new jobs. In contrast, *Manufacturing* added a dismal one thousand jobs to employment within this category.

Employment gains within the *Craft* occupational category were primarily due to the rapid growth of the *Mining and Construction* sector. Of the 19 thousand new jobs created in *Crafts* and related occupations between 1982 and 1988, this sector alone was responsible for almost 8 thousand. With 4,314 and 2,555 new jobs, respectively, the *Manufacturing* and *Trade* sectors were also responsible for a substantial portion of employment growth within this category. Although not usually thought of as a primary employer of individuals in *Crafts* occupations, *Government* nonetheless accounted for over one thousand of the new jobs within this category.

In 1988, *Manufacturing* was responsible for more than half of the employment of Puerto Ricans in *Operative* and related occupations. The sector's predominance in employment opportunities for individuals in these occupations was also reflected in

estimates for job creation. This sector alone was responsible for more than half of the 17 thousand *Operative* jobs created between 1982 and 1988. No other sector could even come close to the employment generating capacity of the Manufacturing sector for *Operative* occupations. To illustrate, the second largest contribution to *Operative* employment over the six year period was from the *Mining and Construction* sector: 1,783 new jobs.

The largest sectorial gains in employment for *Laborers* over this period were within the *Mining and Construction, Trade, and Manufacturing* sectors. Together, these accounted for over 75 percent of the employment of Puerto Ricans in laborer occupations in both 1982 and 1988 and for 8 of the 10 thousand new jobs created during the six year period.

Agriculture lost over a thousand farming jobs between 1982 and 1988. All other sectors of the Puerto Rican economy expanded their employment in this occupational category, although minimally, resulting in a much lower net loss of 182 farming jobs over the six year period. Thus, for farmers, employment gains in sectors other than *Agriculture* were not enough to offset job losses within their primary employer.

In general, during the period between 1982 and 1988, Puerto Rican employment increased for most occupations -- *Farm* was the exception. Employment also remained concentrated among skilled rather than unskilled occupations. In terms of occupations, employment growth was disproportionately concentrated within *Sales and Clerical* occupations -- the largest occupational category during the period -- while, in sectorial terms, it was concentrated in *Government* -- the largest overall employer for the period.

Perhaps the main finding from this part of the analysis is that the majority of the changes in employment across occupational groups was due (at least, in direct terms) to growth in sectors other than *Manufacturing*. The *Financial, Investment and Real Estate, Government, and Trade* sectors, in particular, played a crucial role in employment growth

for most medium- and high-skill occupations. The *Manufacturing* sector dominated employment prospects for individuals in *Operative* occupations, although it also played an important role in employment within *Crafts* occupations. These, however, were occupations for which labor force and employment growth during the period lagged behind overall growth for the economy. Further, despite the promotion capital-intensive industries and the expected employment of higher-skill individuals in these industries, the *Manufacturing* sector made a minimal contribution to employment growth at this end of the occupational spectrum.

A.4. General Findings

After the economic downturn of the late 1970s and early 1980s, the period from 1982 to 1988 was one of recovery. The number of Puerto Ricans who were active in the labor force increased over the period, surpassing the one million mark in 1988. Employment grew faster than the labor force in most occupational categories resulting in noticeable improvements in unemployment: both in absolute numbers and proportion of those in the labor force.

During the period of study, the Puerto Rican economy continued along its 1970s trend of transformation towards a services-dominated economy. This trend was evidenced by the expansion of output and employment in the Financial, Investment and Real Estate sector, followed by growth in Government, Services and Trade. Judging by the sector's loss in its share of total output and employment, the Manufacturing sector's capacity for further growth had been eroded by the structural transformations and cyclical fluctuations of the late 1970s and early 1980s.

In general, Puerto Rican employment and its growth remained concentrated within skilled occupations. Nothing in the research indicates a move away from this trend. During the period between 1982 and 1988, employment growth was disproportionately

concentrated within *Sales and Clerical* occupations, the largest occupational group during the period, while employment in other medium- and high-skill occupational groups increased sufficiently to keep their shares of total employment stable. Labor force and employment growth, however, appeared to be moving away from *Crafts* and *Operatives* occupations: two of the largest groups at the beginning of the period of study as well as occupations for which Manufacturing has played and continues to play a key role.

Perhaps the main finding from this part of the analysis is that the majority of the changes in employment across occupational groups between 1982 and 1988 was due to (direct) growth in sectors other than *Manufacturing*. The *Financial, Investment and Real Estate, Government, and Trade* sectors, in particular, played a crucial role in employment growth for most medium- and high-skill occupations. *Manufacturing* dominated employment prospects for individuals in *Operative* occupations and played an important role for *Crafts* occupations. However, despite the promotion of capital-intensive industries and the expected employment of higher-skill individuals in these industries, the *Manufacturing* sector made a minimal contribution to employment growth at this end of the occupational spectrum.

B. Puerto Rican Out-migration during the 1980s

For this part of the industrial change and migration model, I estimate a regression model of migration rates per occupation from Puerto Rico to the United States. The model, based on data from the PRPB Migration Survey for 1982 to 1988, is specified in logarithmic form. The reference "sending country," as the model is specified, is Puerto Rico and, to the extent that the available data permit, the reference population in the "receiving country" is Puerto Ricans in the United States.⁹

⁹ This group was selected since, as explained by Prof. Edwin Melendez in his migration research, "ethnicity is an important stratifying factor in US labor markets". Using Puerto Ricans in the U.S. as the reference population in the receiving country may also minimize some of the "noise" in the model caused

B.1. Method and Data

In his research, Meléndez notes that one of the major problems in the study of Puerto Rican migration is the lack of reliable data. Most past analyses of Puerto Rican migration have relied on net movement of passengers as a proxy for migratory flows. However, passenger traffic figures overestimate gross migratory flows and, although useful, do not offer any information about the characteristics of migrants. The decennial censuses of population constitute another major source of data for Puerto Rican migration studies. However, census data is also limited in this application, among various reasons, because migration is not measured directly.

As noted by Meléndez, "(the) recent availability of the Puerto Rican Planning Board (PRPB) Migration Survey offers the opportunity to directly assess the composition and characteristics of Puerto Rican migrants to the United States for a relatively long period of time, from 1982 to 1988." (Forthcoming, b) The survey is based on a sample drawn from all the commercial flights leaving or entering Puerto Rico's International Airport -- almost the exclusive way of traveling abroad.

An emigrant, according to the operational definition used by the PRPB when collecting the data, is a person 16 years or older who leaves the Island intending to remain in the United States for more than three months and whose purpose for traveling is not to visit family or for health reasons. In the survey, migrants are asked about the purpose of their trip, labor force status prior to departure, occupation, age, education, and sex among other characteristics. For the purposes of this study, only migrants in the labor force were selected. The observations were then grouped by quarters, beginning with 1982-3 and through 1988-2 for a total of 24 quarters, and by eight occupational categories. (Table

by the fact that contacts in the receiving country also act as positive influence, rather than a deterrent, in migration.

3B.1 provides the names and definitions of the categories used as well as of the variables used in in the model specification.)

The model developed measures migration tendencies (i.e. rates) by occupation for Puerto Rican emigrants. In this pooled regression model of time-series and cross-sectional data the dependent variable, DDRATE, is the ratio of migrants in an occupation to the number of labor force participants in that occupation in Puerto Rico. Four sets of regressors are included in each model: time series, occupational, demographic, and labor market regressors.

Because of cyclical and seasonal variations in the quarterly data, the first set of regressors are variables trying to control for time-related fluctuations in the data (i.e., quarters, time period, year). Figures 3B.1 and 3B.2 show migration flows and rates, by occupation, from Puerto Rico to the United States for the period of study. Two patterns are evident in the graphs. First, there was a sharp decline in the magnitude of the flows from the recessionary years of 1982 and 1983 to the economic expansion of 1984. Second, there are pronounced seasonal variations in the quarterly data. I included seasonal variables to control for the second type of fluctuations.¹⁰

The occupational regressors include dichotomous (i.e. "dummy") variables. A positive coefficient for any of these indicates that, after controlling for seasonal,

¹⁰ Other variables like time or fiscal years when included in the model proved problematic. Apparently, these variables had non trivial interactions with some of the other key (economic) variables in the model, lowering their significance and/or making their signs erratic.

Two views had to be considered regarding this issue. First, in orthodox theory, migration is considered an equilibrating mechanism. As such, migration flows are expected to prevail as long as differentials in employment and earning opportunities prevail. According to structural theories, once migration flows are established between two "countries" these flows could be expected to persist even after economic conditions between the two countries were equalized (if this were to ever happen) due to the information networks created from previous migration flows. These information networks link labor markets in the sending and receiving countries, effectively making them act as one. I decided to give precedence to economic variables and not include a control for time trends in the data. This decision was based primarily on the fact that, historically, Puerto Rican migration has been economically motivated.

Table 3B.1: Variable names and definitions

Name	Definition	Comments
ln(ddrate)	natural log of the proportion of migrants to the number of Puerto Ricans in the occup of interest	
Constant	Inherent migration rate for the control occupation in the control seasonal quarter	Control occupation is crafts Control season is Spring
Summer	Dichotomous variable controlling for migr statistics for this quarter	
Fall	Dichotomous variable controlling for migr statistics for this quarter	
Winter	Dichotomous variable controlling for migr statistics for this quarter	
ProfTech	Dichotomous variable controlling for migr statistics for this occup	
MangAdm	Dichotomous variable controlling for migr statistics for this occup	
SalesCler	Dichotomous variable controlling for migr statistics for this occup	
Craft	Dichotomous variable controlling for migr statistics for this occup	Variable omitted in most regr since this is control occup
Operatives	Dichotomous variable controlling for migr statistics for this occup	
Svcs	Dichotomous variable controlling for migr statistics for this occup	
Farm	Dichotomous variable controlling for migr statistics for this occup	
Laborers	Dichotomous variable controlling for migr statistics for this occup	
Recode of ln(%dd1624)#	Natural log of the proportion of migrants ages 16 to 24 in the flow for any one occupation in any one quarter	Cases for which %dd1624 was zero (0) and, consequently, ln(%dd1624) would have been undefined were replaced with mean value of ln(%dd1624) across all occupations
Recode of ln(%ddEDHS)#	Natural log of the proportion of migrants High School educ in the flow for any one occupation in any one quarter	Cases for which %ddedhs was zero (0) and, consequently, ln(%ddedhs) would have been undefined were replaced with mean value of ln(%ddedhs) across all occupations
Recode of ln(%ddMALE)#	Natural log of the proportion of migrants who were male in the flow for any one occupation in any one quarter	Cases for which %male was zero (0) and, consequently, ln(%ddmale) would have been undefined were replaced with mean value of ln(%ddmale) across all occupations

Table 3B.1: Variable names and definitions

Name	Definition	Comments
ln(UNPR)	Natural log of the unemployment rate in PR for the occupation of interest at the current time period	
ln(RWG)	Natural log of the estimated real wage gain in PR for the occupation of interest at the current time period	Real wage gain defined as the difference in real wages between PR and US for the occupation of interest, divided by real wages in PR: $(RWUS - RWPR) / RWPR$
LN(%OCC@DEST)	Natural log of the proportion of Puerto Ricans in the occupation of interest in the United States	
Recode of ln(ddWORK)#	Natural log of the Number of migrants leaving with a job offer for any one occupation in any one quarter	Cases for which ddwork was zero (0) and, consequently, ln(ddwork) would have been undefined were replaced with mean value of ln(ddwork) across all occupations

demographic and labor market variations, a particular occupation generally has a higher migration rate than the reference group. The converse is true for occupational regressors with a negative coefficient. *Crafts and related* were selected as the reference group in the model because the average migration rate for this occupational group was the closest to one percent for the period of study. (Table 3B.2 presents the averages by quarters of the characteristics of migrants by occupations.) As such, this control would provide a useful benchmark for comparisons across the different occupational categories.

The set of demographic regressors attempts to control for non-economic characteristics of migrants. These include the percent of male migrants (%ddMALE), percent migrants ages 16 to 24 (%dd1624), and the percent of high school graduates (%ddEDHS). It is well established in the literature that migrants tend to be young men. Among emigrants, 78 percent are male and 37 percent ages 16 to 24. (See Table 3B.2) Further, in the case of Puerto Rican migrations to the United States, men are less educated than the general population while women tend to be more educated.¹¹ If not controlled for, these migrant traits would have an impact on the estimated migration rates for different occupations. For example, in the case of occupations like *Craft and Kindred*, *Farm*, and *Laborers* which are notably male occupations, the occupational emigration rate would be overestimated. Conversely, for *Managers and Administrators* which have a noticeably low proportion of young persons, emigration rates would be underestimated. In general, the proportion of migrants who were high school graduates (a proxy for educational attainment) was high: more than half of emigrants and immigrants had completed high school. Nonetheless, this control was necessary because the proportion of high school graduates is much higher among *Professional and Technical*, and much lower among *Farm* workers and *Laborers*, relative to other occupations. The estimated coefficients for these

¹¹ See Melendez (forthcoming, b) for a detailed discussion of these characteristics for the period under investigation.

Figure 3B.1: Total Departures by Occupation by Quarter (1982.3 - 1988.2)

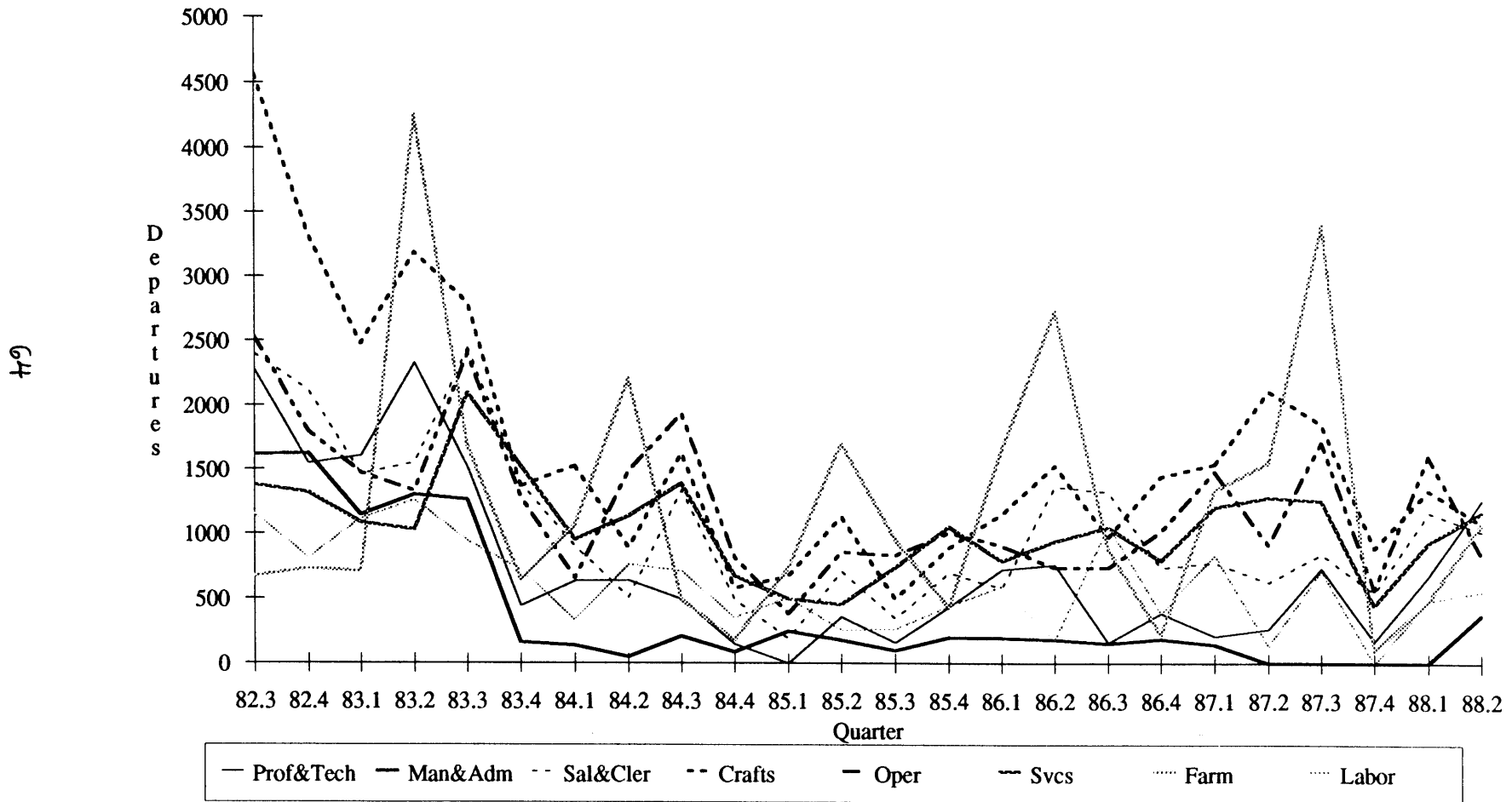


TABLE 3B.2:
Characteristics of Migrants by Occupations, Averages by Quarters (1982-1988)

	ProfTech	MangAdm	SalesCler	Craft	Oper	Svcs	Farm	Laborers	Avg. across All Occup	Total PR Labor Force
EMIGRANTS:										
Departures	750	398	1065	1643	1220	1050	1246	610	998	7982
DDRATE	0.58%	0.45%	0.56%	1.15%	0.74%	0.83%	2.71%	1.26%	1.04%	0.84%
%TOTDD	8.16%	3.92%	13.34%	20.41%	16.16%	14.42%	15.76%	7.82%		
DD1624	252	22	462	568	405	498	534	284	378	
%1624	30.07%	5.43%	40.96%	35.61%	31.22%	45.85%	44.87%	57.53%	37.03%	37.4%
DDEDHS	681	164	870	604	552	532	221	168	473	
%EDHS	93.15%	71.44%	78.36%	36.86%	46.28%	48.41%	15.53%	29.61%	51.95%	46.9%
DDMALE	514	148	533	1461	974	733	1224	597	773	
%MALE	73.42%	65.61%	53.69%	92.18%	76.47%	67.82%	98.93%	98.32%	78.5%	78.0%
DDWORK	392	90	338	545	397	364	758	247	392	
%WORK	57.1%	43.1%	32.1%	37.5%	33.7%	34.0%	51.7%	48.6%		40.2%
%OCC@DEST	9.29%	6.72%	27.06%	11.84%	19.29%	19.10%	1.23%	5.48%	12.50%	
WAGES:										
RWPR	177	190	125	129	123	106	47	102		123
RWUS	417	445	278	360	278	198	189	232		300
RWUS/RWPR	2.36	2.35	2.23	2.8	2.27	1.86	4.08	2.28		2.53
RWDIFF	240	256	153	231	155	92	143	130		175
RWG	1.3588	1.3508	1.2275	1.8012	1.2733	0.8637	4.08	1.275	1.5289	
UNEMPLOYMENT:										
UNPR	6.28%	5.71%	15.06%	32.97%	21.63%	16.60%	28.80%	37.39%	20.56%	
UNEMPPR	8,470	5,462	28,814	47,174	35,765	21,147	13,646	18,256	22,342	

regressors were expected to have a negative correlation with migratory rates. That is, as the proportion of migrants in a given occupation choosing to leave Puerto Rico increased, flows were expected to be less positively selected.

The last set of regressors pertains to the labor market characteristics of migrants and constitutes the core of the model. I included a control for the occupational unemployment rate in Puerto Rico (UNPR) -- a "push" factor -- and for the number of migrants with employment at the destination at the time of departure (ddWORK) -- a measure of demand for Puerto Rican labor abroad.¹² Each of these variables was expected to have a positive correlation with migration rates. That is, as unemployment in Puerto Rico or labor demand in the United States for any given occupation increased, migration rates for that occupation were expected to rise.

An occupational distribution variable (%OCC@DEST) was also included to control for the distribution of Puerto Rican employment in the receiving country.¹³ This variable was also expected to have a positive impact on occupational migration rates. The rationale for this was that for occupations with a higher concentration of Puerto Rican employment in the U.S., information on labor market conditions abroad would be more easily available (perhaps also more reliable) and that adaptation to the U.S. labor market would be easier. Then, all other factors held constant, migration rates for occupations with a higher concentration of Puerto Rican employment in the U.S. would be expected to have higher migration rates.

¹² By including ddWORK, the reference population for each occupational group is then migrants who were either looking for jobs or did not intend to be in the labor force. Contrary to conventional wisdom, a relatively large number of emigrants (on the average 57 percent) reported that they had a job offer at their destination at the time of departure. The proportion of migrants who reported having a job offer was also high at both ends of the occupational spectrum. Migrants in *Professional and Technical, Managerial and Administrative*, and *Farm* occupations, as well as *Laborers* all had above average percents.

¹³ As noted by Melendez in his study of selectivity in Puerto Rican migration, ethnicity is an important stratifying factor in the US labor markets. For this reason, like in his study, I selected the distribution of Puerto Rican employment in the United States rather than the overall distribution of employment for this variable.

Wage differences are considered one of the most important determinants of migration in the literature. Across all occupations, for the period of study, median weekly earnings were substantially higher in the United States than in Puerto Rico: about two and a half times higher on average. The average wage difference, deflated for inflation, was \$175. This difference, however, was higher for high-wage occupations and lower for low-wage occupations. (See Table 3B.2). For the regression model, I decided to include an index of wage gains (RWG), rather than wage ratios or wage differentials in belief that these better reflect the economic gains from migration.¹⁴ The variable, hypothesized to have a positive correlation with migration rates, was defined as the difference in real median weekly earnings in the United States and Puerto Rico, for the occupation of interest, divided by real median weekly earnings in Puerto Rico. This formulation also standardized wage differentials across occupations allowing for greater comparative ability across the different groups. Thus, higher migration rates were expected for those occupations for which the estimated wage gains were the greatest.

Finally, by controlling for potential differences in occupational migration rates through the use of "dummies," the implicit assumption of the model was that the effects of wage and employment opportunity differentials were statistically the same across occupations. However, my hypothesis was in effect that these assumptions would not be borne out. I expected occupations to be differentially more or less sensitive to changes in these two determinants of migration and, consequently, for migration flows to respond more or less to changes in these two variables.¹⁵ Therefore, a separate model of

¹⁴ As Melendez points out, wage differences can be relatively the same for different occupations. A case in point is that of sales and clerical workers in Puerto Rico in contrast to farm workers. With a similar difference in real median weekly earnings of approximately \$150, the wage ratio is only 2.23 for sales and clerical workers but a significantly higher 4.08 for farm workers. Other things equal, one would expect that wage disparities between Puerto Rico and the United States would affect farm workers more, inducing a higher migration rate, than sales and clerical occupations.

¹⁵ This formulation takes into consideration the idea that for occupations the motivation for migration may be different. In declining occupations, for example, conformity might have already set in and migration rates may in actuality be lower than otherwise expected. In stable occupations, the pattern might be more one of Puerto Rico's labor market as "staging" for US market. In "shock" occupations, the

emigration rates was then also specified based on the assumption that the "sensitivity" of each group to the same economic variables could be different across occupations.

B.2. Discussion of Findings

I estimated two types of models. The first model uses the approach referred to as the covariance or fixed effects model (OLSFE). In it, a dummy variable is included for each occupation to represent cross-sectional effects. The second model is a disaggregated variable effects model (OLSDVE). In it, terms are included to control for occupation-wage and occupation-unemployment interactions. Table 3B.3 presents the results of these experiments.

The number of migrants that had a job offer at the time of departure, unemployment rates in Puerto Rico, wage gains from migration, and the distribution of Puerto Rican employment at the destination all proved significant factors affecting migratory rates. Once included, labor market variables explained 25 percent of the variation in migratory rates. (See model OLSFE and compare to OLSFE-2 in Table 3B.3).

Employment opportunities abroad (i.e., labor demand in the U.S.) were found to be a particularly significant factor for migratory rates. The number of migrants leaving with job offers (ddWORK) was found to account for approximately 16 percent of the variation explained by labor market variables. (Compare model OLSFE to OLSFE-3 in Table 3B.3). The larger the number of migrants in a given occupation who had a job offer when leaving (i.e., the better employment opportunities in the United States), the larger the migration rate for that occupation. This factor proved more significant than the distribution of Puerto Rican employment in the United States (%OCC@DEST). This variable --

pattern might be one related more to "desperation" when faced with an unexpected change in or lack of employment opportunities in the island. These occupational differentials could best be described by a concept of "elasticity" or differential sensitivity to changes in the economic conditions in the Island and is consistent with the logarithmic formulation of the model.

formulated to capture labor market segmentation in the U.S. and, to some extent, ease of adaptation to labor market conditions abroad -- was found to have a positive correlation with migration rates, but its effect was of much lower magnitude than that for `ddWORK`.

Unemployment rates in Puerto Rico proved one of the most significant determinants of migration rates. As expected, the higher the unemployment rate for Puerto Ricans in a given occupational group, the more likely individuals in that occupational group were to migrate. The coefficient for this term, however, was less than unitary implying that migration is somewhat unemployment inelastic. That is, with increases in unemployment rates, migration rates will increase but by a lesser magnitude.

In the OLSFE model, estimated wage gains were found to be a significant determinant of migration rates. However, this variable was estimated to have a negative effect on migratory rates. This result is attributed to the narrow variance of the wage gains variable in combination with the strong negative trend in the data on migration rates. (See Figure 3B.3). My explanation is that there are two contradictory effects in wage gains in a time series--cross-sectional pooled data model. The first effect is produced by occupations: as explained before, the greater the potential wage gains from migration, the higher the migration rate for any given occupation. The second, a strong negative time-series effect was due to the business cycle. Because the period from 1982 to 1988 was one of recovery from a recession and recovery was slower in Puerto Rico than in the United States, wages increased faster abroad. (See Figures 3B.4, 3B.5, and 3B.6). During the same period, however, migration rates fell. Thus, the correlation between migration and wage gains was negative and dominated during the period of study. Although different formulations of this

Table 3B.3: Regression Coefficients for Migration Rate Equations

MODELS: $y = \ln(\text{DDRATE})\#$	OLSFE	OLSFE-1	OLSFE-2	OLSDVE
Statistics				
n =	186	186	186	186
R-square =	0.739	0.4187	0.5042	0.7369
Adj R-Square =	0.7126	0.3855	0.4667	0.6977
F =	27.9883	12.605	13.4553	18.7904
DW =	1.6413	1.1187	1.2188	1.6992
Constant	-6.3803	-4.6681	-5.1192	-7.0282
Summer	0.0103 0.0993	0.1103 0.7447	0.1172 0.8363	0.0221 0.2034
Fall	-0.0227 0.2139	0.2889 1.9502**	0.2185 1.5630	-0.0038 0.0345
Winter	-0.1721 1.6278*	-0.2199 1.4760	-0.2004 1.4165	-0.1716 1.5673
ProfTech	-0.0092 0.0159	-0.8786 4.2156**	-0.6764 2.8236**	
MangAdm	0.0578 0.0975	-1.2308 5.6922**	-1.2888 5.4835**	
SalesCler	-0.9349 2.3989**	-0.7406 3.5925**	-0.7794 3.1792**	
Craft	CONTROL	CONTROL	CONTROL	
Operatives	-0.6616 2.4012**	-0.3887 1.8853*	-0.4266 2.1336**	
Svcs	-0.8999 2.0015**	-0.2439 1.1832	-0.3519 1.6956*	
Farm	2.0394 4.2927**	0.6507 3.1566**	0.5340 2.5754**	
Laborers	0.1853 0.787	0.1197 0.5743	0.1265 0.6396	
Recode of $\ln(\%dd1624)\#$	-0.2094 2.5873**		-0.0394 0.3756	-0.2044 2.3685**
Recode of $\ln(\%ddEDHS)\#$	-0.1583 1.6473*		-0.3517 2.7466**	-0.1787 1.7658*
Recode of $\ln(\%ddMALE)\#$	-0.4467 3.6859**		-0.5433 3.3353	-0.3634 2.7296**
$\ln(\text{UNPR})$	0.5589 1.8349*			DISAGGREG
$\ln(\text{RWG})$	-1.3413 3.2409**			DISAGGREG
$\text{LN}(\% \text{OCC@DEST})$	0.2667 1.7244*			0.1579 1.0118
Recode of $\ln(\text{ddWORK})\#$	0.5455 9.6479**			0.54 9.1481**

Table 3B.3: Regression Coefficients for Migration Rate Equations (cont.)

MODELS: $y = \ln(\text{DDRATE})\#$	OLSFE	OLSFE-1	OLSFE-2	OLSDVE
ln(UNPR)*P&T				1.6977 2.0992**
ln(UNPR)*M&A				0.2121 0.8065
ln(UNPR)*S&C				0.679 1.8888*
ln(UNPR)*CRAFT				-0.1599 0.1333
ln(UNPR)*OPER				0.6848 1.5291
ln(UNPR)*SVCS				0.7572 2.3002**
ln(UNPR)*FARM				-0.645 0.8934
ln(UNPR)*LABOR				0.1136 0.2105
ln(RWG)*P&T				3.7108 1.3891
ln(RWG)*M&A				-3.1237 1.788*
ln(RWG)*S&C				-1.8776 1.7*
ln(RWG)*CRAFT				-1.9715 0.8669
ln(RWG)*OPER				-1.109 0.8905
ln(RWG)*SVCS				-1.1927 0.7868
ln(RWG)*FARM				-0.7242 1.1041
ln(RWG)*LABOR				-1.078 1.1021

LEGEND:

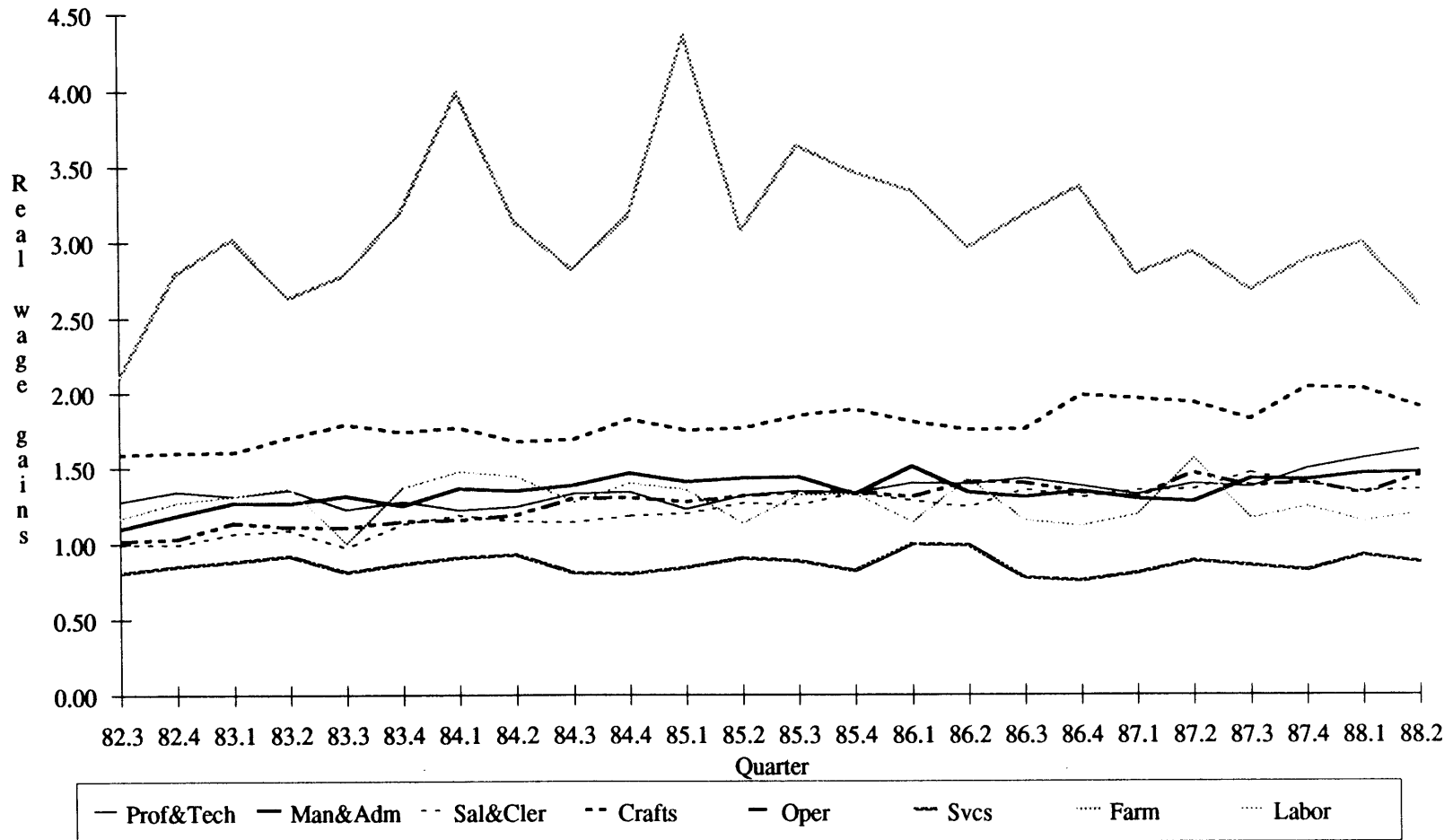
* SIGNIFICANT AT 90% CONFIDENCE LEVEL

** SIGNIFICANT AT 95% CONFIDENCE LEVEL

INCLUDES RECODED VARIABLES: Undefined cases of independent variable were replaced with mean value

Figure 3B.3: Wage Gains from Migration by Occupation by Quarter (1982.3 - 1988.2)

73



**Figure 3B.4: Median Weekly Wages, Across Occupations in Puerto Rico and the U.S.
(1980.3 - 1988.2)**

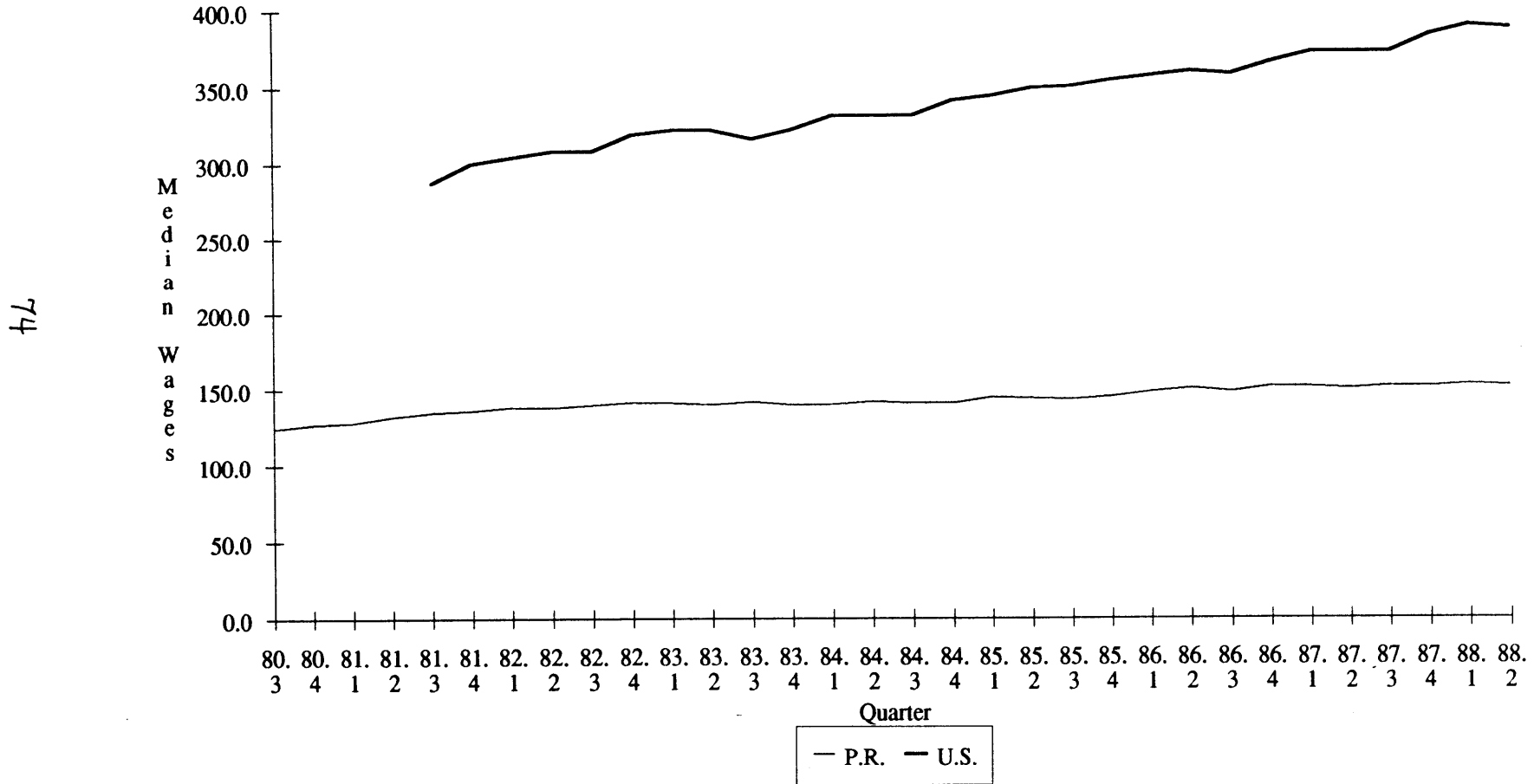


Figure 3B.5: Implicit Price Deflators for Gross National Product (1982 = 100)

75

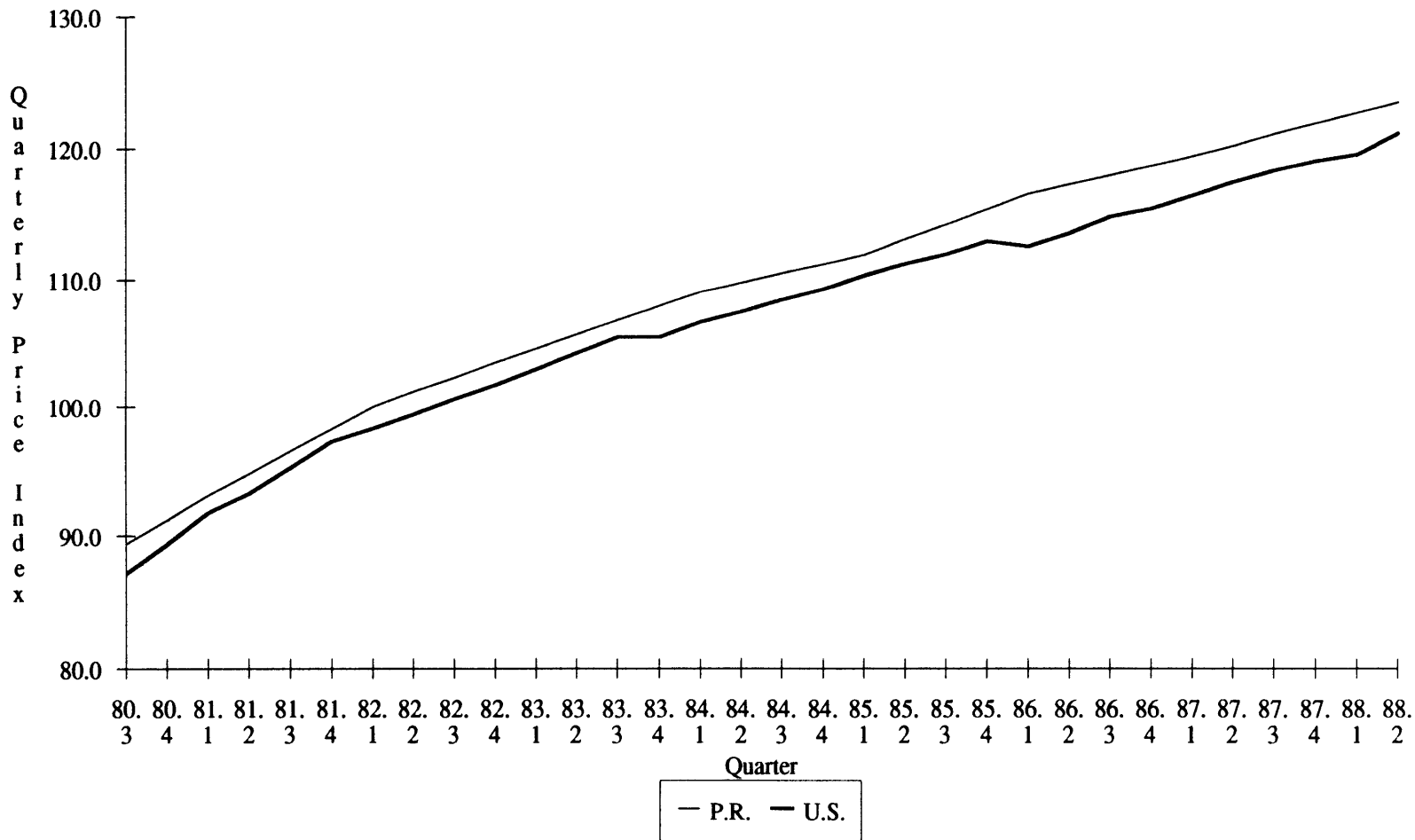
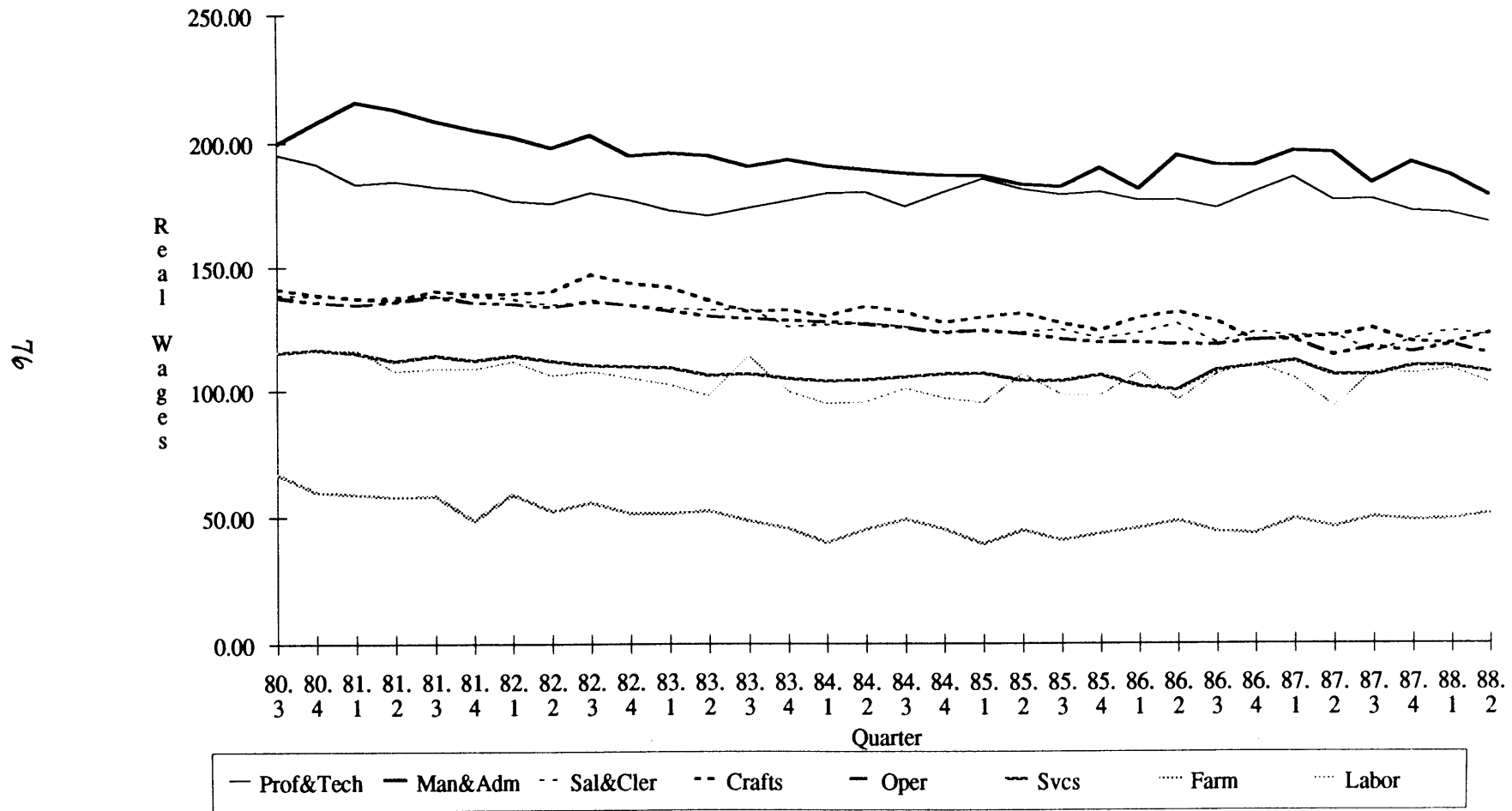


Figure 3B.6: Real Weekly Wages in Puerto Rico by Occupation by Quarter (1980.3 - 1988.2)



variable were used in an attempt to disaggregate these two effects, none of the formulations tried was able to accomplish this and correct the problem.

For the estimation of the fixed effects model (OLSFE), first a regression including only seasonal and occupational controls was performed. (See model OLSFE-1 in Table 3B.3). In this first step, most occupations had inherent migration rates significantly lower from that estimated for *Crafts*, the control occupation: .009 percent. *Professional and Technical, Managerial and Administrative, Sales and Clerical, Operatives, and Services* all had significantly lower migration rates. *Farm* was the only occupational group with a significantly higher migration rate: .018 percent. Once controls for migrant characteristic and economic variables were included, a lesser number of occupations was significantly different from the migration rate estimated for *Crafts*.¹⁶ (Compare OLSFE with OLSFE-1 in Table 3B.3). The estimated inherent migration rates for the control and most other occupations was also lower: for *Crafts* it was now 0.002 percent. Again, significantly higher migration rates were noted only for *Farm* occupations: .013 percent.

In terms of seasonal differences, the winter quarter alone displayed a significant negative correlation with migratory rates. It is important to note, however, that this variable may have been capturing the more seasonal character of migration for individuals in *Farm* and *Laborer* occupations rather than seasonal variation of migration rates across all occupations.

Among the regressors for migrant characteristics, the percent ages 16 to 24, the percent high school educated and the percent male all proved significant factors affecting occupational migration tendencies. As expected, all migrant characteristic variables had a negative correlation with migratory rates indicating that as the tendency to migrate among

¹⁶ When a occupation coefficient proves significant if labor market variables are excluded, but not significant once they are, this indicates that the occupation coefficient was capturing some of the effects of other labor market conditions.

individuals in any one occupation increases, migratory flows tend to be less indicative of "positive selectivity." Further, given the inclusion of these controls in the fixed effects regression, the coefficients for occupational "dummies" can be interpreted as capturing the effects of age, gender, and educational levels on migratory flows given their predominance among individuals in that occupation.

With unemployment and wage effects disaggregated by occupations to allow for variable cross-sectional effects on migration rates, parameter estimates and their significance varied somewhat but the overall explanatory power of the model did not increase. (See model OLSDVE in Table 3B.3). Unemployment rates in Puerto Rico had a significant positive correlation with the dependent variable for the *Professional and Technical*, *Sales and Clerical*, and *Services* occupational categories. In the case of *Professional and Technical* occupations, migration rates were found to be unemployment elastic. That is, unlike in the fixed effects model, a one percent increase in the unemployment rate of *Professionals and Technical* in Puerto Rico were expected to result in an increase of more than one percent in the occupational migration rate. Estimated wage gains were a significant factor on migration rates for only two occupations: *Sales and Clerical* and *Managerial and Administrative* occupations. The coefficients for these terms remained negative but displayed lower significance (i.e., the estimated coefficients were significant at a confidence level of 90 rather than 95 percent.) The number of migrants with job offers abroad at the time of departure again proved to be one of the most significant factors for migration rates. An increase of one percent in ddWORK for the occupation of interest was estimated to result in an increase of over half a percent in migratory rates. Also in the OLSDVE model, the proportion of Puerto Ricans in the occupation of interest abroad displayed a positive correlation with migration rates, but this effect failed to be significant once other labor market variables had been included. Perhaps the main finding from this particular model formulation was then that, for the period of study, developments

in unemployment in Puerto Rico and labor market opportunities abroad, rather than potential wage gains from migration, appeared to be the most significant factors affecting occupational migratory rates.

In the OLSVDE model, seasonal effects on migratory rates were all estimated to be negative but non significant. In the case of migrant characteristics, all variables proved significant factors affecting migration rates. The controls for migrant characteristics also displayed a negative correlation with migration rates in this model formulation, indicating that as the migration rate for a particular occupational category increases, the proportion of migrants who are male (i.e., gender selectivity) or young (i.e., age selectivity) decreases.

In general, the explanatory power the models tried was statistically the same. Adjusted R-squared statistics for the models ranged between 70 and 71 percent. A significantly higher F-statistic was found for the fixed effects model: 28 percent compared to 19 percent for the disaggregated variable effects model. The Durbin-Watson statistic testing for heteroscedasticity ranged between 1.64 and 1.67 for both models. For the period of study, the fixed effect model minimized the Sum of Squared Errors (SSE). The SSE statistics, however, were fairly close for the two model formulations tried.

C. Migration and Economic Development in Puerto Rico (1982-88)

Much has been speculated regarding the impact a change in political status could have on migration. Little, however, has been concluded because previous studies have failed to establish the relationship between the industrial structure of the Puerto Rican economy and the levels and composition of migratory flows as these exist today. As a result, understanding how Puerto Rican migration is driven has taken on increased urgency.

The goal of my research has been to simulate the link between the industrial structure of the Puerto Rican economy -- and the resulting levels and occupational structure of employment -- to the levels and composition of migratory flows between Puerto Rico and the U.S. as these prevailed during the 1980s:

Δ industrial structure ---> Δ occupational structure of employment ---> Δ migratory flows

To this end, I used 1982-88 data from the Puerto Rico Planning Board (PRPB) migration survey combined with a 1982 Input-Output (I-O) model to create a two-part economic model of the Puerto Rican economy. In the first part, I used the I-O methodology to discuss how industrial changes in Puerto Rico between 1982 and 1988 were reflected in changes in the insular economy and labor markets. In the second part, I used the PRPB survey data to create a regression model of out-migration tendencies, by occupation, given pertinent labor market conditions in Puerto Rico and the United States.

The Input-Output analysis showed that, between 1982 and 1988, Puerto Rican employment remained concentrated in skilled rather than unskilled occupations. The statistics for labor force participation, employment and unemployment analyzed, nonetheless, suggested that, during the same period, the insular labor force was undergoing a transformation: away from medium-skill occupations like *Crafts* and *Operatives* towards greater polarization. Growth in the labor force and employment was dominated by occupations like *Sales and Clerical* and *Services* at the lower end of the occupational spectrum and *Professional and Technical* and *Managerial and Administrative* at the high-end.

Manufacturing continued to be a key sector of the Puerto Rican economy, but primarily for production. The focus of the industrialization program towards capital-intensive production was reflected in the dramatic expansion of output figures but limited employment generation within the sector.

Thus, Puerto Rico continued along its 1970s trend of transformation towards a services-dominated economy. Sectors like *Financial, Investment, and Real Estate, Services, and Government* had large gains in their total output levels but, perhaps more important, accounted for the majority of employment being generated within "growth" occupations.

Manufacturing experienced losses in its shares of total output and employment. The sector, nonetheless, continued to dominate the employment prospects for individuals in *Operative* occupations and also played an important role for *Crafts*. However, its new-job contributions to occupations expanding their shares of the labor force (i.e. *Sales and Clerical and Services*) and to total employment during the period of study were rather limited. Further, despite the promotion of capital-intensive industries and the expected expanded employment of higher-skill individuals in these industries, *Manufacturing* also made a minimal contribution to employment growth at this end of the occupational spectrum. Thus, future employment growth within the Puerto Rican economy appears to lie both within sectors other than *Manufacturing* and a different kind of industrialization.

In terms of the analysis done regarding migration and the industrial structure of the economy, without doubt, the main finding has been that, from 1982 to 1988, Puerto Rican migration was driven primarily by employment opportunities -- that is, job growth and unemployment in Puerto Rico and employment opportunities in the United States -- rather than by income-earning differentials between island and mainland. During the period of study, as employment in most occupations grew at a rate faster than labor force growth and unemployment was consequently alleviated, migration rates fell -- despite persistent and expanding wage gains to be obtained from employment opportunities abroad. The implication of this research finding would then be that the key to influencing patterns of Puerto Rican migration in the following decades lies in the preservation of existing

employment and the generation of new opportunities, rather than in the promotion of firms or industries providing higher-pay positions.

Finally, in the context of persistently high unemployment across most occupations in Puerto Rico, low labor force participation rates, and persistent wage differentials between island and mainland, these findings point to an understanding of Puerto Rican migration as a coping mechanism. The low "inherent" migration rates encountered indicate that this is nonetheless a mechanism of last resort. Limited employment opportunities both in Puerto Rico and abroad translate into the migratory flows of individuals seeking a solution to the labor market difficulties faced day by day but who are also aware of the dislocation and adjustment such a decision entails.

**IV. Potential Directions in Economic Development for Puerto Rico
in the Year 2000 and their Implications for Migration**

IV. Potential Directions in Economic Development for Puerto Rico in the Year 2000 and their Implications for Migration

In his research, Professor Angel Ruiz uses the years of 1992 and 2000 for the estimation of changes in production, employment, and income -- per industrial sector -- to result from a change in 936 industrial policies in the Island. Five scenarios for each of these years were constructed. In the first -- a base scenario -- it is assumed that the different sectors of the economy would continue growing at their estimated rate for the period from 1973 to 1988.¹ In the second and third scenarios, changes were estimated based on a reduction of final demand of 936 industries, to occur between the years 1992 and 2000. Two magnitudes of reduction (representing the two separate scenarios) were considered: 37 and 20 percent.² In the final two scenarios, the same reduction magnitudes, 37 and 20 percent, for final demand of 936 industrial sectors are kept but combined with a (policy-induced) expansion in the final demand of non-936 manufacturing enterprises. In these last two scenarios, non-936 industries are assumed to grow during the period between 1992 and 2000 at their maximum historical rates, thus somewhat compensating for the decline in subsidized industrial production.³

Each industrial scenario was developed using the 95-sector 1982 Input-Output model of the economy.⁴ The solution to the model describes the impacts these changes

1 The exception were "936" manufacturing industries. Due to unavailability of data, their estimated growth rates were based on data for the period between 1982 and 1988.

2 These 37% and 20% reduction magnitudes were based on estimates from the Congress Budget Office and the Pro-Independence Party in the Island, respectively.

3 This figure was around a 3% annual growth rate between 1992 and the year 2000.

4 The use of an Input-Output model to estimate these scenarios, in and of itself, assumes the structure of production (i.e. technology) of the different sectors of the Puerto Rican economy will remain basically the same between 1982 and 2000. This is a problematic assumption since industries can and do change the proportions in which they use different inputs (including capital and labor) to adjust for changes in prices or the sheer availability of certain inputs. Technological improvements occur and, at times, whole sectors -- as defined within the I-O framework -- emerge or disappear. The period between 1982 and 2000 is a sufficiently long one for some of these changes to occur and be expected. Yet, a static model, the I-O framework assumes that these changes will be negligible. (For a discussion of these and some other

would have on the levels of production, employment, and income for each of the 95 industrial sectors and for the economy as a whole.⁵

The rationale used to develop the migration projections discussed in this chapter was as follows. Changes in the industrial structure of the Puerto Rican economy -- resulting from changes in final demand and, consequently, the output levels of specific industries -- translate into changes in the overall levels and occupational distribution of employment in the Island. These changes in the industrial demand for labor across different occupations combine with supply side changes to determine overall employment and unemployment levels in the Puerto Rican economy. Given that unemployment in Puerto Rico was found to be a significant factor in the determination of migration rates across occupations, holding all other factors constant, it is then possible to estimate the scenario-specific impacts on migration.

In order to conduct my analysis, I allocated and aggregated the aforementioned employment projections by the same eight major industrial sectors and eight occupational categories utilized in the previous section. To this end, I utilized the occupational employment allocation matrix also used in chapter three and obtained overall scenarios for

limitations of the I-O framework, please refer to Miller A. Blair's Input-Output Analysis, Foundations, and Extensions. Englewood Cliffs, NJ: Prentice Hall, Inc. 1985.)

Prof. Ruiz, when developing the figures for output, employment, income and final demand for 1988, did make an attempt to check the reliability of these projections with historical data from the PRPB. In most cases, the estimates were very close to the actual figures, which makes me more comfortable with using these projections. Nonetheless, to extend such assumptions through the year 2000 will remain problematic and will have to be taken into account in the final analysis of migration projections. Were drastic changes in the structure of the economy of Puerto Rico (or in the structure of production of key sectors within it) to become evident by the year 1992, many of the projections made would become invalid. To date, however, this does not appear to be the case.

⁵ To estimate the base scenario projections as well as the changes in final demand from the 1982 I-O model, final demands for 1988 had to be constructed. These were based on PRPB data on total sales of 936 and non-936 firms from 1982 to 1988 and data on the production of these sectors, as defined in the I-O methodology, for 1982. These final demands were then projected for 1992 and 2000. These final demands were divided into three groups: (a) Final demand for 936 manufacturing products, (b) Final demand for non-936 manufacturing products, and (c) final demand for the products of all remaining sectors. This disaggregation made it possible to analyze the specific impacts on production, employment and income of 936 enterprises, of non-936 enterprises, and of the rest of the economy, as well as their aggregated impact.

the industrial demand for labor across occupations in the economy. These projections of employment by occupation for the economy as a whole were then used -- in combination with scenarios of labor force growth within each occupation -- as a starting point for the analysis of potential migration impacts the industrial scenarios developed by Prof. Ruiz. Because industrial policy changes are projected to take effect in the period between 1992 and 2000, I limited my analysis to three of the scenarios for the year 2000. It is hoped that these represent the upper and lower bounds of potential scenarios for the Puerto Rican economy for that year.

In this chapter, I follow the above-described rationale to analyze the potential migration impacts, across occupations, of the following: (a) the base scenario for the year 2000, (b) the worst-case reduction scenario (i.e. 37 percent reduction of 936 final demand with no compensatory measures), and (c) the best-case reduction scenario (i.e., 20 percent reduction of 936 final demand with compensation from non-936 manufacturing).

The chapter is organized into four sections. In the first, I offer a brief description of the economic scenarios for which migration impacts are discussed. In the second section -- before discussing the unemployment and, consequently, migration impacts of each scenario -- I describe the methodology used to develop the labor force projections for each occupation in the year 2000. These were used to develop the best-case, middle-ground, and worst-case occupational unemployment projections determining the migration scenarios discussed in the third section. Finally, in the fourth section, I review the main findings from this exercise.

A. Three scenarios for the Puerto Rican Economy in the Year 2000

In this section, I discuss the main elements of those scenarios developed by Prof. Angel Ruiz for the Puerto Rican economy in the year 2000 for which potential migration impacts are analyzed.

- Base Scenario: No changes in 936 industrial policy

In this scenario, final demand for the Puerto Rican economy is projected to increase by \$16 billion from 1988 to 2000. (See Table 4.1). Of this amount, half would be due to growth in Manufacturing final demand. Within Manufacturing, expansion of final demand is almost exclusively due to 936 growth: changes in non-936 industrial final demand account for less than 1 percent of the final demand changes for the Manufacturing sector as a whole.

Total production (i.e., intermediate sales and sales to final users, adjusted for changes in inventories) for the economy as a whole is projected to grow from \$50.5 billion in 1988 to \$72.6 billion by the year 2000, which represents an average annual change of 3.6 percent.⁶ (See Table 4.2). As for the period between 1982 and 1988, Manufacturing is expected to continue dominating the overall production outlook of the Puerto Rican economy. Production in this sector alone is expected to account for 44 percent of the total for the economy in the year 2000; output increases within the sector account for 40 percent of overall output growth in the economy between 1988 and 2000.

As a result of the final demand and production changes in this scenario, total employment (i.e., labor demand) is projected to grow at an average annual rate of 1.8

⁶ GNP figures were estimated using independent econometric analysis. These figures, nonetheless, coincided with those estimated using the I-O model.

TABLE 4.1: FINAL DEMAND OF THE PUERTO RICAN ECONOMY
Fiscal year 1988 and Projections for Year 2000 (Different Scenarios)
(in thousands of dollars: 1982 = 100)

Industrial Group					Reduction in 936 FD			Reduction in 936 FD and Compensatory Policies		
	1988	Base Scenario			37% Reduction Scenario			20% Reduction Scenario		
		2000	Δ88-2000	% Δ88-2000	2000	Δ Base Scen	% Δ BaseScen	2000	Δ Base Scen	% Δ BaseScen
AGRICULTURE	172,102	200,243	28,141	16.35%	200,243			200,243		
MINING AND CONSTRUCTION	1,992,213	2,133,505	141,292	7.09%	2,133,505			2,133,505		
MANUFACTURING	16,059,843	24,094,659	8,034,816	50.03%	14,492,380	-9,602,279	-39.85%	19,039,859	-5,054,799	-20.98%
936 MANUFACTURING	12,464,081	20,473,871	8,009,790	64.26%						
NON-DURABLES MFG	11,130,257	17,130,950	6,000,693	53.91%	9,969,728	-7,161,221	-41.80%	13,085,812	-4,045,138	-23.61%
936 NON-DURABLES MFG	8,291,433	15,050,772	6,759,339	81.52%						
Apparel and clothing	988,085	723,505	-264,580	-26.78%	462,518	-260,987	-36.07%	614,534	-108,971	-15.06%
936 Apparel and Clothing Mfg	645,133	579,812	-65,321	-10.13%						
Clothing and Misc. Accessories	901,817	565,506	-336,311	-37.29%	373,494	-192,012	-33.95%	486,950	-78,556	-13.89%
936 Clothing and Misc. Accessories	572,460	426,576	-145,884	-25.48%						
Chemicals, Petrochemicals, and Pharmaceuticals	6,537,550	6,335,924	-201,626	-3.08%	4,064,182	-2,271,742	-35.85%	5,389,251	-946,673	-14.94%
936 Chemical Mfg	5,208,649	5,046,944	-161,705	-3.10%						
Pharmaceuticals	4,800,420	5,100,916	300,496	6.26%	3,144,347	-1,956,568	-38.36%	4,268,260	-832,655	-16.32%
936 Pharmaceuticals	4,355,112	4,346,747	-8,365	-0.19%						
DURABLES MFG	4,929,586	6,963,709	2,034,123	41.26%	4,522,652	-2,441,057	-35.05%	5,954,048	-1,009,661	-14.50%
936 DURABLES MFG	4,172,648	5,423,099	1,250,451	29.97%						
Machinery, exc. Electrical	862,753	614,395	-248,358	-28.79%	347,826	-266,569	-43.39%	497,031	-117,364	-19.10%
936 Machinery, exc. Electr., Mfg	810,315	592,215	-218,100	-26.92%						
Electric and Electronic Machinery	2,474,872	3,704,058	1,229,186	49.67%	2,182,119	-1,521,939	-41.09%	3,043,535	-660,523	-17.83%
936 Electric and Electronic Machinery Mfg	2,096,930	3,381,166	1,284,236	61.24%						
Prof & Scientific Instruments	1,092,554	1,705,397	612,843	56.09%	1,231,241	-474,156	-27.80%	1,526,442	-178,956	-10.49%
936 Prof & Scientific Instruments Mfg	1,001,703	1,053,394	51,691	5.16%						
TRANSPORT, COMMUN., AND PUBLIC UTIL.	1,721,321	2,099,088	377,767	21.95%	2,099,088			2,099,088		
FINANCIAL, INSURANCE AND REAL ESTATE	3,008,449	7,625,991	4,617,542	153.49%	7,625,991			7,625,991		
WHOLESALE AND RETAIL TRADE	4,204,460	4,909,985	705,525	16.78%	4,909,985			4,909,985		
SERVICES	2,133,124	2,768,315	635,191	29.78%	2,768,315			2,768,315		
Touristic Hotels and Other Rooming Services	322,380	265,649	-56,730	-17.60%	265,649			265,649		
Medical/Health Services	702,934	934,360	231,426	32.92%	934,360			934,360		
GOVERNMENT	4,158,782	6,506,305	2,347,523	56.45%	6,506,305			6,506,305		
Total	33,450,295	50,338,091	16,887,796	50.49%	40,735,813	-9,602,279	-19.08%	45,283,292	-5,054,799	-10.04%

Source:
Author's allocations based on I-O tables and estimates of Final Demand done by Prof. Angel Ruiz (1988a).

TABLE 4.2: PRODUCTION GENERATED BY FINAL DEMAND OF THE PUERTO RICAN ECONOMY
Fiscal Year 1988 and Projections for Year 2000 (Different Scenarios)
(in thousands of dollars: 1982 = 100)

Industrial Group	Base Scenario				Reduction in 936 FD			Reduction in 936 FD and Compensatory Policies		
	1988	2000	Δ88-2000	%Δ88-2000	37% Reduction Scenario			20% Reduction Scenario		
					2000	Δ Base Scen	%Δ Base Scen	2000	Δ Base Scen	%Δ Base Scen
AGRICULTURE	604,943	627,730	22,787	3.77%	545,008	-82,722	-13.18%	596,589	-31,141	-4.96%
MINING AND CONSTRUCTION	2,443,419	2,819,752	376,333	15.40%	2,756,045	-63,707	-2.26%	2,793,803	-25,949	-0.92%
MANUFACTURING	23,442,840	32,172,008	8,729,169	37.24%	22,369,028	-9,802,980	-30.47%	28,139,706	-4,032,303	-12.53%
NON-DURABLES MFG	16,421,408	21,741,814	5,320,406	32.40%	15,193,755	-6,548,059	-30.12%	19,054,902	-2,686,912	-12.36%
Apparel and clothing	1,049,454	793,173	-256,281	-24.42%	518,551	-274,622	-34.62%	678,517	-114,655	-14.46%
Clothing and Misc. Accessories	957,064	628,149	-328,915	-34.37%	423,770	-204,379	-32.54%	544,429	-83,720	-13.33%
Chemicals, Petrochemicals, and Pharmaceuticals	9,312,428	10,016,772	704,345	7.56%	7,128,266	-2,888,506	-28.84%	8,823,689	-1,193,083	-11.91%
Pharmaceuticals	4,895,976	5,232,542	336,566	6.87%	3,270,030	-1,962,512	-37.51%	4,397,394	-835,148	-15.96%
DURABLES MFG	7,021,432	10,430,194	3,408,762	48.55%	7,175,273	-3,254,921	-31.21%	9,084,803	-1,345,391	-12.90%
Machinery, exc. Electrical	1,232,249	1,089,206	-143,044	-11.61%	695,223	-393,983	-36.17%	917,938	-171,268	-15.72%
Electric and Electronic Machinery	2,987,283	4,360,938	1,373,655	45.98%	2,692,702	-1,668,236	-38.25%	3,638,336	-722,602	-16.57%
Prof & Scientific Instruments	1,325,194	2,043,340	718,146	54.19%	1,514,028	-529,312	-25.90%	1,841,379	-201,961	-9.88%
TRANSPORT, COMMUN., AND PUBLIC UTIL.	3,985,018	5,455,785	1,470,767	36.91%	5,004,824	-450,961	-8.27%	5,270,527	-185,258	-3.40%
FINANCIAL, INSURANCE AND REAL ESTATE	5,031,011	10,590,564	5,559,552	110.51%	10,320,887	-269,676	-2.55%	10,479,529	-111,035	-1.05%
WHOLESALE AND RETAIL TRADE	5,130,861	6,199,709	1,068,848	20.83%	5,963,940	-235,769	-3.80%	6,102,314	-97,395	-1.57%
SERVICES	5,563,125	7,902,685	2,339,560	42.05%	7,271,855	-630,830	-7.98%	7,644,391	-258,294	-3.27%
Touristic Hotels and Other Rooming Services	656,202	767,763	111,560	17.00%	714,434	-53,329	-6.95%	745,798	-21,964	-2.86%
Medical/Health Services	839,947	1,131,368	291,421	34.70%	1,130,322	-1,046	-0.09%	1,130,940	-428	-0.04%
GOVERNMENT	4,334,831	6,817,858	2,483,027	57.28%	6,802,981	-14,877	-0.22%	6,811,803	-6,056	-0.09%
Total	50,536,049	72,586,092	22,050,043	43.63%	61,034,568	-11,551,523	-15.91%	67,838,661	-4,747,430	-6.54%

Source:
Author's allocations based on I-O tables and estimates of Final Demand done by Prof. Angel Ruiz (1988a).

percent from its 1988 I-O estimated levels to reach 1.1 million by the year 2000. (See Table 4.3). Assuming a labor force participation rate of 47 percent among the population ages 16 to 65, Ruiz estimated a labor force of 1,232,674 for Puerto Rico in the year 2000. This figure implies an overall unemployment rate of 11.5 percent: as Ruiz notes, a reduction from the historical figure of 15.9 percent in 1988. (See Table 4.6, ahead).

In sectorial terms, in this most optimistic scenario for the year 2000, direct Manufacturing employment is projected to increase by less than 12 thousand -- despite the sector's considerable expansion of final demand and output. As Ruiz notes in his more detailed study, the proportion of overall employment (i.e., within the whole economy and not just in Manufacturing) generated by 936 production is expected to increase only from 149 thousand in 1988 to 171 thousand in 2000. This represents an annual growth rate of only 1.12 percent. Non-936 manufacturing generated employment is expected to decline over the same period. From 62 thousand in 1988, by the year 2000, it is expected to be little over 54 thousand -- representing an annual growth rate of -1.1 percent. Ruiz concludes that the above described figures are indicative of the limited employment absorption of Manufacturing but also of its limited reciprocal impacts with the rest of the Puerto Rican economy due to the low level of (backward and forward) linkages with other sectors.

Displaying similar trends as those seen in the 1982-88 period, employment in Agriculture declines from its 1988 levels while that in the Financial, Investment, and Real Estate sector expands dramatically. For the latter sector, employment grows by almost 85 thousand representing close to half of employment gains for the economy as a whole between 1988 and 2000. Considerable employment growth is also expected within Government. Employing 67 thousand more than in 1988, the sector is projected to remain the largest employer in Puerto Rico. Employment in the Mining and Construction sector, one of the biggest winners in 1982-88, is projected to decline by 4.5 thousand.

TABLE 4.3: DIRECT AND INDIRECT EMPLOYMENT GENERATED BY THE PRODUCTION OF THE PUERTO RICAN ECONOMY
Fiscal Year 1988 and Projections for Year 2000 (Different Scenarios)
(In actual number of employees)

Industrial Group	Base Scenario				Reduction in 936 FD			Reduction in 936 FD and Compensatory Policies		
	1988	37% Reduction Scenario			20% Reduction Scenario					
		2000	Δ88-2000	% Δ88-2000	2000	Δ Base Scen	% Δ Base Scen	2000	Δ Base Scen	% Δ Base Scen
AGRICULTURE	33,844	29,126	-4,719	-13.94%	25,132	-3,994	-13.71%	27,608	-1,517	-5.21%
MINING AND CONSTRUCTION	52,846	48,380	-4,466	-8.45%	48,047	-333	-0.69%	48,244	-135	-0.28%
MANUFACTURING	155,561	166,941	11,380	7.32%	115,306	-51,635	-30.93%	145,671	-21,270	-12.74%
NON-DURABLES MFG	93,013	86,286	-6,728	-7.23%	59,582	-26,704	-30.95%	75,289	-10,996	-12.74%
Apparel, clothing, and accessories	31,548	19,819	-11,729	-37.18%	12,974	-6,845	-34.54%	16,963	-2,856	-14.41%
Apparel and Misc. Accessories	28,902	15,866	-13,036	-45.11%	10,703	-5,163	-32.54%	13,751	-2,115	-13.33%
Chemical companies	16,525	14,735	-1,791	-10.84%	9,904	-4,831	-32.78%	12,709	-2,025	-13.74%
Pharmaceuticals	11,776	10,526	-1,250	-10.61%	6,578	-3,948	-37.51%	8,846	-1,680	-15.96%
DURABLES MFG	62,548	80,655	18,108	28.95%	55,724	-24,932	-30.91%	70,382	-10,274	-12.74%
Machinery, exc. Electrical	8,339	6,165	-2,174	-26.07%	3,935	-2,230	-36.17%	5,196	-969	-15.72%
Electric and Electronic Machinery	25,626	31,290	5,663	22.10%	19,320	-11,970	-38.25%	26,105	-5,185	-16.57%
Prof & Scientific Instruments	13,464	17,364	3,900	28.96%	12,866	-4,498	-25.90%	15,648	-1,716	-9.88%
TRANSPORT, COMMUN., AND PUBLIC UTIL.	49,312	56,423	7,112	14.42%	51,799	-4,624	-8.20%	54,529	-1,895	-3.36%
FINANCIAL, INSURANCE AND REAL ESTATE	60,953	145,709	84,756	139.05%	142,560	-3,149	-2.16%	144,406	-1,303	-0.89%
WHOLESALE AND RETAIL TRADE	172,775	174,610	1,835	1.06%	167,970	-6,640	-3.80%	171,867	-2,743	-1.57%
SERVICES	153,924	185,384	31,460	20.44%	179,257	-6,127	-3.30%	182,872	-2,512	-1.36%
Touristic Hotels and Other Rooming Services	10,831	10,119	-712	-6.58%	9,497	-622	-6.14%	9,863	-256	-2.53%
Medical/Health Services	54,385	61,288	6,903	12.69%	61,201	-87	-0.14%	61,252	-36	-0.06%
GOVERNMENT	217,126	284,497	67,371	31.03%	284,143	-354	-0.12%	284,353	-145	-0.05%
Total	896,341	1,091,069	194,728	21.72%	1,014,214	-76,856	-7.04%	1,059,549	-31,520	-2.89%

Source:
Author's allocations based on I-O tables and estimates of Final Demand done by Prof. Angel Ruiz (1988a).

Changes in sectorial employment levels from 1988-2000 are reflected in changes in employment across occupations in the following manner. (See Table 4.4). *Sales and Clerical* remains the largest occupation in terms of employment, now followed by *Professional and Technical*, *Services*, *Operatives* and *Managerial and Administrative*, in that order. I would attribute the changes from the overall distribution of employment across occupations observed for 1988 to the fact that employment in *Professional and Technical*, *Managerial and Administrative*, and *Service* occupations is projected to grow at rates faster than the average for the economy as a whole, while *Operatives* and *Crafts* grow at rates lower than the average.

- Scenario with 37 percent reduction in 936-manufacturing final demand

With a 37 percent reduction in final demand of 936 enterprises, final demand for the whole economy is expected to decrease by \$9.6 billion from the \$50.3 billion in the base scenario (i.e., a 19 percent decline). (See Table 4.1). This reduction in final demand would result in a decline in total production of \$11.6 billion. (See Table 4.2). Of this amount, \$9.8 billion would be attributable to output declines within Manufacturing. The rest would be due to "losses" in other sectors caused by their linkages with Manufacturing.

The largest non-Manufacturing sectorial output declines are projected to occur within Services (\$631 million) followed by the Transportation, Communication and Public Utilities Sector (\$451 million). Comparatively much smaller production impacts would be felt in Agriculture, Mining and Construction, and Government. Production declines in these sectors (relative to the Base Scenario) would all be under \$100 million. In the case of Agriculture, however, given the limited size of the sector such losses would represent a considerable reduction (13 percent) in the otherwise expected output levels for 2000.

As a result of the changes in production projected in this most pessimistic reduction scenario, over 75 thousand jobs would be "lost." (See Table 4.3). The overall

TABLE 4.4: Occupational Allocation of Employment Generated by the Production of the Puerto Rican Economy
Fiscal Year 1988 and Projections for Year 2000 (Different Scenarios)

Occupational Group	Base Scenario				Reduction in 936 FD			Reduction in 936 FD and Compensatory Policies		
	1988	2000	Δ88-2000	% Δ88-2000	37% Reduction Scenario			20% Reduction Scenario		
					2000	Δ Base Scen	% Δ Base Scen	2000	Δ Base Scen	% Δ Base Scen
Professional & Technical	136,642	174,115	37,473	27.42%	170,334	-3,780	-2.17%	172,552	-1,562	-0.90%
Administrative and Managerial	83,584	118,788	35,204	42.12%	113,194	-5,594	-4.71%	116,485	-2,303	-1.94%
Sales & Clerical	245,416	321,245	75,829	30.90%	307,461	-13,784	-4.29%	315,569	-5,677	-1.77%
Crafts	90,507	99,188	8,681	9.59%	87,064	-12,125	-12.22%	94,193	-4,995	-5.04%
Operatives	121,758	126,383	4,625	3.80%	99,572	-26,811	-21.21%	115,349	-11,034	-8.73%
Services	136,016	167,913	31,897	23.45%	161,954	-5,959	-3.55%	165,466	-2,447	-1.46%
Farm	33,554	30,797	-2,757	-8.22%	27,134	-3,663	-11.89%	29,402	-1,395	-4.53%
Laborers	48,863	52,641	3,778	7.73%	47,500	-5,140	-9.76%	50,535	-2,106	-4.00%
TOTAL	896,341	1,091,069	194,728	21.72%	1,014,214	-76,856	-7.04%	1,059,549	-31,520	-2.89%

SOURCE:

Author's allocations based on I-O tables and estimates of Final Demand developed by Prof. Angel Ruiz, and 1988 matrix of employment coefficients by occupation and by industry.

unemployment rate would increase from 11.5 percent in the base scenario to 17.7 percent to surpass 1988 levels.

Of the projected employment "losses", over two thirds would be attributable to Manufacturing. The Trade and Services sectors would also suffer considerably with an employment reduction of over 6 thousand (each) from their 2000 projected levels. Due to linkages with Manufacturing, the reductions projected for Transportation, Communications and Public Utilities, Agriculture, and Financial, Investment, and Real Estate would be between 3 and 5 thousand. Much more limited employment impacts would be seen in Government and the Mining and Construction sector.

The occupational category most seriously affected by the projected declines in overall employment creation in this scenario would be *Operatives*. (See Table 4.4). Employment in this group would be 27 thousand (i.e., 21 percent) less than that otherwise expected. The employment prospects of individuals in *Sales and Clerical* and *Crafts* occupations could also be seriously affected: employment losses between 12 and 14 thousand are projected for these two groups. Individuals in *Farm* and *Laborer* occupations could also suffer: the number of jobs available in the year 2000 in these occupations could be cut by over 10 percent due to a reduction of 37 percent in 936 final demand.

- Scenario with 20 percent reduction in 936-manufacturing final demand and compensatory measures

With a 20 percent reduction of 936 activity between 1992 and the year 2000 -- combined with the stimulation of non-936 manufacturing enterprises -- final demand for the economy as a whole increases from \$40.7 billion (in the worst-case reduction scenario) to \$45.3 billion. (See Table 4.1). Production, in turn, increases from \$61.0 to \$67.8 billion. (See Table 4.2). Employment increases from 1,014,214 (with a 37 percent reduction and no stimulus) to 1,059,549 under the 20 percent compensated reduction scenario. (See

Table 4.3). Employment losses in the "most pessimistic" reduction scenario are thus cut by more than half. Assuming a labor force participation rate of 47 percent for the year 2000, the overall unemployment rate would be reduced from from 17.7 percent in the 37 percent reduction scenario to 14.0 percent (see Table 4.6, ahead), pointing to the importance of prompt and effective government action.

Manufacturing, nonetheless, still bears the majority of the decline from otherwise expected employment levels. (See Table 4.3). The projected levels of employment within this sector for 2000, would be cut by close to a third even within this more moderate reduction scenario.

In terms of the occupational distribution of these employment impacts, the largest "losses" would still be seen among individuals in *Operative* occupations, to be followed (again) by the *Sales and Clerical* and *Crafts* groups. (See Table 4.4). However, a more limited reduction of 936 activity and compensatory policies could cut the employment losses projected for each of these occupations under the more-drastic reduction scenario by more than half.

B. Projections of the Puerto Rican Labor Force across Occupations

In his study, Prof. Ruiz estimates the labor force for Puerto Rico for the year 2000 by projecting Puerto Rican population ages 16 to 65 and setting overall labor force participation rates -- of 45 and 47 percent -- according to historical trends. He, however, does not allocate the projected labor force across occupations. Such allocations would, nonetheless, be necessary to assess the labor market conditions each occupational group could confront in Puerto Rico by the year 2000 and, consequently, the impact these scenarios could have on migration.

I use two approaches to do the allocation of the overall labor force projections across occupations. In the first, I assume that by the year 2000 little will change in the occupational distribution of the labor force from that observed in 1988. Thus, I use the proportions of the total labor force observed in 1988 across occupations to allocate the 2000 labor force projections developed by Ruiz. In the second approach, I assume that the occupational labor force groups would continue to grow or decline along the trends observed for the 1982-88 period. Thus, I calculate an average annual growth rate for each occupation for that period and use this number to project an "occupational labor force" for the year 2000. I then reconcile these figures with the projections of overall labor force growth. I allocated Ruiz' totals according to the new occupational proportions of the total labor force obtained by dividing the individual labor force projections for each occupation by their sum total for 2000.

The occupational labor force groups developed with these two approaches were not used directly in my analysis. Rather, based on the results from these two approaches I determined a high- and a low- labor force projection for each occupation. These two figures were then averaged to arrive at a baseline projection for each occupation for the year 2000, with the higher and lower bounds determining a range of possible labor force growth within each category. Table 4.5 presents a summary of the calculations performed as well as the ranges of labor force growth established for each occupation.

TABLE 4.5: Puerto Rican Labor Force by Occupational Categories
Estimates for the Year 2000

Occupational Group	Fixed 1988 Proportions		Growth Trend Proportions ##				2000 Labor Force Projections###		
	2000 Labor Force 47% LFPR#	2000 Labor Force 45% LFPR#	82-88 Avg. Annual Growth Rate	2000 Projected Growth	2000 Labor Force 47% LFPR	2000 Labor Force 45% LFPR	Baseline	Upper Bound	Lower Bound
1 Professional & Technical	181,190	173,783	4.52%	235,226	208,394	199,875	191,089	208,394	173,783
2 Managerial & Administrative	130,977	125,623	5.26%	179,845	159,330	152,817	142,477	159,330	125,623
3 Sales & Clerical	263,376	252,610	4.62%	344,428	305,139	292,666	278,875	305,139	252,610
4 Crafts	181,165	173,759	1.17%	173,943	154,102	147,803	164,484	181,165	147,803
5 Operatives	202,084	193,823	0.47%	179,613	159,125	152,620	177,352	202,084	152,620
6 Services	164,416	157,695	3.09%	189,703	168,064	161,194	162,879	168,064	157,695
7 Farm	48,880	46,882	-2.25%	30,038	26,612	25,524	37,202	48,880	25,524
8 Laborers	60,586	58,109	1.24%	58,592	51,909	49,787	55,186	60,586	49,787
TOTAL	1,232,674	1,182,285	2.61%	1,391,388	1,232,674	1,182,285			

Source:

Author's estimates based on unpublished data from the PR Department of Labor, Household Survey, and from projections made by Prof. Angel Ruiz of the Labor Force for the Year 2000.

Notes:

- # Occupational allocations based on the distribution of the Puerto Rican labor force for 1988. (See Table B.1)
- ## Occupational allocations based on projected growth of each category (according to 1982-88 Average Annual Growth Rate) and reconciliation with total labor force projections by Ruiz for the year 2000. That is, each figure under the 2000 "projected growth" column was divided by the total (for the same column) and multiplied by the projections made by Ruiz based on participation rates of 47 and 45 percent of the population ages 16 to 65. The resulting occupational proportions then reflect the growth tendencies of each group for the period from 1982 to 1988 while remaining in agreement with the preceding projections of overall labor force growth through the year 2000.
- ### To calculate this middle-of-the-road labor force projection for each occupation, for the year 2000, the minimum and maximum labor force projections from the previous columns excluding the "projected growth" column -- were averaged.

C. Unemployment Impacts of the Industrial Scenarios for 2000 and their Migration Implications

The occupational labor force projections developed (and described in the previous section) were combined with the projected figures of employment by occupation for each industrial scenario for the year 2000 to determine unemployment figures as well as rates. The estimated unemployment rates were then "fed" into the OLSFE model (developed in chapter three) to project potential migration rates for each occupation and, consequently, the changes a disruption of 936 subsidized industrial production and employment could bring about.

Based on this exercise, in this section, I describe the impact particular scenarios could have on the employment prospects of the individual occupations in Puerto Rico by the year 2000 as well as the migratory tendencies these could generate. Tables 4.6 and 4.7 summarize the findings from these experiments.

- *Professional and Technical* occupations

The *Professional and Technical* group was among the fastest growing, both in terms of employment and the labor force, during the period from 1982 to 1988. Not accounting for changes in 936, if continuing along this trend of fast labor force growth through the year 2000, individuals in this category could be faced with an unemployment rate of up to 16.5 percent in the Island. When assuming more moderate labor force growth tendencies, the generation of employment opportunities within the economy would still not be sufficient to accommodate labor force growth within this category. The unemployment rate projected with the baseline labor force in the industrial base scenario would be close to 9 percent: almost a full 3 percentage points higher than the average rate observed in the 1982-88 period. (Average quarterly unemployment and migration rates for each occupation

TABLE 4.6: PUERTO RICAN UNEMPLOYMENT BY OCCUPATIONAL CATEGORIES

Projections for Year 2000

Occupational Group	2000 Labor Force	2000 Base Scenario		2000 20% Rdn. & Comp. Scenario			2000 37% Reduction Scenario		
		Unempl.	Unemp. Rate	Unempl.	Unemp. Rate	ΔBase Scen.	Unempl.	Unemp. Rate	ΔBase Scen.
1 Professional & Technical	Baseline	16,974	8.88%	18,537	9.70%	0.82%	20,755	10.86%	1.98%
	Upper Bound	0	***	1,231	0.71%		3,449	1.98%	1.98%
	Lower Bound	34,279	16.45%	35,842	17.20%	0.75%	38,059	18.26%	1.81%
2 Managerial & Administrative	Baseline	23,689	16.63%	25,992	18.24%	1.62%	29,283	20.55%	3.93%
	Upper Bound	6,835	5.44%	9,139	7.27%	1.83%	12,429	9.89%	4.45%
	Lower Bound	40,542	25.45%	42,846	26.89%	1.45%	46,136	28.96%	3.51%
3 Sales & Clerical	Baseline	0	***	0	***		0	***	
	Upper Bound	0	***	0	***		0	***	
	Lower Bound	0	***	0	***		0	***	
4 Crafts	Baseline	65,296	39.70%	70,291	42.73%	3.04%	77,420	47.07%	7.37%
	Upper Bound	81,977	45.25%	86,972	48.01%	2.76%	94,101	51.94%	6.69%
	Lower Bound	48,614	32.89%	53,610	36.27%	3.38%	60,739	41.09%	8.20%
5 Operatives	Baseline	50,969	28.74%	62,003	34.96%	6.22%	77,780	43.86%	15.12%
	Upper Bound	75,701	37.46%	86,735	42.92%	5.46%	102,512	50.73%	13.27%
	Lower Bound	26,237	17.19%	37,271	24.42%	7.23%	53,048	34.76%	17.57%
6 Services	Baseline	0	***	0	***		925	0.57%	0.57%
	Upper Bound	0	***	0	***		0	***	
	Lower Bound	151	0.09%	2,598	1.55%	1.46%	6,110	3.64%	3.55%
7 Farm	Baseline	6,405	17.22%	7,800	20.97%	3.75%	10,068	27.06%	9.85%
	Upper Bound	18,083	36.99%	19,478	39.85%	2.85%	21,746	44.49%	7.49%
	Lower Bound	0	***	0	***		0	***	
8 Laborers	Baseline	2,545	4.61%	4,651	8.43%	3.82%	7,686	13.93%	9.32%
	Upper Bound	7,945	13.11%	10,051	16.59%	3.48%	13,086	21.60%	8.48%
	Lower Bound	0	***	0	***		2,286	4.59%	4.59%
TOTAL	LFPR	141,605	11.49%	173,125	14.04%	2.56%	218,460	17.72%	6.23%
	LFPR	91,216	7.72%	122,736	10.38%	2.67%	168,071	14.22%	6.50%

Sources:

Author's calculations based on projections of employment by occupation and projections of the labor force by occupation for the year 2000.

Notes:

1. Definitions:

LFPR - Labor Force Participation Rate

Unempl. - Unemployment figures (in absolute numbers)

Unemp. Rate - Unemployment Rate

2. Absolute Unemployment figures were obtained by subtracting employment figures in Table YZX from labor force figures in table XYZ.

3. *** The estimated labor force growth for this occupation through the year 2000 would not be sufficient to fully satisfy industrial labor demand resulting in labor shortages or a situation of full employment.

TABLE 4.7: PUERTO RICAN UNEMPLOYMENT RATES, MIGRATION RATES, AND MIGRATION BY OCCUPATIONAL CATEGORIES
Projections for the Spring Quarter, 2000

Occupational Group	2000 Labor Force			2000 Base Scenario				2000 20% Reduction & Compensation Scenario					2000 37% Reduction Scenario				
	Participants	Proportion of Total L.F.	Unempl. Rate	Emigration Rate	Quarterly Emigration	Prop. of Total Qtrly. Emigr.	Unempl. Rate	Emigration Rate	Quarterly Emigration	Prop. of Total Qtrly. Emigr.	Abs. Chg. from Base	Unempl. Rate	Emigration Rate	Quarterly Emigration	Prop. of Total Qtrly. Emigr.	Abs. Chg. from Base	
																	Rate
1 Professional & Technical	Baseline	191,089	15.80%	8.88%	0.59%	1,131	18.27%	9.70%	0.62%	1,188	17.77%	57	10.86%	0.66%	1,266	16.80%	135
	Lo	173,783	16.01%	***	0.00%	0	0.00%	0.71%	0.14%	250	6.90%	250	1.98%	0.26%	445	9.97%	445
	Hi	208,394	15.63%	16.45%	0.84%	1,741	19.84%	17.20%	0.86%	1,785	18.86%	44	18.26%	0.89%	1,846	18.01%	105
2 Managerial & Administrative	Baseline	142,477	11.78%	16.63%	0.58%	832	13.45%	18.24%	0.62%	877	13.11%	44	20.55%	0.66%	937	12.44%	105
	Lo	125,623	11.57%	5.44%	0.31%	393	13.09%	7.27%	0.37%	462	12.74%	69	9.89%	0.44%	549	12.30%	156
	Hi	159,330	11.95%	25.45%	0.74%	1,181	13.46%	26.89%	0.76%	1,218	12.87%	37	28.96%	0.80%	1,269	12.39%	88
3 Sales & Clerical	Baseline	278,875	23.06%	***	0.00%	0	0.00%	***	0.00%	0	0.00%	0	***	0.00%	0	0.00%	0
	Lo	252,610	23.27%	***	0.00%	0	0.00%	***	0.00%	0	0.00%	0	***	0.00%	0	0.00%	0
	Hi	305,139	22.88%	***	0.00%	0	0.00%	***	0.00%	0	0.00%	0	***	0.00%	0	0.00%	0
4 Crafts	Baseline	164,484	13.60%	39.70%	1.22%	2,005	32.38%	42.73%	1.27%	2,089	31.24%	84	47.07%	1.34%	2,205	29.26%	200
	Lo	147,803	13.62%	32.89%	1.10%	1,622	53.99%	36.27%	1.16%	1,713	47.20%	91	41.09%	1.24%	1,836	41.14%	215
	Hi	181,165	13.58%	45.25%	1.31%	2,376	27.07%	48.01%	1.36%	2,455	25.94%	80	51.94%	1.42%	2,566	25.04%	190
5 Operatives	Baseline	177,352	14.66%	28.74%	0.86%	1,531	24.74%	34.96%	0.96%	1,709	25.55%	177	43.86%	1.09%	1,939	25.74%	408
	Lo	152,620	14.06%	17.19%	0.65%	989	32.92%	24.42%	0.79%	1,203	33.16%	214	34.76%	0.96%	1,466	32.83%	477
	Hi	202,084	15.15%	37.46%	1.00%	2,023	23.06%	42.92%	1.08%	2,183	23.07%	160	50.73%	1.19%	2,397	23.39%	374
6 Services	Baseline	162,879	13.47%	***	0.00%	0	0.00%	***	0.00%	0	0.00%	0	0.57%	0.12%	191	2.54%	191
	Lo	157,695	14.53%	***	0.00%	0	0.00%	***	0.00%	0	0.00%	0	***	0.00%	0	0.00%	0
	Hi	168,064	12.60%	0.09%	0.04%	70	0.80%	1.55%	0.21%	346	3.65%	275	3.64%	0.33%	557	5.44%	487
7 Farm	Baseline	37,202	3.08%	17.22%	1.36%	505	8.16%	20.97%	1.52%	564	8.44%	59	27.06%	1.75%	651	8.64%	145
	Lo	25,524	2.35%	***	0.00%	0	0.00%	***	0.00%	0	0.00%	0	***	0.00%	0	0.00%	0
	Hi	48,880	3.67%	36.99%	2.08%	1,018	11.60%	39.85%	2.17%	1,061	11.21%	43	44.49%	2.31%	1,129	11.02%	111
8 Laborers	Baseline	55,186	4.56%	4.61%	0.34%	186	3.00%	8.43%	0.47%	260	3.89%	74	13.93%	0.62%	345	4.58%	159
	Lo	49,787	4.59%	***	0.00%	0	0.00%	***	0.00%	0	0.00%	0	4.59%	0.34%	167	3.75%	167
	Hi	60,586	4.54%	13.11%	0.60%	366	4.17%	16.59%	0.69%	417	4.41%	51	21.60%	0.80%	484	4.72%	118
TOTAL	Baseline	1,209,543		Baseline		6,191		Baseline		6,687			Baseline		7,534		
	Lo	1,085,445		Lo		3,004		Lo		3,629			Lo		4,464		
	Hi	1,333,642		Hi		8,775		Hi		9,466			Hi		10,248		

Source:

Author's calculations based on regression model developed (OLS Fixed Effects version), I-O projections of employment by occupation for 2000 and occupational allocations of the labor force for the year 2000.

Notes:

*** The estimated labor force growth for this occupation through the year 2000 would not be sufficient to fully satisfy industrial labor demand resulting in labor shortages or a situation of full employment.

appear in Table 3B.2, Chapter 3). Only in the event of even-lower labor force participation and no expansion in this occupation's share of the labor force is a situation of full-employment projected to arise. This, however, is an unlikely scenario given the relatively advantageous position of individuals in *Professional and Technical* occupations in Puerto Rico today. In conclusion, even without any changes in Puerto Rican 936 industrial policy, the employment prospects for individuals within this occupational category appear worse than they were during the 1980s.

Despite the expected worsening of employment opportunities in Puerto Rico for individuals in this occupation, the projected migratory rate would remain relatively unchanged from the average for 1982-88. Using the baseline (labor force and) unemployment projections for this occupation, a *quarterly* emigration rate of 0.59 percent is estimated for this group in the year 2000. With higher labor force growth and, consequently, higher unemployment in this base scenario, the migration rate is expected to increase to 0.84 percent.

At first glance, the above projected changes in migration rates appear limited. However, considering that this highly-skilled group could become the second largest occupational group in Puerto Rico's labor force by the year 2000, it should be alarming that (using the baseline labor force projection) over 11 hundred individuals in *Professional and Technical* occupations could be leaving Puerto Rico every quarter due to the limited employment opportunities projected. This number would represent an increase of 51 percent over the average out-migratory flows for the 1982-88 period. Further, even without a change in the 936 industrial incentives program, the proportion of these highly-

skilled individuals among all emigrants is expected to be indicative of some over-representation.⁷

When considering the changes in unemployment and migration induced by changes in the 936 industrial sector, the impacts on the above mentioned trends are rather small. This is attributed to the relatively low direct employment of *Professional and Technical* individuals within Manufacturing and the apparently limited linkage of this sector with others more influential in the determination of their overall employment opportunities in Puerto Rico. The unemployment rates projected in the 20% reduction and compensation scenario are around 1 percentage point higher than those for the base scenario; the unemployment rates projected in the 37% reduction and no compensation scenario are around 2 percentage points higher. Considering the baseline labor force projection for this occupation, the resulting migration rates increase from 0.59 percent in the base scenario to 0.62 and 0.66 percent in the 20% and 37% reduction scenarios, respectively. Such changes imply that, as a result of a reduction in 936 industrial activity, the migratory flows expected for individuals in this occupational category -- already considered large and indicative of over-representation -- could be between 5 and 11 percent higher than those projected for the base scenario and between 58 and 69 percent higher than the average flows for 1982-88. Thus, despite the limited impact of the Manufacturing sector on the employment prospects of individuals in these occupations, a reduction in 936 industrial activity could aggravate an already critical situation.

- *Managerial and Administrative* occupations

The *Managerial and Administrative* group was also among the fastest expanding in Puerto Rico during the period between 1982 and 1988. With an average unemployment

⁷ By over-representation I refer to the observation that the proportion of migrants in this occupational category is projected to be larger than the proportion of *Professional and Technical* workers in the Puerto Rican labor force.

rate of 5.71 percent for this period, individuals in this group also had to be thought of as in a relatively advantageous position.

When considering the base industrial scenario for the year 2000, nonetheless, drastic changes in the labor market outlook for individuals in these occupations are found depending on the pattern of labor force growth chosen. In the "best" of all circumstances -- assuming low rates of labor force participation and no further expansion of this occupation's share of the labor force -- the incidence of unemployment among *Managers and Administrators* remains relatively unchanged from its 1982-88 average level. Using the baseline labor force growth projection, however, the unemployment rate among individuals in this category could have an 11 percentage point hike. Assuming fast labor force growth and no further decline in overall labor force participation rates -- and not accounting for any changes in 936 industrial activity -- about a quarter of all individuals in *Managerial and Administrative* occupations in Puerto Rico could be unemployed by the year 2000. Thus, as with *Professional and Technical* occupations, the employment outlook for individuals and labor force entrants in this category is projected to become worse by the year 2000.

The migration implications of such scenarios must be considered serious. More than double the average number of *Managerial and Administrative* out-migrants observed during the 1982-88 period is projected (using the baseline labor force projection) for the 2000 industrial base scenario. Even with the most "optimistic" unemployment projections, quarterly migration levels would remain unchanged. Using the upper bound of the unemployment projections for this base scenario, quarterly out-migration among *Managers and Administrators* could be close to 12 hundred and represent an increase of almost 200 percent from the average for 1982-88. Representing between 11.6 and 11.9 percent of the 2000 labor force yet between 13.1 and 13.5 percent of the flows projected in the base

scenario, individuals in *Managerial and Administrative* occupations would be over-represented among Puerto Rican migrants to the United States.

In the event of a reduction in 936 activity, regardless of its magnitude and whether or not compensated, the impacts on Puerto Rican labor market conditions for individuals in these occupations would be greater than those estimated for *Professional and Technical* occupations. Because of direct impacts from reductions of employment within Manufacturing and indirect effects due to this sector's linkage with others employing a large number of *Managers and Administrators*, the unemployment rates projected for this occupational category for the year 2000 could increase between 2 and 4 percentage points from those projected in the base scenario.

The projected impact of such a change on migration rates would also be greater than those estimated for the *Professional and Technical* group. Using the baseline labor force projections, in the 20 percent compensated reduction scenario, the occupational quarterly migration rate would increase from 0.58 percent in the base scenario to 0.62 percent. In the 37 percent non-compensated reduction scenario, the projected quarterly migration rate would be 0.66 percent. As with *Professional and Technical* occupations, these changes would mean quarterly migratory outflows between 5 and 13 percent higher than those projected for the base scenario and between 120 and 135 percent higher than the average quarterly flows for 1982-88.

- *Sales and Clerical* occupations

Employment opportunities within this category, the largest in labor force and employment terms in Puerto Rico during the period from 1982 to 1988, are projected to grow at a high rate through the year 2000. The absolute number and proportion of individuals in this category would have to increase at a rate faster than the average for 1982-88 in order to satisfy labor demand for workers in these occupations in the year

2000. Otherwise, a situation of full-employment or labor shortages could occur within this category.

With no unemployment to exert a migratory "push" for individuals in *Sales and Clerical* occupations -- assuming no changes in the other factors -- the quarterly migration rates and flows projected for this category in the base industrial scenario would be zero.

Although the reduction in the number of employment opportunities available to individuals in these occupations as a result of changes in 936 industrial policy would be substantial (i.e., between 5 and 14 thousand less jobs than otherwise expected for the year 2000), the insufficiency of labor force growth would be such that lower employment changes are only projected to alleviate labor shortages. Thus, for the reduction scenarios, the labor market outlook of individuals in these occupations would still be one of full employment. Migration rates (as well as migration flows) for the reduction scenarios are estimated to be zero.

- *Crafts* occupations

For an occupational category for which the average unemployment rate in Puerto Rico was close to 33 percent for the period between 1982 and 1988, the labor market outlook for the year 2000 is no reason for hope. Even without considering changes in 936 Manufacturing activity and when assuming limited labor force growth, the projected unemployment rate for the year 2000 is 33 percent. Assuming no further declines in overall labor force participation and a steady share of the labor force for this occupation, the incidence of unemployment among individuals in this group could jump an additional 13 percentage points from its average 1982-88 level.

Even with this grim labor market outlook, compared to an average quarterly migration rate of 1.15 percent for 1982-88, migration rates for this occupation are projected

to remain relatively unchanged in the 2000 industrial base scenario. Depending on the labor force growth trajectory chosen and the resulting unemployment statistics, the quarterly migration rate for individuals in *Crafts* occupations could be between 1.10 and 1.31 percent. Considering the baseline labor force projection, however, this would represent a quarterly outflow of around 2 thousand individuals in *Crafts* occupations -- a number 22 percent higher than the average for 1982-88. Further, although workers in these occupations are projected to make up around 14 percent of the Puerto Rican labor force for the year 2000, they are projected to comprise between 27 and 54 percent, that is, the largest portion of total quarterly migratory flows from Puerto Rico to the United States.

As pointed out in the previous chapter, Manufacturing plays an important role in the determination of employment prospects for individuals in *Crafts* occupations. For this reason, this category must be counted among those most seriously affected by a change in 936 industrial policies. In the worst 936 reduction scenario (i.e., 37% reduction with no compensatory policies), the incidence of unemployment among *Crafts*, regardless of the labor force projection chosen, is projected to be close to 50 percent. In the more moderate compensated reduction scenario, unemployment rates are projected to be between 36 and 48 percent.

The projected migration rates to result from employment changes in either scenario would never surpass 1.5 percent. The projected quarterly migration flows, however, are between 3 and 13 percent higher than those for the base scenario and between 27 and 34 percent higher than the average for 1982-88. Thus, for an occupation for which the labor market outlook for the year 2000 in Puerto Rico is already discouraging, the changes in employment resulting from changes in 936 activity would be noticeable and could sufficiently aggravate their situation to result in even higher outmigration.

- *Operative* occupations

As with individuals in *Crafts* occupation, the labor market outlook for Puerto Rican *operators* for the year 2000 is not encouraging. In the industrial base scenario, only by assuming a decline in the share of total labor force participation for this category and a lower overall rate of labor force participation does the occupational unemployment rate fall from its average 1982-88 levels. Regardless of the labor force growth trajectory chosen, the incidence of unemployment projected in the base scenario among individuals in this group would be much higher than the averages for the labor force as a whole. Using the baseline labor force projection, the corresponding unemployment rate within the base scenario is 28.74 percent: that is, 7 percentage points higher than the average for 1982-88. Thus, even without any changes in 936 manufacturing, the labor market position of individuals in *Operative* occupations, relative to individuals in other occupations in the Puerto Rican economy, is projected to become worse by the year 2000.

This relative worsening of labor market conditions is, in turn, expected to translate itself into the higher migration of individuals in *Operative* occupations. For the base scenario, the baseline occupational quarterly migration rate is projected to be 0.86 percent, representing a quarterly outflow of 1,531 *operators*. This figure would represent an increase of 25 percent from the average quarterly outflows observed between 1982 and 1988. Without any changes in 936 policies, operators could thus be expected to make up the second largest group among Puerto Rican emigrants to the United States. Their proportion among Puerto Rican migrants would be double their proportion within the Puerto Rican labor force.

Manufacturing is the principal employer of individuals in *Operative* occupations in Puerto Rico to date. Consequently, this group would be the most obviously and overwhelmingly affected by a reduction in 936 industrial activity in the Island. Depending

on the industrial reduction and labor force scenarios chosen, the unemployment rate statistics for this category could increase by as much as 17 percentage points.

The migration response to such changes would also be the highest among all occupations. From the baseline labor force projection of 0.86 percent in the 2000 industrial base scenario, migration rates could increase to 1.09 percent with a 37 percent uncompensated reduction of 936 final demand and to 0.96 percent with a compensated reduction of 20 percent. Compared to the baseline labor force estimate in the 2000 base scenario, the estimated quarterly outflow of *operators*, consequently, would increase by around 400 in the most drastic reduction scenario and 200 in the more moderate one. In the event of a change in 936 industrial policies, the projected quarterly outflows of individuals in *Operative* occupations could thus be up to 60 percent higher than the average flows for 1982-88. For individuals in these occupations, the bleak labor market prospects projected for the year 2000 as well as the potential unemployment and migration impacts of a change in 936 manufacturing industrial activity point to the urgent need for the promotion and creation of alternative employment opportunities to those available within 936 Manufacturing.

- *Service* occupations

For this occupational category, high employment creation in the industrial base scenario could combine with moderate labor force growth to result in a situation of full employment by the year 2000. With no projected changes in other factors affecting migratory rates from Puerto Rico, the effective migration rate for individuals in this group is projected to be zero. Thus, without a change in 936 industrial activity, the labor market outlook for individuals in this type of occupations is one of overall improvement.

However, because of the linkages of the Manufacturing sector with other sectors in the economy who are in large part responsible for the employment of individuals in *Service*

occupations, a reduction in subsidized industrial activity would mean noticeable decreases in employment. The number of new *Service* jobs created within the Puerto Rican economy between 1988 and 2000 could be cut by as much as one fifth (23 percent) of the 32 thousand projected in the base scenario. Because of the moderate labor force growth projected for this occupational group, however, such a "loss" would represent an increase in the unemployment rate from 0.09 percent in the base scenario to 3.64 percent in the highest reduction scenario, which is still considered a situation of full employment.

With a relatively positive labor market outlook even in the most drastic 936 reduction scenario, the quarterly migration rates projected for this occupational category -- assuming no changes in other factors -- would be well below 1 percent and much lower than the average rate observed between 1982 and 1988. Thus, in the event of a change in 936 activity, migration rates and the actual flows of individuals in this type of occupation would be expected to remain among the lowest of any occupations and to be greatly reduced from their average 1982-88 levels.

- *Farm* occupations

Farmers were a group experiencing high incidences of unemployment in Puerto Rico throughout the 1980s. Employed mostly within the declining Agriculture sector, the labor market outlook for individuals in such occupations was not very positive then, nor is it better for the year 2000. Even in the base scenario, the number of jobs in *farming* occupations throughout the economy is projected to be below the I-O estimated figure for 1988.

The trend observed for this group in regard to labor force participation during the 1982-88 period, however, was one of decline in both the proportion and absolute number of individuals within *farming* occupations. Thus, if this trend were to continue through the year 2000, noticeable improvement in employment opportunities could be expected. A

reason for concern, nonetheless, relates to the question of what is happening to individuals previously in these occupations: that is, whether they are entering other groups or simply abandoning the labor force. For this reason, I have chosen to discuss only the upper bound of the labor force scenarios for these occupations in relation to unemployment projections and their migration implications.

Due to the actual decline in the absolute number of employment opportunities available to *Farmers* in the base industrial scenario for the year 2000, an unemployment rate of 37 percent is projected. This figure represents an increase of close to 9 percentage points from the average quarterly unemployment rate for individuals in *Farm* occupations during the period from 1982 to 1988.

The resulting incidence of migration among *Farmers* in this scenario, although lower than its average for 1982-88, would still be the highest among those projected for all occupational categories: 2.08 percent. As a result, in the base scenario, this group is projected to have migrant outflows comparable to those for much larger groups (such as *Professional and Technical* or *Managerial and Administrative*) and comparable to those observed between 1982 and 1988. Although comprising less than 4 percent of all labor force participants in Puerto Rico by the year 2000, *farmers* could account for almost 12 percent of total quarterly migratory outflows.

Despite the fact that Manufacturing has been and continues to be (directly) responsible for very little of the total employment of *Farmers* in the Puerto Rican economy, a reduction in 936 industrial activity would have serious implications for individuals within these occupations. In the context of a base scenario with projections of higher unemployment and more limited employment opportunities relative to those available in 1988, the more drastic reduction scenario projects that a reduction of as many as 64 hundred of the jobs available to *Farmers* in 1988 could be lost by the year 2000. This

figure represents an additional decline of farming employment of almost 37 hundred from that projected in the base scenario; a 20 percent compensated reduction of 936 final demand could mean an additional "loss" of about 14 hundred.

The expected quarterly migration rate for the occupational category would increase as a result of the hike in unemployment. But for a group already expected to exhibit the highest incidence of migration and relatively large quarterly migrant outflows, the increase must be considered moderate. From 2.08 percent in the base scenario, the quarterly migration rate could reach 2.31 percent in the 37% reduction scenario. This last figure would represent a quarterly outflow of *Farmers* around 100 higher than that estimated for the base scenario.

- *Laborer* occupations

Individuals in *laborer* occupations comprised the group with the highest average incidence of unemployment in Puerto Rico for the period between 1982 and 1988. The creation of new employment opportunities by the year 2000 combined with the projected moderate labor force growth within this occupation, nonetheless, spell considerable improvement in the labor market outlook for individuals in this occupation.

Using the baseline labor force and the employment figures from the base industrial scenario results in the projection of an unemployment rate of less than 5 percent for *Laborers* by the year 2000, which is considerably lower than the average of 37 percent for the 1982-88 period. As a result, the occupational quarterly migration rate is projected to fall from an average of 1.26 percent in 1982-88 to 0.34 percent (based on the baseline labor force projection) in the 2000 base scenario. *Laborers* are thus expected to make up a rather small proportion of total migrant outflows.

A change in 936 industrial policy by the year 2000 would bring about noticeable changes in the otherwise expected labor market outlook for Puerto Ricans in these occupations. With the highest magnitude reduction and no compensation from non-936 manufacturing, the estimated unemployment rate among *Laborers* could increase by as much as 9 percentage points. With the more moderate reduction in 936 final demand and some compensatory non-936 growth, the projected unemployment rate could be as high as 17 percent.

However, even the higher unemployment rates projected under reduction scenarios would mean some improvement from the labor market conditions faced by *Laborers* between 1982 and 1988. For this reason, the resulting quarterly migratory rates are noticeably lower than the average for that period. In the 37 percent reduction scenario, the upper bound for the projected migration rate for this group would be 0.8 percent. The number of *Laborers* among Puerto Rican migrants to the United States could thus be double that expected under the base scenario. Nonetheless, with a maximum projected number of 484 migrating each quarter, *Laborers* would still make up a small fraction of the total migrant outflow.

D. General Findings

The labor market scenarios discussed in the previous pages point to the fact that policy makers in Puerto Rico will face a difficult challenge by the year 2000. A change in 936 industrial legislation, and the consequent changes in employment and unemployment, could compound the problems encountered due to the limited growth prospects for the economy.

For most occupations, the Puerto Rican labor market outlook for the year 2000 does not hold promises of improvement relative to the conditions observed between 1982 and 1988. *Sales and Clerical* and *Services* are projected to be the only occupations for

which employment could expand sufficiently to accommodate labor force growth and potentially result in a full employment situation. Yet, assuming no drastic changes in the growth tendencies of specific sectors of the economy or in the occupational distribution of employment within industries (i.e., within their structure of production), limited employment creation within *Professional and Technical* and *Managerial and Administrative* occupations could mean a much higher incidence of unemployment relative to that observed during the 1982-88 period among individuals in these highly-skilled categories. The labor market outlook for individuals in medium-skill occupations is one of limited opportunities as well. The unemployment rates for individuals in *Crafts and Operatives* occupations, the groups most directly affected by changes within the Manufacturing sector, is expected to rise beyond their already high 1982-88 averages.

Thus, even before considering the impacts from a change in 936 industrial policy, labor market conditions in Puerto Rico are projected to have deteriorated sufficiently by the year 2000 to result in higher emigration to the United States for most occupations -- including those for which 936 manufacturing declines would have the largest impacts. In the base scenario it is projected that between 16 and 24 hundred individuals in *Crafts* occupations could be leaving Puerto Rico, together with around a thousand in *Professional and Technical*, another thousand *Managers and Administrators* and between one and two thousand *Operators* in the first quarter of the year 2000 alone. As indicated by the occupational shares of projected flows, in the base scenario, the out-migratory flow is expected to be composed primarily of individuals in high- and medium-skill occupations. Further, although the estimated quarterly migration rates are, in general, low -- that is, below 1 percent of the labor force for most categories -- the cumulative impacts of such outflows must be considered significant.

A change in 936 policies or investment patterns could, nonetheless, seriously aggravate this already poor situation. Undoubtedly, the worst occupational impacts would

be those for individuals in medium-skill occupations like *Crafts* and *Operatives*. Under the 37 percent reduction scenario, the projected employment for these two groups in Puerto Rico for the year 2000 would be reduced by 12 and 27 thousand, respectively. Further, the "losses" would be attributed primarily to direct employment declines within Manufacturing.

Other occupational groups would also be seriously affected. As a result of changes in the levels of 936 industrial activity, large percentage-wise declines in the employment levels projected for the 2000 base scenario would be seen for *Farmers* and *Laborers*. Noticeable impacts would also be felt on the employment prospects of *Managers and Administrators* as well as those of individuals in *Service* occupations: both primarily due to linkages of the Manufacturing sector with other sectors predominantly responsible for their employment. The *Professional and Technical* group would perhaps be the least affected by such changes due to the relatively low direct employment of individuals of this category within Manufacturing and the limited linkage of Manufacturing with sectors more crucial to their employment (e.g., Government).

In the event of a reduction of 936 industrial activity, the estimated migratory tendencies increase across most occupations although slightly. Considerably higher outflows are nonetheless projected, especially for those occupations expected to compose the majority of the flows according to the projections for the 2000 base scenario. The most noticeable of such impacts would unquestionably be for individuals in medium-skill occupations (i.e., *Operatives* and *Crafts*) -- that is occupations for which employment prospects in Puerto Rico are most directly affected by the Manufacturing sector.

The changes in employment and unemployment to result from a change in 936 industrial policies are thus expected to have a limited impact on the overall composition of migratory flows and the relative over- or under-representation of specific occupational

groups within them. It appears that, by the year 2000, these will be more reflective of the overall trends in the economy: that is, the expansion of service-oriented sectors, the relative decline of more production-oriented sectors like Manufacture and Agriculture, and the limited capacity for further expansion and employment generation of the existing Manufacturing enterprises within the Puerto Rican economy. Changes induced by a decline in subsidized industrial activity, nonetheless, would have a noticeable impact on the levels of such flows. Moreover, they could seriously aggravate the predicted and already critical discrepancies between labor force growth and employment creation within the Puerto Rican economy.

V. Conclusions

V. Conclusions

Puerto Rican migration has been a topic of great interest and heated debate since the early stages of the industrialization process in the Island. However, with the possibility of a change in political status, a new dimension has been added to the discussion. Much has been speculated regarding the impact a change in political status could have on migration; little, however, has been concluded because previous studies have failed to establish the relationship between the industrial structure of the Puerto Rican economy and the levels and composition of migratory flows as these exist today.

The research presented in the past pages has tried to address two questions. First, I have tried to identify how patterns observed in the level and composition of recent migratory flows related to the structure of the insular economy and the employment opportunities available to Puerto Ricans within it. Second, having established the current structure of the Puerto Rican economy and the ways in which migratory responses relate to it, I analyze the impact a change in political status could have on the industrial structure of the Island and, consequently, on migratory flows. In answering these questions, the focus has been on economically motivated movements and on the impacts originating from a change in the 936 industrial incentives program. Historically, the former have comprised the largest proportion of Puerto Rican migrants. The latter spell disruption for the Manufacturing sector, which is, in many ways, considered responsible for the industrialization and development of the insular economy.

The first step in this effort was a review of existing literature on this subject. The literature reviewed was grouped in two separate categories: (1) economic theories of migration and (2) the historical background on Puerto Rican development and the role migration has played in it.

From the review of economic theories of migration, two approaches were identified: orthodox and structural. In orthodox conceptualizations of migration, wage and employment opportunity differentials between the sending and receiving countries are considered the main motivation behind migratory flows. Migration is thus conceived as an equilibrating mechanism by which labor is transferred from areas of excess supply (having driven wages down) to areas experiencing labor shortages (having driven wages up). Structural theories view migration in a different light based on the empirical observation that periods of large population transfers tend to correspond to periods of rapid transformation in the economic and social structures of the sending country. Thus, in this alternative conceptualization of migration, the disruption and dislocation generated by rapid changes in the social and economic structures at home are considered the driving force behind the flows.

Literature dealing with the historical connection between economic development and migration in Puerto Rico tended to support a structural view of Puerto Rican migration. The process described in most studies was one in which, as the Island moved from an agriculture-based economy to one focussed on labor-intensive and, later, capital-intensive manufacturing, the migration of hundreds of thousands of farmers and laborers (previously employed in a now declining sector) facilitated the restructuring of the insular economy. This is where the notion of out-migration as "escape valve" has its origins.

Other points deemed of importance also came from this second review of literature. Among them, first, the limited employment generation capacity and low linkage of Manufacturing to other sectors in the Puerto Rican economy have been problems recognized from early stages in the evaluation of the current economic development strategy. Second, the shift towards more-capital intensive production was prompted by concern with the above-mentioned traits of Manufacturing and, consequently, of a development strategy dependent upon growth within this sector.

With the completion of the review of the literature, the first step in my analysis was establishing the current structure of the Puerto Rican economy. The Input-Output analysis showed that, between 1982 and 1988, Puerto Rico continued along its 1970s trend of transformation towards a services-dominated economy. Sectors like *Financial, Investment, and Real Estate, Services, and Government* had large gains in their total output levels. Perhaps more important, these accounted for the majority of employment being generated within the economy as well as employment generated within "growth" occupations -- that is, occupations in the categories of *Professional and Technical* and *Managerial and Administrative*, at the high-end, and *Sales and Clerical* and *Services*, at the lower-end.

Manufacturing continued to be a key sector of the Puerto Rican economy, but primarily for production. The focus of the industrialization program towards capital-intensive production was reflected in the dramatic expansion of output figures but limited employment generation of employment within the sector. Further, *Manufacturing*, continued to dominate the employment prospects of individuals in *Operative* and *Crafts* (i.e., medium-skill) occupations but, despite the promotion of capital-intensive industries and the hoped-for expansion of employment of higher-skill individuals in these industries, the sector made a minimal contribution to employment growth at the higher-end of the occupational (pay and skills) spectrum. Finally, evidenced by the limited generation of employment within the sector and the declining sectorial shares of total output and employment, the capacity of the *Manufacturing* sector for further expansion had apparently eroded.

From the regression analysis of recent migratory flows, without doubt, the main finding was that from 1982 to 1988 Puerto Rican migration was driven primarily by employment opportunities -- that is, job growth and unemployment in Puerto Rico and employment opportunities in the United States -- rather than by income-earning differentials between island and mainland. During the period of study, as employment in most

occupations grew at a rate faster than labor force growth and unemployment was consequently alleviated, migration rates fell -- despite persistent and expanding wage gains to be obtained from employment opportunities abroad. In the context of persistently high unemployment across most occupations in Puerto Rico, low labor force participation rates, and persistent wage differentials between island and mainland, at the individual level, the regression model findings point to an understanding of Puerto Rican migration as a coping mechanism of last-resort for individuals faced with difficult labor market situations day after day in the island .

The labor market and migration scenarios developed in the last section of this research project confirm that, as expected from I-O analysis for 1982-88, future employment growth within the Puerto Rican economy appears to lie within sectors other than *Manufacturing*. The projected expansion of service-oriented sectors and relative decline of productive sectors within the economy spell limited job growth for high- and medium-skill occupations relative to their growth within the insular labor force and, consequently, an unemployment situation similar to or worse than that observed between 1982 and 1988.

For most occupations, the Puerto Rican labor market outlook for the year 2000 does not hold promises of improvement. Relatively low-skill occupations (i.e., *Sales and Clerical* and *Services*) are projected to be the only groups for which employment could expand sufficiently to accommodate labor force growth and potentially result in full employment situations. Yet, assuming no drastic changes in the growth tendencies of specific sectors of the economy or in the occupational distribution of employment within industries (i.e., within their structure of production), limited employment creation relative to labor force growth could mean unemployment rates up to five times higher than those observed between 1982 and 1988 among individuals in highly-skilled occupations. The employment outlook for individuals in medium-skill occupations is one of limited

opportunities as well: due to the limited capacity for further employment creation of the Manufacturing sector, the incidence of unemployment among *Crafts* and *Operatives* is expected to rise.

Based on the regression model developed, then, for most occupations the labor market outlook in Puerto Rico for the year 2000 is sufficiently poor to result in higher emigration to the United States -- even without a change in 936 industrial policies. In the base scenario, between 15 and 25 hundred individuals in *Crafts* occupations could be leaving Puerto Rico together with a thousand in *Professional and Technical*, another thousand *Managers and Administrators* and between one and two thousand *Operators* in the first quarter of the year 2000 alone. Thus, as a result of discrepancy between labor force growth and employment creation within the Puerto Rican economy, the migration outflow is projected to be composed primarily of individuals in high- and medium-skill occupations.

The difficult challenge facing Puerto Rican policy makers by the year 2000 due to the impacts the limited growth prospects for the Puerto Rican economy could have on migration is compounded by the possible impact of a change in 936 industrial legislation. In the event of a reduction of 936 industrial activity -- as a result of the changes in employment levels and, consequently, projected unemployment -- migratory tendencies increase across most occupations although slightly. The projected increases in total quarterly migration flows from Puerto Rico to the United States are more noticeable. Undoubtedly, the worst occupational impacts from 936 changes would be those for individuals in medium-skill occupations, like *Crafts* and *Operatives*, which are also predicted to comprise the largest proportion of quarterly migration outflows for the year 2000.

The changes in employment and unemployment to result from a change in 936 industrial policies are thus expected to have a limited impact on the overall composition of migratory flows (as predicted for the year 2000) as well as on the relative over- or under-representation of specific occupational groups within them. It appears that, by the year 2000, these will be more reflective of the overall trends in the economy: that is, the expansion of service-oriented sectors, the relative decline of more production-oriented sectors like Manufacture and Agriculture, and the limited capacity for further expansion and employment generation of the existing Manufacturing enterprises within the Puerto Rican economy. Changes induced by a decline in subsidized industrial activity, nonetheless, would have a noticeable impact on the levels of migratory flows.

Thus, in the face of governmental inaction, the short-run migration response to higher unemployment across occupations (resulting from a change in 936 policies) is expected to be limited. However, in the long run, allowing emigration to act as an adjustment mechanism to the changes projected could be detrimental to the Puerto Rican economy. The cumulative effect of out-migration could leave the insular government with very limited tools -- particularly in terms of the skills' mix within the labor force and the morale of those in the Island -- to utilize towards the future improvement of the economy.

The main implication of the research here presented is then that the key to preventing Puerto Rican migration in the following years lies in the preservation of existing employment and the generation of new opportunities, but more importantly in a different focus in the development program for the Island. Policies directed at the preservation of 936 and related industries would preserve the existing but already insufficient employment opportunities for individuals in medium-skill occupations. In order to generate more medium-skill employment, a focus towards more labor-intensive enterprises is needed for the Puerto Rican economy. Because of linkages with Manufacturing, such measures could also have second order impacts of employment generation for Puerto Ricans in low-skill or

service-oriented occupations. Their contribution to the generation of new employment opportunities for individuals at the high-end of the occupational spectrum, however, would be rather limited. The promotion of domestic business creation, more entrepreneurial ventures, or direct job creation would be crucial in the improvement of labor market prospects in Puerto Rico for individuals in occupations like *Professional and Technical* and *Managerial and Administrative*. In the event of a change in 936 legislation, training for dislocated workers or labor force participants faced with inadequate opportunities could also play an important role in the improvement of the overall outlook for the economy.

BIBLIOGRAPHY

Alperovicyh, Gershon, Joel Bergsman and Christian Ehemann. (1975) "An Econometric Model of Migration Between U.S. Metropolitan Areas." The Urban Institute, Working Paper No. 0974-4.

Chiswick, Barry R. (1986) "Is the New Immigration Less Skilled Than the Old." Journal of Labor Economics, Vol. 4, No. 2.

Clark, Gordon L., Meric S. Gertler, and John E.M. Whiteman. (1976) Regional Dynamics: Studies in Adjustment Theory. Allen&Unwin, Boston.

Dietz, James L. (1986) Economic History of Puerto Rico: Institutional Change and Capitalist Development. Princeton University Press.

Ehrenberg, Ronald G., et.al. (1991) Modern Labor Economics: Theory and Public Policy. Harper-Collins Publishers, Inc., 4th. Edition.

Evans, Alan W. (1990) "The Assumption of Equilibrium in the Analysis of Migration and Interregional Differences: A Review of Some Recent Research." Journal of Regional Science, Vol. 30, No. 4.

Falcón, Luis M (1990) "Migration and Development: The Case of Puerto Rico" Commission for the Study of International Migration and Cooperative Economic Development, Working Paper No. 18.

Findley, Sally (1977) Planning for Internal Migration: A review of issues and policies in developing countries. US Department of Commerce and Bureau of the Census.

Greenwood, Michael J. (1988) "Changing Patterns of Migration and Regional Economic Growth in the U.S.: A Demographic Perspective." Growth and Change, vol. 19, no. 4.

----- (1985) "Human Migration: Theory, Models, and Empirical Studies." Journal of Regional Science, vol. 25, no. 4. 1985.

----- (1975) "Research on Internal Migration in the United States: A Survey." Journal of Economic Literature, No. 13.

Greenwood, Michael J., et.al. (Forthcoming) "Migration, Regional Equilibrium, and the Estimation of Compensating Differentials."

History Task Force, Centro de Estudios Puertorriqueños. (1979) Labor Migration Under Capitalism: The Puerto Rican Experience. Monthly Review Press.

Meléndez, Edwin (Forthcoming) "Puerto Rican Migration and Occupational Selectivity, 1982-1988".

----- (Forthcoming) "Los que se van, los que regresan: Puerto Rican Migration To and From the United States, 1982-1988."

Mueller, Charles F., editor. (1982) The Economics of Labor Migration: A Behavioural Analysis. Academic Press.

Pai, Gregory and Lea Shinan. (1977) Factor Mobility, Commodity Trade, and Regional Growth: A Review of the Literature. DOT-EDA Report, No. 18.

Papademetriou, Demetrios G. and Philip L. Martin, editors. (1991) The Unsettled Relationship: Labor Migration and Economic Development. Greenwood Press.

Portes, Alejandro and Robert L. Bach. (1985) Latin Journey: Cuban and Mexican Immigrants in the United States. University of California Press.

Reynolds, Lloyd G., et. al. (1987) Economics of Labor. Prentice Hall, Inc., NJ.

Rivera-Batiz, Francisco (1987) "Is There a Brain Drain of Puerto Ricans to the United States." Puerto Rico Business Review, Vol. 12, No. 6 & 7. Government Development Bank for Puerto Rico.

Rivera-Torres, L. (1989). Tax Exemption and Industrial Development. Massachusetts Institute of Technology: Ph.D. Thesis.

Ruiz, Angel . (1988a) "Impactos en Produccion, Empleo e Ingreso de Cambios en el Status Político de Puerto Rico: Analisis basado en el Modelo de Insumo-Producto." Unpublished.

----- (1988b) "Impacto Intersectoral y Macroeconomico en la Economia de Puerto Rico de las Empresas Operando Bajo la Seccion 936 del Codigo de Rentas Internas de los Estados Unidos." Paper presented at the "Seminario Internacional sobre Plantas Complementarias y Fondos 936," at the Instituto Tecnologico de Santo Domingo y Fundacion Friedrich Eberd, Santo Domingo.

----- (1984) "Input Output Analysis in Economic History and Theory." Serie de Temas Diversos de Economia, Num. 20. U.P.R. Depto. de Economia.

----- (1984) "The Input Output Model" in Serie de Ensayos y Monografias, Num. 40. U.P.R. Depto. de Economia.

Sassen, Saskia. (1988) The mobility of Labor and Capital: A Study in International Investment and Labor Flow. Cambridge University Press.

Sayrs, Lois W. (1989) "Pooled Time Series Analysis" Series: Quantitative Applications in the Social Sciences. Sage Publications.

Schachter, Joseph and Paul G. Althaus. (1989) "An Equilibrium Model of Gross Migration." Journal of Regional Science, Vol. 29, No. 2.

Tabuchi, Takatoshi. (1985) "Time-Series Modeling of Gross Migration and Dynamic Equilibrium." Journal of Regional Science, Vol. 25, No. 1.

Treyz, George I., et.al. (Forthcoming) "The Migration Sector of a Multiregional Policy Analysis Model." Unpublished Paper.

Treyz, George I., et.al. (Forthcoming) "The REMI Economic-Demographic Forecasting and Simulation Model." Unpublished Paper.

Weiner, Myron, editor. (1975) Internal Migration Policies: Purposes, Interests, Instruments, Effects. Migration and Development Study Group, Center for International Studies, MIT, Cambridge, MA.

Willis, Kenneth G. (1974). Problems in Migration Analysis. Saxon House, DC. Heath Ltd.