The New Jersey Apartment Industry
Economic Impact Analysis and Sector Profile

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Table of Contents

Appendices

Executive Summary

This report presents the findings of a broad study of the economic impact and economic profile of New Jersey's apartment industry commissioned by the New Jersey Apartment Association (NJAA) from the Edward J. Bloustein School of Planning and Public Policy of Rutgers, The State University of New Jersey. The purpose of the study is to estimate the economic and fiscal impacts of the rental apartment industry on the New Jersey economy, and to examine the industry's current and historical growth and demographic characteristics. It is important to note that the study primarily addresses the role of the industry as a business sector and the demographics of its market. It does not address the important and central economic and social contribution of the industry in providing housing for a large segment of the population. The study consists of two parts:

- Part I comprises an analysis of the economic and fiscal contribution to the state economy of the apartment industry's annual capital and operating expenditures.
- Part II, completed in March 2011, presents a profile of the industry's historical growth and its economic and demographic characteristics.

The findings of the study demonstrate that the apartment industry – comprising over 500,000 rental units in structures of five or more units – is a significant component of the New Jersey economy. The study estimates that in 2010, the industry directly or indirectly supported over 44,000 jobs, or 1.2% of total state employment. In addition, the industry directly or indirectly contributed $5.7 billion to state Gross Domestic Product (GDP), or 1.2% of total state GDP, and generated over $1 billion in local tax revenues.

Despite economic strain caused by the recent recession, market conditions for the multi-family rental housing industry improved in 2010, and in fact, the rental sector remains the one positive sector in an otherwise still struggling housing market.

Following is a brief summary of the key data and findings of each of the report's two main parts.

Part I: Contribution of Apartment Industry Expenditures to the New Jersey Economy (pp. 1-11)

- This component of the study drew on a broad survey of NJAA membership to derive estimates of the statewide economic impacts of the apartment industry's annual operations.

- The survey collected data from firms representing over 80,000 apartment units, almost 16% of the state's estimated 505,333 rental apartments in structures of five or more units.

- Based on the survey, it is estimated that in 2010 the New Jersey apartment industry:

  - Spent approximately $4.2 billion on its annual ongoing operations.
  - Directly employed nearly 22,000 property managers, maintenance personnel, leasing agents, administrators and other staff.
  - Was responsible for an additional 22,000 jobs in other business sectors as a result of its expenditures.
  - Spent approximately $410.6 million in capital expenditures on renovations and additions to existing structures (exclusive of new construction).

  (See pages 2-3 and Appendices 1, 2 and 3 for information about the survey and detailed data on industry expenditures.)

- Based on analysis of the expenditure data derived from the survey, the study estimates that the industry's *direct and indirect* contributions to the state economy in 2010 totaled:

  - Over 44,000 jobs
  - $2.1 billion in annual income
  - $5.7 billion in annual gross domestic product for the state
  - $140 million in annual state tax revenue
  - $1.0 billion in annual local tax revenue.

(See pages 4-9 and Appendix 4 for a detailed explanation of the economic impacts and the R/ECON™ Input-Output Model used in the analysis.)

Part II: Quantitative and Qualitative Profile of the New Jersey Apartment Industry (pp. 15 – 54)

- This component of the study, completed in March 2011, presents a broad overview of the history of the rental apartment industry in New Jersey, a demographic and financial profile of the renter population, and a review of apartment construction trends.

- Chapter I of Part II of the study (pp. 16-31) reviews the history of the apartment sector in New Jersey.

  - Close to one half (47.7 percent) of the state's renter-occupied units are now 50 years or older. Nearly half of these (22.5% of the total) were built in or before 1939. The earliest rental structures in the state were linked to the great immigration waves of a century ago and the needs of urban-industrial New Jersey. As industrialization spawned an emerging middle class, non-family or childless households sought more substantial rental accommodations, leading to the construction of large multi-family structures. Following the Great Depression and World War II, returning veterans and their varied shelter needs led to a proliferation of garden apartments.

  - As household incomes soared in the 1950s and 1960s, more upscale mid-rise and high-rise apartments emerged in the 1960s occupied by more affluent renters. By the late 1960s, the baby boom started to enter the housing market directly and in full force, and a second postwar wave of garden apartment and other rental development commenced. This was geographically more dispersed, and represented the spread of multi-family rentals to the suburban landscape. Close to three out of ten (29.5 percent) of all the renter-occupied supply in 2009 was built between 1960 and 1979.

- In the 1980s and 1990s, additions to the rental inventory slowed significantly. As a result, only 9.8 percent of today's renter-occupied units date from 1980 to 1989, and only 6.4 percent from 1990 to 1999 (Table 1). A similar share (6.6 percent) of the current rental inventory was built in the 2000-2009 period. As the baby boom echo, born between 1976 and 1994, began to enter the housing market, a more urban focus emerged. This new generation was far less suburban-centric than its parents. This change will be one of the key rental contours of the decade now unfolding. Alternative, and wide-spread, life style changes and burgeoning foreign born populations add further complexity and potential growth to the rental sector.

- Chapter II (pp. 32-45) explores the demographic and financial characteristics of the renter population in New Jersey using five-year average data for 2005-2009. Key findings include:
  - Minorities account for a significantly larger share of the rental housing market (43.3%) than of owner-occupied housing (17.8%) (pp. 34).
  - 53.7% of renter-occupied units are occupied by people 44 years of age or younger, versus 30.6% of owner-occupied units (pp. 35).
  - Median household income for New Jersey homeowners is approximately $88,173, versus $39,584 for renters (pp. 40-42).
  - Median annual owner costs of housing in New Jersey were approximately $27,552, versus median gross annual rent of $12,708 (pp. 40-42).

- Chapter III (pp. 46-54) examines construction trends in New Jersey in recent years. Among the chapter's key findings are:
  - While the total number of housing construction permits has dropped sharply since 2005, the share of multi-family units authorized was higher in 2010 (36.2%) than in 2005 (32.2%), and peaked at 44.8% in 2007 (p. 47).
  - Completed (certified and ready for occupancy) multi-family housing units peaked at nearly 8,000 in 2007, and had declined to 4,620 by 2010 (p. 49).
  - The share of *rental* housing units authorized by building permits doubled from 11.3% of total permits in 2006 to 22.8% in 2007, and as of August 2010 had risen to 25.2%.

Part I

Contribution of Apartment Industry Expenditures to the New Jersey Economy

Introduction

This report presents an analysis of the contribution of the apartment industry's annual expenditures to the New Jersey economy. Each year, the rental apartment industry makes significant expenditures on staffing, materials and supplies, utilities, administrative and management functions, third-party services (e.g., plumbing, electrical, snow removal), and other expenses, to support its ongoing operations and maintain and improve its properties. These expenditures have significant impacts as the salaries and business expenditures paid by the industry ripple throughout the state economy. Drawing on data from a survey of apartment building owners and management companies, the analysis estimates the magnitude of this economic contribution using a highly detailed input-output model of the New Jersey economy. The section begins with a brief description of the survey and the industry-wide expenditure estimates derived from the survey data. A description of the economic input-output model used in the analysis is then provided, followed by a discussion of the findings. A series of appendices provides further detail on the survey methods and findings.

New Jersey Apartment Industry Survey

The economic impact estimates are based on a survey of apartment building owners and management companies, including member organizations of the New Jersey Apartment Association (NJAA) and the New Jersey Affordable Housing Management Association (JAHMA).[1] The survey, conducted by the Bloustein Center for Survey Research (BCSR) at Rutgers University, yielded usable responses from 39 organizations representing 80,040 apartment units in structures of five or more units. The analysis is limited to structures of five or more units in order to capture the market segment occupied by purpose-built multi-family structures, and to exclude units in converted single-family homes, duplexes, and other structures not professionally owned and/or managed. This definition is used by the U.S. Census Bureau in its Survey of Market Absorption of Apartments, as well as in Chapter 12 of the New Jersey Administrative Code addressing property taxation. The survey total of 80,040 units in such structures represents approximately 48.2% of the 166,000 units owned and/or managed by NJAA members, and approximately 15.8% of the 505,333 total rental apartment units in New Jersey in

[1] The full survey and a description of the survey methodology are provided in Appendix 1.

structures of five or more units.[2] Based on the survey representation of 80,040 units and the U.S. Census Bureau estimate of 505,333 units statewide, the annual operating and capital expenditure data obtained through the survey were used to derive estimates of expenditures on an *industry-wide* basis.

Apartment Industry Expenditures in New Jersey

Table 1 summarizes the 2010 estimated industry-wide operating and capital expenditures derived from the survey data.[3] Operating expenditures are divided into *property-related* and *headquarters-related* expenditures and are estimated at $4.2 billion. Note that the expenditures are provided on both an industry-wide and a per-unit basis. The per-unit expenditure estimates reflect the estimated total expenditures as distributed over the full industry unit count of 505,333. That is, for example, the owner-paid oil expenditure estimate of $41 per unit does not reflect the average expenditures of owner-paid oil for only those units that are oil-heated. Rather, it reflects the total oil costs reported by the survey respondents for those units that are oil-heated, which are then distributed across *all* units represented in the survey. In this way, the per-unit estimates capture both the magnitude of those expenditures, and also the share of units that incur those costs. These costs are then extrapolated to the full industry scale. The capital expenditures indicated in the table encompass only expenditures on building renovations and additions (i.e., capital expenditures on new construction are excluded). These outlays on renovations and additions are estimated at $410.6 million annually, based on four-year averages (2007-2010). [4]

To ensure validity of the data, expenditure estimates derived from the survey were compared to the expenditures reported for master metered properties nationwide in the National Apartment Association's *2010 Survey of Operating Income & Expenses in Rental Apartment Communities*.[5] The BCSR survey found estimated per-unit revenues of $12,827 annually, compared to an NAA survey estimate of $13,683, and estimated property-related operating expenditures of $6,928 per unit, compared to the NAA finding of $6,503. In addition, the survey estimate of local (i.e., property) taxes paid by the industry was compared to an estimate of 2010

[2] American Community Survey, 2010, U.S. Census Bureau. Table B25032, "Tenure by Units in Structure."
[3] Appendix 2 provides a summary of the original survey data, prior to extrapolation to the industry-wide level.
[4] Survey data on *new construction* was not sufficient to generate statewide estimates of industry expenditures. Estimated economic impacts of new construction expenditures on a per-million dollar basis are provided separately.
[5] Lee, Christopher, *2010Survey of Operating Income & Expenses in Rental Apartment Communities*, National Apartment Association, August 2010.

property taxes paid on apartments derived from municipal-level apartment value and tax rate estimates available on the website of the New Jersey Department of Community Affairs (DCA).[6] The survey data resulted in an estimate of $864.16 million in local property taxes, compared to an estimate of $805.4 million based on the DCA data. These comparisons indicate that the survey-derived estimates align well with the range of values found in other sources.

[6] 2010 property tax rates and value classification are available at http://www.nj.gov/dca/lgs/taxes/taxmenu.shtml.

Table 1
Revenues and Distribution of Expenditures
New Jersey Apartment Industry, 2010

Revenue/Expenditure Category	Per-Unit	Total
Total Revenue	**$12,827**	**$6,482,008,581**
Residential Rental Income	**12,022**	**6,075,253,511**
All Other Tenant Fees	**389**	**196,359,417**
Total Ancillary Income	**416**	**210,395,653**
Total Expenditures (Operating and Capital)	**$9,148**	**$4,622,940,058**
Total Operating Expenditures	**$8,336**	**$4,212,341,515**
Total Property-Related Expenditures	**$6,928**	**$3,501,013,928**
Total Employee Payroll Costs	**1,278**	**645,606,243**
Direct Employment		14,023 full-time equivalent jobs
Average Salary		46,038
Material/Equipment[7]	**537**	271,309,180
Insurance	**309**	156,107,190
Local Taxes	**1,710**	864,159,124
State Taxes	**23**	11,766,406
State and Local Fees	**48**	24,269,259
Owner-Paid Electric	**290**	146,463,819
Owner-Paid Gas	**653**	330,031,796
Owner-Paid Oil	**41**	20,513,046
Owner-Paid Water/Sewer	**529**	267,531,118
Mgmt. Fees	**635**	320,849,664
Marketing/Advertising	**135**	68,100,431
Third-Party Services[8]	**741**	374,306,645
Total Headquarters Expenditures	**$1,408**	**$711,327,587**
Total Employee Payroll Costs	**668**	**337,408,552**
Direct Employment		7,886 full-time equivalent jobs
Average Salary (full and part-time)		42,788
Total Contracted Services	**269**	**135,746,801**
Accounting	28	14,257,797
Marketing	42	21,455,458
Legal	55	27,628,017
Computer	11	5,614,519
Other	132	66,791,013
Other Operating Expenditures (rent, insurance, supplies, utilities, etc.)	**456**	**230,651,462**
HQ Capital Expenditures (computers and other business technology, furniture, etc.)	**15**	**7,520,772**
Total Capital Expenditures – Renovation & Additions	**$812**	**$410,598,543**
Renovations	**777**	**$392,794,407**
Additions	**35**	**$17,804,137**

[7] Material and equipment was defined as supplies required for building and unit maintenance and repairs, including minor electrical and plumbing supplies, such as fuses, switches, minor wiring, faucets, etc.; supplies required for occasional (e.g., at turnover) maintenance and repair work, including paint, carpeting, locks, doorknobs, light fixtures, associated hardware, etc.; and rental office supplies.
[8] A detailed breakdown of expenditures on Third-Party Services is provided in Appendix 3.

Economic Impact Analysis and the R/ECON™ Model

The annual operating and capital expenditures of the apartment industry in New Jersey constitute a significant recurring economic contribution to the state economy. Expenditures on staffing, supplies, third-party services and other requirements for the ongoing property-related and headquarters functions of the industry, as well as capital spending on property improvements (new construction, additions, renovations), have both *direct* economic effects as those expenditures become incomes and revenues for workers and businesses, and subsequent *indirect* "ripple" or "multiplier" effects, as those workers and businesses, in turn, spend those dollars on other consumer goods and business operations and investment expenditures. These in turn, become income for other workers and businesses. This income gets further spent, and so on.

Economic input-output modeling focuses on the detailed interrelationships of sales and purchases among sectors of the economy. This analytical method measures the effect of changes in expenditures in one industry on economic activity in all other industries, thus capturing both the *direct* and *indirect* impacts of any set of initial expenditures in the economy. Input-output models also embody the degree to which supply of locally produced goods and services meets local demand. These measures, known as regional purchase coefficients (RPCs), capture the economic "leakage," as some portion of any investment or expenditure flows out of the region.

The R/ECON™ Input-Output Model developed and maintained at Rutgers' Center for Urban Policy Research is designed to measure these direct and indirect impacts for New Jersey.[9] The R/ECON™ model consists of 517 individual sectors of the New Jersey economy, and can measure the impacts of investments and expenditures in terms of the effect of such spending on employment (by sector), income, gross domestic product for the state, and indirect state and local tax revenues. The model has been used recently to estimate the economic impacts of a wide array of projects and activities, such as:

- Construction of office buildings
- Manufacture of military technologies
- Upgrading of electric and water utility infrastructure
- Construction and operation of liquid natural gas terminals
- Operations of physicians' practices in the state
- Government tax incentives

[9] A full description of the R/ECON™ Model and input-output modeling methodology is provided in Appendix 4.

Economic Impact Results

The R/ECON™ Input-Output Model was used to measure the contribution of the apartment industry's operating and capital expenditures to the New Jersey economy based on the distribution of costs presented in Table 1.[10]

Table 2 provides the estimated annual economic contribution, both direct and indirect, of the apartment industry to the New Jersey economy based on total annual operating and capital expenditures of $4.6 billion. (*Note that the capital expenditure impacts represented in the table include only renovations and additions to existing properties, and do not include the impacts of new construction projects undertaken by the industry.*) Table 3 provides the estimated employment impacts of these expenditures by industry. A brief explanation of the impacts follows Table 3.[11]

Table 2
Contribution of the Apartment Industry to the New Jersey Economy
Estimated 2010 Operating and Capital Expenditures of $4.6 Billion

Impacts	Direct	Indirect	Total
Employment (job-years)	21,909	22,535	44,444
GDP ($ millions)	3,718.0	1,974.7	5,692.7
Compensation ($ millions)	983.0	1,157.8	2,140.8
State Tax Revenues ($ millions)	11.8	128.2	140.0
Local Tax Revenues ($ millions)	864.2	160.4	1,024.6

Total impacts of the industry's expenditures in 2010 include:

- 44,444 job-years (one job lasting one year);
- $5.7 billion in gross domestic product (GDP) for the state;
- $2.1 billion in compensation (i.e., income);
- $140 million in state tax revenues; and
- $1.0 billion in local tax revenues.

[10] Expenditures on renovations and additions were allocated across the 517 model sectors based on existing estimates of expenditure distributions for renovation work by the construction sector.
[11] Note that all impacts resulting from the industry's capital expenditures are included in the *indirect* impacts. Tables in Appendix 5 provide the impacts of the operating and capital expenditures separately.

For comparison, the total employment impact of 44,444 jobs is equal to approximately 1.2% of total state employment in 2010, and exceeds the 2011 annual employment gain of 36,400 jobs. As in the case of employment, the total GDP impact of $5.7 billion is approximately 1.2% of the state's total GDP of $487.3 billion in 2010. The total local tax revenues of $1.0 billion generated by the industry's activity represent approximately 1.4% of total property taxes collected statewide.

Table 3
Distribution of Employment Impacts by Sector

Sector	Job-Years
Natural Resources & Mining*	2,106
Construction**	3,157
Manufacturing**	1,054
Transportation & Public Utilities	2,068
Wholesale Trade	715
Retail Trade	4,232
Financial Activities***	24,890
Services	5,673
Government	550
Total	**44,444**

* The large number of indirect job-years generated in the Natural Resources & Mining industry is primarily comprised of employment in landscaping and related functions.

** The large number of jobs in the construction and manufacturing sectors results from the investment in renovations and additions to properties.

*** The real estate sector is contained within the broader Financial Activities Sector.

- Employment

  Employment impacts are measured in job-years (i.e., one job lasting one year). However, as long as annual industry expenditures are maintained at 2010 levels, these jobs are, in effect, permanent. The industry's 2010 expenditures of $4.6 billion are estimated to generate 44,444 job-years in New Jersey, including approximately 21,909 *direct* jobs in the industry (within the financial activities sector). Significant additional *indirect* employment (22,535 job-years) is generated across various business sectors, including: services (includes architectural and engineering services, miscellaneous business services, education and health industries, and other service sectors); construction (driven largely by the capital expenditures on renovations and additions); transportation and public utilities; financial activities; and retail trade, as the direct expenditures become

personal incomes and business revenues. As these incomes and revenues are spent, they generate additional economic activity in the state's economy. The estimate of job-years generated by the industry (44,444) will recur each year assuming that same level of industry operating and capital expenditures (adjusted for inflation) continues annually. (This same result will also occur for the other economic impacts discussed below).

- Gross Domestic Product (GDP)

  The increase in GDP, a measure of the value of the output of final goods and services produced in the state based on the industry's 2010 expenditures, is estimated at $5.7 billion. GDP is the standard measure of the size of an economy (national or state) and is measured consistently across all states and the nation by the U.S. Bureau of Economic Analysis.[12]

- Compensation

  Compensation (or income) represents the total wages, salaries and wage supplements (i.e., employer contributions to government and private pension funds) paid for all direct *and* indirect jobs generated as a result of the industry's annual expenditures *in New Jersey*.[13] The expenditures are estimated to generate $2.1 billion in compensation in New Jersey.

- State Tax Revenues

  State tax revenues include direct state taxes paid by the industry as derived from the survey data, the indirect income and sales taxes associated with the salaries paid to the workers in the direct *and* indirect jobs generated by the industry expenditures, and the indirect business taxes associated with the economic output generated by the initial

[12] It is measured in three ways: by expenditures on final goods and services; by type of income generated; and by value added by producing sector. Of the three methods, it is best intuitively described as the total dollar value of all final goods and services produced by a specific economy (e.g., by a state or by a nation) per unit of time (quarterly for the nation, annually for a state). National income and product accounting protocols assure that the three methods of measurement yield the same total value of GDP.

[13] In more familiar terms, compensation as used in this and similar economic impact analyses is equivalent to income.

expenditures as they ripple through the economy. These state taxes are estimated to total $140 million annually.

- Local Tax Revenues

  The estimated increase in local tax revenues is for the entire state. It includes *both* direct property and other local taxes paid by the apartment industry, and a *long-run estimate* of additional property tax revenues resulting from increased property values associated with improvements to existing, or construction of new, property due to the new and/or increased personal and business incomes generated directly and indirectly by the apartment industry's annual expenditures. These local tax revenues are estimated to total $1.0 billion annually. Following is a more detailed description of how the estimated *indirect* local tax revenues are generated.

  Indirect local tax revenues increase because the additional economic activity resulting from the expenditures generates income for workers and revenues for business. [14] The increases in personal incomes and in business revenues are, in part, used to pay property taxes and to improve properties (both residential and commercial). Thus, households benefitting from the additional jobs and resulting incomes acquire and/or improve residential properties, and are able to pay rents and mortgages and the associated property taxes. Similarly, business income and profits also increase as a direct result of higher sales and output caused by the project. Businesses subsequently acquire and/or improve their properties.

  Historical New Jersey fiscal and economic data are used to measure the relationship between business revenues and the amount of commercial property tax revenues collected, and between household incomes and the amount of residential property tax revenues collected.[15] Given the increases in both household income and business

[14] For businesses, the revenue increase is measured in terms of value-added, and it is the change in value -added in the business sector that is the basis for the estimated change in property tax revenues.

[15] For the entire state, approximately 76% of total local property tax revenues are attributable to residential property; with approximately 21% derived primarily from commercial and industrial property.

revenues associated with apartment industry expenditures, the R/ECON™ Input-Output Model invokes the known statistical relation of local property tax revenues to both household income and business revenues in order to estimate the addition to local tax revenues attributable to the capital expenditures on residential and commercial property. It is important to note that this additional tax revenue occurs over a period of time. It is not an immediately generated impact. The economic sequence is as follows. The additions/improvements to residential and commercial property financed by the higher household incomes and higher business revenues are, in time, captured by higher property assessments, which, in turn, generate higher local tax revenues. There are time lags between the increase in incomes and revenues, the improvements to property, and the increase in assessed values. Thus, the local tax revenue impacts estimated in this analysis are the outcome of a long-run adjustment process. This process occurs over the entire state based on the geographical dispersal within New Jersey of the households and businesses that benefit from the apartment industry expenditures.

Additional Impacts - New Construction

In addition to expenditures on renovations and additions, capital expenditures for *new construction* were requested from survey respondents for the years 2007-2010. However, due to a low number of survey responses and accompanying sample reliability concerns, this average was ***not*** scaled to an industry-wide level. Instead, the results provided in this section are estimates of the economic impacts of new construction on a *per-million dollar basis.*

The R/ECON™ Model was used to measure the economic impacts of $1 million in expenditures for construction of new apartment buildings. These estimates are provided in Table 4. Table 5 shows the estimated employment impacts by industry.

Table 4
Economic Impacts in New Jersey of $1 Million in Capital Expenditures on New Construction of Multi-Family Housing

Impacts	Direct	Indirect	Total
Employment (job-years)	6.8	3.0	9.8
GDP ($)	506,123	206,745	712,868
Compensation ($)	406,926	139,344	546,271
State Tax Revenues ($)	-	-	26,211
Local Tax Revenues ($)	-	-	29,936

Table 5
Distribution of Employment Impacts by Sector

Sector	Job-Years
Natural Resources & Mining	0.07
Construction	4.90
Manufacturing	1.41
Transportation & Public Utilities	0.30
Wholesale Trade	0.58
Retail Trade	1.18
Financial Activities	0.35
Services	0.96
Government	0.06
Total	**9.81**

These impacts per $1 million of new construction expenditures can be applied to any subsequently obtained estimates of industry-level new construction expenditures to obtain estimates of their contribution to the New Jersey economy. Note that employment estimates are in job-years, and that fractional amounts of employment can thus be interpreted as the number of job-years (akin to person-hours) estimated to be generated by $1 million in new construction investment.

Thus, if annual industry capital expenditures on new construction are $200 million, the multipliers in Table 4 can be used to estimate total impacts. For example, this level of capital expenditure would generate 1,960 job-years (9.8 x 200), $142.6 million in GDP ($712,868 x 200), and $109.3 million in compensation ($546,271 x 200). These would be the sustained impacts year after year as long as new capital construction expenditures remained at $200 million annually.

Part II

Quantitative and Qualitative Profile of the New Jersey Apartment Industry

Introduction

This component of the report has three goals. First, it provides a brief history of the apartment industry in New Jersey. Second, using the latest American Community Survey data from the U.S. Bureau of Census it provides a current profile of the economic and demographic characteristics of the renter population in New Jersey. Third, it examines the trends in multi-family housing construction (permits and valuation) over the past five years in New Jersey.

These analyses are contained in three chapters. Together, they provide the context to better understand the economic profile and scale of the apartment industry in New Jersey. Below is a brief statement about each chapter:

- *A Broad History of the New Jersey Apartment Sector* provides a decade by decade description of the evolution of the apartment industry in New Jersey, including the changing physical characteristics of rental housing as well as the demographic shifts driving the market.

- *A Profile of New Jersey Renter-Occupied Housing Units* explores the demographic and financial characteristics of the renter population, comparing and contrasting renters to homeowners.

- *Construction Trends* analyzes changes in the permitting, completion, and valuation of multi-family housing.

Chapter I: A Broad History of the New Jersey Apartment Sector

Overview

During the past 100 years, rental housing in New Jersey was driven by demographic forces and economic change. The earliest rental structures were linked to the great immigration waves of a century ago and the needs of urban-industrial New Jersey. Then, when continued industrialization spawned an emerging middle class in the first three decades of the 20th century, non-family or childless households sought more substantial rental accommodations, leading to the construction of large multi-family structures. But the Great Depression essentially ended this era. Today, however, more than one out of five (22.5 percent) of New Jersey's renter-occupied housing units were built in 1939 or earlier and, thus, date from this era (Table I-1).

Following the Great Depression and World War II, returning veterans and their varied shelter needs led to a proliferation of garden apartments. While not nearly as ubiquitous as the vast single-family tract developments that swept the state at the same time, garden apartments remain a very visible and integral part of New Jersey's current rental inventory. Just over one out of four (25.2 percent) of the state's occupied rental housing units were built between 1940 and 1959 (Table I-1). Thus, close to one half (47.7 percent) of New Jersey renter occupied units are now 50 years or older (i.e., built before 1960).

As household incomes soared in the 1950s and 1960s, more upscale mid-rise and high-rise apartments emerged in the 1960s occupied by more affluent renters. Then, the fabled baby boom generation, that over-sized population cohort born between 1946 and 1964, became the overwhelming demographic dynamic, a role they continue to play today. Many developers adopted a strategy of "life-cycle riding" of the baby boom, catering to their shelter needs at each of their life-cycle stages. Obviously, the first stage was providing the basic shelter to initially house and rear the baby boom itself, largely accomplished in New Jersey through the burgeoning of single-family suburbia. But, by the late 1960s, the baby boom started to enter the housing market directly and in full force, and a second postwar wave of garden apartment and other rental development commenced.[16] This was geographically more dispersed, and represented the

[16] A second, smaller demographic force just preceded the baby boom into the housing market. These were "war babies" or "good-bye babies," a mini baby boom born between 1942 and 1944. This was initiated by service men as they were preparing to be deployed overseas. When it became apparent that the United States was clearly winning the war, the boom quickly ended. Subsequently, in 1945, Census Bureau demographers projected a long-term decline in birth rates. However, just the opposite happened. Births soared starting in 1946, as the baby boom initiated its long run.

spread of multi-family rentals to the suburban landscape. As befits the huge impact of the baby boom, the largest share of New Jersey's existing rental inventory comes from this era. Close to three out of ten (29.5 percent) of all the current (2009) renter-occupied supply was built between 1960 and 1979 (Table I-1). In addition, further high-rise and mid-rise developments emerged in selected locations during these two decades.

In the 1980s and 1990s, additions to the rental inventory slowed significantly. As a result, only 9.8 percent of today's renter-occupied units date from 1980 to 1989, and only 6.4 percent from 1990 to 1999 (Table 1). This was partially due to municipal slow-growth policies, but also to demographics. As the baby boom matured, new housing market entry-level households were increasingly drawn from the baby bust, that undersized population cohort produced during the low birth era that followed the baby boom (the cohort born from 1965 through 1976). Rental housing was released by the baby boom as it shifted into the family raising stage of their lives and thus lessened the need for new rental housing for the much smaller replacement baby-bust cohort. Much of the new construction of this two-decade period (1980-1999) was linked to geographic need. The emergence of powerful suburban office growth corridors, such as Route 1 in Princeton (Figure I-1) and Route 78 in Somerset County, generated rental demand by the young growing suburban white collar workforce.

Figure I-1
Office complex along Route 1 in Princeton, NJ

(Bing Maps, 2011)

While a similar share (6.6 percent) of the current rental inventory was built in the 2000-2009 period, the underlying dynamics shifted again (Table 1). Suburban areas were no longer the new economic frontiers, and office sprawl slowed from its previous frantic pace. While suburban restrictive-growth policies intensified, young households began to retreat from suburban lifestyles. As the baby boom echo, born between 1976 and 1994, began to enter the housing market, a more urban focus emerged. This new generation was far less suburban-centric than its parents. This change will be one of the key rental contours of the decade now unfolding. Alternative, and wide-spread, life style changes and burgeoning foreign born populations add further complexity and potential growth to the rental sector.

Table I-1
Year Structure Built

	Absolute Number of Renter-Occupied Units	Share of Renter-Occupied Units (%)	Share of Owner-Occupied Units (%)*
Occupied housing units	**1,035,989**		**2,116,888**
2000 or later	68,375	6.6%	7.7%
1990 to 1999	66,303	6.4%	10.7%
1980 to 1989	101,527	9.8%	12.9%
1960 to 1979	305,617	29.5%	26.4%
1940 to 1959	261,069	25.2%	25.2%
1939 or earlier	233,098	22.5%	17.1%

The Early Rental Markets

The first wave of multi-family rental housing emerged in New Jersey in the years before and after World War I and through the decade of 1920s. This coincided with a booming industrial economy and the initial stages of a white collar service economy, which spawned a rising middle class. Prior to this time, most newly constructed rental housing units were in modest two-story, wood-framed structures comprised of two to four units.[17] Much of this housing was built for urban industrial workers and their families, and was often within walking distance of urban factories. Large areas of Newark, New Brunswick, and Elizabeth, for example,

[17] It was typical for the owner of the structure to occupy one of the units.

still contain such structures nearby closed manufacturing facilities, or nearby former manufacturing sites now demolished.

New Jersey did not experience the earlier wave of up-scale apartment development that emerged in Manhattan and New York City starting in the 1860s. Such developments emerged from surging land values which made private-house living increasingly difficult for widows, childless couples, and professional men. Before the emergence of now iconic buildings such as the Dakota Figure I-2), the residential options to expensive, large, multistory private dwellings were hotels and boarding houses.[18] Thus, emerging affluent demographic market sectors and soaring land costs led to the first large-scale rental apartment complexes in New York. Such developments were decades ahead of New Jersey.

Figure I- 2
The Dakota on W. 72nd Street in Manhattan

(Bing Maps, 2011)

New Jersey also did not experience the earlier wave of tenement building that swept New York in the second half of the nineteenth century and ultimately led to the New York State Tenement House Acts of 1867, 1879, and 1901. What are today known as Old Law Tenements were built between 1879 and 1901 and are popularly referred to as "dumbbell tenements" because of the shape of the buildings' footprints.[19] Many such structures, built to shelter

[18] Christopher Gray, "Apartment Houses: The Early Story," The New York Times, December 30, 2010.
[19] Air shafts to provide windows to every inhabitable room produced the narrow-wasted shaft of a dumbbell.

European immigrant populations, are still extant on the side streets of Lower East Side of Manhattan. New Law Tenements refer to those built after 1901 and incorporated stricter health standards.[20] In New Jersey's large cities, there were probably similar structures, but there are very few still in existence.

The emergence in New Jersey of rental units much more substantial than modest wood framed structures took place just before and after World War I. This early "wave" of specialized "all-rental" structures – relatively large multi-story masonry structures typically four to six stories or so in height[21] – predated zoning ordinances in much of New Jersey.[22] As such, they were usually built on relatively large building lots in blocks that were primarily comprised of large single-family units. They could be considered the iconic middle-class rental buildings of pre-Great Depression New Jersey. Such structures were often built out to the edge of the lot-lines, sometimes standing cheek by jowl to adjacent single-family units, significantly changing the residential character (Figure I-3).

Figure I-3
Pre-Great Depression rental housing in New Brunswick, NJ

(Bing Maps, 2011)

[20] The air shafts required by the 1879 Act ultimately proved to be unsanitary as the occupants used them as repositories for garbage and wastewater. New Law Tenements required courtyards designed for garbage removal as well as outward facing windows.
[21] A smaller number were far taller.
[22] The first zoning law in America was passed in New York City in 1916

Others had much less lot coverage and were set in almost park-like settings. As was appropriate during that era, off street parking was not a major concern (Figure I-4). Whatever the lot coverage format, these structures are still visible and viable today in many of New Jersey's older municipalities, usually at the edge of downtown centers and generally close to commuter rail stations.[23] One of many New York City analogs is the typical art deco apartment structures lining the Grand Concourse in the Bronx (Figure I-5). One of the greatest concentrations of pre-Depression mid and high rise rental buildings is still evident in East Orange.

Figure I-4
Pre-Great Depression rental housing in Madison, NJ

Figure I-5
Art deco structure along Grand Concourse in the Bronx, NY

(Bing Maps, 2011)

[23] While sometimes dramatically changing the single-family character of neighborhoods, today this pattern of building would be considered a form of smart growth transit villages.

The Post World War II Boom

During the Great Depression and World War II, all residential development slowed dramatically both in the nation and New Jersey.[24] Consequently, when housing demand soared with the return of millions of American veterans starting in 1945, the nation faced a major multi-dimensional housing crisis. The obvious shelter image of the postwar period was the large tract house suburban development typified by Levittown, now Willingboro. Many returning servicemen and their newly created households, however, sought rental housing, either by preference or necessity. While there were federally supported temporary rental housing developments, the immediate post-World War II private-market iconic rental structure was the garden apartment, built on the outer edges of developed communities or in adjacent municipalities (Figure I-6).[25] A spurt of developments was built in the late 1940s and early 1950s to accommodate both family and nonfamily households.

Figure I-6
Garden apartments in Highland Park, NJ

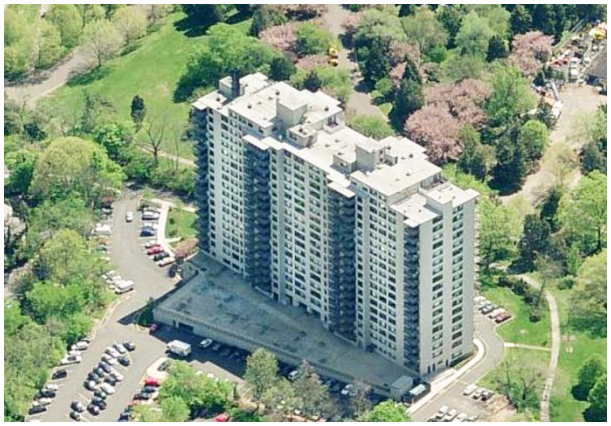
(Bing Maps, 2011)

[24]One interesting exception was federally-sponsored defense-worker housing. The Federal Works Administration, in collaboration with local municipalities, built approximately 625,000 units. These were modest wood-frame buildings. In New Jersey, the Winfield Park Mutual Ownership Defense Housing Project, carved out of Linden and Clark in Union County, opened just prior to the involvement of the United States in World War II. It was established as a separate municipality, the only defense housing project to be so.

[25] While now nearly forgotten, the emergency temporary rental housing projects were often racially segregated and were modeled after typical military barracks. They were ultimately sold off by the federal government or demolished. One notable development was actually built within the horse racing track in Weequahic Park in Newark. The race track followed what is now the oval portion of Thomas Carmichael Drive in the park.

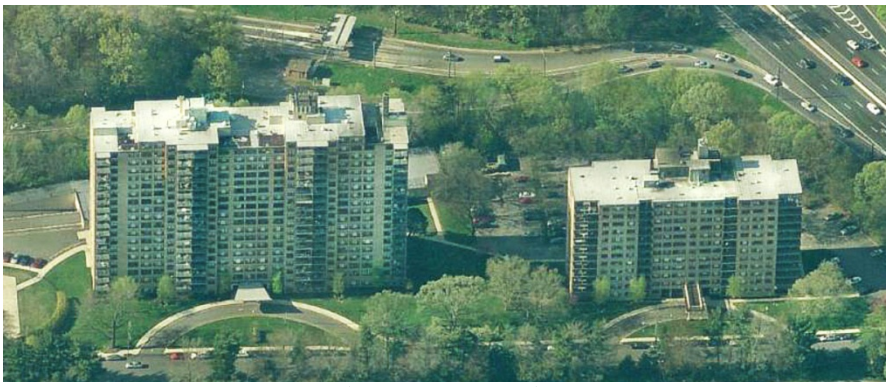
The 1960s also brought the emergence of high rise apartments in select, dispersed locations in New Jersey, such as New Brunswick (Figure I-7), Cherry Hill, Clifton (Figure I-8), and Fort Lee. These tended to be more upscale accommodations than the "garden variety" garden apartment. The 1950s and 1960s were the decades of American global economic dominance. The real (inflation adjusted) median family income in the United States nearly doubled between 1950 and 1970.[26] This generated a growing cohort of affluent renters whose only choices throughout most of New Jersey had previously been garden apartments. In fact, significant parts of the emerging high rise markets were drawn from households who had been garden apartment renters.

Figure I-7
High-rise apartment in New Brunswick, NJ



(Bing Maps, 2011)

Figure I-8
High-rise apartment in Clifton, NJ



(Bing Maps, 2011)

[26] In the 20 years between 1950 and 1970, the median family income (in 2009 constant dollars) in the United States grew from $25,814 to $48,640, an increase of 88.4 percent. To put this performance in perspective, during the next 39 years (1970 to 2009), the median family income increased by only 23.5 percent to $60,088.

But the most significant rental focus of the 1960s and 1970s was a second wave of garden apartment construction. The fabled baby boom generation – the largest generation, approximately 3 million strong, ever produced in New Jersey's history – began forming households, and generating demand for entry-level rental housing. And the housing industry responded quickly. Because of relatively more affordable land in the newly emerging suburbs, densities were low by today's standards, generally eight to ten units per acre. And what presaged today's almost obsessive concerns about the high cost of educating the students generated by new housing developments were zoning ordinances that often specified an 80-20 ratio, i.e., 80 percent of the units would have to have one bedroom or less, and only 20 percent could have two bedrooms. The common "demographic multiplier" of that era projected an average of .04 public school pupils per one bedroom unit (or four pupils per hundred units) and .4 public school pupils per two bedroom unit (or 40 pupils per 100 units). Hence, the concern about the number and costs of new public school pupils that accompany new residential development dates back almost one-half century. Still, this two-decade period, 1960 to 1979, could be considered New Jersey's golden rental housing construction period, with more units added to the rental inventory than any other two-decade period in the state's history.

Maturing Housing Demand: The 1980s and 1990s

The demographics of the 1970s yielded enormous levels of young household formation, producing a level of housing demand and market segmentation that could not have been envisioned a generation earlier. Baby boomers were a motive force in this evolution; they wanted everything their parents had, only sooner, and in their own unique fashion. They essentially restructured the New Jersey shelter arena. And, after bulwarking the rental sector in the 1960s and 1970s, they eventually started to withdraw from it. The decade of the 1980s saw a maturing baby boom sprint to homeownership, slowing the growth of renter households considerably. A signature housing prototype of this period was the townhouse, heretofore a limited ownership market sector in New Jersey. At the time, it was viewed as the new entry-level homeownership format.

Nonetheless, New Jersey's rental housing inventory continued to grow, albeit at a much slower pace. Much of the increase was tied to the new economic geography of New Jersey. The decade of the 1980s was transformative for the state's economy. While New Jersey's manufacturing base continued to contract, there was a surge of knowledge-based, white-collar

jobs located in office buildings. In 1980, the state was a virtual non player in the broader New York-New Jersey regional office market. Manhattan's share of the regional market stood at an overwhelmingly dominant 85 percent. But then New Jersey experienced an unprecedented office building boom. By 1990, 80 percent of all the office space ever produced in the history of the state had been constructed during the preceding 10 years (1980-1989), much of it in suburban highway growth corridors. If the 11-county northern and central New Jersey market had been an officially designated metropolitan area in 1990 – instead of being fragmented into smaller metropolitan configurations – it would have been the fifth largest metropolitan office market in the country, with more office square footage than metropolitan Atlanta, metropolitan Dallas, metropolitan Boston, etc.

This suburbanization of the state's new and vast information-age economy led to the demand for rental housing in, or easily accessible to, the emerging growth corridors, by the new, young white-collar workers. Throughout the 1980s, the tail end of the baby boom still constituted the state's entry level labor force. Consequently, while the overall demographically-determined demand for rental housing slowed, the new economic geography caused a new spatially determined demand for rental housing. The rapid growth of rental complexes in Plainsboro (Middlesex County) – a key municipal component of the Route 1-Princeton corridor – stands as a prime example of the economic, demographic, and housing forces at work (Figure I-9).

Figure I-9
1980's rental apartments in Plainsboro, NJ

(Bing Maps, 2011)

Geographic catch-up by the rental market continued through the 1990s. However, the baby-bust generation itself – the nation's demographic cohort of contraction – began to directly impact the state's housing market. Foreordained to trail in the wake of the far larger baby boom, the baby bust has always had available to it the large capacity that was originally built for the baby boom, whether it be schools or housing. Thus, entry-level shelter initially tailored to the baby boom became available to the baby bust, further muting the need for entry-level rental housing. By 1995, mid-decade, the baby bust was between 19 and 30 years of age. Thus, at that time, all of the state's "20-somethings" were baby busters. As a result, the 1990s had the smallest pool of entry-level housing consumers in half a century.

The New Millennium

The relentless march of demographics, shifting geographic preferences, and an unprecedented housing and credit bubble defined the first decade of the 21st century. There were two signature demographic dates, one early in the decade and one in its aftermath. On January 1, 2001, the first baby boomer hit the "big 55" – 55 years of age. Consequently, the leading edge of this generation was entering empty-nesterhood. Ten years later, January 1, 2011, the first boomer then hit the "big 65" – 65 years of age. Empty-nesterhood had arrived in full force. The process of re-sizing in the housing market became a powerful new dynamic, with the oldest members of this generation shedding their McMansions for more appropriately scaled dwellings. These were often in active adult suburban communities or condominiums in more developed areas, as well as in selected rental market segments. Concurrently, the baby-boom echo started to swell the number of "20-somethings," and the entry level rental demand sector accelerated as the 2000s matured. In addition, the foreign born, accounting for one-out-of five New Jerseyans by decade's end, became a growing component of the rental market.

The signature shelter events of the first decade of the 2000s were America's boom and bust of the housing and credit bubbles. These interconnected events had significant ramifications for rental housing. While cheap and easy credit facilitated new rental construction, the emergence of "creative" mortgage products enabled a significant number of extant renters to join the ranks of homeowners. The homeownership rate in the United States, historically around 64 to 65 percent in recent decades, soared to 69 percent by 2004. Many of these former renters should not have become homeowners. By 2010, the rate had retreated to below 67 percent as a

major housing market rebalancing unfolded with massive foreclosure activity.[27] The obsession with becoming a homeowner is now under correction.

Geographically, rental housing experienced a resurgence in urban and developed areas due to the preference for activity centers by boomers and echo boomers alike. Also propelling this shift was the increasing hostility to development by less densely developed suburban and exurban areas. Farmland and open space preservation efforts reached new highs, and down-zoning became a growing tool to limit development. Despite this impediment, the growth of rental housing during the decade actually surpassed that of the 1990s, even though the Great Recession of 2007-2009 devastated housing production in the nation and New Jersey. The year 2009 was the worst housing production year in the state since World War II, supplanting 1991.

The great housing bust also had significant impacts on household mobility and labor markets. The United States, compared to Europe, always has had a more fluid and mobile labor force willing to relocate to secure new employment. But, the harsh end-of-decade housing reality was: "if you can't sell your house, you can't move." This new phenomenon has contributed to persistently high unemployment rates and thus, to the detriment of the economy in general. This downside to homeownership may be a feature of the decade to come, with a much greater recognition that homeownership can be a constraint to mobility. This would potentially encourage the attractiveness of renting.

Moreover, the decade of the 2000s also turned out to be the lost employment decade both for New Jersey and the United States, reinforcing the probability that geographic mobility is necessary to secure employment in a slow-growth job environment. The year 1939 was the first year that payroll employment statistics were compiled in the United States. Based on 71 years of data, the 2000s were the first time that the nation and New Jersey ended a decade with fewer private-sector jobs than at the start. This has contributed to enormous employment deficits that now have a significant impact on housing buying power and housing rental power. As a result, these changes are significantly affecting the relative demand for owner-occupied vs. renter-occupied housing units.

[27] Annual homeownership rates are based on the average of the four quarterly rates for each year published by the U.S. Census Bureau in its Housing Vacancy Survey. See http://www.census.gov/hhes/www/housing/hvs/historic/index.html.

The Current Decade

Long-standing stage-in-life-cycle shelter tendencies cannot be underestimated in anticipating future housing demand. As was described in the preceding history of rental housing, the aging of households and the distinct configuration of households are directly linked to the types of dwelling units which they can either afford or prefer. For example, middle-age or near-middle-age is the period of peak family-raising activity. At this life cycle stage, child-rearing housing has the highest priority and is usually satisfied by free-standing, single-family ownership units. And this type of unit is most accessible to married couple families that stand on top of the income ladder. Single-parent families often find single-family housing much more difficult to secure.

Figure I-10
Post-2000 rental housing in Edgewater, NJ

(Bing Maps, 2011)

The classic conceptualization of life-cycle-segmented shelter requirements can be envisioned as static, discrete sets of housing facilities with each set occupied by households of similar demographic characteristics – but not the same households – over time. The names of the occupants shift, but not their attributes. Presented below is the conventional age-driven progression of household life cycle stages.

Contemporary "Conventional" Life Cycle Progression

1. Single "First Timers"
2. Advancing Singles
3. Young Marrieds
4. Compact Family
5. Expanding Family
6. Established Family & Pre-Empty Nesterhood
7. Empty Nesterhood
8. Active Retired and Retired

At each of the stages, there is a tendency to gravitate toward specific dwelling unit accommodations. Young singles, particularly "first-time" singles, may dominate garden-apartment facilities, with a subset (advanced singles) of more affluence – and in a higher tax bracket – advancing into the more modest condominium occupancy formats. Young married historically have led a relatively brief tenure in garden apartments, and have moved increasingly into condominium alternatives. The compact family may take advantage of the latter format, but as it expands will have a strong tendency to move into traditional freestanding, single-family dwellings. Attaining affluence, a further shift may take place into prestige or upscale housing for those who can afford it, sometimes just at the point when their offspring are on the verge of vacating the facility (pre-empty nesterhood). With the nest emptied, the appeal of less maintenance-prone condominium facilities, sometimes in an adults-only format, becomes evident. This appeal gains intensity as active-retired and fully retired status are reached; the proliferation of specialized active-adult and retirement communities stands as visible testimony. The last stages of life are reflected in the vast boom in nursing homes and the renewed interest in terminal-care facilities of all kinds.

Certainly, however, this is not a pattern which has been experienced by all New Jerseyans. Thus, to these classic stages above now must be added alternative "standings" which are far from unique, but whose very scale commands increasing attention of housing development style and format.

Alternative Life-Cycle "Standings"

1. Permanent Singles or Re-singled
2. Mingles
3. Never Nesters
4. Single-Parent Families

These alternatives include permanent singles, or those re-singled as a result of divorce or the death of a spouse; the mingles, i.e., unrelated adults (often of the opposite sex) sharing facilities; the rise of what might be termed the "never-nesters," i.e., married couples who have foregone child rearing; and single-parent families. It is the mix of these demand sectors which is crucial in determining the long-term potential of rental housing. Certainly, singles, mingles and single-parent families have traditionally been rental-centric and this is likely to continue in the future.

Outlook

As we view the future from the perspective of 2011, it is evident from the preceding analyses that, just as a function of age, America and New Jersey have been moving from an era dominated by family-raising baby boomers to an era that will have an unprecedented cohort of empty nesters. As a result, conventional life-cycle stages seven and eight will surge. So, too will stages one and two, driven by the children of the baby boom – echo boomers – who represent the second great population bulge emerging from the twentieth century. These represent the "new" demographics that have unfolded: maturing baby boomers pursuing empty-nester life styles and echo boomers – the "young 20-somethings" entering their early household life-cycle stages. They will dominate the decade to come, and both are prime rental targets. In addition, all of the alternative "standings" listed above will be growth sectors; again, these are prime rental targets.

Age-related demography will again prove to be destiny. In addition, another demographic cohort will prove to be instrumental. It consists of the new immigrant and foreign-born population. This has resulted from the second great immigration wave to sweep over New Jersey that rivals the scale and diversity of the first great immigration wave of a century ago.

So, these are the three key demographic building blocks of housing demand for the second decade of the 21st century: the baby boom, the baby boom echo, and the foreign-born.

Never, over the past 60 years, have the state's demographics been as non-single family centric. A revised calculus of housing demand is now emerging.

Finally, the full costs of homeownership have become much more apparent as a result of the lost employment decade, the Great Recession, and the bursting of the housing bubble. The new economy may well require increased household mobility in order to secure employment. As a result, a key advantage of rental housing has reasserted itself.

Chapter II: Profile of New Jersey Renter-Occupied Housing Units

Overview

This chapter examines housing data from the American Community Survey (ACS) of the U.S. Census Bureau. The data are measured as the annual average over the five-year period 2005 to 2009, a time frame that spans the boom and bust of the latest housing cycle.

The analysis has two major objectives. First, it provides a profile of the economic and demographic characteristics of the households that occupy rental units in the state. Second, in nearly every case[28], the analysis contrasts that profile with the equivalent profile of the households that reside in owner-occupied units. This allows comparisons to be made of differences and similarities in the two profiles. Together, both components yield a comprehensive assessment of the characteristics of the community served by the rental apartment industry in New Jersey.[29]

Data and Analysis

Table II-1 provides the number of renter-occupied housing units and owner-occupied units and the geographic distribution of these units within New Jersey.[30] The ACS indicates that there were, as an annual average, over one million renter-occupied units (1,035,989) for the period 2005 to 2009 in New Jersey.[31] This represents 32.9 percent of the total annual average of all housing units (3,152,877 renter- and owner-occupied units) in New Jersey during the period. Over half of the renter-occupied units (54.2 percent) were located in the eight Northern counties, slightly under a third (31.2 percent) in the six Central counties, and 17.2 percent of the units were in the seven Southern counties. The share of owner-occupied housing units by region differs

[28]This is the case except for Table 2, which examines the number of rental apartments in the structure.

[29] The analysis covers the major demographic characteristics – age, race/ethnicity, household size, presence of children, and financial factors (rents, housing costs and income). Two additional characteristics were analyzed at the request of the New Jersey Apartment Association (gender of head of household and foreign born households).

[30] The distribution is measured for three regions: North (Bergen, Essex, Hudson, Morris, Passaic, Sussex, and Warren); Central (Middlesex, Mercer, Monmouth, Ocean, Somerset, and Union), and South (Atlantic, Burlington, Camden, Cape May, Cumberland, Gloucester, and Salem). Detailed data on the characteristics of rental units by region are available in the appendix.

[31] According to the U.S. Census, "renter-occupied units are renter-occupied units that exclude 1-family houses on 10 or more acres" and "owner-occupied units only include 1 family houses on less than 10 acres without a business or medical office on the property." U.S. Census Bureau, American Community Survey. "2009 Subject Definitions." http://www.census.gov/acs/www/data_documentation/documentation_main/

significantly. Of the total of 2,116,888 owner-occupied units, 36.7 percent were in the Northern counties, 39.4 percent in the Central counties, and 23.9 percent in the Southern counties.

Table II-1
Occupied Housing Units by Region

	Absolute Number of Renter-Occupied Units	Share of Renter-Occupied Units (%)	Share of Owner-Occupied Units (%)
Total	1,035,989	-	2,116,888
North	544,199	52.5%	36.7%
Central	313,306	30.2%	39.4%
South	178,484	17.2%	23.9%

Table II-2 provides data on the number of units in rental apartment structures. Nearly half of the rental structures (48.5 percent) have five or more apartment units, and 36.8 percent of all rental structures consist of 10 or more units.

Table II-2
Number of Units in the Structure

	Absolute Number of Renter-Occupied Units	Share of Renter-Occupied Units (%)
Occupied housing units	1,035,989	
1, detached	117,067	11.3%
1, attached	70,447	6.8%
2 apartments	181,298	17.5%
3 or 4 apartments	159,542	15.4%
5 to 9 apartments	121,211	11.7%
10 or more apartments	381,244	36.8%
Mobile home or other type of housing	5,180	0.5%

Table II-3 compares the race and ethnicity characteristics of the households occupying rental units with those residing in the owner-occupied units. The top panel of the table indicates that 56.7 percent of the householders occupying rental units were white, compared with 82.2 percent of the owner-occupied units. Accordingly, the non-white share of householders in the rental units exceeded the non-white share of householders in the owner-occupied units. Thus, 23.4 percent of the rental units had black or African American householders compared to 8.3 percent of the owner-occupied units. Asian householders represented 7.2 percent of the rental units compared to 5.9 percent of the owner-occupied units. And, householders of "some other race" comprised 10.7 percent of the rental units compared to 2.7 percent of the owner-occupied units.

Table II-3
Race/Ethnicity of the Householder

	Absolute Number of Renter-Occupied Units	Share of Renter-Occupied Units (%)	Share of Owner-Occupied Units (%)*
Occupied housing units	**1,035,989**		**2,116,888**
One race --			
White	587,406	56.7%	82.2%
Black or African American	242,421	23.4%	8.3%
American Indian and Alaska Native	3,108	0.3%	0.2%
Asian	74,591	7.2%	5.9%
Some other race	110,851	10.7%	2.7%
Two or more races	17,612	1.7%	0.8%
Total	1,035,989	100%	100%
Hispanic or Latino origin	244,493	23.6%	7.4%
White alone, not Hispanic or Latino	467,231	45.1%	77.8%

The last two rows of the table examine ethnicity and focus on Hispanic and Latino householders. The data indicate that householders of Hispanic or Latino origin comprise a significant share of rental unit occupancy (23.6 percent) relative to their share of owner-occupied units (7.4 percent).

Table II-4 provides the age distribution of householders in rental vs. owner-occupied units. As expected, rental units are disproportionately occupied by young householders. Householders under 35 years of age represent 31.2 percent of the renter-occupied units compared to only 9.5 percent of the owner-occupied units, primarily reflecting income, age, and home price affordability relationships in New Jersey.[32] In the age category of 35 to 44 years, the share of householders in rental and owner-occupied units is nearly equal (22.5 percent vs. 21.1 percent). In every subsequent age category, owner-occupied shares exceed renter-occupied shares. Thus, the general, and expected, conclusion is that relatively young householders predominate in rental units (53.7 percent of the householders in renter-occupied units are 44 years of age or younger). At the same time, rental units serve a significant number of middle-aged householders (30.1 percent of all rental units are occupied by householders from age 45 to 64).

Table II-4
Age of Householder

	Absolute Number of Renter-Occupied Units	Share of Renter-Occupied Units (%)	Share of Owner-Occupied Units (%)
Occupied housing units	**1,035,989**		**2,116,888**
Under 35 years	323,229	31.2%	9.5%
35 to 44 years	233,098	22.5%	21.1%
45 to 54 years	189,586	18.3%	25.4%
55 to 64 years	122,247	11.8%	19.8%
65 to 74 years	77,699	7.5%	12.6%
75 to 84 years	61,123	5.9%	8.8%
85 years and over	29,008	2.8%	2.9%

[32] Since income typically increases with age, income and housing affordability constraints facing young householders result in a relatively large share of such householders living in rental units. As income increases (again, typically with age), homeownership rates also rise. The latest housing cycle with its severe foreclosure situation, has increased the demand for rental housing.

Table II-5 provides data on household size by renter and owner-occupied units. As expected, one-person households comprise the single largest share (37.8 percent) of the renter-occupied units. This share is significantly greater than the share of one-person households in owner-occupied units (20.2 percent). The shares of two- and three-person households in renter-occupied units decline to 26.4 percent and 16.4 percent respectively, but the share then increases to 19.5 percent for households consisting of four or more persons. As expected, all household sizes above one-person comprise larger shares of owner-occupied units than of renter-occupied units. Still, households consisting of three or more persons represent 35.9 percent of all renter-occupied units.

Table II-5
Household Size

	Absolute Number of Renter-Occupied Units	Share of Renter-Occupied Units (%)	Share of Owner-Occupied Units (%)
Occupied housing units	**1,035,989**		**2,116,888**
1-person household	391,604	37.8%	20.2%
2-person household	273,501	26.4%	32.2%
3-person household	169,902	16.4%	17.7%
4-or-more-person household	202,018	19.5%	29.9%

Table II-6 provides data on the type of households by gender in renter and owner-occupied housing. Married- couple households represent 27.7 percent of the households residing in renter-occupied units compared to 63.7 percent in owner-occupied units. In contrast, female householders with no spouse present comprise 19.8 percent of the households in renter-occupied units, compared to 9.3 percent in owner-occupied units. Male householders with no spouse present represent 6.4 percent of the households in renter-occupied units compared to 3.7 percent in owner-occupied units.

Table II-6
Profile of Household Type[33]

		Absolute Number of Renter-Occupied Units	Share of Renter-Occupied Units (%)	Share of Owner-Occupied Units (%)
Occupied Housing Units		**1,035,989**		**2,116,888**
Breakdown within Family Households	**Married-couple family**	288,005	27.8%	63.7%
	Male householder, no wife present	66,303	6.4%	3.7%
	Female householder, no husband present	205,126	19.8%	9.3%

Table II-7 provides data on the presence of children in renter and owner-occupied units. Households with no related children under the age of 18 represent similar percentages in both renter and owner-occupied units (66.8 percent and 63.4 percent respectively).[34] The shares between the two types of housing units remain similar within the categories of *own children present* by age of children except for the category of children 6 to 17 years of age. In that category, as expected, there is a larger share of such households in owner-occupied units (21.2 percent) than in renter- occupied units (15.5 percent).

[33] Other household type includes "non-family," which breaks down to "householder living alone" and "householder not living alone." U.S. Census Bureau, 2005 – 2009 American Community Survey.
[34] The 63.4% is the percentage of owner-occupied housing units with no related children under 18 taken from the entire population of owner-occupied units, including 23.3% that are non-family households. Excluding all non-family households reduces this percentage to about 40% (and about 49% for all housing units). A similar logic applies to the renter population.

Table II-7
Presence of Children[35]

	Absolute Number of Renter-Occupied Units	Share of Renter-Occupied Units (%)	Share of Owner-Occupied Units (%)
Occupied Housing Units	**1,035,989**		**2,116,888**
No related children under 18 years	692,041	66.80%	63.4%
With related children under 18 years	343,948	33.2%	36.6%
With own children under 18 years	317,013	30.60%	34.2%
Under 6 years only	91,167	8.80%	7.0%
Under 6 years and 6 to 17 years	65,267	6.30%	6.0%
6 to 17 years only	160,578	15.50%	21.2%
No own children under 18 years	26,936	2.60%	2.5%

The next five tables provide data on the financial characteristics of households in renter and owner occupied units. Table II-8 examines the monthly housing costs of owner-occupied units (with a mortgage) as a percent of monthly household income. The definition of monthly housing costs is comprehensive (mortgage, taxes, insurance, utilities, and other costs).[36] Nearly 45 percent of homeowners (with a mortgage) have monthly housing costs that exceed 30 percent

[35] The American Community Survey defines an "own child" as "a never-married child under 18 years who is a son or daughter by birth, a stepchild, or an adopted child of the householder. In certain tabulations, own children are further classified as living with two parents or with one parent only. Own children of the householder living with two parents are by definition found only in married-couple families. "Additionally, the ACS definition of a "related child" is "any child under 18 years old who is related to the householder by birth, marriage, or adoption. Related children of the householder include ever-married as well as never-married children. Children, by definition, exclude persons under 18 years who maintain households or are spouses or unmarried partners of householders." U.S. Census Bureau, American Community Survey. "2009 Subject Definitions." http://www.census.gov/acs/www/data_documentation/documentation_main/

[36] See the endnote to Table 8 for a complete definition. Note also that the number of owner-occupied units with a mortgage (1,505,524) is approximately 29% less than the total number of owner-occupied units (2,116,888). The difference of 611,364 owner-occupied units consists of units with no mortgage. Again, it is important to note that the dollar values in the tables are the five year annual averages (2005-2009).

of their monthly income. Within that, over 34 percent of the households have monthly costs that exceed 35 percent of their monthly income. Just over 55 percent of homeowners have monthly housing costs below 30 percent of their monthly income.

TableII-8
Selected Monthly Owner Costs as a Percentage of Household Income[37]

	Units	Percent
Housing units with a mortgage (excluding units where SMOCAPI cannot be computed)	1,505,524	
Less than 20.0 percent	397,867	26.4%
20.0 to 24.9 percent	229,042	15.2%
25.0 to 29.9 percent	203,848	13.5%
30.0 to 34.9 percent	157,031	10.4%
35.0 percent or more	517,736	34.4%
Not computed	4,213	(X)

Table II-9 indicates that the median annual housing cost of owner-occupied units with a mortgage is $27,552 and the median annual household income (of such homeowners) is $88,173. Thus, median housing costs comprise 31.2 percent of median income for households residing in owner-occupied units with a mortgage.

[37] The term "selected" refers to a specific set of homeowner costs. As defined by the 2005 – 2009 ACS, it is the "sum of payments for mortgages, deeds of trust, contracts to purchase, or similar debts on the property (including payments for the first mortgage, second mortgages, home equity loans, and other junior mortgages); real estate taxes; fire, hazard, and flood insurance on the property; utilities (electricity, gas, and water and sewer); and fuels (oil, coal, kerosene, wood, etc.)." Also included in the sum are monthly condominiums fees and costs related to mobile homes like "installment loan payments, personal property taxes, site rent, registration fees, and license fees." U.S. Census Bureau, American Community Survey. "2009 Subject Definitions." http://www.census.gov/acs/www/data_documentation/documentation_main/

Table II-9
Median Homeowner Costs and Income

Median Annual Homeowner Costs ($)	27,552
Median HH Income ($, Homeowners)	88,173
Median Annual Homeowner Costs as a Percent of Median Household Income	31.20%

Table II-10 provides data on the size distribution of gross monthly rent.[38] The median monthly rent was $1,059. Over 37 percent of the units had a monthly rent of between $1,000 and $1,499, the largest frequency of any of the rent categories. Over 34 percent of the units had a monthly rent between $500 and $999, while over 18 percent of the units had a rent of $1,500 or more.

Table II-10
Gross Monthly Rent

	Total	Percent
Occupied units paying rent	**999,842**	
Less than $200	26,625	2.70%
$200 to $299	29,850	3.00%
$300 to $499	42,923	4.30%
$500 to $749	103,496	10.40%
$750 to $999	241,117	24.10%
$1,000 to $1,499	375,223	37.50%
$1,500 or more	180,608	18.10%
Median (dollars)	1,059	(X)
No rent paid[39]	36,147	(X)

[38] Note that the number of units reporting rent information (999,842) is approximately 34% less than the number of rental units reporting in other tables (1,505,524). The difference includes the 36,147 units, as noted in Table 10, that pay no rent (as opposed to the other units in this difference for which no rent data was available).
[39] This group is comprised of people who may live in units owned by "friends or relatives who live elsewhere and who allow occupancy without charge. Rent-free houses or apartments may be provided to compensate caretakers, ministers, tenant farmers, sharecroppers, or others." U.S. Census Bureau, American Community Survey. "2009 Subject Definitions." http://www.census.gov/acs/www/data_documentation/documentation_main/

Table II-11 lists the rent as a percent of household income. Rent comprised less than 30 percent of household income for nearly half (49.2 percent) of households in occupied units paying rent.[40] However, rent represented 35 percent more of household income for 41.3 percent of the households.

Table II-11
Gross Rent as a Percentage of Household Income

	Total	Percent
Occupied units paying rent (excluding units where GRAPI cannot be computed)	982,686[41]	
Less than 15.0 percent	118,024	12.00%
15.0 to 19.9 percent	125,616	12.80%
20.0 to 24.9 percent	126,358	12.90%
25.0 to 29.9 percent	113,294	11.50%
30.0 to 34.9 percent	93,634	9.50%
35.0 percent or more	405,760	41.30%

Table II-12 provides information on the relationship between median rent and median income.[42] It is noteworthy that median rent as a percentage of median income (32.1 percent) is nearly identical to median housing costs as a percent of median income for home owners (31.2 percent) as reported in Table II-8. This is because although the median household income of renters ($39,584) is approximately 45 percent of median household income of homeowners ($88,173), median annual rent ($12,708) is approximately 46 percent of median annual homeowner costs ($27,552).

[40] Again, note the number of units reporting (982,686) is less than the number of units in other tables due to the reasons given in the endnote to the table.
[41] This number is lower than the number of units reported in Table 10 since GRAPI cannot be calculated for households that have no income or reported a net loss of income. U.S. Census Bureau, American Community Survey. "2009 Subject Definitions." http://www.census.gov/acs/www/data_documentation/documentation_main/
[42] It is thus symmetric to Table 8 which provided information on median home owner costs to median home owner income (for all units with a mortgage).

Table II-12
Median Renter Costs and Income

Median Annual Rent ($)	12,708
Median HH Income ($, Renters)	39,584
Median Annual Rent as a Percent of to Median Household Income	32.10%

The final six tables provide data on foreign born households in rental units and in owner-occupied units. Table II-13 indicates that foreign born households occupy 31.5 percent of the renter-occupied units compared to 17.7 percent of the owner-occupied units (although the actual number of units occupied by foreign born households, 325,616 and 374,194, are similar in the two categories). Table II-14 shows that foreign born households reside in 700,810, or 22.2 percent, of the state's 3,152,877 housing units. Of the 700,810 units occupied by foreign born households, 53.4 percent are owner-occupied units and 46.6 percent are renter-occupied units. The regional origin of the foreign born households by owner and renter-occupied units is given in Table II-15. Of the Asian born households (205,476), 61.6 percent live in owner-occupied units and 38.4 percent live in renter-occupied units. For European born households, 71.5 percent live in owner-occupied units and 28.5 percent live in renter-occupied units. This relation is reversed for Latin American born households. For those households, 38.5 percent live in owner-occupied units, and 61.5 percent reside in renter-occupied units.[43]

Table II-13
Foreign-born Occupants

	Renter-Occupied Housing Units	**Owner-Occupied Housing Units**
All Units	1,035,989	2,116,888
Occupied by Foreign-Born	326,616	374,194
Percentage	31.5%	17.7%

[43] This variation of rental status vs. homeowner status among foreign born households by region of origin is primarily due to income differences. The average Asia foreign born household income was $93,580, of European foreign born, $66,061, and of Latin American foreign born, $49,396.

Table II-14
Housing Tenure of Foreign-born

	Total
Occupied housing units by foreign-born	700,810
Owner-occupied housing units	53.4%
Renter-occupied housing units	46.6%

Table II-15
Housing Tenure of Foreign-born by Region

	Foreign born; Asia	Foreign born; Latin America	Foreign born; Europe
Occupied housing units[44]	205,476	296,263	156,901
Owner-occupied housing units	61.6%	38.5%	71.5%
Renter-occupied housing units	38.4%	61.5%	28.5%

Table II-16 indicates that the size of foreign households in owner-occupied units (3.3 persons) exceeds the size in renter-occupied units (2.9 persons). Table II-17 examines household size by region of foreign born. Asian foreign born households represent 29.3 percent of all foreign born households with an average household size of 3.5 persons in owner-occupied units and 2.7 persons in renter-occupied units. Latin American households comprise 42.3 percent of foreign born households with an average size of 3.7 persons in owner-occupied units and 3.3 persons in renter-occupied units. European born households are 22.3 percent of all foreign born households with an average size of 2.7 persons in owner-occupied units and 2.1 persons in renter-occupied units.

[44] The number of total occupied housing units is 42,170 less than 700,810 units. The 42,170 units are of foreign born occupants from Africa, Northern America, and Oceana.

Table II-16
Foreign-born Household Size

	Total
Occupied housing units	700,810
Average household size of owner-occupied unit	3.3
Average household size of renter-occupied unit	2.9

Table II-17
Foreign-born Household Size by Region

	Foreign born; Asia	Foreign born; Latin America	Foreign born; Europe	Foreign born; Other[45]
Occupied housing units	205,476 29.3%	296,263 42.3%	156,901 22.4%	42,170 6%
Average household size of owner-occupied unit	3.5	3.7	2.7	_ [46]
Average household size of renter-occupied unit	2.7	3.3	2.1	_ [47]

Table II-18 concludes the analysis with data on monthly housing costs as a percent of income for foreign born households by region. Of owner-occupied units, 41.6 percent of Asian born households, 60.7 percent of Latin American born households, and 44.4 percent of European born households paid more than 30 percent of household income in housing costs. For renter-occupied units, the percentages were: 35.3 percent for Asian households, 55.6 percent for Latin American households, and 43.6 percent for European born households.

[45] Foreign-born occupants from Africa, Northern America, and Oceana.
[46] Insufficient sample size.
[47] Insufficient sample size.

Table II-18
Monthly Owner Costs or Rent as a Percentage of Household Income of Foreign-born by Region

	Foreign born; Asia	Foreign born; Latin America	Foreign born; Europe
Owner-occupied housing units[48]	126,478	114,170	112,169
Owner-Occupied: Less than 30 percent	58.4%	39.3%	55.6%
Owner- Occupied: 30 percent or more	41.6%	60.7%	44.4%
Renter-occupied housing units[49]	78,998	182,093	44,732
Renter-Occupied: Less than 30 percent	64.7%	44.4%	56.4%
Renter-Occupied: 30 percent or more	35.3%	55.6%	43.6%

Conclusion

Approximately one third of New Jersey's housing is rental housing, largely concentrated in the northern third of the state. Nearly half of all rental units are located in larger apartment complexes with five or more units. The demographic data illustrates that a much higher percentage of those who identify as black or African-American are renters rather than homeowners as is the percentage of those of Latino or Hispanic origin. Renters are generally younger, and close to one third of rental households are comprised of a single individual living alone. Financial data indicate that as a percentage of income, renters and homeowners are spending equal amounts on housing costs. Finally, a closer look into the foreign-born population reveals that just under half of all foreign-born households live in rental units. Within the foreign-born population, a much higher percentage of Latin Americans live in rental units than those born in other regions of the world. Latin American rental occupants tend to also have larger families and more households are burdened by their housing costs than their counterparts from other regions of the world.

[48] The sum of the total occupied housing units is 42,170 units less than the total 700,810 units. The 42,170 units are of foreign born occupants from Africa, Northern America, and Oceana that were not included in the charts as the sample size was too small for the U.S. Census to analyze.
[49] The sum of the total occupied housing units is 42,170 units less than the total 700,810 units. The 42,170 units are of foreign born occupants from Africa, Northern America, and Oceana that were not included in the charts as the sample size was too small for the U.S. Census to analyze.

Chapter III: Construction Trends

Overview

This chapter examines trends in the apartment housing stock – what is proposed to be built (permits), what was built (certification), and how much value was potentially created by permitted apartment buildings (valuation). All of this data is found in the New Jersey Department of Community Affairs (NJDCA) annual *Construction Reporter*.[50] Data on new construction reported by the U.S. Census Bureau is also included in this section.[51]

The New Jersey Department of Community Affairs (DCA) definition of multi-family housing includes rental and for-sale units in buildings that have three or more units. Where possible, the data has also been broken out by structures with five or more units, in order to reflect the sector as represented in Part I of the study. Given the DCA's definition of multi-family housing, it should be noted that the earlier American Community Survey data of the previous section indicated that 64.4 percent of all rental households live in structures with three or more units.[52] The importance of these differences is that the construction data presented below does not fully capture the rental housing market presented in the preceding demographic and economic profile of New Jersey.

The following definitions, as stated in NJDCA's *Construction Reporter*, clarify the construction measures presented in the first three charts below:

- "Permit: A document issued by construction officials that authorizes the construction of a new structure or an addition or alteration of an existing structure. New construction permits are for new buildings. Permits for additions authorize work that adds space to an existing structure. Alterations also are for work on existing buildings, but no new space is added.
- Housing Unit Authorized by Building Permit: A rental or for-sale dwelling unit authorized by a construction permit.

[50] New Jersey Department of Community Affairs. *Construction Reporter.* 2011. http://www.state.nj.us/dca/divisions/codes/reporter/

[51] U.S. Census. Housing Units Authorized by Building Permits. 20,000 Place Series. January 27, 2011. http://www.census.gov/const/www/C40/table2.html#annual.

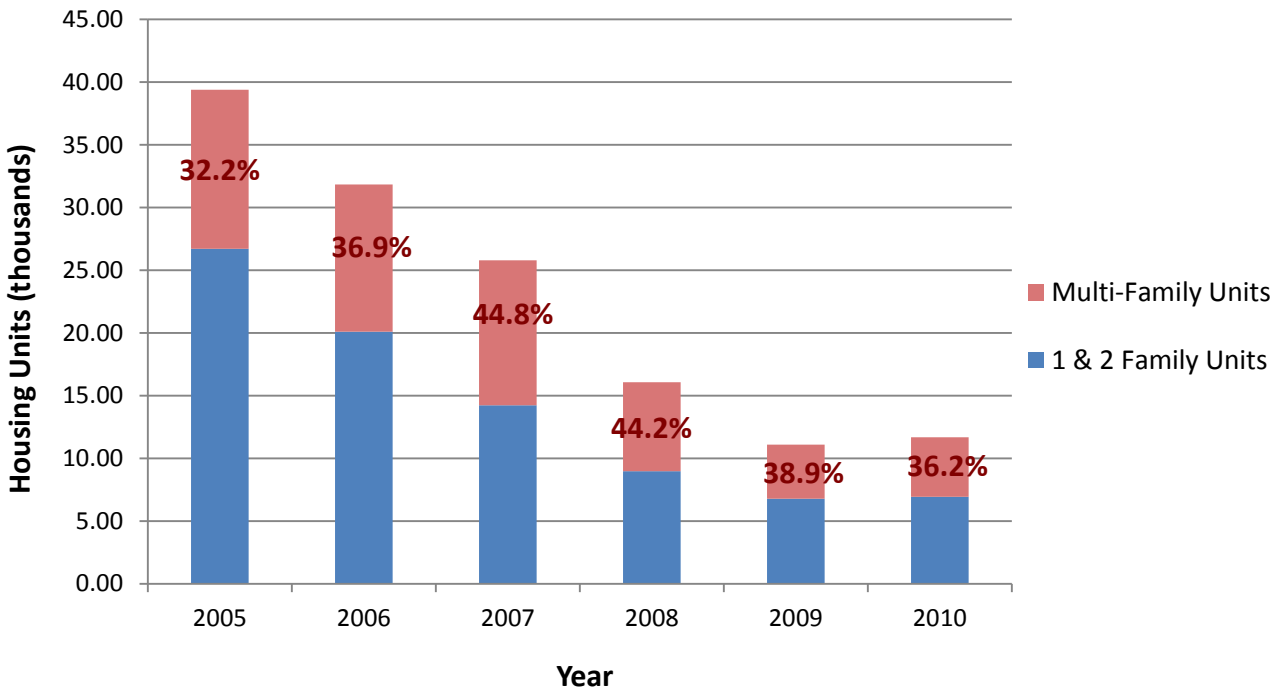
[52] Accordingly, about one-third of renter-occupied units are not included in the data in this section. U.S. Census Bureau. S2504. Physical Housing Characteristics for Occupied Housing Units. 2005 – 2009 American Community Survey 5-Year Estimates.

- Housing Units Certified: A rental or for-sale unit completed and certified by the construction official for conforming to the standards in the New Jersey UCC. Certificates are issued for work completed and ready for occupancy.
- Dollar Amount of Construction: Estimated cost of work, as reported by the permit applicant to the construction official."[53]

Analysis of Construction Data

Figure III-1 displays housing units authorized by building permits. The percentages listed are the multi-family units as a percent of total units. The chart displays a steep decline in multi-family housing units authorized by building permits over the past six years. The number of housing units permitted peaked in July 2005 at 12,687. In 2010, only 4,733 permits were authorized.

Figure III-1
Housing Units Authorized by Building Permits



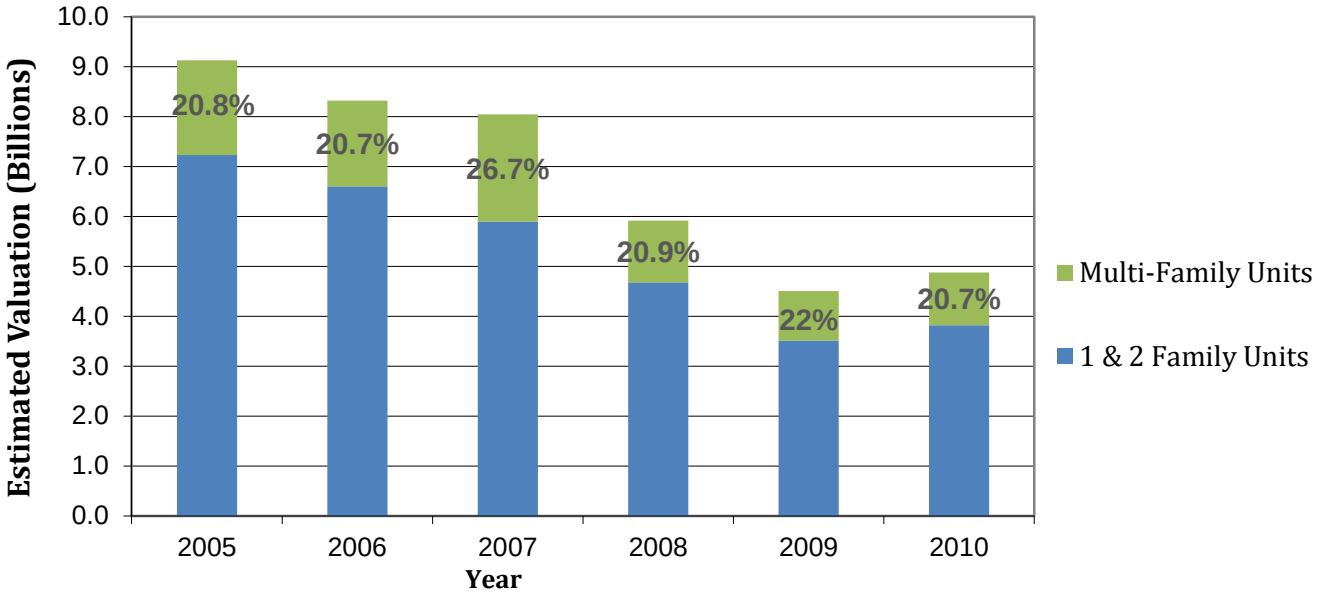
Source: New Jersey Department of Community Affairs.

[53] New Jersey Department of Community Affairs. *Construction Reporter Annual 2009 Data.* Exhibit A. Page 2. http://www.state.nj.us/dca/divisions/codes/reporter/2010monthly/online_cr_07_2010.pdf.

The largest decrease occurred between 2008 and 2009 when permits dropped by 39.3 percent. As a share of total housing, multi-family housing peaked at 44.8 percent in 2007. It is interesting to note that although the volume of housing units permitted has dropped significantly, the fraction of multi-family units to 1 and 2 family units is currently above the 2005 ratio. The 4,733 multi-family permits issued in 2010 represent a 62.7 percent decline from the peak in 2005.

Figure III-2 shows the accompanying decline in construction costs (as authorized by building permits. It also shows that multi-family construction costs as a percentage of total construction costs have remained relatively constant (at approximately just over 20 percent). In absolute terms and as a percentage of the total, estimated multi-family construction costs peaked in 2007 at $2,149,830,923 and 26.7 percent, respectively.[54] In 2010, estimated multi-family construction costs were at $1,057,072,829 – a 50.9 percent decline since the peak in 2007.

Figure III-2
Construction Costs as Authorized Building Permits

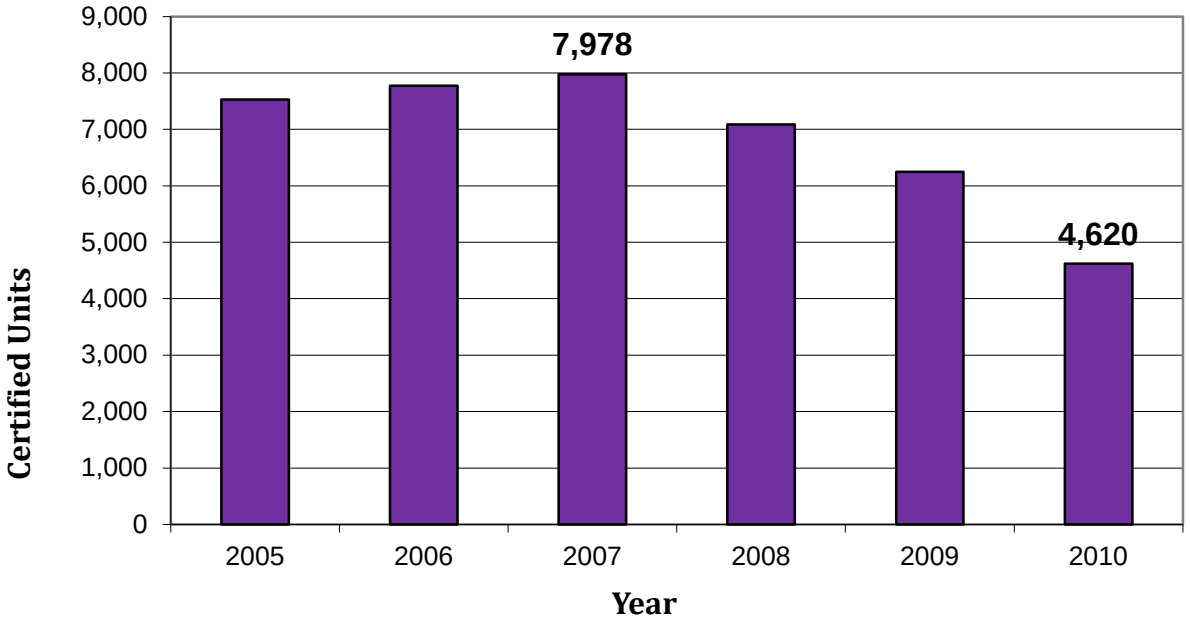


Source: New Jersey Department of Community Affairs.

[54] Building permits actually remained nearly constant 2007 at 20,787 authorized building permits. New Jersey Department of Community Affairs. *Construction Reporter*. http://www.state.nj.us/dca/divisions/codes/reporter/building_permits.html.

While building permits provide a measure of authorized construction in a particular year, certified housing units is a measure of construction that was actually completed and ready for occupancy (defined above). Figure III-3 shows that in 2007 certified multi-family housing units peaked at 7,978. This figure dropped to 4,620 in 2010. This represents a 42.1 percent decline from the 2007 peak, and a 38.7 percent decline from the beginning of the period in 2005.

Figure III-3
Multi-Family Housing Units Certified (NJDCA)

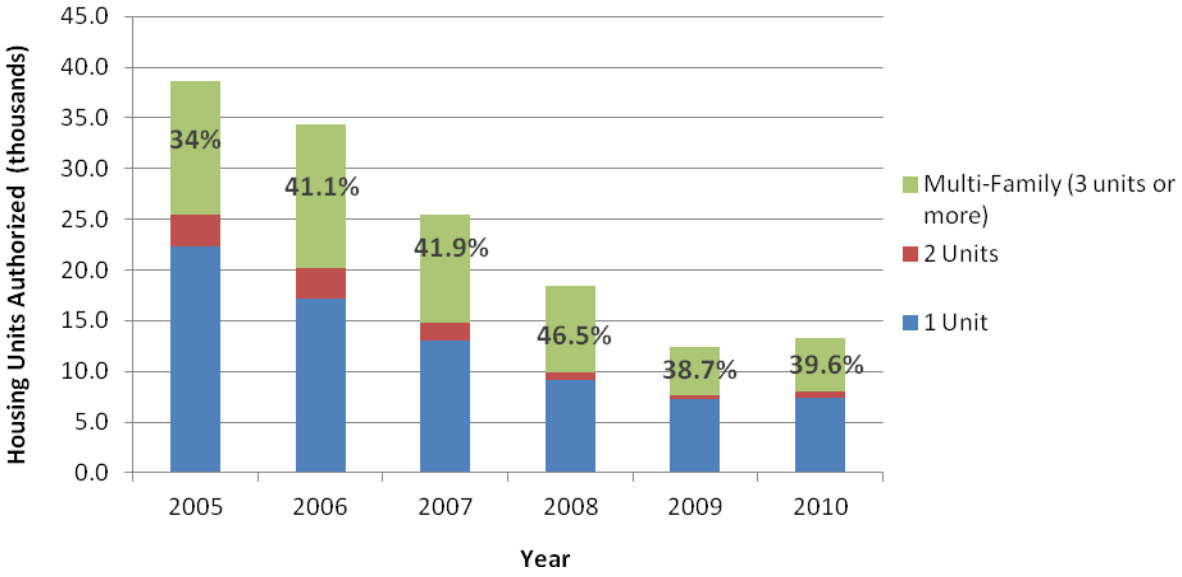


Source: New Jersey Department of Community Affairs.

Figures III-4 through III-7 utilize data from the U.S. Census Bureau. The U.S. Census tabulates housing units authorized by building permits differently than the New Jersey Department of Community Affairs. The primary difference is that the Census tabulations only include new construction. Data are reported according to the number of housing units (1 unit, 2 units, 3 and 4 units, and 5 or more units). The DCA definition of multi-family housing (3 or more units) was used to group Census data for Figure III-4 and III-6. Figures III-5 and III-7 illustrate the impact of larger apartment complexes.

Figure III-4 shows the total number of new, privately-owned housing units authorized by building permits from 2005 – 2010. The percentages displayed are the multi-family units as a percent of total units. In absolute numbers, multi-family housing units peaked in 2006 at 14,122 units. Three years later, this number dropped to 4,810, the lowest in the last five years. As a percent of the total, multi-family housing units was greatest in 2008 (46.5 percent) and has remained above 2005 levels through 2010. The number of permits declined steadily from 2005 to 2009, but began to recover in 2010 (an estimated 9.7 percent increase).

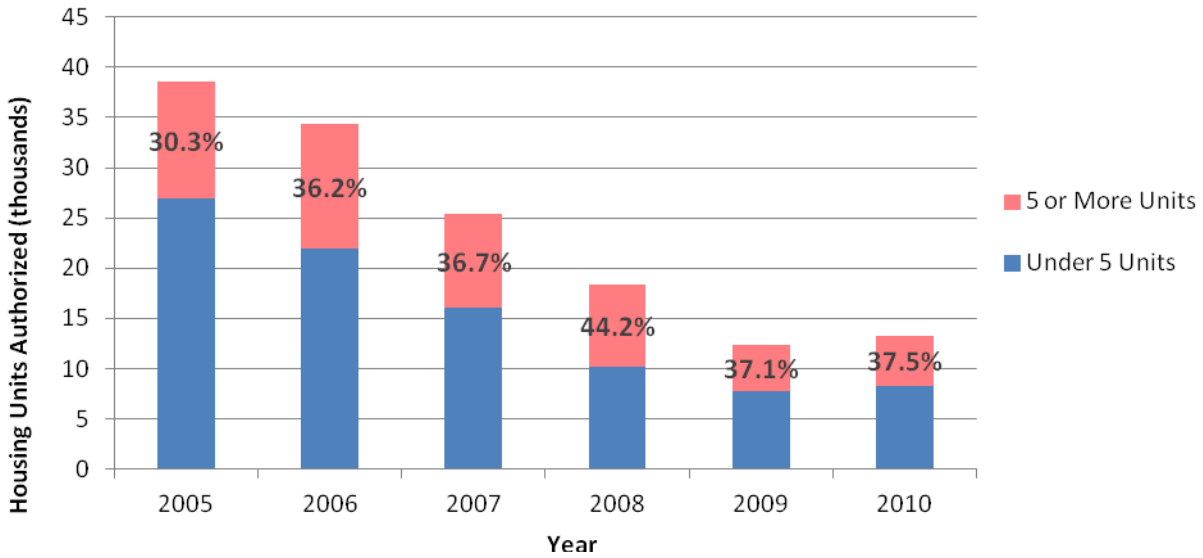
Figure III-4
New, Privately-Owned Housing Units Authorized by Building Permits



Source: U.S. Census Bureau

Figure III-5 relies on the same Census data , but focuses on the growth and decline of permits for new construction in structures with five or more units relative to those with fewer than five units. The overall trends are very similar to those seen in Figure III-4. In absolute terms, permits for new construction of structures with five or more units peaked in 2006 at 12,414 units and was at its lowest in 2009 at 4,604 units.

Figure III-5
New, Privately-Owned Housing Units Authorized by Building Permits
(by large and small apartment complexes)



Source: U.S. Census Bureau

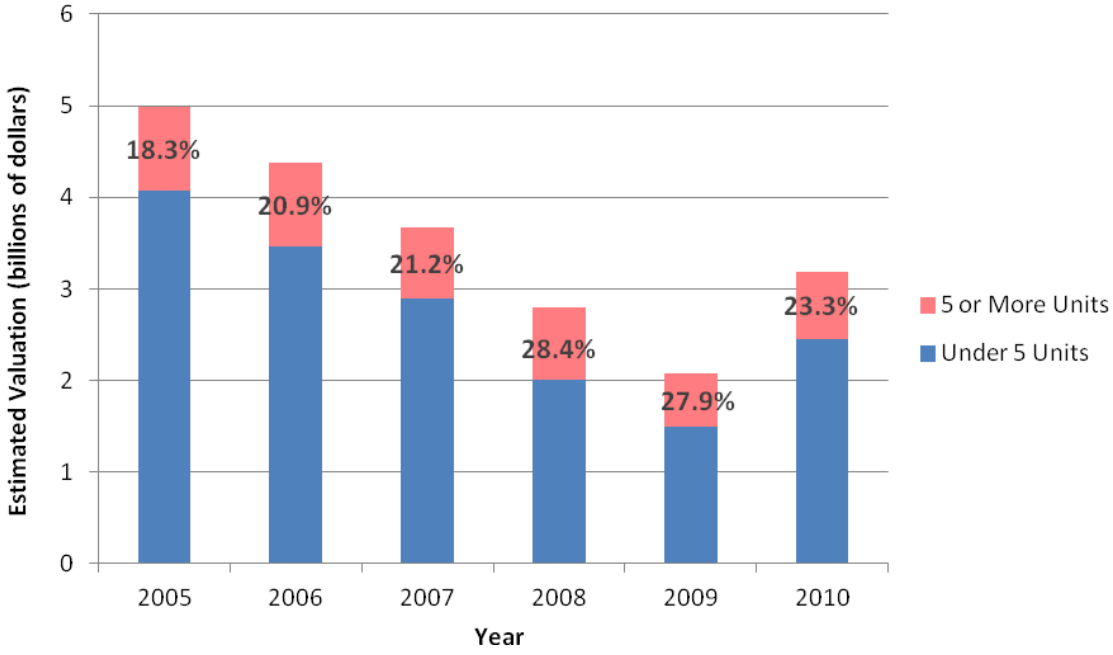
Census estimates of the valuation of new, privately-owned multi-family housing units authorized by building permits also followed similar trends to the NJDCA data series (Figure III-2). The percentages displayed in Figure III-6 are the estimated valuation of multi-family units as a percent of total units. In 2005, Census data reported $1,016,906,000 authorized by building permits for multi-family units. By the end of 2010 this number dropped to $835,825,000, a 17.8 percent decrease from 2005. The lowest absolute dollar value for new, multi-family construction ($602,411,000) and largest percent change from the previous year (- 26.9 percent) occurred in 2009. The industry began to recover in 2010 with a 38.8 percent increase in the estimated valuation of new multi-family units.

Again, the pattern seen when examining structures with five or more units compared to those with fewer than five units is similar to the patterns in Figure III-6 that use NJAA's definition of multi-family housing. Figure III-7 shows that in absolute terms, the estimated valuation of construction of new, private 'five or more units' peaked in 2005 at $915,478,000 and fell to a low of $578,470.000 in 2009, a decline of 36.8 percent. The total in 2010 of $742,352,000 indicates a recovery of 28.3 percent from the previous year.

Figure III-6
Estimated Valuation of New Privately Owned Housing Units Authorized by Building Permits

Source: U.S. Census Bureau

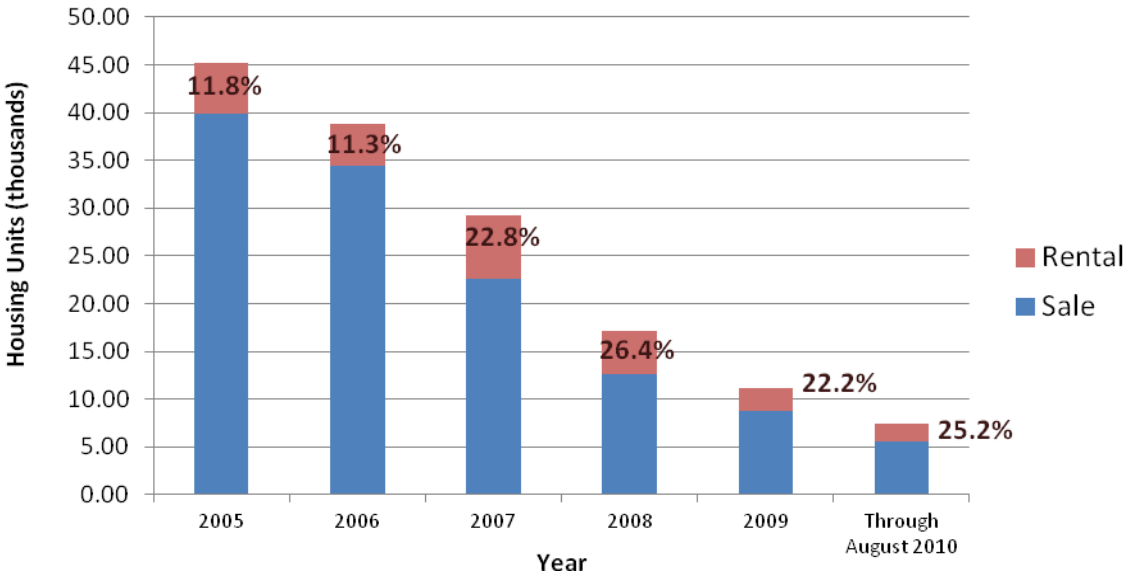
Figure III-7
Estimated Valuation of New Privately Owned Housing Units Authorized by Building Permits
(by large and small apartment complexes)



Source: U.S. Census Bureau

A final way to look at construction trends is to look at housing units authorized by building permits divided according to for-sale and rental housing, shown in Figure III-8. These numbers are estimated using construction permits, not completed construction. Comparing rental housing (Figure III-8) and multi-family housing as a percent of total housing units (Figures III-1 and III-4), it is clear that rental units are a much smaller percentage of the total. However, the permitting trends are similar. Permit approved rental units peaked in absolute terms in 2007 at 6,654 and in 2008 as a percentage of all housing (28.4 percent). As of August 2010, rental housing units dropped to 1,881 units but comprise over one quarter of all housing units. If the rate of rental housing permits continues through 2010, a total of 2,822 rental housing units will be approved. This is a 57.6 percent decline from the peak in 2007. One striking difference between Figures III-1 and III-4 and Figure III-6 is that when measuring sale versus rental units one can see that beginning in 2007, the proportion of rental units to total permitted housing units doubled. Such a shift is not as pronounced when examining multi-family to single-family permitting.

Figure III-8
Housing Units Authorized by Building Permits, by Sale and Rental[55]



Source: U.S. Census Bureau

[55] Lago, John. New Jersey Department of Community Affairs. Personal Communication. September 14, 2010.

When looking at the change in the number of rental units permitted from year to year, the annual decline ranges from 18.4 percent from 2005 to 2006 to 45.1 percent from 2008 to 2009. However, there was a large (52.1 percent) increase in the number of rental units permitted from 2006 to 2007. If permitting trends of continue at the rate established through August 2010 through the end of the year, there will be a 13.5 percent increase in permitted rental units from 2009 to 2010.

Conclusion

The recession, which began in December 2007 and officially ended in June 2009, has had a large, negative impact on the apartment industry. The permitting, completion, and valuation of apartment construction (all residential construction for that matter) has declined during the last five years, drastically declining in the 2007 – 2009 period. The large drop in building permits shows that fewer apartment developments were planned, but the even larger decline in certifications highlights how many planned projects never came to fruition in the past few years. As the number of permitted units for all housing fell, likewise so did the estimated valuation of construction. However, 2010 has been a year of modest recovery with many of the construction trends suggesting the bottom of the current housing cycle has occurred, at least with respect to building activity.

Appendices

Appendix 1: Data Collection Methodology and Apartment Industry Survey

Primary data for this project were collected via a census of the contactable membership of the New Jersey Apartment Association (NJAA) and the New Jersey Affordable Housing Management Association (JAHMA). Data from this closed, finite population were gathered online via a questionnaire application developed using the Qualtrics Company's internet-based survey software. As noted in the main text, the data collection effort yielded usable responses from 39 responding members representing 80,040 units. That total represents approximately 48.2% of the 166,000 units owned and/or managed by NJAA members, and approximately 15.8% of the 505,333 total apartment units in New Jersey in structures of five or more units.

Questionnaire Development

After an initial meeting on July 7, 2010, questionnaire development began and continued, together with contact list development, through November of 2010. On December 1, 2010, a comprehensive questionnaire review meeting was held with the survey subcommittee of NJAA, and the questionnaire was subjected to final scrutiny. Based on comments, suggestions, and edits from the December 1st meeting, and further discussion with NJAA from December 2010 through mid-January, 2011, the questionnaire was revised and edited, the web survey architecture was developed, and the questionnaire application was programmed, subjected to extensive testing, and finalized for the pretest.

Questionnaire Pretesting

On Tuesday, January 25, 2011, an email invitation to take the pretest questionnaire was sent to eight NJAA board members; on Tuesday, February 8, two additional pretest participants were sent email invitations to the pretest questionnaire. On Friday, February 11, 2011, an email reminder was sent to the 10 pretest participants, with a final email reminder sent on Wednesday, February 23, 2011 to two "partially completed" pretest participants. On Saturday, March 26, 2011, the pretest field period was closed. All told, the pretest yielded seven completed questionnaires. No substantive changes were made from the pretest to the questionnaire, and thus the pretest data are properly included in the final dataset.

Main Field Period and Respondent Contacting

On Wednesday, April 27, 2011, a hard-copy mailing, consisting of an endorsement letter from the project's Principal Investigator, Professor Joseph Seneca, together with a questionnaire instruction sheet, and a hard-copy printout of the online questionnaire, was mailed to the NJAA contact list. On Friday, April 29, 2011, the NJAA address roster of firm principals was finalized and fixed for sampling.

On Monday, May 9, 2011, individualized email invitations were sent to the 214 contactable NJAA members on the final sample list. On May 18, 2011, the JAMHA address roster was finalized and on Monday, May 23, 2011, email invitations were sent to the 74 contactable JAHMA members on that final sample list.

Through the end of May through early September, the application remained open and the survey administrators provided individualized support to participating NJAA and JAHMA members. On Thursday, September 8, 2011, personalized reminder emails were sent to those members who had participated, but left their submission partially complete. From September 8 through 28th, 2011, the survey administrators continued to provide individualized support to participating NJAA and JAHMA members.

On Wednesday, September 28, 2011, the main data collection field period was closed, and, through October 12, 2011, the data were cleaned and processed for use in the economic impact analysis.

RUTGERS
Edward J. Bloustein School
of Planning and Public Policy

The Board of Directors of NJAA has partnered with economists at the Edward J. Bloustein School of Planning and Public Policy at Rutgers, The State University to calculate the economic benefits of our industry to the New Jersey state economy.

In order to conduct that economic modeling, we need to collect fiscal data about our membership's business operations. In this way, we will be able to provide the model with the necessary data input.

Your cooperation is essential to the success of this important effort to advance the best interests of our industry. All responses will be held in confidence and used only as an economic model input. Your assistance is vital in strengthening our lobbying efforts, both now and in the future, and both in Trenton and at the local level.

If you have any questions about the data inputs, please contact the project team at NJAA@EJB.Rutgers.edu.

Thank you for your time and attention to this important effort.

I. Respondent

1. Name	
2. Title	
3. Company	
4. Address Line 1	
5. Address Line 2	
6. City	
7. State	
8. Zip Code	
9. Telephone	
10. E-mail	

Do you...?

- ○ Own property
- ○ Manage property
- ○ Both own and manage property

II. Corporate Information (Annual expenditures, for the year ended 12-31-2010)

This information should be specific to headquarters operations located *in New Jersey* that will not be included in the property-specific information asked in the subsequent sections

1a. How many properties do you own and/or manage?

1b. How many total rental units are in the properties referred to in Q1a.

2. Average number of employees during 2010:

Full Time:
Part Time:

3. Total wages, salaries, other employment compensation (benefits, unemployment insurance, payroll taxes) *and* non-wage distributions derived from proprietorships, or partnerships, including LLCs and S-Corporations.

$

4. Total Contracted (outsourced business) services (*in New Jersey*)

$

Please provide additional detail by breaking out the total contracted services listed above into the categories listed below. Provide as much information as possible.

a) Accounting:	$
b) Marketing (PR/Advertising):	$
c) Legal:	$
d) Computer services (including web development):	$
e) Other:	$

5. All other operating expenditures (office rent, supplies, insurance, utilities, etc., excluding all taxes):

$

6. Capital Expenditures, related to running headquarters. *This includes computer systems and other business technology, software, furniture, and other non-recurring expenditures.*

$

III. Capital Expenditures Related to Multi-Family Properties

While capital expenditures, by nature, vary widely from year to year, given the volatility resulting from the economic downturn of the past few years, we are hoping to gain a sense of the magnitude and breakdown of your capital expenditures over a period that begins before the downturn. Therefore, please provide capital expenditure data for as many years as possible for the period from 2007 through 2010.

In order to minimize respondent burden, please note that later in the survey we will ask for detailed operating expenses for the year-ending 2010 only.

Capital Expenditures Related to Multi-Family Properties (please allocate by year spent; if this information is not available by year then include in the year of completion)

	2007	2008	2009	2010
Construction of New Apartment Buildings				
Additions to Existing Structures				
Purchase Price for Acquired Properties				
Renovation or Capital Repairs to Existing Structures *(These categories - alterations, remodeling, rehabilitation, building systems upgrades - refer to structural modifications, large-scale renovations and refurbishments, and capital purchases that should be distinguished from ongoing routine maintenance and repair expenditures)*				

For the following sections, if you select "aggregate," you will move through the sequence once and then be asked to finalize your responses.

If you select either "by property type," you will be moved through the sequence for each of the property types you select, following which you will be asked to finalize your responses.

If you select "by individual property," at the end of the sequence, you will be asked if you wish to "add another property" or finalize your responses.

Please note when using the electronic system, once you select the property category on which you intend to report, you will be in a questionnaire loop for that category and cannot return to your prior answers. Before proceeding to the next section, please review and confirm previously entered final answers.

IV. Financial Operating Information

Please provide information on your annual operating expenditures for the most recent calendar year. You may answer either in aggregate for all properties you own and/or manage, in groups by property type (e.g., garden apts.), or seperately for each individual property.

Aggregate By property type By individual property

A. Property Characteristics

1. Community Name	
2. Address Line 1	
3 Address Line 2	
4. City	
5. State	
6. Year Built	

2. Do you...?

- ○ Own this property
- ○ Manage this property
- ○ Both own and manage this property

3. Type of Building (please check one type only)

- ○ Garden (1-3 stories)
- ○ Mid-rise (4-6 stories)
- ○ High-rise (7 or more stories)
- ○ Townhouse

4. Number of Units

Total:

Please break out the total number of units into the unit type.

Number of Units Market Rate (excluding rent controlled) :	
Number of Units Deed Restricted Affordable:	
Number of Units Rent-controlled:	

B. Operating Revenues *(Round to nearest dollar.)* - **Year ended 12-31-2010**

1. Residential Rental Income (total rents collected):

$

2. All Other Tenant Fees (please include all additonal fees paid *by tenants*, including parking, amenity fees, and other services requiring payment over and above apartment rent):

$

3. Total ancillary income generated from the property(ies) (for e.g., rental of rooftop space to cellular phone companies, etc):

$

C. Operating Expenditures *(Round to nearest dollar.)* - **Year ended 12-31-2010**

In this section, please enter the total operating expenses for the property. We will ask detail about these operating expenses on the next page.

1. Total Operating Expenses:

$

Operating Expenditures Details:

2. Total Employee Payroll Costs (including salaries, benefits, unemployment insurance, payroll taxes but excluding in-kind income and payments to payroll processing firms):

$

2a1. Employee In-Kind compensation (i.e., reduction from apartment market rate rent):

$

2a2. Please identify average number of staff by type -- *if employees split time between properties please list them only once* (if *other*, specify):

	# of Full-Time	# of Part-Time
On-Site Management / Administrative / Leasing Office		
Maintenance		
Other:		

3. Materials/Equipment Expenditures. *Expenditures on supplies required for building and unit maintenance and repairs, including:*

- minor electrical and plumbing supplies, such as fuses, switches, minor wiring, faucets, etc.
- supplies required for occasional (e.g., at turnover) maintenance and repair work, including paint, carpeting, locks, doorknobs, light fixtures, associated hardware, etc.
- rental office supplies

$

4. Insurance (all types of property coverage):

$

5. Taxes and government Fees$

a) Property and other county, municipal, or school taxes and/or PILOTs (Payments in Lieu of Taxes): $

b) State taxes (i.e., taxes paid directly to the state, including state corporate income tax):$

c) State and municipal fees (e.g. state, municipal, and federal inspection fees, licensing and permits, turnover fees, partnership fees, filing fees, certificate of occupancy fees, landlord registration fees, etc.): $

6. Utilities: Owner-Paid Utilities, including common area charges

	Check if owner-paid (even if submetered)	List amount
a) Electricity:		$
b) Gas:		$
c) Oil:		$
d) Water/ Sewer:		$

7. Management Fees (include all fees paid to management companies, including data processing fees and additional billing, if not included in payroll costs above):

$

8. Marketing/ Advertising Expenditures:

$

(Continued on Next Page)

9. Total Third-Party Contract Services:

$

Please provide additional detail by breaking out the total contracted services listed above into the categories below. Provide as much information as possible.

a) Landscaping/ gardening:	$
b) Exterminating:	$
c) Trash removal:	$
d) Security:	$
e) Snow removal:	$

f) Repair and maintenance (externally contracted)

Plumbing:$	
Electrical/HVAC:$	
Janitorial/Cleaning/Custodial:$	
Painting/Drywall/Plastering:$	
General/Other (Specify Type):	
General/Other (Specify Amount):$	
General/Other (Specify Type):	
General/Other (Specify Amount):$	
General/Other (Specify Type):	
General/Other (Specify Amount):$	

10a. Number of occupants (annual average):

10b. Number of children ages 5-17 (annual average):

Appendix 2: Survey Response Summary

Table A2-1 provides a summary of the data collected in the survey of NJAA membership. These are the dollar totals and associated numbers of units represented by the reporting organizations that were extrapolated to the broader industry based on the full sample universe of 80,040 units and estimated total statewide units of 505,333 (U.S. Census Bureau). Where necessary, additional adjustments were made to some expenditure categories to account for unclassified expenditure amounts. As such, the per-unit expenditures reported here may differ from those provided in Table 1 of the text.

Table A2-1

	Units Reporting	Total Reported Expenditures ($)	Per-Unit Average ($) (Reporting Units Only)
Revenue			
Residential Rental Income	80,040	962,263,084	12,022
All Other Tenant Fees	68,401	31,101,487	455
Total Ancillary Income	60,416	33,324,695	552
Property-Related Employment & Expenditures			
Full-Time Administrative Personnel	74,538	673	0.009
Part-Time Administrative Personnel	47,249	91	0.002
Full-Time Maintenance Personnel	71,384	968	0.014
Part-Time Maintenance Personnel	49,468	172	0.003
Full-Time Other Personnel	12,871	65	0.005
Part-Time Other Personnel	10,212	165	0.016
Total Operating Expenses	74,850	554,527,717	7,409
Material/Equipment	75,281	37,153,019	494
Insurance	76,579	21,377,284	279
Local Taxes	75,604	118,337,759	1,565
State Taxes	36,211	1,611,289	44
State and Local Fees	68,401	3,323,427	49
Electric $	68,736	20,056,723	292
Gas $	72,621	45,194,481	622
Oil $	25,296	2,809,052	111
Water $	75,909	36,635,652	483
Mgmt. Fees	71,694	43,937,082	613
Marketing/Advertising	73,836	9,325,658	126

Total Third-Party Services	64,527	51,257,470	794
Landscaping/Gardening	75,697	12,148,189	160
Exterminating	70,879	2,511,808	35
Trash Removal	74,448	6,044,240	81
Security	42,057	2,905,896	69
Snow Removal	74,562	8,759,042	117
External Plumbing	60,282	5,727,626	95
External Electric/HVAC	9,933	734,907	74
External Janitorial	57,599	3,639,104	63
External Painting	69,457	10,234,780	147
External Misc. Services (e.g., pool mgmt., elevators, carpentry, etc.)	Various	4,215,354	-
HQ Employment and Expenditures			
Average number full-time employees during 2010	60,147	1,155	0.019
Average number of part-time employees during 2010	43,923	188	0.004
Total wages, salaries, other employment compensation	51,952	53,442,345	1,029
Third-Party Business Services (in New Jersey)	42,858	21,501,018	502
Accounting	43,755	1,273,126	29
Marketing (PR/Advertising)	28,553	1,915,829	67
Legal	46,033	2,466,997	54
Computer services (including web development)	35,350	501,339	14
Other	23,747	5,963,991	251
All other operating expenditures (office rent, supplies, insurance, utilities, etc., excluding all taxes)	48,877	34,601,850	708
Capital Expenditures, related to running headquarters	36,595	1,156,126	32
Annual Capital Expenditures - Renovations & Additions			
Renovation 2007	42,928	52,762,601	1,229
Renovation 2008	46,566	62,355,503	1,339
Renovation 2009	43,935	67,532,550	1,537
Renovation 2010	46,869	66,209,122	1,413
Additions 2007	11,315	2,556,064	226
Additions 2008	11,315	2,608,637	231
Additions 2009	7,808	4,007,578	513
Additions 2010	7,677	2,107,753	275

Appendix 3: Detail of Third-Party Services

Table A3-1 provides a detailed breakdown of the estimated $374.3 million in annual operating expenditures on Third-Party-Services reported in Table 1 of the text. The per-unit costs are scaled to the industry-wide count of 505,333 units.

Table A3-1

	Per-Unit	Total
Third-Party Services	**$741**	**$374,306,645**
Landscaping/Gardening	132	66,948,288
Exterminating	27	13,842,495
Trash Removal	66	33,309,617
Security	32	16,317,053
Snow Removal	96	48,270,805
Plumbing	129	65,097,122
Electric/HVAC	8	4,050,049
Janitorial	40	20,054,988
Painting	158	79,802,565
Windows/Doors/Roofs	24	11,993,723
Appliances	5	2,672,450
Elevators	8	3,960,631
Pool Mgmt.	3	1,486,742
Carpentry/Cabinets	2	768,204
Minor construction/paving	11	5,731,913

Appendix 4: Input-Output Analysis and the R/ECON™ Model

This appendix discusses the history and application of input-output analysis and details the input-output model, called the R/ECON™ I-O model, developed by Rutgers University. This model offers significant advantages in detailing the total economic effects of an activity (such as historic rehabilitation and heritage tourism), including multiplier effects.

Estimating Multipliers

The fundamental issue determining the size of the multiplier effect is the "openness" of regional economies. Regions that are more "open" are those that import their required inputs from other regions. Imports can be thought of as substitutes for local production. Thus, the more a region depends on imported goods and services instead of its own production, the more economic activity leaks away from the local economy. Businessmen noted this phenomenon and formed local chambers of commerce with the explicit goal of stopping such leakage by instituting a "buy local" policy among their membership. In addition, during the 1970s, as an import invasion was under way, businessmen and union leaders announced a "buy American" policy in the hope of regaining ground lost to international economic competition. Therefore, one of the main goals of regional economic multiplier research has been to discover better ways to estimate the leakage of purchases out of a region or, relatedly, to determine the region's level of self-sufficiency.

The earliest attempts to systematize the procedure for estimating multiplier effects used the economic base model, still in use in many econometric models today. This approach assumes that all economic activities in a region can be divided into two categories: "basic" activities that produce exclusively for export, and region-serving or "local" activities that produce strictly for internal regional consumption. Since this approach is simpler but similar to the approach used by regional input-output analysis, let us explain briefly how multiplier effects are estimated using the economic base approach.

If we let **x** be export employment, **l** be local employment, and **t** be total employment, then

$$\mathbf{t} = \mathbf{x} + \mathbf{l}$$

For simplification, we create the ratio **a** as

$$\mathbf{a} = \mathbf{l}/\mathbf{t}$$

so that $\mathbf{l} = \mathbf{at}$

then substituting into the first equation, we obtain

$$\mathbf{t} = \mathbf{x} + \mathbf{at}$$

By bringing all of the terms with t to one side of the equation, we get

$$\mathbf{t} - \mathbf{at} = \mathbf{x} \text{ or } \mathbf{t}\,(1-\mathbf{a}) = \mathbf{x}$$

Solving for **t,** we get $\mathbf{t} = \mathbf{x}/(1-\mathbf{a})$

Thus, if we know the amount of export-oriented employment, **x,** and the ratio of local to total employment, **a**, we can readily calculate total employment by applying the economic base multiplier, 1/(1-**a**), which is embedded in the above formula. Thus, if 40 percent of all regional employment is used to produce exports, the regional multiplier would be 2.5. The assumption behind this multiplier is that all remaining regional employment is required to support the export employment. Thus, the 2.5 can be decomposed into two parts the direct effect of the exports, which is always 1.0, and the indirect and induced effects, which is the remainder—in this case 1.5. Hence, the multiplier can be read as telling us that for each export-oriented job another 1.5 jobs are needed to support it.

This notion of the multiplier has been extended so that **x** is understood to represent an economic change demanded by an organization or institution outside of an economy—so-called final demand. Such changes can be those effected by government, households, or even by an outside firm. Changes in the economy can therefore be calculated by a minor alteration in the multiplier formula:

$$\Delta\mathbf{t} = \Delta\mathbf{x}/(1-\mathbf{a})$$

The high level of industry aggregation and the rigidity of the economic assumptions that permit the application of the economic base multiplier have caused this approach to be subject to extensive criticism. Most of the discussion has focused on the estimation of the parameter **a**. Estimating this parameter requires that one be able to distinguish those parts of the economy that produce for local consumption from those that do not. Indeed, virtually all industries, even services, sell to customers both inside and outside the region. As a result, regional economists devised an approach by which to measure the *degree* to which each industry is involved in the nonbase activities of the region, better known as the industry's *regional purchase coefficient*. Thus, they expanded the above formulations by calculating for each ***i*** industry

$$\mathbf{l}_i = \mathbf{r}_i \mathbf{d}_i$$

and $$\mathbf{x}_i = \mathbf{t}_i - \mathbf{r}_i \mathbf{d}_i$$

given that $\mathbf{d}_i$ is the total regional demand for industry ***i***'s product. Given the above formulae and data on regional demands by industry, one can calculate an accurate traditional aggregate economic base parameter by the following:

$$\mathbf{a} = \mathbf{l}/\mathbf{t} = \Sigma \mathbf{l}_{ii} / \Sigma \mathbf{t}_i$$

Although accurate, this approach only facilitates the calculation of an aggregate multiplier for the entire region. That is, we cannot determine from this approach what the effects are on the various sectors of an economy. This is despite the fact that one must painstakingly calculate the regional demand as well as the degree to which they each industry is involved in nonbase activity in the region.

As a result, a different approach to multiplier estimation that takes advantage of the detailed demand and trade data was developed. This approach is called input-output analysis.

Regional Input-Output Analysis: A Brief History

The basic framework for input-output analysis originated nearly 250 years ago when François Quesenay published *Tableau Economique* in 1758. Quesenay's "tableau" graphically and numerically portrayed the relationships between sales and purchases of the various industries of an economy. More than a century later, his description was adapted by Leon Walras, who advanced input-output modeling by providing a concise theoretical formulation of an economic system (including consumer purchases and the economic representation of "technology").

It was not until the twentieth century, however, that economists advanced and tested Walras's work. Wassily Leontief greatly simplified Walras's theoretical formulation by applying the Nobel prize–winning assumptions that both technology and trading patterns were fixed over time. These two assumptions meant that the pattern of flows among industries in an area could be considered stable. These assumptions permitted Walras's formulation to use data from a single time period, which generated a great reduction in data requirements.

Although Leontief won the Nobel Prize in 1973, he first used his approach in 1936 when he developed a model of the 1919 and 1929 U.S. economies to estimate the effects of the end of World War I on national employment. Recognition of his work in terms of its wider acceptance and use meant development of a standardized procedure for compiling the requisite data (today's national economic census of industries) and enhanced capability for calculations (i.e., the computer).

The federal government immediately recognized the importance of Leontief's development and has been publishing input-output tables of the U.S. economy since 1939. The most recently published tables are those for 1987. Other nations followed suit. Indeed, the United Nations maintains a bank of tables from most member nations with a uniform accounting scheme.

Framework

Input-output modeling focuses on the interrelationships of sales and purchases among sectors of the economy. Input-output is best understood through its most basic form, the *interindustry transactions table* or matrix. In this table (see Figure A4-1 for an example), the column industries are consuming sectors (or markets) and the row industries are producing sectors. The content of a matrix cell is the value of shipments that the row industry delivers to the column industry. Conversely, it is the value of shipments that the column industry receives from the row industry. Hence, the interindustry transactions table is a detailed accounting of the disposition of the value of shipments in an economy. Indeed, the detailed accounting of the interindustry transactions at the national level is performed not so much to facilitate calculation of national economic impacts as it is to back out an estimate of the nation's gross domestic product.

Figure A4-1
Interindustry Transactions Matrix (Values)

	Agriculture	Manufacturing	Services	Other	Final Demand	Total Output
Agriculture	10	65	10	5	10	$100
Manufacturing	40	25	35	75	25	$200
Services	15	5	5	5	90	$120
Other	15	10	50	50	100	$225
Value Added	20	95	20	90		
Total Input	100	200	120	225		

For example, in Figure A4-1, agriculture, as a producing industry sector, is depicted as selling $65 million of goods to manufacturing. Conversely, the table depicts that the manufacturing industry purchased $65 million of agricultural production. The sum across columns of the interindustry transaction matrix is called the *intermediate outputs vector*. The sum across rows is called the *intermediate inputs vector*.

A single *final demand* column is also included in Figure A4-1. Final demand, which is outside the square interindustry matrix, includes imports, exports, government purchases, changes in inventory, private investment, and sometimes household purchases.
The *value added* row, which is also outside the square interindustry matrix, includes wages and salaries, profit-type income, interest, dividends, rents, royalties, capital consumption allowances, and taxes. It is called value added because it is the difference between the total value of the industry's production and the value of the goods and nonlabor services that it requires to produce. Thus, it is the *value* that an industry *adds* to the goods and services it uses as inputs in order to produce output.

The value added row measures each industry's contribution to wealth accumulation. In a national model, therefore, its sum is better known as the gross domestic product (GDP). At the state level, this is known as the gross state product—a series produced by the U.S. Bureau of Economic Analysis and published in the Regional Economic Information System. Below the state level, it is known simply as the regional equivalent of the GDP—the gross regional product.

Input-output economic impact modelers now tend to include the household industry within the square interindustry matrix. In this case, the "consuming industry" is the household itself. Its spending is extracted from the final demand column and is appended as a separate column in the interindustry matrix. To maintain a balance, the income of households must be appended as a row. The main income of households is labor income, which is extracted from the value-added row. Modelers tend not to include other sources of household income in the household industry's row. This is not because such income is not attributed to households but rather because much of this other income derives from sources outside of the economy that is being modeled.

The next step in producing input-output multipliers is to calculate the *direct requirements matrix*, which is also called the technology matrix. The calculations are based entirely on data from Figure A4-1. As shown in Figure A4-2, the values of the cells in the direct requirements matrix are derived by dividing each cell in a column of Figure A4-1, the interindustry transactions matrix, by its column total. For example, the cell for manufacturing's purchases from agriculture is 65/200 = .33. Each cell in a column of the direct requirements matrix shows how many cents of each producing industry's goods and/or services are required to produce one dollar of the consuming industry's production and are called *technical coefficients*. The use of the terms "technology" and "technical" derive from the fact that a column of this matrix represents a recipe for a unit of an industry's production. It, therefore, shows the needs of each industry's production process or "technology."

Figure A4-2
Direct Requirements Matrix

	Agriculture	Manufacturing	Services	Other
Agriculture	.10	.33	.08	.02
Manufacturing	.40	.13	.29	.33
Services	.15	.03	.04	.02
Other	.15	.05	.42	.22

Next in the process of producing input-output multipliers, the *Leontief Inverse* is calculated. To explain what the Leontief Inverse is, let us temporarily turn to equations. Now, from Figure A4-1 we know that the sum across both the rows of the square interindustry transactions matrix (**Z**) and the final demand vector (**y**) is equal to vector of production by industry (**x**). That is,

$$\mathbf{x} = \mathbf{Zi} + \mathbf{y}$$

where **i** is a summation vector of ones. Now, we calculate the direct requirements matrix (**A**) by dividing the interindustry transactions matrix by the production vector or

$$\mathbf{A} = \mathbf{ZX}^{-1}$$

where $\mathbf{X}^{-1}$ is a square matrix with inverse of each element in the vector **x** on the diagonal and the rest of the elements equal to zero. Rearranging the above equation yields

$$\mathbf{Z} = \mathbf{AX}$$

where **X** is a square matrix with the elements of the vector **x** on the diagonal and zeros elsewhere. Thus,

$$\mathbf{x} = (\mathbf{AX})\mathbf{i} + \mathbf{y}$$

or, alternatively,

$$\mathbf{x} = \mathbf{Ax} + \mathbf{y}$$

solving this equation for **x** yields

x =	$(\mathbf{I}-\mathbf{A})^{-1}$		**y**
Total =	Total	*	Final
Output	Requirements		Demand

The Leontief Inverse is the matrix $(\mathbf{I}-\mathbf{A})^{-1}$. It portrays the relationships between final demand and production. This set of relationships is exactly what is needed to identify the economic impacts of an event external to an economy.

Because it does translate the direct economic effects of an event into the total economic effects on the modeled economy, the Leontief Inverse is also called the *total requirements matrix.* The total requirements matrix resulting from the direct requirements matrix in the example is shown in Figure A4-3.

Figure A4-3
Total Requirements Matrix

	Agriculture	Manufacturing	Services	Other
Agriculture	1.5	.6	.4	.3
Manufacturing	1.0	1.6	.9	.7
Services	.3	.1	1.2	.1
Other	.5	.3	.8	1.4
Industry Multipliers	.33	2.6	3.3	2.5

In the direct or technical requirements matrix in Figure A4-2, the technical coefficient for the manufacturing sector's purchase from the agricultural sector was .33, indicating the 33 cents of agricultural products must be directly purchased to produce a dollar's worth of manufacturing products. The same "cell" in Figure A4-3 has a value of .6. This indicates that for every dollar's worth of product that manufacturing ships out of the economy (i.e., to the government or for export), agriculture will end up increasing its production by 60 cents. The sum of each column in the total requirements matrix is the *output multiplier* for that industry.

Multipliers

A *multiplier* is defined as the system of economic transactions that follow a disturbance in an economy. Any economic disturbance affects an economy in the same way as does a drop of water in a still pond. It creates a large primary "ripple" by causing a *direct* change in the purchasing patterns of affected firms and institutions. The suppliers of the affected firms and institutions must change their purchasing patterns to meet the demands placed upon them by the firms originally affected by the economic disturbance, thereby creating a smaller secondary "ripple." In turn, those who meet the needs of the suppliers must change their purchasing patterns to meet the demands placed upon them by the suppliers of the original firms, and so on; thus, a number of subsequent "ripples" are created in the economy.

The multiplier effect has three components—direct, indirect, and induced effects. Because of the pond analogy, it is also sometimes referred to as the *ripple effect*.

- A *direct effect* (the initial drop causing the ripple effects) is the change in purchases due to a change in economic activity.

- An *indirect effect* is the change in the purchases of suppliers to those economic activities directly experiencing change.

- An *induced effect* is the change in consumer spending that is generated by changes in labor income within the region as a result of the direct and indirect effects of the economic activity. Including households as a column and row in the interindustry matrix allows this effect to be captured.

Extending the Leontief Inverse to pertain not only to relationships between *total* production and final demand of the economy but also to *change*s in each permits its multipliers to be applied to many types of economic impacts. Indeed, in impact analysis the Leontief Inverse lends itself to the drop-in-a-pond analogy discussed earlier. This is because the Leontief Inverse multiplied by a change in final demand can be estimated by a power series. That is,

$$(\mathbf{I}-\mathbf{A})^{-1}\,\Delta\mathbf{y} = \Delta\mathbf{y} + \mathbf{A}\,\Delta\mathbf{y} + \mathbf{A}(\mathbf{A}\,\Delta\mathbf{y}) + \mathbf{A}(\mathbf{A}(\mathbf{A}\,\Delta\mathbf{y})) + \mathbf{A}(\mathbf{A}(\mathbf{A}(\mathbf{A}\,\Delta\mathbf{y}))) + \ldots$$

Assuming that $\Delta\mathbf{y}$—the change in final demand—is the "drop in the pond," then succeeding terms are the ripples. Each "ripple" term is calculated as the previous "pond disturbance" multiplied by the direct requirements matrix. Thus, since each element in the direct requirements matrix is less than one, each ripple term is smaller than its predecessor. Indeed, it has been shown that after calculating about seven of these ripple terms that the power series approximation of impacts very closely estimates those produced by the Leontief Inverse directly.

In impacts analysis practice, $\Delta\mathbf{y}$ is a single column of expenditures with the same number of elements as there are rows or columns in the direct or technical requirements matrix. This set of elements is called an *impact vector*. This term is used because it is the *vector* of numbers that is used to estimate the *economic impacts* of the investment.

There are two types of changes in investments, and consequently economic impacts, generally associated with projects—*one-time impacts* and *recurring impacts*. One-time impacts are impacts that are attributable to an expenditure that occurs once over a limited period of time. For example, the impacts resulting from the construction of a project are one-time impacts.

Recurring impacts are impacts that continue permanently as a result of new or expanded ongoing expenditures. The ongoing operation of a new train station, for example, generates recurring impacts to the economy. Examples of changes in economic activity are investments in the preservation of old homes, tourist expenditures, or the expenditures required to run a historical site. Such activities are considered changes in final demand and can be either positive or negative. When the activity is not made in an industry, it is generally not well represented by the input-output model. Nonetheless, the activity can be represented by a special set of elements that are similar to a column of the transactions matrix. This set of elements is called an economic disturbance or impact vector. The latter term is used because it is the vector of numbers that is used to estimate the impacts. In this study, the impact vector is estimated by multiplying one or more economic *translators* by a dollar figure that represents an investment in one or more projects. The term translator is derived from the fact that such a vector *translates* a dollar amount of an activity into its constituent purchases by industry.

One example of an industry multiplier is shown in Figure A4-4. In this example, the activity is the preservation of a historic home. The *direct impact* component consists of purchases made specifically for the construction project from the producing industries. The *indirect impact* component consists of expenditures made by producing industries to support the purchases made for this project. Finally, the *induced impact* component focuses on the expenditures made by workers involved in the activity on-site and in the supplying industries.

Figure A4-4
Components of the Multiplier for the
Historic Rehabilitation of a Single-Family Residence

Direct Impact	Indirect Impact	Induced Impact
Excavation/Construction Labor Concrete Wood Bricks Equipment Finance and Insurance	Production Labor Steel Fabrication Concrete Mixing Factory and Office Expenses Equipment Components	Expenditures by wage earners on-site and in the supplying industries for food, clothing, durable goods, entertainment

Regional Input-Output Analysis

Because of data limitations, regional input-output analysis has some considerations beyond those for the nation. The main considerations concern the depiction of regional technology and the adjustment of the technology to account for interregional trade by industry.

In the regional setting, local technology matrices are not readily available. An accurate region-specific technology matrix requires a survey of a representative sample of organizations for each industry to be depicted in the model. Such surveys are extremely expensive.[56] Because of the expense, regional analysts have tended to use national technology as a surrogate for regional technology. This substitution does not affect the accuracy of the model as long as local industry technology does not vary widely from the nation's average.[57]

Even when local technology varies widely from the nation's average for one or more industries, model accuracy may not be affected much. This is because interregional trade may mitigate the error that would be induced by the technology. That is, in estimating economic

[56]The most recent statewide survey-based model was developed for the State of Kansas in 1986 and cost on the order of $60,000 (in 1990 dollars). The development of this model, however, leaned heavily on work done in 1965 for the same state. In addition the model was aggregated to the 35-sector level, making it inappropriate for many possible applications since the industries in the model do not represent the very detailed sectors that are generally analyzed.

[57]Only recently have researchers studied the validity of this assumption. They have found that large urban areas may have technology in some manufacturing industries that differs in a statistically significant way from the national average. As will be discussed in a subsequent paragraph, such differences may be unimportant after accounting for trade patterns.

impacts via a regional input-output model, national technology must be regionalized by a vector of regional purchase coefficients,[58] **r**, in the following manner:

$$(\mathbf{I}-\mathbf{rA})^{-1}\,\mathbf{r}\cdot\Delta\mathbf{y}$$

or

$$\mathbf{r}\cdot\Delta\mathbf{y} + \mathbf{rA}\,(\mathbf{r}\cdot\Delta\mathbf{y}) + \mathbf{rA}(\mathbf{rA}\,(\mathbf{r}\cdot\Delta\mathbf{y})) + \mathbf{rA}(\mathbf{rA}(\mathbf{rA}\,(\mathbf{r}\cdot\Delta\mathbf{y}))) + \ldots$$

where the vector-matrix product **rA** is an estimate of the region's direct requirements matrix. Thus, if national technology coefficients—which vary widely from their local equivalents—are multiplied by small RPCs, the error transferred to the direct requirements matrices will be relatively small. Indeed, since most manufacturing industries have small RPCs and since technology differences tend to arise due to substitution in the use of manufactured goods, technology differences have generally been found to be minor source error in economic impact measurement. Instead, RPCs and their measurement error due to industry aggregation have been the focus of research on regional input-output model accuracy.

A Comparison of Three Major Regional Economic Impact Models

In the United States there are three major vendors of regional input-output models. They are U.S. Bureau of Economic Analysis's (BEA) RIMS II multipliers, Minnesota IMPLAN Group Inc.'s (MIG) IMPLAN Pro model, and CUPR's own REcon™ I–O model. CUPR has had the privilege of using them all. (R/Econ™ I–O builds from the PC I–O model produced by the Regional Science Research Corporation's (RSRC).)

Although the three systems have important similarities, there are also significant differences that should be considered before deciding which system to use in a particular study. This document compares the features of the three systems. Further discussion can be found in Brucker, Hastings, and Latham's article in the Summer 1987 issue of *The Review of Regional Studies* entitled "Regional Input-Output Analysis: A Comparison of Five Ready-Made Model Systems." Since that date, CUPR and MIG have added a significant number of new features to PC I–O (now, R/Econ™ I–O) and IMPLAN, respectively.

[58]A regional purchase coefficient (RPC) for an industry is the proportion of the region's demand for a good or service that is fulfilled by local production. Thus, each industry's RPC varies between zero (0) and one (1), with one implying that all local demand is fulfilled by local suppliers. As a general rule, agriculture, mining, and manufacturing industries tend to have low RPCs, and both service and construction industries tend to have high RPCs.

Model Accuracy

RIMS II, IMPLAN, and RECON™ I–O all employ input-output (I–O) models for estimating impacts. All three regionalized the U.S. national I–O technology coefficients table at the highest levels of disaggregation (more than 500 industries). Since aggregation of sectors has been shown to be an important source of error in the calculation of impact multipliers, the retention of maximum industrial detail in these regional systems is a positive feature that they share. The systems diverge in their regionalization approaches, however. The difference is in the manner that they estimate regional purchase coefficients (RPCs), which are used to regionalize the technology matrix. An RPC is the proportion of the region's demand for a good or service that is fulfilled by the region's own producers rather than by imports from producers in other areas. Thus, it expresses the proportion of the purchases of the good or service that do not leak out of the region, but rather feed back to its economy, with corresponding multiplier effects. Thus, the accuracy of the RPC is crucial to the accuracy of a regional I–O model, since the regional multiplier effects of a sector vary directly with its RPC.

The techniques for estimating the RPCs used by CUPR and MIG in their models are theoretically more appealing than the location quotient (LQ) approach used in RIMS II. This is because the former two allow for crosshauling of a good or service among regions and the latter does not. Since crosshauling of the same general class of goods or services among regions is quite common, the CUPR-MIG approach should provide better estimates of regional imports and exports. Statistical results reported in Stevens, Treyz, and Lahr (1989) confirm that LQ methods tend to overestimate RPCs. By extension, inaccurate RPCs may lead to inaccurately estimated impact estimates.

Further, the estimating equation used by CUPR to produce RPCs should be more accurate than that used by MIG. The difference between the two approaches is that MIG estimates RPCs at a more aggregated level (two-digit SICs, or about 86 industries) and applies them at a desegregate level (over 500 industries). CUPR both estimates and applies the RPCs at the most detailed industry level. The application of aggregate RPCs can induce as much as 50 percent error in impact estimates (Lahr and Stevens, 2002).

Although both RECON™ I–O and IMPLAN use an RPC-estimating technique that is theoretically sound and update it using the most recent economic data, some practitioners question their accuracy. The reasons for doing so are three-fold. First, the observations currently

used to estimate their implemented RPCs are based on 20-years old trade relationships—the Commodity Transportation Survey (CTS) from the 1977 Census of Transportation. Second, the CTS observations are at the state level. Therefore, RPC's estimated for substate areas are extrapolated. Hence, there is the potential that RPCs for counties and metropolitan areas are not as accurate as might be expected. Third, the observed CTS RPCs are only for shipments of goods. The interstate provision of services is unmeasured by the CTS. IMPLAN replies on relationships from the 1977 U.S. Multiregional Input-Output Model that are not clearly documented. RECON™ I–O relies on the same econometric relationships that it does for manufacturing industries but employs expert judgment to construct weight/value ratios (a critical variable in the RPC-estimating equation) for the nonmanufacturing industries.

The fact that BEA creates the RIMS II multipliers gives it the advantage of being constructed from the full set of the most recent regional earnings data available. BEA is the main federal government purveyor of employment and earnings data by detailed industry. It therefore has access to the fully disclosed and disaggregated versions of these data. The other two model systems rely on older data from *County Business Patterns* and Bureau of Labor Statistic's ES202 forms, which have been "improved" by filling-in for any industries that have disclosure problems (this occurs when three or fewer firms exist in an industry or a region).

Model Flexibility

For the typical user, the most apparent differences among the three modeling systems are the level of flexibility they enable and the type of results that they yield. R/Econ™ I–O allows the user to make changes in individual cells of the 515-by-515 technology matrix as well as in the 11 515-sector vectors of region-specific data that are used to produce the regionalized model. The 11 sectors are: output, demand, employment per unit output, labor income per unit output, total value added per unit of output, taxes per unit of output (state and local), nontax value added per unit output, administrative and auxiliary output per unit output, household consumption per unit of labor income, and the RPCs. Te PC I–O model tends to be simple to use. Its User's Guide is straightforward and concise, providing instruction about the proper implementation of the model as well as the interpretation of the model's results.

The software for IMPLAN Pro is Windows-based, and its User's Guide is more formalized. Of the three modeling systems, it is the most user-friendly. The Windows orientation has enabled MIG to provide many more options in IMPLAN without increasing the complexity of use. Like R/Econ™ I–O, IMPLAN's regional data on RPCs, output, labor compensation, industry average margins, and employment can be revised. It does not have complete information on tax revenues other than those from indirect business taxes (excise and sales taxes), and those cannot be altered. Also like R/Econ™, IMPLAN allows users to modify the cells of the 538-by-538 technology matrix. It also permits the user to change and apply price deflators so that dollar figures can be updated from the default year, which may be as many as four years prior to the current year. The plethora of options, which are advantageous to the advanced user, can be extremely confusing to the novice. Although default values are provided for most of the options, the accompanying documentation does not clearly point out which items should get the most attention. Further, the calculations needed to make any requisite changes can be more complex than those needed for the R/Econ™ I–O model. Much of the documentation for the model dwells on technical issues regarding the guts of the model. For example, while one can aggregate the 538-sector impacts to the one- and two-digit SIC level, the current documentation does not discuss that possibility. Instead, the user is advised by the Users Guide to produce an aggregate model to achieve this end. Such a model, as was discussed earlier, is likely to be error ridden.

For a region, RIMS II typically delivers a set of 38-by-471 tables of multipliers for output, earnings, and employment; supplementary multipliers for taxes are available at additional cost. Although the model's documentation is generally excellent, use of RIMS II alone will not provide proper estimates of a region's economic impacts from a change in regional demand. This is because no RPC estimates are supplied with the model. For example, in order to estimate the impacts of rehabilitation, one not only needs to be able to convert the engineering cost estimates into demands for labor as well as for materials and services by industry, but must also be able to estimate the percentage of the labor income, materials, and services which will be provided by the region's households and industries (the RPCs for the demanded goods and services). In most cases, such percentages are difficult to ascertain; however, they are provided in the R/Econ™ I–O and IMPLAN models with simple triggering of an option. Further, it is impossible to change any of the model's parameters if superior data are known. This model ought not to be used for

evaluating any project or event where superior data are available or where the evaluation is for a change in regional demand (a construction project or an event) as opposed to a change in regional supply (the operation of a new establishment).

Model Results

Detailed total economic impacts for about 500 industries can be calculated for jobs, labor income, and output from R/Econ™ I–O and IMPLAN only. These two modeling systems can also provide total impacts as well as impacts at the one- and two-digit industry levels. RIMS II provides total impacts and impacts on only 38 industries for these same three measures. Only the manual for R/Econ™ I–O warns about the problems of interpreting and comparing multipliers and any measures of output, also known as the value of shipments.

As an alternative to the conventional measures and their multipliers, R/Econ™ I–O and IMPLAN provide results on a measure known as "value added." It is the region's contribution to the nation's gross domestic product (GDP) and consists of labor income, nonmonetary labor compensation, proprietors' income, profit-type income, dividends, interest, rents, capital consumption allowances, and taxes paid. It is, thus, the region's production of wealth and is the single best economic measure of the total economic impacts of an economic disturbance.

In addition to impacts in terms of jobs, employee compensation, output, and value added, IMPLAN provides information on impacts in terms of personal income, proprietor income, other property-type income, and indirect business taxes. R/Econ™ I–O breaks out impacts into taxes collected by the local, state, and federal governments. It also provides the jobs impacts in terms of either about 90 or 400 occupations at the users request. It goes a step further by also providing a return-on-investment-type multiplier measure, which compares the total impacts on all of the main measures to the total original expenditure that caused the impacts. Although these latter can be readily calculated by the user using results of the other two modeling systems, they are rarely used in impact analysis despite their obvious value.

In terms of the format of the results, both R/Econ™ I–O and IMPLAN are flexible. On request, they print the results directly or into a file (Excel® 4.0, Lotus 123®, Word® 6.0, tab delimited, or ASCII text). It can also permit previewing of the results on the computer's monitor. Both now offer the option of printing out the job impacts in either or both levels of occupational detail.

RSRC Equation

The equation currently used by RSRC in estimating RPCs is reported in Treyz and Stevens (1985). In this paper, the authors show that they estimated the RPC from the 1977 CTS data by estimating the demands for an industry's production of goods or services that are fulfilled by local suppliers (*LS*) as

$$LS = D^{e(-1/x)}$$

and where for a given industry

$x = k\, Z_1^{a1} Z_2^{a2}\, P_j\, Z_j^{aj}$ and *D* is its total local demand.

Since for a given industry RPC = *LS*/*D* then

$$\ln\{-1/[\ln(\ln LS/\ln D)]\} = \ln k + a_1 \ln Z_1 + a_2 \ln Z_2 + S_j\, a_j \ln Z_j$$

which was the equation that was estimated for each industry.

This odd nonlinear form not only yielded high correlations between the estimated and actual values of the RPCs, it also assured that the RPC value ranges strictly between 0 and 1. The results of the empirical implementation of this equation are shown in Treyz and Stevens (1985, table 1). The table shows that total local industry demand (Z_1), the supply/demand ratio (Z_2), the weight/value ratio of the good (Z_3), the region's size in square miles (Z_4), and the region's average establishment size in terms of employees for the industry compared to the nation's (Z_5) are the variables that influence the value of the RPC across all regions and industries. The latter of these maintain the least leverage on RPC values.

Because the CTS data are at the state level only, it is important for the purposes of this study that the local industry demand, the supply/demand ratio, and the region's size in square miles are included in the equation. They allow the equation to extrapolate the estimation of RPCs for areas smaller than states. It should also be noted here that the CTS data only cover manufactured goods. Thus, although calculated effectively making them equal to unity via the

above equation, RPC estimates for services drop on the weight/value ratios. A very high weight/value ratio like this forces the industry to meet this demand through local production. Hence, it is no surprise that a region's RPC for this sector is often very high (0.89). Similarly, hotels and motels tend to be used by visitors from outside the area. Thus, a weight/value ratio on the order of that for industry production would be expected. Hence, an RPC for this sector is often about 0.25.

The accuracy of CUPR's estimating approach is exemplified best by this last example. Ordinary location quotient approaches would show hotel and motel services serving local residents. Similarly, IMPLAN RPCs are built from data that combine this industry with eating and drinking establishments (among others). The results of such aggregation process is an RPC that represents neither industry (a value of about 0.50) but which is applied to both. In the end, not only is the CUPR's RPC-estimating approach the most sound, but it is also widely acknowledged by researchers in the field as being state of the art.

Advantages and Limitations of Input-Output Analysis

Input-output modeling is one of the most accepted means for estimating economic impacts. This is because it provides a concise and accurate means for articulating the interrelationships among industries. The models can be quite detailed. For example, the current U.S. model currently has more than 500 industries representing many six-digit North American Industrial Classification System (NAICS) codes. The CUPR's model used in this study has 517 sectors. Further, the industry detail of input-output models provides not only a consistent and systematic approach but also more accurately assesses multiplier effects of changes in economic activity. Research has shown that results from more aggregated economic models can have as much as 50 percent error inherent in them. Such large errors are generally attributed to poor estimation of regional trade flows resulting from the aggregation process.

Input-output models also can be set up to capture the flows among economic regions. For example, the model used in this study can calculate impacts for a county, as well as a metropolitan area or a state economy.

The limitations of input-output modeling should also be recognized. The approach makes several key assumptions. First, the input-output model approach assumes that there are no economies of scale to production in an industry; that is, the proportion of inputs used in an

industry's production process does not change regardless of the level of production. This assumption will not work if the technology matrix depicts an economy of a recessional economy (e.g., 1982) and the analyst is attempting to model activity in a peak economic year (e.g., 1989). In a recession year, the labor-to-output ratio tends to be excessive because firms are generally reluctant to lay off workers when they believe an economic turnaround is about to occur.

A less-restrictive assumption of the input-output approach is that technology is not permitted to change over time. It is less restrictive because the technology matrix in the United States is updated frequently and, in general, production technology does not radically change over short periods.

Finally, the technical coefficients used in most regional models are based on the assumption that production processes are spatially invariant and are well represented by the nation's average technology. In a region as large and diverse as New Jersey, this assumption is likely to hold true.

Appendix 5: Impact Detail – Operating and Capital Expenditures

The following tables present the estimated economic impacts of the apartment industry's operating and capital expenditures separately. Tables A5-1 and A5-2 present the impacts of the operating expenditures. Tables A5-3 and A5-4 present the impacts of the capital expenditures. Note that in the combined impact results presented in Table 2 (p. 5) of the text, the *total* capital expenditure impacts shown in Table A5-3 are *all* incorporated into the *indirect* impact column. Here, they are divided between direct and indirect impacts to differentiate the direct construction-related impacts from their multiplier or "ripple" effects.

Table A5-1
Contribution of the Apartment Industry to the New Jersey Economy
Estimated 2010 Operating Expenditures of $4.2 Billion

Impacts	Direct	Indirect	Total
Employment (job-years)	21,909	18,709	40,618
GDP ($ millions)	3,718.0	1,701.5	5,419.5
Compensation ($ millions)	983.0	946.3	1,929.4
State Tax Revenues ($ millions)	11.8	117.7	129.5
Local Tax Revenues ($ millions)	864.2	148.2	1,021.4

Table A5-2
Distribution of Employment Impacts by Sector

Sector	Job-Years
Natural Resources & Mining*	2,074
Construction	1,496
Manufacturing	426
Transportation & Public Utilities	1,946
Wholesale Trade	410
Retail Trade	3,776
Financial Activities**	24,751
Services	5,215
Government	525
Total	**40,618**

Table A5-3
Contribution of Average Annual Capital Expenditures of
of $410.6 million to the New Jersey Economy*

Impacts	Direct	Indirect	Total
Employment (job-years)	2,630	1,196	3,826
GDP ($ millions)	190.2	83.0	273.2
Compensation ($ millions)	155.4	56.1	211.6
State Tax Revenues ($ millions)	-	10.5	10.5
Local Tax Revenues ($ millions)	-	12.2	12.2

Table A5-4
Distribution of Employment Impacts by Sector

Sector	Job-Years
Natural Resources & Mining*	32
Construction	1,661
Manufacturing	628
Transportation & Public Utilities	122
Wholesale Trade	305
Retail Trade	456
Financial Activities	139
Services	458
Government	25
Total	**3,826**

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