

HOW IS THE VALUE OF REAL ESTATE AFFECTED
BY THE DEPARTMENT OF DEFENSE
BASE REALIGNMENT AND CLOSURE PROCESS?

by

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ABSTRACT

THOMAS E. HIEBERT. How is the value of real estate affected by the Department of Defense Base Realignment and Closure Process?
(Under the direction of DR. RICHARD J. BUTTIMER, JR.)

This study examines the Department of Defense Base Realignment and Closure (BRAC) process as it relates to real estate prices in the communities surrounding the bases marked for closure and realignment. I examine the history of the BRAC process, detail the bases that have been marked for realignment and closure over the five “rounds” of the BRAC process to date (1988, 1991, 1993, 1995, 2005), and present a model that tests the hypothesis that BRAC closure announcements are correlated with the value of real estate in the local communities surrounding the bases marked for closure. I find that there is a strong and statistically significant correlation between the BRAC process, particularly the series of announcements that occur within the BRAC timeline, and the value of real estate in the local communities affected by the BRAC process. I also discuss policy implications of these findings for the Department of Defense, as well as future research areas and opportunities that have arisen as a result of this study.

DEDICATION

This dissertation is dedicated to my sons, Michael and Patrick Hiebert, in the fervent hope that this work may inspire them both to a lifelong love of education as well as to a lifetime of service to our Nation.

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LIST OF ABBREVIATIONS AND ACRONYMS

AB	Air Base
AES	Aviation Engineering Station
AFB	Air Force Base
BRAC	Base Realignment and Closure
CBO	Congressional Budget Office
CNI	Commander, Naval Installations
COBRA	Cost of Base Realignment Actions [Model]
CRS	Congressional Research Service
DoD	Department of Defense
DUSA (I&E)	Deputy Under Secretary of Defense (Installations & Environment)
EAC	Economic Adjustment Committee
GAO	Government Accounting Office
IMA	Installation Management Agency
LRA	Local Re-Use Authority
OEA	Office of Economic Assistance
OSD	Office of the Secretary of Defense
PRV	Plant Replacement Value
QDR	Quadrennial Defense Review
SecDef	Secretary of Defense
USAREUR	United States Army Europe
WS	Weapons Station

CHAPTER 1: INTRODUCTION

In the fall of 2008, Kristin Hall of the Associated Press reported on a story related to the ongoing housing/ mortgage crisis in the United States that barely garnered a ripple of attention in the national media. Hall's story, entitled "Military bases helping protect nearby housing markets," studied the residential real estate markets outside four military bases across the country: Eglin Air Force Base (Fort Walton Beach, Florida, population 21,000); Fort Bragg (Fayetteville, North Carolina, population 168,000); Fort Campbell (Clarksville, Tennessee, population 117,000); and Minot Air Force Base (Minot, North Dakota, population 37,000). Drawing upon transactional real estate data from these four communities, the study demonstrated that while the vast majority of the country saw average home prices drop at double-digit rates in 2007 and 2008, these four communities actually experienced increasing, or at the very least, steady home values during this same period. For example, according to the Office of Federal Housing Enterprise Oversight, which uses data from Fannie Mae and Freddie Mac and includes more than 5 million repeat sales transactions, average home prices in the U.S. fell a record 4.8 percent in the third quarter of 2008 compared with the same period in 2007. Some areas of Florida, California and Nevada fell even further, down between 14 and 16 percent from the year before.¹

¹ Kristin Hall, "Military bases helping protect nearby housing markets," Associated Press: 11 November 2008.

But around both Fort Campbell and Minot Air Force Base, the average sales prices for single family homes increased almost 6 percent, from \$139,065 to \$147,460 in the third quarter of 2008 compared to the same period in 2007. Homes in the communities surrounding Fort Bragg experienced similar increases in property values. The average price for an existing home in Fayetteville was up 5.2 percent in the third quarter of 2008; from \$123,912 in 2007 to \$130,355 in 2008.²

Why is this the case? As the general manager of a regional homebuilder with an office in Fayetteville said, "We are faring very well here... it is a solid year for us. We are doing better than most of the markets because the military gives us a very stable influence."³ Simply put, due to the continuous turnover on military bases, a steady income (one of the major program initiatives of the Bush Administration was to "close the pay gap," that is, bring the military pay scale more in line with that of working class America; as such service members received an average annual pay increase of between 3.5% and 4.5% between 2001 and 2008), and an additional housing allowance (called variable housing allowance, or VHA, as rates are paid based on both military rank and geographic region of the country), military bases are generally seen as a boom to the local economy, and this is reflected in the value of homes in the community, as well.

Thus, if this is indeed the case, and I believe it is, then what effect would we expect to see in the value of residential property in the local community if a base suddenly closed down? More directly, how does the mere threat of base closure, as demonstrated through the Department of Defense's Base Realignment and Closure (BRAC) process, in which a series of announcements are made by the Secretary of

² Ibid.

³ Ibid.

Defense and an independent Commission, affect the value of real estate in the local communities surrounding the bases marked for closure? This paper attempts to answer that question. Specifically, this paper addresses the formal hypothesis: how does the Department of Defense Base Realignment and Closure (BRAC) process affect the value of real estate in local communities, where the null hypothesis is that the BRAC process has no effect on the value of real estate in local communities.

In the Background section of the paper, I provide a detailed account of the BRAC process: the history of the program, why it was deemed necessary to the national security of the United States of America to formally establish such a process under law, and what has occurred with respect to specific base realignment and closure activity as a result of BRAC since its inception in 1988. In the Literature Review, I then provide a detailed review of the literature corresponding to the study that I have undertaken here: a review of the relevant literature on the economic impacts of the BRAC process on local communities across the United States; and a review of the literature corresponding to the methodology that I will follow in my research, that is, a review of hedonic pricing models and event study methodology. In the Data and Methodology section, I describe the communities and the data I have chosen to study in my quest for an answer to the problem: why I chose to study the communities that I did, while others were omitted; how I gathered the data required to complete the study; and a detailed description of the data, its own special characteristics, along with the special requirements I had of the data in order to complete this study.

In the Empirical Results and Discussion section, I provide an account of my empirical results, detailed analysis of these results, and the answers they provide with

respect to the research question. These results clearly demonstrate that there is a strong and statistically significant correlation between the BRAC process, particularly the series of announcements that occur within the BRAC timeline, and the value of real estate in the local communities affected by the BRAC process. Thus, I disprove the null hypothesis, that is, that the BRAC process does not affect the value of real estate in local communities.

Finally, I close the paper with a detailed discussion of the policy implications inherent in my findings. First and foremost among these is that if real estate in local communities is indeed affected by the BRAC process and the series of announcements imbedded within the process, then the Department of Defense must account for this effect through the manner and methodology with which it announces which bases will close. In line with these implications, I also provide a detailed list of areas for future study, as I believe that I have barely touched the surface of all the valuable work that can and should be done in this area of vital importance to both the academic community and the Department of Defense.

CHAPTER 2: BACKGROUND

2.1 Background and History of the BRAC Process

The decade since the last BRAC has been a period of dramatic change. The U.S. national security strategy addresses the new challenges posed by international terrorism, the proliferation of weapons of mass destruction, ungoverned areas, rogue states, and non-state actors. BRAC 2005 provides the Department [of Defense] a new unique opportunity to adjust U.S. base structure to meet these developments, and to meet the challenges envisioned during the next two decades.

Secretary of Defense Donald Rumsfeld
13 May 2005⁴

One of the most politically contentious processes undertaken by the Department of Defense (DOD) since the end of the Cold War in the late 1990s, and the onset of the overhaul and transformation of the entire U.S. military over the past decade, is the Base Realignment and Closure (BRAC) process. While the transformation of both military force structure and weapons platforms across all the services has largely been a matter for the Department of Defense and the President to determine, the question of which military bases to realign and shut down was determined to be too politically sensitive to be left up to decision-makers within the Department of Defense alone. Instead, the formal process, known formally as the Base Realignment and Closure (BRAC) process, was established by law in 1988 in order to protect shield the process from parochial political influences.⁵

⁴ Donald M. Rumsfeld, introductory letter to the Chairman of the 2005 Base Realignment and Closure (BRAC) Commission, 13 May 2005, The Pentagon, Arlington, Virginia, p.1.

⁵ Dardia, Michael, et. al., "The Effect of Military Base Closures on Local Communities: A Short Term Perspective," Rand: National Defense Research Institute, 1996, pp.1-2.

Much of this sensitivity is due simply to the concern for the fate of the communities surrounding the closed bases; such concerns are understandable in light of the fact that in many of these communities, the personnel working on base, both military and civilian, represent a significant share of the local population and employment base. Even communities with promising alternative uses for the local base (especially those with pre-existing runways, mature transportation nodes, and/or the capacity for petroleum storage) seem wary of the immediate effects of the closure, with its loss of civilian jobs and the direct loss of input to the local economy in the way of lost revenue through property taxes and local sales and income taxes, as well as through lost retail sales resulting from the closure of a military base. Though Dardia (1996) tells us that the long-term experience with base closures seems to have little negative effect on the surrounding community,⁶ little is known about the size or distribution of the immediate (or even long-term) impacts of base closures with respect to the value of real estate. If the effects are adverse, intuitively they ought to be most severe immediately after the closure, before there is time for local and regional real estate markets to recover and for the compensatory effects of base reuse plans to materialize.

Though instituted formally under law in 1988, the BRAC process had its origins in the 1960s. Cognizant of the fact that the DoD had to reduce the base structure that it had created largely to support and fight the Second World War, President John F. Kennedy directed Secretary of Defense Robert S. McNamara to develop and implement an extensive base realignment and closure program in order to compensate for the

⁶ Ibid., p.7.

changing economic and political realities of the 1960s.⁷ In its infancy, the Office of the Secretary of Defense (OSD) established its own criteria to govern the selection of bases marked for closure, without consulting either the United States Congress or the separate branches of the United States military (the Departments of the Army, Navy, Air Force and Marine Corps). Under Secretary McNamara's guidance, the Department of Defense closed sixty bases in the early 1960s without either Congressional approval or the involvement of other government agencies outside the Department of Defense.⁸ In light of the presumed enormous immediate economic and ensuing political ramifications of these closures, Congress determined that it had to be personally involved in the process and passed legislation in 1965 that required the DoD to report any base closure programs through an official notification program. President Lyndon B. Johnson vetoed the bill, however, and thus allowed the DoD to continue closing bases without either congressional oversight or approval throughout most of the remainder of the decade.⁹

Heightened economic and political pressures eventually forced Congress to intervene in the process of realigning and closing military bases around the United States, especially as it sought to end the DoD's ability to operate completely independent from Congress and outside the law on the matter. On 1 August 1977, President Jimmy Carter signed Public Law 95-82. This law required the Secretary of Defense to notify Congress when a base was a candidate for reduction or closure; to prepare studies on the strategic, environmental, and local economic impact and consequences of such action; and to wait sixty days for a congressional response before acting on the closure. Codified as Section

⁷ Department of Defense Base Realignment and Closure Commission Report, December 1988, U.S. Government Printing Office, pp.7-8.

⁸ Ibid., p.8.

⁹ Ibid., pp.8-9.

2687, Title 10, United States Code, this legislation, along with the requirements of the National Environmental Policy Act (NEPA) permitted Congress to nullify any DoD attempt to initiate base realignment and closure studies unilaterally by refusing to approve them, and thus gave Congress an integral role in the initial phases of the BRAC process.¹⁰

As the U.S. economy fell into recession and the country was beset by mounting domestic and international unrest in the late 1970s and early 1980s (least of all the 444-day Iranian hostage crisis in 1979-1981 and the failed rescue attempt in April 1980), the U.S. defense budget fell to its lowest level (as a percentage of U.S. GDP) since just prior to the Second World War.¹¹ This, in turn, intensified pressure on the DoD to close military installations that many in Congress believed were superfluous and no longer necessary, especially in light of heightened budgetary constraints. In 1983, in an effort to find significant cost savings throughout the colossal Department of Defense budget, President Ronald Reagan appointed a bipartisan committee to study cost-cutting measures across all program and directorates within the Department of Defense. This commission, formally known as the President's Private Sector Survey on Cost Control, or the Grace Commission, concluded in its final report to the President that substantial budgetary savings could be realized through cuts in base structure, and recommended the creation of a bipartisan, independent commission to study base realignment and closure across the entire DoD.¹² The DoD did not immediately act upon this recommendation. As a result of glasnost in the Soviet Union, the march towards the end of the Cold War,

¹⁰ Ibid., p. 9.

¹¹ I discovered this in conducting research for a previous study on the Department of Defense Budget from 1945-2007. The source for this information is the 2008 Department of Defense Budget, October 2007.

¹² Congressional Research Service, "Military Base Closures: A Historical Review from 1988 to 1995. Updated 18 October 2004," 18 October 2004, pp.6-7.

and the subsequent draw-down of U.S. military forces both domestically and overseas, however, the Secretary of Defense recognized the requirement to close excess bases to save money, and therefore chartered the Commission on Base Realignment and Closure in 1988 to recommend military bases within the United States for realignment and closure.¹³

Formally enacted as Public Law 100-526 (PL 100-526) on 24 October 1988, the law directed the creation of a bipartisan Commission, appointed by the Secretary of Defense and approved by the Congress, which would make recommendations to Congress on base realignments and closures, and that had to be voted down or accepted as a whole.¹⁴ Congress has subsequently enacted two additional laws since 1988 that provide for the realignment and closure of military installations across the United States. Since 1988, there have been five successive formal Base Realignment and Closure (BRAC) Commissions (1988, 1991, 1993, 1995, and 2005) which recommended the closure of 125 major military facilities and 225 minor military bases and installations and the realignment of the operational and functional capabilities of 145 others.¹⁵

The Department of Defense defines “minor” installations as those bases with a workforce population of less than 2,500 combined military and civilian contract personnel. In the 2008 Base Structure Report, the Department of Defense further categorizes bases as large, medium and small as:

Large Site – total Plant Replacement Value (PRV) \geq \$1.665 billion
 Medium Site – total PRV $<$ \$1.665 billion but \geq \$888 million
 Small Site – total PRV $<$ \$888 million¹⁶

¹³ Congressional Research Service, 18 October 2004, p.12.

¹⁴ Congressional Research Service, 18 October 2004, p. 2.

¹⁵ 2005 DoD BRAC report, p. 17.

¹⁶ Department of 2008 Defense Base Structure Report, 30 September 2007, p. 22.

By another estimate, the first four BRAC rounds achieved 97 base closings and 55 major realignments. According to the Department of Defense, this resulted in net savings to taxpayers of over \$16 billion through 2001, and over \$6 billion in additional savings annually.¹⁷

The primary mechanism for implementing the BRAC process in both statutes has been the independent, bipartisan Commission, appointed by the President and approved by the Congress, mandated in Public Law 100-526. Two of the most pressing issues faced by the Commission while in the performance of its regulatory responsibilities are (1) providing assistance to local communities which have been economically impacted by base closures and (2) establishing a cost-effective program for the proper environmental clean-up at bases prior to their final closure. Prior to 1988, the Secretary of Defense could close a major military base only when the Congress approved his recommendation and authorized the necessary funding. Under this system, the Congress approved base closures on a case-by-case basis, and required the Department of Defense to submit exhaustive reports on the potential strategic, environmental, and local economic consequences of closing a base.¹⁸

Congress refined the process in 1990 with another law (PL 101-510) that charged the Defense Department with drawing up an initial list of bases for consideration by the Commission.¹⁹ This commission, in accordance with a statutory provision, was required to convene in 1991, 1993, and 1995. Named the Defense Base Closure and Realignment

¹⁷ 2005 DoD BRAC report, p.17.

¹⁸ United States Congress, Congressional Budget Office, "Closing Military Bases: An Interim Assessment," U.S. Government Printing Office, December 1996, p. 10.

¹⁹ Ibid.

Act of 1990 (1990 Base Closure Act), Public Law 101-510 further codified the process by which Department of Defense installations would be closed and/or realigned.²⁰

Under the formal BRAC process (as established by Public Laws 100-526 and 101-510), the Secretary of Defense makes recommendations on base closures and realignments to an independent Commission. This Commission is nominated by the President, and confirmed by the United States Senate. The Commission, after being confirmed by the Senate, reviews the recommendations made by the Secretary of Defense, and takes up to 120 days to: (1) conduct public hearings on the recommended base closures; (2) conduct installation site visits and conduct on-site interviews; (3) conduct independent analysis to confirm or deny the Secretary of Defense's recommended base closure and realignment list. In order to reject, change, or add new recommendations to the Secretary of Defense's recommended list, the Commission must first show that the Secretary of Defense "deviated substantially" from the Department of Defense force structure plan. In addition, the Commission can only add a base closure to the list if at least seven of the nine members vote in favor of it, and at least two of the nine actually visit the installation.²¹

Once the Commission has completed its analysis of the Secretary of Defense's recommended realignment and closure, it presents its own recommendations to the President in a formal document. The President then reviews the recommendations, and either sends the list back to the Commission for additional work, whereby the Commission would be given five more weeks to formalize its new recommendations to the President, or forwards the recommendations, without changes, to the Congress. The

²⁰ Ibid., pp. 17-18.

²¹ Department of Defense, "Base Realignment and Closure," Information brief to members of Congress, Washington, D.C.: 10 May 2005, pp.6-8.

Congress then has forty-five days to enact a joint resolution of the House and Senate disapproving of the Commission's list on an all-or-none basis, or the recommendations become binding and are signed into law by the President.²²

The introduction of the BRAC process instituted a new approach requiring the Congress to authorize or reject closing a group of bases recommended by the BRAC Commission, an independent bipartisan commission. The BRAC Commission's recommendations were based on proposals submitted by the Department of Defense and approved by the President. The new process precluded the Congress from making adjustments to the Commissions' recommendations and facilitated the process by reducing reporting requirements. Congressional legislation governing BRAC procedures required the Department of Defense to begin closing bases within two years of the Commission's final report and approval of the President, and to complete BRAC actions within an additional two years from the date of their approval.²³

The Secretary of Defense issues guidelines to the four armed services to ensure that, first and foremost, military requirements are at the forefront of all decision-making criteria when determining which bases to recommend for realignment or closure (see Table 1). The strategic military value of an installation is foremost among the selection criteria issued by the Secretary of Defense. The requirement to make military value the primary consideration when making realignment and closure recommendations was stressed in a 14 October 2005 Defense Department memorandum in which the Service Secretaries were advised to use the "BRAC Military Value Principles" (see Table 2) to ultimately determine which bases to maintain-- or to close down.

²² Ibid., p.9.

²³ Ibid.

Table 1: Secretary of Defense Selection Criteria for Base Closure or Realignment Recommendation²⁴

Military Value
1. The current and future mission capabilities and the impact on operational readiness of the Department of Defense's total force, including the impact on joint warfighting, training, and readiness.
2. The availability and condition of land, facilities and associated airspace (including training areas suitable for maneuver by ground, naval, or air forces throughout a diversity of climate and terrain areas and staging areas for the use of the Armed Forces in homeland defense missions) at both existing and potential receiving locations.
3. The ability to accommodate contingency, mobilization, surge, and future total force requirements at both existing and potential receiving locations to support operations and training.
4. The cost of operations and the manpower implications.
Other Considerations
5. The extent and timing of potential costs and savings, including the number of years, beginning with the date of completion of the closure or realignment, for the savings to exceed the costs.
6. The economic impact on existing communities in the vicinity of military installations.
7. The ability of both the existing and potential receiving communities' infrastructure to support forces, missions, and personnel.
8. The environmental impact, including the impact of costs related to potential environmental restoration, waste management, and environmental compliance activities.

²⁴ These seven criteria were added to Public Law 108-375, the Ronald Reagan National Defense Authorization Act of 2005, in order to amend the current law governing the BRAC process, P.L. 101-510. They were reiterated in an informational memorandum signed on 4 January 2005 by the Under Secretary of Defense (Acquisition, Technology, and Logistics).

Table 2: BRAC Value Principles²⁵

Recruit and Train: The Department must attract, develop, and retain active, reserve, civilian, and contractor personnel who are highly skilled and educated and have access to effective, diverse, and sustainable training space in order to ensure current and future readiness, to support advances in technology, and to respond to anticipated developments in joint and service doctrine and tactics.

Quality of Life: The Department must provide a quality of life, including quality of work place that supports recruitment, learning, and training, and enhances retention.

Organize: The Department needs force structure sized, composed, and located to match the demands of the National Military Strategy, effectively and efficiently supported by properly aligned headquarters and other DoD organizations, and that takes advantage of opportunities for joint basing.

Equip: The Department needs research, development, acquisition, test, and evaluation capabilities that efficiently and effectively place superior technology in the hands of the warfighter to meet current and future threats and facilitate knowledge-enabled and net-centric warfare.

Supply, Service, and Maintain: The Department needs access to logistical and industrial infrastructure capabilities optimally integrated into a skilled and cost efficient national industrial base that provides agile and responsive global support to operational forces.

Deploy & Employ (Operational): The Department needs secure installations that are optimally located for mission accomplishment (including homeland defense), that support power projection, rapid deployable capabilities, and expeditionary force needs for reach-back capability, that sustain the capability to mobilize and surge, and that ensure strategic redundancy.

Intelligence: The Department needs intelligence capabilities to support the National Military Strategy by delivering predictive analysis, warning of impending crises, providing persistent surveillance of our most critical targets, and achieving horizontal integration of networks and databases.

Other evaluative factors include the availability and condition of land, facilities, and airspace; the ability to meet contingency requirements; potential cost and savings; and potential environmental and local economic impact. The services apply these factors in examining their facilities in each of five major categories: fighting, training, industrial,

²⁵ Under Secretary of Defense (Acquisition, Technology & Logistics), informational memorandum to Secretaries of the military departments, The Pentagon, Arlington, Virginia, 14 October 2004.

medical, and command and control. Using the Cost of Base Realignment Actions (COBRA) model, the services determine which bases are surplus in each of the categories and recommend closure and realignment actions to the Secretary of Defense accordingly. First developed for use and assistance with BRAC 1988, COBRA is an economic analysis model that makes use of simulation and the financial principals of net present value (NPV) and payback period (PB) in order to estimate both the costs and savings associated with all proposed base closure or realignment action in a current BRAC round. As such, the COBRA model output is used extensively to compare the relative cost benefits of alternative BRAC actions.²⁶

Under the existing laws, the Secretary of Defense then submits his recommendations to the President for review before forwarding a final list of proposed actions to the BRAC Commission. The process thereby prevents the Congress from making any uninformed or premature adjustments to the Commissions' recommendations before authorizing the Department of Defense to proceed with closures and realignments.²⁷

With the procedural requirements mandated by law in mind, it is important to examine the direct results of each successive BRAC round, beginning with the first formal BRAC round of 1988. During the decade of the 1980's, no major military bases were closed, largely because of the aforementioned procedural requirements established by Congress. After several legislative efforts to break the deadlock failed, Congress introduced a new base closure procedure (P.L. 100-526, enacted on October 24, 1988).²⁸

²⁶ United States Department of Defense, Cost of Base Realignment Actions (COBRA) User's Manual, 2005, pp. 3-4.

²⁷ CBO Report, December 1996, p. 10.

²⁸ Congressional Research Service report, 18 October 2004, pp.14-15.

The original base-closing law was designed to minimize political interference; as previously stated, this new law established a bipartisan commission to make recommendations to Congress and the Secretary of Defense on closures and realignments. Lawmakers had to accept or reject the commission's report in its entirety. Along with the additions provided in subsequent legislation, this characteristic of the law remains in effect today. On 28 December 1988, the first BRAC Commission issued its report, recommending closure of 86 installations, partial closure of 5, and realignment of 54 others. The President approved its recommendation on January 5, 1989.²⁹ Since the commission approach adopted by Congress was successful, new base closure legislation was introduced which also relied on the services of an independent commission.

From 1989 to 2000, the Department of Defense reduced the total size of its active duty military component by 32 percent, from over 2,000,000 in 1989 to fewer than 1,400,000 in 2000.³⁰ After four successive rounds of base closing (1988, 1991, 1993, and 1995), however, only 21 percent of the military installations in the continental United States had been closed or realigned.³¹ Before the first base closure round, there were approximately 500 military bases in the United States and its territories.³² After all of the bases from the first four BRAC rounds were closed, only 400 bases remained, not including those remaining overseas. By 2008 the Department of Defense had also reduced its overseas base structure by nearly 75 percent, closing down the operational capacity of over 960 facilities and handing the land on which it sat back to the

²⁹ Ibid., p.16.

³⁰ U.S. Department of Defense, *Quadrennial Defense Review*, 30 September 2001, p.76.

³¹ Ibid., p.77.

³² According to the DoD Base Structure Report, pages 36-75, the U.S. maintains facilities in American Samoa, Guam, Johnston Atoll, Northern Mariana Islands, Puerto Rico, U.S. Virgin Islands, and the Wake Islands.

government of the host nation. The Army in Europe alone has closed the equivalent of 25 United States major maneuver bases.³³

The 1995 BRAC Commission Report estimated that the implementation of the BRAC actions in the first four rounds would result in \$23 billion in one-time implementation costs, offset by savings of \$36.5 billion, for a total net savings of \$13.5 billion between 1990 and 2001, when the implementation of the first four rounds was supposed to be concluded.³⁴ The Commission further concluded that the Department of Defense did not include the total cost of environmental cleanup beyond 2001 in the net savings figures.³⁵ Approximately half the savings which the Department of Defense predicted would come from BRAC during the implementation of the Commission's recommendations (determined presumably through the use of the COBRA model) were due to assumed savings in operation and maintenance costs. However, much of those assumed savings turned out to be the result of the reductions in civilian personnel brought about by the closing of selected bases.³⁶

The 1995 BRAC process also produced some nefarious political dealing which ultimately resulted in a ten-year gap between it and the next round of BRAC in 2005. The 1995 BRAC Commission recommended closing two maintenance depots, McClellan Air Logistics Center near Sacramento, CA, and Kelly Air Logistics Center in San Antonio, TX. As an alternative to shutting the depots in the two politically powerful states, President Bill Clinton proposed having private contractors take over maintenance work at the sites. The 1995 Base Closure Commission did not recommend, nor authorize,

³³ U.S. Department of Defense, *Quadrennial Defense Review*, 6 February 2006, p.52.

³⁴ 1995 BRAC Commission Report, Washington, D.C., 1 July 1995, pp. 27-28.

³⁵ *Ibid.*

³⁶ *Ibid.*, p. 35.

this seeming “privatization-in-place” at either Kelly or McClellan. Thus, Congress was bound, by law, to either approve the BRAC Commission recommendations (whereby Kelly and McClellan would both be closed down) or disapprove the entire list as a whole, in which case all the work of both the Department of Defense and the BRAC Commission throughout the year would be null and void. Concern was raised about the integrity of the BRAC process in light of this attempt keep these two bases open despite the BRAC Commissions formal recommendations. Ultimately, they were left open, and Republicans in Congress charged that the President could not be trusted to respect the apolitical nature of the entire BRAC process, as mandated in and required by law.³⁷

As a direct result of the President’s actions, and with a significant shift in the balance of power in both the United States Senate and House of Representatives as a result of the 1998 mid-term elections, lawmakers in both the House and Senate could not agree until 2001 to schedule another round of base closings. Before the matter was resolved, the dispute held up a conference agreement on the fiscal 2002 defense authorization bill (PL 107-107) and led then President George W. Bush to threaten to veto the bill if it did not allow a new round in 2005.³⁸ Defense Secretary Donald H. Rumsfeld and Army General Hugh Shelton, chairman of the Joint Chiefs of Staff, told the House Armed Services Committee in July 2001 that the Pentagon maintained 25 percent more facilities than it needed, even after the first four rounds of base closings. By some accounts, the excess military bases annually cost taxpayers an estimated \$3.5 billion.³⁹ Furthermore, the events of September 11th 2001, and subsequent U.S. involvement in

³⁷ 1995 BRAC Commission Report, p.74.

³⁸ Congressional Research Service Report, 18 October 2004, pp. 15-16.

³⁹ Ibid., pp.16-17.

combat operations in Afghanistan in October 2001 and in Iraq in March 2003 caused the process to stall indefinitely.

The 2001 Quadrennial Defense Review (QDR) concluded that additional infrastructure savings were required to begin to reduce the share of the defense budget devoted to infrastructure. Retaining excess base infrastructure is unnecessary with a smaller military force, and wastes scarce defense resources that are essential to future military modernization. Base closings are an integral part of this plan. The QDR found that the Department has enough excess base structure to warrant two additional rounds of BRAC, similar in scale to 1993 and 1995. The Department estimated that two additional base closure rounds would result in savings of approximately \$2.7 billion annually.⁴⁰

Thus, Public Law 108-375, the National Defense Authorization Act for Fiscal Year 2005, directed that the Department of Defense make recommendations on future base closures no later than 15 March 2005, and that the President form a new BRAC Commission in accordance with the guidance laid out in Public Law 101-510.⁴¹ With the four branches of the armed services focused on the improvement of installation operations, the office of the Secretary of Defense was then free to begin the detailed examination of efficiencies that could be obtained by such actions as consolidation of functions on installations, regionalization of support, base realignments and closures, and creation of joint installations where facilities are shared by active forces, National Guard, and Reserve components of all the services.⁴²

⁴⁰ U.S. Department of Defense, *Quadrennial Defense Review*, 30 September 2001, p.25.

⁴¹ U.S. Congress, Public Law 108-375, "National Defense Authorization Act for Fiscal Year 2005," Washington, D.C.: 28 October 2004, pp. 322-325.

⁴² Congressional Research Service Report, 16 October 2008, pp.33-34.

Table 3: Comparing BRAC Rounds

	Major Base Closures	Major Base Realignments	Minor Closures and Realignments	Costs (\$B)	Annual Recurring Savings (FY05 \$B)
BRAC 88	16	4	23	2.7	0.9
BRAC 91	26	17	32	5.2	2.0
BRAC 93	28	12	123	7.6	2.6
BRAC 95	27	22	57	6.5	1.7
Total (88 - 95)	97	55	235	22	7.3
BRAC 05	33	29	775	24.4	5.5

BRAC 2005 has been a significant change to previous BRAC rounds. Though, as in previous BRAC rounds, many bases (a total of 177) were marked for closure (see Table 3), BRAC 2005 applied a new definition to the “realignment” phase of the process.⁴³ Where in previous rounds realignment applied mainly to the movement and consolidation of capabilities at a small degree, with very little movement or exchange of mass troop movement on a large scale, BRAC 2005 took realignment to a new level altogether. As the 2005 BRAC Commission stated in its final report to the President on 8 Sep 2005:

⁴³ 2005 *Defense Base Closure and Realignment Commission Report to the President*, Washington, DC, September 8, 2005, p.13.

Prior BRAC rounds occurred at the dusk of the Cold War, when military budgets and force structure were shrinking. The 2005 BRAC round occurred in a post-9/11 environment with our armed forces deployed in combat in Iraq and Afghanistan with stable or increasing force structure and defense budgets. During the 2005 BRAC implementation period, the armed forces expect to relocate 70,000 service members from overseas to installations within the United States. Prior BRAC rounds took place in the context of military doctrine and force structure shaped by the Cold War. The 2005 BRAC round occurred during the transformation of military doctrine and force structure to meet the needs of an entirely new threat and security environment.⁴⁴

In his own guidance to the DoD Staff with respect to the 2005 BRAC process, Secretary of Defense Donald Rumsfeld provided clear guidance on the transformational nature of this BRAC round, stating that this round of recommendations would serve to align

U.S. base structure with the force structure that is expected to be needed over the next 20 years. These proposals will implement the Department's global force reposturing; facilitate the ongoing transformation of U.S. forces to meet the challenges of the 21st century; and restructure important support functions to capitalize on advances in technology and business practices. The Department's BRAC recommendations address almost every Defense mission area and affect most of the Department's major U.S. installations. Overall, these recommendations support force transformation; address new threats, strategies and force protection concerns; consolidate business-oriented support functions; promote joint- and multi-service basing; and provide significant savings.⁴⁵

Furthermore, in his testimony before the Subcommittee on Military Construction of the House Appropriations Committee on 22 April 2009, the Deputy Undersecretary of Defense (Installations & Environment), Wayne Army, underscored the significance of the 2005 round of BRAC, saying:

⁴⁴ 2005 BRAC Commission, *2005 Defense Base Closure and Realignment Commission Report to the President*, Washington, DC, September 8, 2005.p.8.

⁴⁵ Rumsfeld introductory letter to the Chairman of the 2005 BRAC Commission, 13 May 2005, pp. 1-2.

Beyond the comparative size, it is important to note that BRAC 2005 is the most complex round ever. This complexity is not merely a function of its magnitude, but is, to the largest extent, a function of the original goal established for this round: that BRAC 2005 would focus on the reconfiguration of operational capacity to maximize war fighting capability and efficiency. Focusing on operational capacity required that we appropriately assess the increased military capabilities we are achieving through these recommendations.⁴⁶

Based on this vision by the Secretary of Defense and his subordinates, a major component of the 2005 BRAC process entailed the joining of existing bases-- Army, Air Force, and Navy-- and combining them to form larger, "super bases" which contained all the elements of the joint service components. Joint basing calls for installations that share a common boundary or are in close proximity to consolidate installation management functions and the delivery of installations support functions, while considering best business practices and ensuring war fighting capabilities are preserved or enhanced.⁴⁷ The earliest example of this "super base" is Joint Base McGuire-Dix-Lakehurst, formed underneath one controlling headquarters out of McGuire Air Force Base, Fort Dix, and Lakehurst Naval Air Station. As a result of the 2005 BRAC process, eleven other joint bases are being formed across the country (see Table 4), and are required, by law, to be operational no later than 15 September 2011.⁴⁸

⁴⁶ Wayne Army, Deputy Under Secretary of Defense (Installations & Environment), Testimony before the Subcommittee on Military Construction of the House Appropriations Committee, 22 April 2009.

⁴⁷ Army, 22 April 2009.

⁴⁸ Ibid.

Table 4: Joint Base Plan in 2005 BRAC Recommendations

Base	Installations Affected	State	Service Lead
Joint Base Anacostia	Bolling AFB and Washington Navy Yard	DC	Navy
Joint Base Andrews	Andrew AFB and Naval Air Facility Washington	MD	Air Force
Joint Base Bragg	Fort Bragg and Pope AFB	NC	Army
Joint Base Charleston	Naval WS Charleston and Charleston AFB	SC	Air Force
Joint Base Elmendorf	Fort Richardson and Elmendorf AFB	AK	Air Force
Joint Base Lackland	Fort Sam Houston, Randolph AFB, Lackland AFB	TX	Air Force
Joint Base Langley	Fort Eustis and Langley AFB	VA	Air Force
Joint Base Lewis	McChord AFB and Fort Lewis	WA	Army
Joint Base Little Creek	Naval Station Norfolk and Fort Story	VA	Navy
Joint Base McGuire	Naval AES Lakehurst, Fort Dix, McGuire AFB	NJ	Air Force
Joint Base Myer	Fort Myer and Henderson Hall	VA	Army
Joint Base Pearl Harbor	Hickam AFB and Naval Station Pearl Harbor	HI	Navy

Despite a continued focus on overseas deployments and a change in Secretary of Defense from Donald Rumsfeld to Robert Gates, a focus on the Department of Defense's transformation effort continues to be the closure on overseas bases and the return of overseas forces to the continental United States. This effort will require full analysis of space availability at installations, and forecasts of not only what will be needed for the current force structures, but also for force structures that involve units and weapons systems still in the design process. In forming the Army's Installation Management Agency (IMA) and the Navy's Commander, Naval Installations (CNI), regional offices were established to coordinate the activities of installations within the regions and to determine where analysis indicates efficiencies of any kind can be generated by combining regional operational and logistical functions.⁴⁹ In addition, the increased use of National Guard and Reserve components during combat operations in both Iraq and Afghanistan has pointed out the close links between the installation needs of the Guard and Reserve and the active force, and has thus opened the question of how best to provide

⁴⁹ Congressional Research Service Report, 18 October 2008, pp. 12-13.

support for these units in the future. Most recently, the 2009 Defense Authorization Act contained a clause in which the BRAC Commission would be dissolved upon the completion of the current BRAC round (presumably in 2011). As there is substantial evidence which indicates that the forced closure of military bases across the country rarely occurred before the evolution of the BRAC Commission in 1988, this law may very well be over-written before it is ever enacted.

2.2 The Intrinsic Value of Military Bases

Assessing the true “value” of a military base is nearly impossible. Gaining an appreciation for the sheer size and magnitude of the land that the Department of Defense controls around the United States, however, is crucial to understanding the true scope of the BRAC problem as it relates to determining the effect of the BRAC process on home prices in the local communities surrounding military bases. According to the most recently available estimates from the Deputy Under Secretary of Defense (Installations & Environment), found in the FY2008 DoD Base Structure Plan, “The Department of Defense... remains one of the world’s largest ‘landlords,’ with a physical plant consisting of more than 545,900 facilities (buildings, structures and linear structures), located on more than 5,400 sites, on approximately 30 million acres.”⁵⁰ As Figure 1 depicts, there are major installations from the Army, Navy, Air Force and Marine Corps in almost every state in the continental United States, as well as several other large bases in both Alaska and Hawaii:

⁵⁰ Department of Defense Base Structure Plan for FY2008, Deputy Under Secretary of Defense (Installations & Environment), 30 September 2007, p. 2.

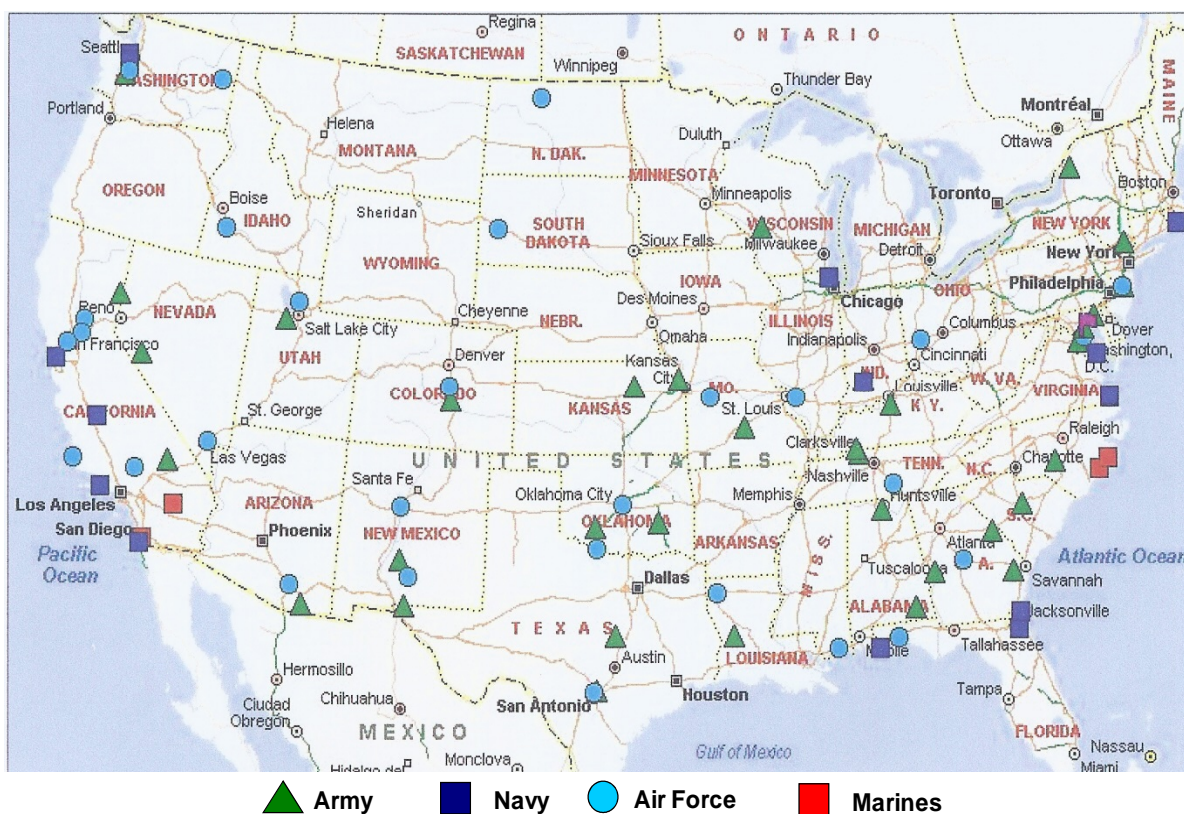


Figure 1: Department of Defense Installations in the Continental United States

In addition, as Tables 5 – 8 clearly demonstrate, the size of the land that the Department of Defense occupies on installations within the United States, its territories, and around the world, the sheer number of buildings on these installations, and the plant replacement value for these facilities, is truly awesome. There are 4,584 military bases in the United States, 104 more in U.S. territories, and 761 overseas, for a total of 5,429 installations world-wide. These bases occupy a total of 32.41 million acres around the globe, and the plant replacement value for the buildings which they house is a staggering \$706.31 billion.

Table 5: Worldwide U.S. Military Installations⁵¹

Area	Army	Navy	Air Force	Marine Corps	White House	Total
United States	1,884	955	1,581	130	14	4,584
U.S. Territories	27	57	19	1	0	104
Overseas	327	149	259	26	0	761
Total	2,238	1,161	1,859	157	14	5,429

Table 6: Total Acreage of U.S. Installations (in millions of acres)⁵²

Acreage	Army	Navy	Air Force	Marine Corps	White House	Total
Total	18.07	2.14	9.85	2.35	> 0.01	32.41

Table 7: Total Buildings and Structures on DoD Installations⁵³

Type of Asset	Army	Navy	Air Force	Marine Corps	White House	Total
Buildings	143,035	66,151	81,970	24,886	196	316,238
Structures	71,315	39,676	56,329	14,043	228	181,591
Linear Structures	21,254	8,247	16,699	1,630	55	47,885
Total	235,604	114,074	154,998	40,559	479	545,714

Table 8: Plant Replacement Value for DoD Installations (\$Billions)⁵⁴

Type of Asset	Army	Navy	Air Force	Marine Corps	White House	Total
Buildings	\$177.28	\$107.17	\$135.87	\$31.36	\$3.72	\$455.40
Structures	\$41.20	\$65.54	\$65.54	\$10.80	\$0.06	\$162.22
Linear Structures	\$35.92	\$27.87	\$27.87	\$4.49	\$0.03	\$88.69
Total	\$172.16	\$229.29	\$229.29	\$46.66	\$3.81	\$706.31

⁵¹ Ibid., p.6.

⁵² Ibid., p. 6.

⁵³ Ibid., p.8.

⁵⁴ Ibid.

Consider the state of North Carolina alone. Within the state, there are 6 major military bases (as previously defined, those bases having a plant replacement value of greater than \$888 million) and 108 minor bases. The military owns or leases a total of 1,727,673 acres of land to maintain these bases. This amounts to 5.7% of the total acreage of the state of North Carolina. In addition, the military employs 118,231 service members and 25,969 civilians and contract employees on these bases. In the case of Fort Bragg, the largest military base in the state, 47,831 Soldiers are stationed on post, and over 15,000 civilians and contract employees work on the base. It is estimated that roughly 70% (or nearly 34,000) of the Soldiers who work on Fort Bragg live in homes off base. Thus, when combined with the civilian and contract employees who work on base, Fort Bragg accounts for nearly 59,000 personnel, in a city with a population of roughly 168,000, or over 35% of the population of Fayetteville.⁵⁵

Other than sheer size, there are other tangible characteristics that make military bases so lucrative and valuable to the community. First, in many cases, the bases are themselves self-contained communities, containing their own schools, hospitals, shopping centers, lakes and recreation facilities, water and sewage treatment plants, and power plants. Most larger military bases have their own mature transportation nodes-- road networks, easy access to interstate systems, rail lines, and bus terminals. Nearly all Air Force bases and many large Army bases have their own runways and air traffic control facilities, and most of these runways are capable of landing any aircraft in the world. And, finally, most Naval bases have their own mature port facility, capable of facilitating the embarkation and debarkation of the largest ships in the world.

⁵⁵ 2008 DoD Base Structure Report, pp. 62-63.

Of course, there are plenty of features which make military bases less than desirable to the local community, as well. Most Army posts are in remote, rural locations, away from large metropolitan areas. Most bases were constructed in the periods between the First and Second World Wars; infrastructure is aging and is in much need of an upgrade to the twenty-first century. Though much progress has been made to abate this during the past ten years, environmental hazards still abound on most military installations, the result of years of fuel spills and leaky vehicles and aircraft. Most large military bases also contain their own live ammunition training areas, and decades and decades of unexploded ordnance undoubtedly lies on the ground in areas where humans have not trod in nearly 100 years. Finally, as military installations are their own self-contained communities, they have never been zoned for commercial or residential building purposes.

2.3 The Way Ahead – BRAC 2014

There were strong objections among the 2005 BRAC Commission as to the manner in which the 2005 BRAC round was executed by the Department of Defense, as well as the degree to which the Commission believed it was not able to properly execute its mandated duties and responsibilities. As such, in Appendix R to the final Commission report to the President on 8 September 2005, the Commission recommended the following actions for the future:⁵⁶

(1) Extend the life cycle of the BRAC Commission in order to ensure that the recommendations made by the Commission and approved by the President are actually carried out;

⁵⁶2005 BRAC Commission Report, 8 May 2005, Appendix R, pp. R8 – R14.

- (2) Create a public “corporation” that has the legal authority to finance the transfer of closed military bases to the private sector;
- (3) Conduct the next BRAC round in 2014-2015; do not begin the formal BRAC process until the issuance of a formal threat assessment by the Director of National Intelligence and the formal release of the Quadrennial Defense Review (QDR);
- (4) Require the Secretary of Defense to release the “certifying data” which supports the DoD’s BRAC recommendations no later than seven days of forwarding the DoD BRAC recommendations to the Commission;
- (5) Extend the time period in which the Commission must make its recommendations to the President from four months to not more than seven months.
- (6) Grant subpoena power to the Commission so that it may independently subpoena witnesses to testify at its hearings and require the delivery of supporting documentation by those testifying before it.

These recommendations were included in a legislative proposal to attempt to get the current BRAC law updated. Thus, while it will be the responsibility of the President in 2014 to determine whether a new round of BRAC is required, the Secretary of Defense will set the conditions required to both implement these required changes as well as to provide the impetus behind another round of base closings.⁵⁷

Considering all of this data and criteria as a whole, however, it seems clear that military installations-- in particular the large category Army posts, Naval stations, Air Force bases, and Marine Corps camps and air stations that are so much of the prevailing landscape across the United States -- contribute a great deal to the local communities in

⁵⁷ Since base closings are normally seen as having a negative net economic effect on the local community, rarely, if ever, would Congress provide this impetus to push for another round of BRAC.

the way of employment opportunities, retail sales and local sales tax, and property tax contributions. Thus, when a major base shuts down as a result of the Base Realignment and Closure process, there is also a clear economic impact and effect on the local community. The process itself, though not perfect, has evolved over time in such a manner as to at least provide some degree of predictability to the communities that it directly effects. The degree to which that process affects the value of residential real estate in these communities is, therefore, a vitally important issue to both these communities and to the individual services within the Department of Defense.

CHAPTER 3: LITERATURE REVIEW

As this paper attempts to answer the question of what effect the Department of Defense Base Realignment and Closure process has on the value of residential property in the surrounding community, I combined the classic components of an event study with hedonic pricing models in real estate. As such, a thorough understanding of all three aspects of this project is critical to understanding the problem: academic literature on the economic impacts of the BRAC process, hedonic pricing models, and event study methodology.

3.1 BRAC – related Literature

Despite concerns about the effects of base closure, policymakers have little information to guide their assessments of which communities might need special assistance and what specific types of assistance to provide. What little academic work has been done on the BRAC process has had a narrow economic focus and has been confined to a narrow geographic region of the United States, as well. There was a flurry of BRAC-related literature in the early nineties that focused on the early BRAC rounds (1988, 1991, and 1993), but as the contentiousness of the process slowly faded away, so did the academic studies. This is also due to the fact that there was an entire decade between BRAC 1995 and BRAC 2005: nobody, it seemed, wanted to re-visit the BRAC issues of the late eighties and early nineties, and neither was anyone interested in

analyzing the round of BRAC 1995 (which was far smaller, in terms of recommended closures and realignments, than BRAC 1993).

Innes, et. al. (1994), Bradshaw (1994), Dardia (1996), Hooker and Knetter (2001), and Poppert and Hertzog (2003) all studied BRAC through the prism of the economic effect on the local community, and all three studies confine their analysis to this effect in the communities surrounding several Army and Air Force bases in California. There is a logical explanation for this, as through the first four rounds of BRAC, nearly 23% of all base closures occurred in California, and California's 22 base closures was nearly as many as the next four highest states combined (Texas – 8, Pennsylvania – 6; Illinois – 5; New York – 5). These studies provide results in two specific areas: (1) the long-term impact of earlier rounds of closures and (2) projections of the effects of the recent round of closures. Each tends to produce a somewhat different picture of base closure effects.⁵⁸

Studies of earlier base closures are generally optimistic about the capacity of a community to recover economically from the closure of a military base in its close proximity. For example, Daicoff et al. (1970) found little economic effect on the community when the employment loss is less than 5 percent of total area employment. Both they and MacKinnon (1978) found no net loss in employment, although there may be some loss of high-wage jobs. Interesting enough, both studies emphasize that the major effect is felt in housing markets, though neither study attempts to analyze this effect in any detail with any sort of empirical data or results. The most extensive study of the long-term effects of base closures (Dardia, 1996), found that over the longer term,

⁵⁸ Michael Dardia, et. al., "The Effect of Military Base Closures on Local Communities: A Short Term Perspective," Rand: National Defense Research Institute, 1996, p. 25.

post-closure employment tends to surpass pre-closure levels. Jointly, all of these studies call attention to several factors that should be kept in mind when considering the effects of base closures on local communities. First, the overall level of economic growth in the area (as well as the nation) will condition the effects of base closure. Second, the transfer of civilian personnel and the employed spouses of military personnel can create substantial job openings for local residents. Third, many of the bases are not closely integrated into their local communities; thus, the loss of base personnel does not necessarily translate into sharp reductions in retail sales to local business. Finally, reuse of bases provides communities with new economic opportunities that can become sources of employment and earnings. In sum, these studies suggest that over the longer term, the vast majority of communities tend to recover and often improve on their pre-closure economies.

Because Dardia (1996) used findings that are based on a limited sample of a few different types of communities in a limited geographic locale, these results cannot necessarily be applied automatically to communities in other regions of the country. The results do suggest, however, that the impacts of base closures are likely to be more modest than initial estimates that do not attempt to consider offsetting economic activity. Close analysis of such local economic variables as off-base employment of military families, the size and spending patterns of local military retirees, and growth trends in population and economic sectors could provide a more accurate picture of what is likely to occur after a major military base in a local community is closed.

Hooker and Knetter (2001) studied the economic effect of employment and the personal income effects that occurred as a result of the BRAC process. They detail the

reduction in defense spending from 1986 to 1998 and the need for greater action on base closure; however, they also provide evidence for the difficulties in executing the base closure process, in particular, how to actually select the right bases for closure. The single most important factor in looking at BRAC, as discussed in the previous studies, is the economic effect that closing a base has on the local community. Hooker and Knetter approached the problem using a newly constructed dataset to study the employment and personal income effects at the county level. They explained that military bases are a major employer of most counties in which the base is located (up to 30% in some cases, according to the study) and thereby accounted for a larger share of income and tax revenues in the area. Thus, the transfer of payment-related income played a vital role in the economic stability of the local community.

These results, however, contradict the results of Dardia (1996) in nearly every way. Why is this so? Dardia (1996) looked only at bases in California, bases that retrospectively occupied prime areas of real estate among one of the most lucrative residential and commercial real estate market in the country. This was not the case with the majority of the bases used in the database for the Hooker and Knetter (2001) study. Though they did include bases in California, they also included other bases across the nation that closed down between 1971 and 1998. The vast majority of these bases were larger bases in more rural type communities. When the bases in Dardia (1996) were marked for closure, it was clear that the effect to the community was much less than the effect of the normal base closure across the rest of the United States, due mostly to the simple value of land in California compared to other parts of the country.

Hooker and Knetter (2001) also demonstrated that government transfer payments helped pay for certain activities within the local communities effected by base closure, especially in the operation and maintenance of the local communities' infrastructure and services. Normally, local taxes (i.e., property taxes and sales tax) are utilized in education, road maintenance and upkeep, parks services and recreation, community development, etc. The importance of the transfer payment differs in one major aspect: the federal government (in the form of property taxes, sales tax, and other taxes owed to the local community government) pays the taxes for the operation and maintenance of the base. Taxes collected by the local civilian government (again, property taxes, sales tax, and any state income tax that exists) normally pay for the operation, maintenance, and service-related functions (i.e., garbage collection, etc.) of the local community. Thus, counties which include a military base within their boundaries enjoy the luxury of receiving additional tax support from the federal government, and it is normally in the best interest of the local community government to keep these bases from closing down.

Hooker and Knetter (2001) also draw out a very important point with respect to BRAC and the local community: the opportunity cost of the resources the base affords the community after it is closed. These tangible assets, which make a military base so intrinsically valuable, are quantified by the Department of Defense by the plant replacement value (PRV) of the base. In particular, Hooker and Knetter cited the available land that the community received and the possible use of the land after it is released to the community as the most important consideration affecting a community as the result of a potential base closure. Hooker and Knetter give us two examples of scenarios that can assist the recovery of local economies after the bases closes; both of

these scenarios relate to bases in California (the Presidio of San Francisco Army base and Moffett Field Naval Air Station in Silicon Valley), and both lend credence to the results of the Rand study. Both of these examples use employment and personal income indicators in their study, and compare responses from local communities to other counterfactual scenarios.

The first scenario assumed that the county's employment and per capita personal income growth rate was equal to the state's growth rate. The second scenario assumed that the difference between the county (and thus the base) and the state's growth rate in the years preceding the date of the base closure would continue long after the base closed down. The results of their research demonstrated that off-base employment grew faster in communities marked for closure than it did in the counterfactual model. The study thus proved that the spillover from job loss on bases did not necessarily affect the surrounding communities, as was shown from the results of their earlier impact analysis. They also showed that if the resources from a base are properly used in alternative ways following the closure of the base, then an increase of job creation could actually occur if industries with higher multiplier effects are brought in to substitute for jobs when the base closes down.

The personal income results from Hooker and Knetter's study also revealed very little impact from the closure of a base through the BRAC process, that is, there was no statistically significant impact on per capita income in a community once a base closed down. Hooker and Knetter give us two possible explanations for this result: (1) generally speaking, military personnel working on a base have below-average income when compared to the income of their peers working in similar sectors off-base; and (2) the

older and more experienced civilian employees working on base who lose their jobs tend to find new employment at higher salaries once the base has closed down. Hooker and Knetter contend, and my own research concurs, that most economic impact reports have traditionally used projected data on income loss instead of more accurate measurements. Hooker and Knetter argue that projections from input-output models tend to ignore the capacity of regional economies to adjust to base closure in order to lessen its overall impact on the local economy. They further argue that the primary factor hampering accurate economic impact studies is the estimation of the impacts that would occur without base closure; these are normally grossly overblown.

The type of the base itself is another key factor that Hooker and Knetter highlight in their discussion of the ability of local communities to weather base closures. Bases that require more highly skilled workers, utilize more methods of transportation for shipping and receiving supplies, personnel, and equipment (i.e., via air, land, rail and sea), and provide more resources for future development tend to assist the local community once it is closed down. This makes perfect sense, and is the primary reason that Air Forces bases with active runways and air traffic control facilities, and Naval bases with mature port facilities are much less prone to feel a negative impact of a base closure than is an Army post in a rural community without access to any major transportation hubs.

Hooker and Knetter conclude their study by recommending that any future studies on the economic impact of BRAC-related base closures should attempt to gain specific, measured results rather than simply projecting the results of some obscure economic impact study. They also emphasize the importance of refuting the negative impacts of

base closure that most of the studies predict, and instead concentrate on highlighting the positive aspects of base closure that can occur in a local community with insightful, detailed, and well-developed planning on the proper use of the base's resources once it is closed down.

Hawkins (2005) assesses the impact of military bases on local economic-growth rates in three distinct metropolitan statistical areas, Jacksonville Naval Air Station, Mayport Naval Station, both located in Jacksonville, Florida; and MacDill Air Force Base, located in Tampa, Florida. He examined the extent to which proximity to a military-base or the Central Business District (CBD) affects local economic growth rates and the degree to which variability in growth is explained by the distance to a base. Using spatial analysis and multiple regression analysis, he attempts to analyze the impact on the economic growth rates of the localized areas from each of the three military bases at the 95% confidence level. His research hypothesis is that military bases have a discernible impact on economic growth rates at a geographical scale because of proximal distances and accessibility along transportation corridors between the base and major commercial and financial nodes at the 95% confidence level. His results showed discernible impact on the economic growth rates of the study areas; however, the cause of economic growth is not discernible among impact from the base, commercial nodes, economic nodes, demographics, distance variables and accessibility variables in the study areas. Regression analyses revealed possible positive and negative causes for economic-growth rates of the study areas.

Though Hawkins did not look at the direct effect of the proximity of homes to these three bases, his approach is very similar to the one I use in this study. In his

conclusions, Hawkins recommends that any future study on the economic impact of BRAC should consider the following important criteria:

- (1) do not predict; rather, estimate the impact of BRAC on economic growth resulting from base closures using viable econometric and statistical models;
- (2) include distance variables and accessibility to local transportation nodes and corridors;
- (3) consider the percentage of total population that is employed at the base in question;
- (4) research should consider using a smaller geographical scale to estimate the impacts at local levels;
- (5) include a large number of social and economic independent variables to increase the variability and random pattern of the model; and
- (6) apply the criteria for base closure as it is defined by the Department of Defense.⁵⁹

Local communities have commissioned their own studies on the effect of BRAC, as well. A study completed by the city of Huntsville, Alabama following the 2005 BRAC announcement is typical of these reports. In the report, the city analyzes the additional revenue that the city will gain through population growth (Redstone Arsenal, in the city of Huntsville, is scheduled to gain an additional 1,655 military employees as a result of the 2005 BRAC process) in the way of increased income tax, sales tax, and fuel tax, and the requirements for transportation infrastructure upgrades and improvements. The study includes neither discussion nor analysis at all of the impact of BRAC as it

⁵⁹ Hawkins, pp. 33-34.

relates to the value of real estate in Madison County or the city of Huntsville.⁶⁰ A report commissioned for the county by the Haas Center for Business Research and Economic Development at the University of West Florida in July 2007 does provide a cursory analysis of the impact of BRAC (like Redstone Arsenal, the region is scheduled to gain approximately 5,000 military employees as a result on enhanced activities at Eglin Air Force Base and Naval Air Station Pensacola) with respect to housing. However, the focus of this analysis is primarily on the increased amount of affordable housing required as a result of military families relocating to the region, and does not analyze the impact at all on housing prices in the region itself.⁶¹

Frieden and Baxter (2000) provide valuable data on the economic challenges of base closures in a study commissioned by the Economic Development Administration of the U. S. Department of Commerce. Though they tell us nothing about the value of real estate as a result of base closures, they detail the problems posed by managing real estate development on military bases following their closure, including: environmental contamination, substandard infrastructure, uncertainty about the future development of particular parcels and buildings, and uncertainty about property conveyance.

Environmental contamination is typical, as at obsolete industrial sites, and may take several years to remedy. Meanwhile, federal regulations prevent conveyance of most contaminated sites to new owners, delaying redevelopment of the base. The military services take responsibility for cleanup and its costs, but progress is often slow. With

⁶⁰ City of Huntsville, Alabama. "Economic & Transportation Impact of BRAC on Huntsville and Madison County," 2005, pp 2-3.

⁶¹ Harper, Rick. "Economic Impact of Military Personnel Realignments in Okaloosa County." Haas Center for Business Research and Economic Development, University of West Florida, July 2007, pp.1-4.

respect to substandard infrastructure and buildings, when many bases were constructed before or during the Second World War, federal sites were not subject to state or local building codes. Many roads, utility lines, and electrical systems do not come up to code standards or to the more demanding commercial standards for real estate development. Many buildings do not comply with standards of the Americans with Disabilities Act. Federal aid is available to pay part of the cost of bringing infrastructure up to standard, but the cost far exceeds federal assistance. So, finding the upfront money for infrastructure improvement is a major problem. Uncertainty about the future development of particular parcels of land abounds, as during the early years after a closing decision, the future use of specific properties is unknown and usually unknowable. As a result, potential investors cannot be sure what will be across the street from their property on land that is not yet zoned and does not yet have public services.

Among public services, the case of electricity illustrates the problem: service providers do not want to risk investing funds in locations where there are no customers, and business firms do not want to locate plants in places without an assured supply of electricity. Finally, there exists great uncertainty about property conveyance, as local communities do not know at the outset which base property may be available to them, and on what terms. In the early stages of base reuse, property is screened for possible transfer to other federal agencies, state and local governments, and providers of housing and services for homeless people before it becomes available for economic development. During the screening process, which usually goes on for several months, the community is unable to make firm plans for base reuse, while other organizations with higher priority carve out sites they consider useful. In the process, the base could be converted from a

large property in single ownership into a checkerboard of parcels selected for their attractiveness to an assortment of potential users.

In order to assist communities adjacent to installations approved for closure or realignment, the Department of Defense created the Office of Economic Assistance (OEA) in 2000. In the introduction to its informational pamphlet designed to assist communities in the midst of base closure planning, the OEA says it serves as the Department of Defense's

primary source for assisting communities that are adversely impacted by Defense program changes, including base closures or realignments, base expansions, and contract or program cancellations. OEA offers technical and financial assistance to adversely impacted communities, and coordinates the involvement of other Federal Agencies through the Defense Economic Adjustment Program and the President's Economic Adjustment Committee.⁶²

In coordination with another DoD entity created to assist in BRAC-related transitions, the President's Economic Adjustment Committee, the OEA works closely with Local Re-use Authorities (LRAs) to assist in everything from micro and macro-level economic planning to land-use planning to the proper use of military training areas. It is also the sole approval authority at the U.S. government level for the granting of business entities as LRAs, organizations which go a long way to ensuring the future success of communities after the military has shut the gates permanently on a base.

The significance of the OEA and the LRAs is that research has shown that communities that have prepared for BRAC through a the early formation of an LRA to govern their post-closure economic growth and development have generally been able to overcome any negative effects of the BRAC process much quicker and more readily than

⁶² United States Department of Defense. Office of Economic Assistance. "Responding to Change: Communities and BRAC." Washington, D.C.: U.S. Government Printing Office, December 2005.

communities that have not prepared and formed an LRA. Reese Air Force Base, one of the two installations that I analyze in this study, is a great example of this. Early on in the process, the BRAC process was predicted by the city and county of Lubbock, Texas to be devastating for the surrounding community. Various articles ran in the local community newspaper, the Lubbock Avalanche-Journal, predicting both public dissatisfaction with the BRAC selection process, as well as economic doom for the city of Lubbock.⁶³ The biggest reason for this, it was initially predicted, was the existence of a regional airport in Lubbock that pre-dated the announcement of Reese's demise through BRAC. Since there would obviously be no opportunity to capitalize on Reese's major function as an active airfield (with a runway capable of facilitating the largest of commercial aircraft), the community feared that Reese would be a 2,500-acre seamless void, immediately release over 1,200 unemployed workers into an already uncertain job market, and be an overall negative drain on the Lubbock economy.

Twelve years later, however, the Reese Technology Center, formerly known as Reese Air Force Base, is touted as a major BRAC "success story" by both the Department of Defense and the city of Lubbock. The bio-technology park is the home to cutting-edge research efforts; Plains College, a two-year associate degree school with an active enrollment of 3,000 students; and three commercial technology companies. Texas Tech University has also built three new research facilities at Reese, the most notable of which is the Texas Tech Institute of Environmental and Human Health. Job creation since BRAC has long wiped away any losses incurred through the closure of Reese AFB,

⁶³ "More Reese AFB support staff leave," Lubbock Avalanche-Journal, Lubbock, Texas, 30 June 1997, p. 1.

and the Reese Technology Center is now the center of a major regional economic boom in northwestern Texas and eastern New Mexico.⁶⁴

Complementing this list of existing literature, the Congressional Research Service (CRS) published four major studies on the BRAC process over the course of the past four years. However, the overwhelming focus of each of these studies was in two predominant areas: the environmental impacts of base closures and the economic impact on communities with respect to unemployment and the loss of retail sales. The report by the Department of Defense itself on the economic impact of BRAC details only the number of military and civilian workers potentially displaced by the realignment and closure process, without regard for the present value or future viability of the land being turned over to the state. Indeed, the Department of Defense itself, in the official 2005 BRAC report to the President and Congress, defines the Total Economic Impact of BRAC as “An aggregation of economic effects or impact of a BRAC action on a particular installation. It includes both direct and indirect job changes, expressed as a percent of the total employment in the economic area.”⁶⁵ This impact is further defined, in net job gains or losses, in Appendix O of the report.

Two recent papers unrelated to the BRAC process that nonetheless provide great insight into the real estate price event study model are Ready and Ready (1995) and Dehring, Depken, and Ward (2007). Ready and Ready (1995) execute an event study in order to determine the effect of landfill announcements on residential property values in the surrounding communities. In many ways this is an event study in nature similar to my own, whereby the announcement of the placement of a landfill is analogous to the

⁶⁴ “Base Re-Use Success Stories,” Office of Economic Adjustment, United States Department of Defense, January 2005, p.6.

⁶⁵ Department of Defense 2005 BRAC Report, 12 May 2005, p. 5.

BRAC closure announcement in my own study. Ready and Ready also show that there is an optimal “tipping fee” that occurs immediately after a new landfill is built, which, in turn, has a significant effect on the value of property in counties adjacent to the landfill. In it applicable to my own research, as well, in that the model Ready and Ready employ in their analysis is well-suited to landfills in particular, as there is normally a great deal of time between construction of subsequent landfills in a particular county.

Dehring, Depken and Ward (DDW) study the impact of announcements for the potential site of the Dallas Cowboys’ new stadium on the value of residential property in the possible counties that the stadium may go. They use a similar methodology to Tu (2005), who compared the values of residential property within a three-mile radius of the Washington Redskin’s new FedEx Field at three distinct periods of time: the “pre-development” phase (i.e., before the site for the stadium was selected), the “development” phase (the period in between site selection and completion of work on the stadium), and the “post development” phase (after the stadium was completed and operational). Though their results are not at all similar to Tu’s, they nonetheless employ a very similar mindset in executing their own research. Also, as Tu looked at the value of residential real estate in the aggregate at these distinct points in time, DDW instead look at the effects of specific stadium announcement on the value of real estate in the surrounding areas.

DDW study the effects of five distinct announcements in two separate geographical areas, the cities of Dallas and Arlington, Texas. As opposed to my own study in which the BRAC process follows a process and timeline mandated by law, their five announcements correspond to the dates in which county officials (in Dallas)

announced the potential or probability of the stadium coming to their city and then, forty days later, announce that negotiations have broken down and the stadium will not be built; and as in the case of Arlington, the three announcements correspond to the: (1) date that the mayor announced he had been in secret negotiations with the Dallas Cowboys to build a publicly-subsidized stadium in Arlington, (2) date that the Arlington City Council approved a voting ballot referendum to put the issue to a public vote, and (3) actual date of the public vote in which the public approved the stadium and the incursion of a new tax to fund its construction.

As with my own study of the effect of the different BRAC announcements on residential property values, it was impossible for DDW to incorporate actual daily changes in the value of a single house (much as a “normal” event study might to track daily changes in stock prices during an event study window). Along the same lines, and again differing from accepted event-study methodology, DDW cannot calculate any sort of relative return in the housing market, in the way that event studies utilize the stock’s abnormal return to determine the effects of a particular event over time. Thus, they are confident that the price effect on residential property values resulting from one of their five stadium announcements will be accurately reflected in the value of the property at the time.

Finally, DDW use a difference-in-difference identification strategy to calculate the effects of the stadium announcements. They do this by employing different dummy variables to account for both the date of the particular announcement, the county in which the announcement occurs, and a dummy variable which is an interaction between the county and the post-announcement effect. This, they postulate, will provide a similar

effect to calculating the actual effect of increased taxation as a result of the future stadium.

Because of the methodology that DDW employ in their study, that is, combining hedonic pricing models in an event-study model that also accounts for difference-in-difference estimators within their sample, I have chosen to replicate many aspects of their regression model and research methodology in this study. Thus, as DDW measure the effects of the stadium announcement on residential property values, I measure the effects of BRAC closure announcements on the value of residential property in a very similar way. I am also utilizing many of the same analytical tools that DDW have used, as they have proven to be an invaluable resource into the potential empirical results of my own study.

One area that DDW do not address in their study is the existence and effectiveness of a communication plan with respect to the stadium announcements in both the city of Arlington and Dallas County. As they showed an initial negative effect on home values with the stadium announcements, it would have been interesting to delve into the strategic communication plan employed by both county and city governments as they attempted to land the site approval for the stadium. The manner in which the stadium announcements were executed publicly may very well have had some sort of effect, negative or positive, on how residential real estate prices were perceived and thus incorporated into the local real estate markets.

Both the Department of Defense and the BRAC Commission, on the other hand, seem to have a detailed and well thought out communication plan with respect to their announcement of their respective BRAC closure plans. Unlike the announcements in the

DDW stadium study (except for the final announcement of the results of the public referendum, which was known well ahead of time, though the results of the vote were seemingly always in doubt until the final “announcement” at the end of Voting Day), the dates for the announcement and publishing of the BRAC lists are both mandated by law and published well ahead of time. Though there is certainly the distinct possibility of insider information and leaks within both the Department of Defense and the BRAC Commission ahead of the official announcements, the date of the announcement is no surprise to anyone.

3.2 Hedonic Pricing Literature

The hedonic pricing method is a simple, basic technique in which housing sales can be decomposed into measurable prices and quantities, so that the prices for different houses or for similar houses in different markets can be predicted and compared. In its simplest form, a hedonic equation is a regression of housing values on housing characteristics.⁶⁶ The independent variables represent the individual characteristics of the house, and the regression coefficients may be transferred into estimates of the implicit prices of these characteristics. Hedonic regressions are basically regressions of home values against characteristics of the unit that determine that value. The hedonic regression assumes that we know the basic determinants of a home’s value:⁶⁷

$$V = f(S, N, L, T) \quad (1)$$

where

⁶⁶ Stephen Malpezzi, “Hedonic Pricing Models: A Selective and Applied Review,” *Housing Economics*, 11(2), 2002, p.42.

⁶⁷ Ibid.

V = value of the house, as determined by a sales price

S = structural characteristics (# of rooms, # of floors, # of bathrooms, etc.)

N = neighborhood characteristics

L = location within the market (i.e., proximity to a base, schools, hospital, etc.)

T = the date of the observation

Most literature in this area refers to a hedonic model along these lines as a “single equation” model or the “first stage” of a “two-stage” model. Two-stage models attempt to go beyond the initial estimation of a hedonic price surface, and in the second stage recover structural supply and demand parameters for individual housing characteristics. Collapsing the vectors S , N , L into a larger vector X for the moment purely for notational convenience, and adopting a common logarithmic functional form, we can re-write the regression equation as:⁶⁸

$$\ln V = X\beta + \varepsilon \quad (2)$$

so that, finally, we have

$$\ln V = Xb + e \quad (3)$$

As one would imagine, there are hundreds of potential housing characteristics that could be included as independent variables on the right hand side of the regression equation. Butler (1982) and Ozanne and Malpezzi (1985) show that all coefficient estimates are not robust with respect to omitted variables. Interestingly enough, however, the same correlation between omitted and included variables that biases individual coefficient estimates can and often does help improved prediction from a “sparse” model. This, Ozanne and Malpezzi claim, suggests that “hedonic models that rely on overall predictions – like place-to-place price indexes, or cost-benefit analysis of housing

⁶⁸ Malpezzi, p.3.

subsidies – can proceed apace, even while papers that rely on interpretation of individual coefficients must be interpreted more cautiously.”

There are almost a limitless number of independent variables that can be included in the model. The high correlation of some of these variables with each other can create estimation problems even if all the variables are not included in the model. For example, a location variable may appear to be highly significant in the model but may actually be reflecting something else, such as school quality. Because of this, interpretation of the individual coefficients can be more difficult.

Various studies have also wrestled with the problem of correct functional form. Follain and Malpezzi (1980) found that the semi-log specification has some advantages over the linear form. Some of these are: (1) it allows for variation in the dollar value of each characteristic; (2) the coefficients can be easily interpreted as the percentage change in the price given a one-unit change in the characteristic; and (3) the semi-log model helps minimize the problem of heteroscedasticity.

Bailey, Muth, and Nourse (1963) is the first true study of housing prices using a regression of expenditures (rents or values) on housing characteristics. The independent variables represent the individual characteristics of the dwelling, and the regression coefficients may be transferred into estimates of the implicit prices of these characteristics. Lancaster (1966) developed a sophisticated branch of microeconomic theory in which utility is generated, not by goods per se, but by characteristics of the goods. The applicability to housing is direct and obvious. Many hedonic studies cite Lancaster’s work, and justifiably so, for providing microeconomic foundations for analyzing utility-generating characteristics. Rosen (1974) focuses on characteristics, but

has less to say about their utility-bearing nature and more about how suppliers and consumers interact within a framework of bids and offers for characteristics. Rosen's model naturally leads to a nonlinear hedonic price structure. Many two-stage characteristic demand models, in particular, cite Rosen as their theoretical foundation.

MacLennan (1977) examines the implicit assumptions made in hedonic studies of urban house prices. Previous uses of the technique are examined and it is suggested that the methodology is inappropriate for testing hypotheses derived from spatial residential models. Amemiya (1980) provides a sound model on the selection of regressors for hedonic pricing models by comparing several simple criteria on the basis of which we can select one regression equation among many candidates. He does not recommend any single criterion as a definitely superior criterion or as a panacea of the problem of selection. Rather, he tells us that all of the criteria considered are based on a somewhat arbitrary assumption which cannot be fully justified, and that by slightly varying the loss function and the decision strategy one can indefinitely go on inventing new criteria. Thus, the selection of regressors should be primarily based on one's knowledge of the underlying economic theory and one's intuition which cannot be easily quantified.

Malpezzi (2002) provides a great review of both the history of hedonic pricing literature as well as the development of a basic model. Using historical models as examples, he demonstrates how to outline a simple model, how to choose the regressors, and how to select the best goodness-of-fit test for the selected model. As he points out, the hedonic model is a way to estimate the value of individual characteristics of the house. Hedonic equations have also been used to measure the effect of various factors of special interest on house prices. Hedonic models are typically estimated as single-stage

equations. That is, the model simply estimates the effect of characteristics on price and does not examine the structural parameters of the individual characteristics. Hedonic models also are estimated various ways regarding the dependent variable, the house price. Price may be specified as an absolute amount (unlogged) or as a logged variable. The most typical model structure historically has been the semi-log form, with the price specified in natural logs and regressed against unlogged independent variables. This allows for variation in characteristic prices across different price ranges within the sample.

Sirmans, MacPherson, and Zietz (2005) using 125 hedonic pricing articles published since 1995 to chart the most frequently used characteristics included in hedonic pricing models. These include lot size, square feet, age, the number of stories, the number of bathrooms, the number of rooms, the number of bedrooms, fireplace, central air-conditioning, basement, garage, deck, pool, brick exterior, distance to CBD, time-on-the-market and a time trend. These variables generally have the expected signs, although in some instances they are not significant. Due to the large number of variables, categories were created and the top five characteristics from each category were identified. The categories and characteristics are: (1) structural features: lot size, square feet, age, number of bathrooms and number of bedrooms; (2) internal features: full baths, half baths, fireplace, air-conditioning, hardwood floors and basement; (3) external features: garage spaces, deck, pool, porch, carport and garage; (4) natural environmental features: lake view, lake front, ocean view and good view; (5) neighborhood and location: location, crime, distance, golf course and trees; (6) public services: school district, percentage of school district minority and public sewer; (7) marketing,

occupancy and selling factors: assessor's quality, assessed condition, vacant, owner-occupied, time-on-the-market and time trend; and (8) financing issues: FHA financing, VA financing, foreclosure, favorable financing and property taxes. Most of the characteristics have a positive effect on selling price. Those characteristics that have had a negative effect on price include age, crime, percentage of school district minorities and vacancy.

Sirmans and Macpherson (2003) also looked at the estimated coefficients for selected characteristics, and compared them across geographical regions in the United States. Some major conclusions include: (1) The effect of square footage on selling price does not have a great deal of variation across regions. The greatest effect was in the Southwest and the lowest average effect is in the Midwest; (2) The effect of lot size is somewhat consistent across regions; (3) Age of the property is consistently negative and the effect on price is also consistent across regions; (4) Each additional bathroom affects selling price in the 10% to 12% range, though the effect of bedrooms on price tends to be greater in the Northeast than it is in the Southwest; (5) The existence of a fireplace has a positive effect on selling price in the 6% to 12% range and is consistent across regions, except for the West; (6) Central air-conditioning is consistently important in all regions, with the greatest price effect in the Southwest; (7) The existence of a basement adds significant value to selling price in most studies in the 12% to 16% range; (8) A swimming pool is a consistently significant characteristic with the effect on price being the greatest in the Southwest and Southeast; (9) The value of a garage is consistent across regions in the 6% to 12% range; and (10) Perceived school quality consistently has a significant effect on selling price.

3.3 Event Study Literature

As this paper combines hedonic pricing theory with the classic case study methodology, it is also worthwhile to look at the primary event study literature existing in the field today. The first published examination of an event study in finance is Dolley (1933). His study looked at the financial impact of stock splits on the value of the share of stock. Foremost among existing event study literature, however, are four articles: Ball and Brown (1968); Fama, Fisher, Jensen and Roll (FFJR, 1969); MacKinlay (1997); and Binder (1998). Ball and Brown (1968) studied the information content on earnings in an event study model, while FFJR (1969) studied the effects of stock splits on the value of stock, after first removing the effects of simultaneous dividends increases. Binder, who provides the definitive (though now, slightly outdated) treatise on existing event study literature at the time, tells us that event studies have been used for two primary reasons by research financiers over time: (1) to test for market efficiency; and (2) to examine the effect of some particular event on the wealth of a firm's shareholders.⁶⁹ Event study methodology has thus become the accepted standard method for measuring the effect of some security price to a specific event in time or announcement on a given day. Though JJFR (1969) provides us with the first true discussion of an economic or financial event study in the market, MacKinlay (1997) actually provides us with the best practical discussion of how to execute an event study. In the introduction to his paper, MacKinlay gives us perhaps the best existing-- and most clear and concise-- definition of an event study:

⁶⁹ John J. Binder, "The Event Study Methodology Since 1969," *Review of Quantitative Finance and Accounting*, 11 (1998), p. 111.

Using financial market data, an event study measures the impact of a specific event on the value of a firm. The usefulness of such a study comes from the fact that, given rationality in the marketplace, the effects of an event will be reflected immediately in security prices. Thus a measure of the event's economic impact can be constructed using security prices over a relatively short period of time.⁷⁰

MacKinlay provides us with a very detailed methodology for executing an event study, from defining the event window to measuring abnormal returns to accounting for (and discarding) any outliers or abnormalities in the data itself.

Shimpalee and Breuer (2006) provide us with a very good recent article using event study methodology. They utilize the event study framework to study the behavior of seven institutional variables in an event window consisting of eighteen months before and eighteen months after a currency crisis. They use their results to demonstrate rather conclusively that there are many instances where institutions are weaker in periods before and after a currency crisis.

Kothari and Warner (2006) have published a masterful review of both the event study methodology as well as the existing literature over the past four decades. They trace the literature from 1974 to 2000, focusing on event study articles found in the five leading Finance journals: *Journal of Finance*, *Journal of Business*, *Journal of Financial Economics*, the *Journal of Financial and Quantitative Analysis*, and the *Review of Financial Studies*. They find 565 articles on event studies published in these five journals during this twenty-seven year period. Their study of these articles demonstrates that the basic statistical format for event studies has not changed during that period, and is, in fact, based on the same methodology first formulated by Fama, Fisher, Jensen in Roll in their 1969 paper on the effect of stock splits on stock prices.

⁷⁰A. Craig MacKinlay, "Event Studies in Economics and Finance," *Journal of Economic Literature*, 35 (1997), p. 13.

Kothari and Warner tell us that despite the continuity in the event study literature over time, two main changes in methodology have taken place since 1974. First, the use of daily rather than monthly security return data has become prevalent, which allows for more precise measurement of abnormal returns and more informative studies of announcement effects. Second, the methods used to estimate abnormal returns and to thus calibrate their statistical significance have become more detailed and sophisticated, owing to enhanced computer modeling. They believe that this second change is of particular importance for long-horizon event studies, which they describe as event studies in which the event window is greater than one year in length. They tell us that the changes in long-horizon event study methods reflect new findings in the late 1990s on the statistical properties of long-horizon security returns. This change also parallels developments in the asset pricing literature, particularly the Fama-French 3-factor model.

Finally, Campbell, Lo and MacKinlay, in their 1997 edition of *The Econometrics of Financial Markets*, devote an entire chapter to the methodology and framework of executing a proper event study in the market. They begin with a short history of the literature, then provide an excellent, concise outline for a proper event study. Their seven step outline is:

- (1) Event definition: define both the event of interest along with the event window;
- (2) Selection criteria: determine the selection criteria for the inclusion of a given firm in the study;
- (3) Normal and abnormal returns: the actual return minus the normal return over the event window;

- (4) Estimation procedure: estimate the parameters of the model using a subset of the data known as the estimation window.
- (5) Testing procedure: must define the null hypothesis and determine the techniques for aggregating the abnormal returns of the selected firms.
- (6) Empirical results: present basic empirical results along with relevant diagnostics.
- (7) Interpretation and conclusions: the empirical results should lead to insights about the mechanism by which the event affects security prices.⁷¹

Campbell, Lo and MacKinlay then provide an example of a relevant event study, provide excellent insights into measuring normal and abnormal returns, and give instances when the null hypothesis can and should be modified. Though, again, as discussed in relation to the Dehring, Depken and Ward paper, my paper does not include the stock specific and abnormal returns elements of an event study, it does follow the basic tenets outlined by Campbell, Lo and MacKinlay, among others, in the event study literature.

⁷¹ John Y. Campbell, Andrew W. Lo, and A. Craig MacKinlay, *The Econometrics of Financial Markets*, Princeton: Princeton University Press, 1997, pp. 149-152.

CHAPTER 4: DATA AND METHODOLOGY

This study examines the direct financial effects of both the BRAC announcement and the base closing process on the real estate markets in local communities across the United States. In particular, I focus on the base closure announcement involving two bases: Reese Air Force Base (AFB), outside of Lubbock, Texas, and Red River Army Depot, outside of Texarkana, Texas. Reese AFB was announced by the DoD for closure in the initial BRAC announcement in February 1995, was approved for closure by the BRAC Commission in May 1995, signed into law by the President in December 1995, and subsequently closed on 30 September 1997. Red River Army Depot, which was recommended by the DoD for closure in February 1995, then recommended by the BRAC Commission to remain operational in their final recommendation to the President, was again recommend for closure by the DoD in February 2005, again recommended by the 2005 BRAC Commission to stay open, and remains active today.

My decision to choose these two bases, out of the hundreds of bases that have been highlighted for closure through the BRAC process over the course of the past twenty years, stems from three fundamental criterion. These criteria are: (1) Both bases are found in areas of largely rural America, remote from any major metropolitan area and removed from any high-value real estate regions that may bias the data, and are, I believe, in communities very characteristic of main-stream America; (2) Both bases are categorized by the Department of Defense as being medium to large bases, that is, with a

combined military and civilian workforce of greater than 2,500 personnel; and, most fundamental to this study, (3) the residential real estate data for both bases had to be available for study and analysis. My initial inclination was to choose four bases from the 1995 BRAC list, as I could conceivably trace the effects of the BRAC process from initial announcement through ultimate closure of the base. However, it became very apparent early on in the research process that the data required for the study, daily real estate transactions or, at the very least, monthly average housing prices, was not readily available in a format conducive to executing a viable empirical study. Thus, I had to eliminate two other bases from my initial sample population, Fort Chaffee (Fort Smith, Arkansas), and Fort McClellan (Anniston, Alabama), as the real estate data was simply not available. Fortunately, because the of the two different paths that Reese Air Force Base and Red River Army Depot followed along their BRAC experience, their examination and analysis should shed considerable light on the true effect of BRAC announcements on real estate prices in local communities.

4.1 Reese Air Force Base

Reese Air Force Base (now Reese Technology Center) is situated on approximately 2,987 acres of land, fourteen miles west of Lubbock, Texas (see Figure 2). The base was established on 26 June 1941, and served as a major training center throughout the Second World War, producing as many as 7,000 bomber pilots throughout the war. Closed for a short period between December 1945 and November 1949, the base became a major initial aviation training center for the United States Air Force. In 1972, Reese became home to the 64th Flying Training Wing, in which student pilots received about 748 academic hours of instruction and 176 hours of flying during a



Figure 2: Reese Air Force Base and Lubbock County, Texas
(Source: Google Maps)

Table 9: Base Demographics

Installation	State	County	County Population	Base Acreage	Workforce	
					Military	Civilian
Reese Air Force Base	TX	Lubbock	186,206 ¹	2,987	2,900	1,238
Red River Army Depot	TX	Bowie	36,054 ²	18,000	2,000	1,300
	AR	Miller	30,006 ²			

¹ 1995 Census Bureau Estimate

² 2005 Census Bureau Estimate

year-long instruction program; the Wing prepared nearly 400 fully-trained new pilots every year.

During its peak years, Reese Air Force Base employed more than 1,200 civilian employees, along with its permanent military population of 2,500 and an annually rotating student (pilot training) population of 400 (see Table 9). The base also provided the local community of Lubbock, Texas with an estimated \$6.4 million annually in to the local economy.⁷² When Reese was closed, many feared that the economic impact would be felt for years to come. One major problem encountered by the Reese redevelopment authority was the pre-existence of a regional airport in Lubbock, which is only fourteen miles from the base. According to the Handbook of Texas Online, this airport was serving four major airlines (American, America West, Delta, and Southwest) by the late 1980s, with over 500,000 passengers annually passing through its terminals.⁷³ While most successful redevelopment efforts concentrate on utilizing the assets left by the departing service, the Lubbock airport hampered Reese's efforts to follow this model. A redevelopment plan that focused on the airfield would have created direct competition

⁷² Michael Castellon, "Flying High Again," Austin, Texas: Office of the Texas Comptroller of Public Accounts, August 2008, p.1.

⁷³ This information is available through the Handbook of Texas Online, an official resource of the states of Texas, and can be accessed at: <http://www.tshaonline.org/handbook/online/articles/LL/hd14.html>.

with the facility in Lubbock. Further hindering the efforts at Reese, neither the city of Lubbock nor the State of Texas provided financial assistance to the redevelopment authority.

As reported by the Lubbock County Chamber of Commerce, the job replacement rate at Reese had been slower than many former air bases. But by October 2005, more than 1,500 jobs had been restored, and per capita personal income in Lubbock County had risen from \$24,785 in 1995 to \$34,459 in 2005.⁷⁴

One problem that initially hampered the speed of economic development and recovery, however, was that initially the best maintained facilities on the base were transferred directly to Texas Tech (the largest employer in Lubbock County) and South Plains College. While the education and research activities provide a magnet to area redevelopment, the schools provide no financial assistance through either rent or taxes to the redevelopment authority, while the authority is responsible for maintaining the grounds and all the other facilities.⁷⁵

4.2 Red River Army Depot

Red River Army Depot is located on more than 18,000 acres of land 15 miles west of the border cities of Texarkana, Texas and Texarkana, Arkansas (see Figure 3). The Depot was established on 9 August 1941 as an ammunition storage depot, less than four months before the United States was provoked into action as a result of the Japanese attack at Pearl Harbor. The demands of the Second World War caused major expansion at the

⁷⁴ Lubbock, Texas Chamber of Commerce, available online at <http://www.lubbock.org>.

⁷⁵ "New Beginnings: How Base Closures Can Improve Local Economies and Transfer America's Military," Center for National Security Reform, Washington, D.C.: 2008.

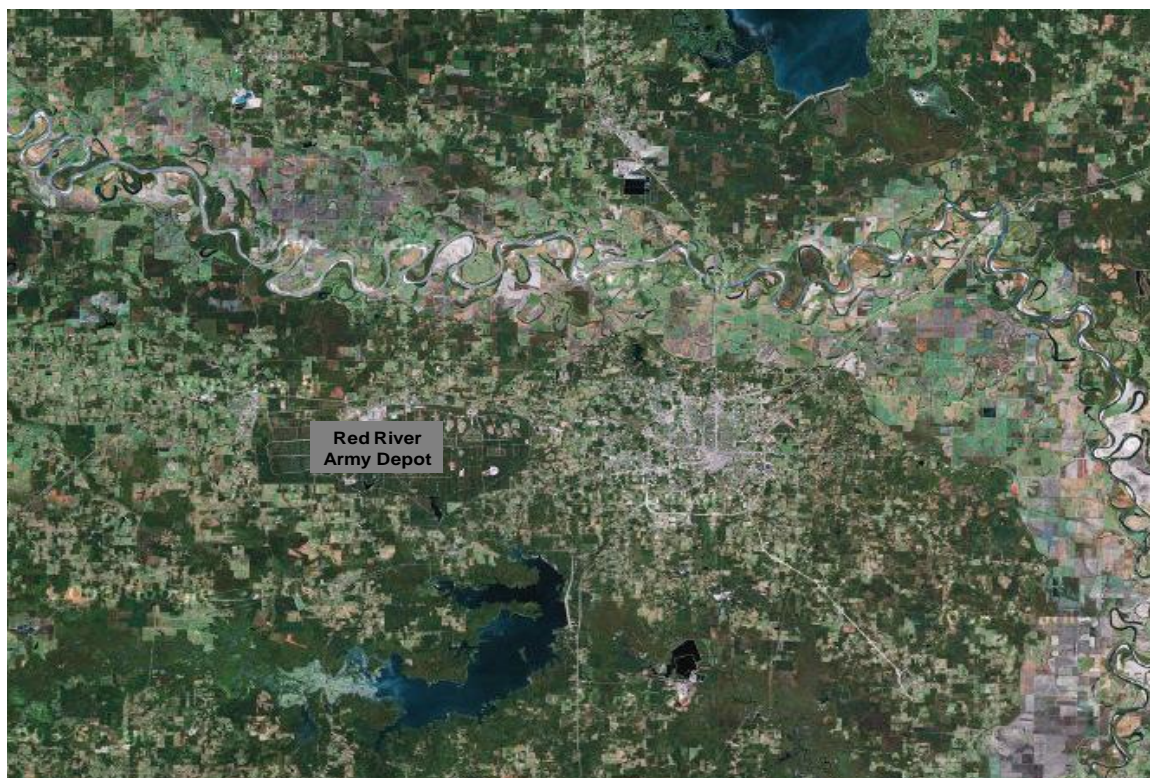


Figure 3: Red River Army Depot, Bowie County, TX and Miller County, AR (Source: Google Maps)

Depot, resulting in its use as a general supply storage and tank repair facility. Today, Red River Army Depot employs nearly 4,300 civilian and Army contracting employees (see Table 9) in support of its mission to produce and refurbish rubber products (truck tires, and road wheels and track pads for the treads on tanks and other mechanized vehicles) and repair large vehicles (to include in the Army's High Mobility Multi-purpose Wheeled Vehicle, or HMMWV; the Heavy Expanded Mobility Tactical Truck, or HEMTT, and the Small Emplacement Excavator, or SEE). Red River Army Depot's command team touts the Depot as "the largest employer in the four states area."⁷⁶

The twin cities of Texarkana, Texas and Texarkana Arkansas, though two separate political entities with separate city governments, school systems, public utilities programs, nonetheless operate as one commercial business entity. With a combined population of nearly 70,000, the Texarkana, U.S.A. Chamber of Commerce touts that

Texarkana's industrial base is broadly diversified. The Red River Army Depot provides the Army's only facility for rubber products associated with track vehicles. This defense complex is capable of rebuilding/recapitalizing over 30 HMMV's each day. The region's timber industry supports two paper mills. Cooper Tire and Rubber and Alcoa join the list of productive, skilled manufacturers. Approximately 80 percent of new jobs have come from expansions of existing industry; the remaining 20 percent have come from new plants. The diversity of products from manufacturing in the metropolitan Texarkana area verifies the availability of a trainable work force.⁷⁷

On 13 May 2005, the Department of Defense published its report on BRAC 2005.

Appendix K of the report, the Department of Defense Proposed 2005 Realignment and Closure List, recommended that Red River Army depot be closed and all of its

⁷⁶ This information is extracted from the Red River Army Depot command home page, an official entity of the United States Army and the Department of Defense.

⁷⁷ Texarkana Chamber of Commerce, available online at: <http://www.texarkana.org>.

operational and logistical functions be transferred to other bases across the United States. In the report, the DoD cited the loss of 4,175 jobs at Red River Army Depot.⁷⁸

In between the receipt of the DoD BRAC report and its requirement to present their own finding and recommendations to the President, the BRAC Commission paid three separate visits to Red River Army depot: 21 June 2005 (James T. Hill and Sue E. Turner); 10 July 2005 (Anthony J. Principi, BRAC Commission Chairman); and 27 July 2005 (James H. Bilbray).⁷⁹ This was a good sign for Red River Army Depot, for by the statutory guidelines of the BRAC process (see page 10 of this study), the Commission could only overturn a recommendation for closure by the Secretary of Defense if at least two Commissioners physically visited the base, and if seven of the nine Commissioners subsequently voted to overturn the DoD recommendation.

On 8 September 2005, the BRAC Commission issued its Final Report to the President. In the report, the Commission voted to overturn the DoD recommendation for closing Red River Army Depot, and recommending instead that some of its capabilities be realigned and moved to McAlester Army Ammunition Plant, Oklahoma; Blue Grass Army Depot, Kentucky; and Letterkenny Army Depot, Pennsylvania. Specifically, the Commission recommends:

By Motion 7-4A, the Commission struck the language “Close Red River Army Depot, TX. Relocate the depot maintenance of Armament and Structural Components, Combat Vehicles, Depot Fleet/Field Support, Engines and Transmissions, Fabrication and Manufacturing, Fire Control Systems and Components, and Other to Anniston Army Depot, AL. Relocate the depot maintenance of Powertrain Components, and Starters/Generators to Marine Corps Logistics Base Albany, GA. Relocate the depot maintenance of Construction Equipment to Anniston Army Depot, AL, and Marine Corps Logistics Base Albany, GA. Relocate the depot maintenance of Tactical Vehicles to Tobyhanna

⁷⁸ Department of Defense BRAC Report, Appendix K, 13 May 2005, p K-2.

⁷⁹ 2005 Defense Base Realignment and Closure Commission report, Appendix J: Commissioner and Staff Installation Site Visits, 8 September 2005, pp. J-7 – J-10.

Army Depot, PA and Letterkenny Depot, PA.” and replaced it with the language “Realign Red River Army Depot, TX.”, and struck the language “Relocate the storage and distribution functions and associated inventories of the Defense Distribution Depot to the Defense Distribution Depot, Oklahoma City, OK.”⁸⁰

4.3 Data

As transactional real estate data at the county level has only been maintained in a form consistent with a study such as this since the early 2000s, I am able to realistically capture only the effects of the BRAC closure announcements on residential property values in and around Red River Army Depot, that is, the counties of Bowie County, Texas and Miller County, Arkansas. I am also able to utilize the monthly mean real estate values in and around Reese Air Force Base (Lubbock County, Texas) to test some of the effects of the base closure announcements using less robust means.

Thus, the data I have utilized for this study is two-fold. First, I use the monthly mean real estate prices for a single-family home in each of the counties surrounding the two military bases designated for closure (Red River Army Depot and Reese Air Force Base), data I obtained through and with the permission of the Texas A&M University Real Estate Center. I also utilize actual transactional residential real estate data, obtained from the Tax Assessors office in Bowie County, Texas and Miller County, Arkansas, to examine the effects of the BRAC announcements on the value of residential real estate in the communities surrounding Red River Army Depot. Mean residential property values, as well as actual MLS transactions prices are examined at the following points in the BRAC cycle: 1 year prior to the official DoD base closure announcement; the date of the DoD announcement itself; the date of the BRAC Commission announcement; the date of

⁸⁰ 2005 Defense Base Realignment and Closure Commission report, Appendix Q: Commission’s Final Recommendations, 8 September 2005, pp. Q-4 – Q-5.

the President's announcement officially approving the BRAC Commission list; 1 year after the President's announcement; and, in the case of Reese Air Force Base, 1 year following the closure of the base itself. These dates are aligned with the BRAC time cycle mandated by the U.S. Congress in 1988 (and subsequent laws governing the BRAC process):

Table 10: BRAC Closure Announcements, 1988 – 2005

<u>DoD Announcement</u>	<u>Commission Recommendation</u>	<u>Final List Approved</u>	<u>Process Started</u>	<u>Process Completed</u>
28 Feb 1988	3 May 1988	29 Dec 1988	Jan 1990	Oct 1995
28 Feb 1991	13 May 1991	12 Dec 1991	July 1993	July 1997
28 Feb 1993	12 May 1993	13 Dec 1993	July 1995	July 1999
28 Feb 1995	13 May 1995	28 Dec 1995	July 1997	July 2001
13 May 2005	8 Sep 2005	18 Dec 2005	July 2007	July 2011 (T)

Thus, in addition to observing the effect of the base closure itself on the price of houses throughout the entire BRAC timeline, I am also able to observe whether the release of the list (analogous to an announcement in the securities market) has any effect on the price of real estate in the local community.

The test of the impact of base closure announcements on residential property values combines hedonic pricing models, event study methodology, and difference-in-difference estimators. Hedonic pricing reveals the implicit price of housing and location attributes, as well as any price effects from the base closure announcement. Because each announcement increases or decreases the probability that a base on the list will close over the course of the subsequent four year period, each is allowed to have an impact on

property values (McKinlay, 1997). I utilize a difference-in-difference identification strategy to distinguish the net amenity effect before and after each announcement, similar to the method employed by Dehring, Depken, and Ward (2007). As I have detailed previously, there is a large body of literature that exists on hedonic pricing models of residential real estate. These studies demonstrate that in most regions of the country a great deal of the variation in house prices can be explained by a house's age, its size and the size of the lot it sits on, and the quality of local hospitals and public schools. Following standard practice, I include these controls in order to study the effect of the BRAC announcement on local real estate prices, although I am not able to include any measure of the quality of local schools and hospitals in my study.

The announcements shown in Table 10 correspond with the dates on which the Secretary of Defense first delivered the list of base closures and realignment to the Congress. One obvious difference from standard event studies is that we cannot track daily changes in the value of a single house but must draw inferences from prices of different houses. Another is that we are not calculating the return relative to the general market as one would do when analyzing abnormal stock returns. Any price effect from a proposed base closure should be reflected in the prices of houses benefiting (or suffering) from the expected net effect at the time of the announcement.

I utilize a general difference-in-difference identification strategy to calculate the effects of BRAC announcement. For example, for the first announcement, I include a dummy variable, an announcement date dummy variable, and an interacted variable of the distance of the property to the main gate of Red River Army Depot interacted with the post-announcement period. I use the distance from each individual property to the main

gate as there is one major entrance/exit to Red River Army depot that the vast majority of employees use to enter and exit the base each day. Since the measured effect of the interaction represents the differential impact of the BRAC announcement on houses in the local community relative to either general announcement effects independent of location at different times, I identify it with the expected effect of increased taxation on home prices in the local community.

The estimating equation is thus represented as:

$$\ln(\text{PRICE}_i) = \beta \text{FEATURES}_i + \delta \text{ANNOUNCE}_i + \gamma \text{ANNOUNCE}_i \bullet \text{DISTTO}_i + \varepsilon_i \quad (4)$$

where β , δ , and γ are vectors of parameters to be estimated, and ε_i is a composite zero-mean error term that facilitates neighborhood fixed effects and spatial correlation.

As shown in Table 11, the dependent variable $\ln(\text{PRICE})$ is the natural logarithm of the sale price of the house. The vector **FEATURES** includes both structural and location attributes including structure age, age squared, square feet of living area, area squared, and dummy variables identifying the class of the house (either one story or two-story). The vector **ANNOUNCE** includes the appropriate dummy variables, for the sample analyzed, indicating whether the sale of the house was executed after each of the three announcements. In the case of Reese Air Force Base, I have also included a fourth dummy variable corresponding to the date in which the base actually closed down (30 September 1997). The variable **DISTTO** is a variable indicating the distance that the home is from a variety of key locations within the community (the main gate of Red River Army Depot, major hospitals, schools, transportation nodes, etc.) Each successive announcement signals an increased likelihood that a base on the BRAC list will shut

Table 11: Variable Descriptions

Variable	Description
LNPRICE	Natural log of the sale price
AGE	Age of the house (in year)
AGE2	Age of the house squared
SQFT	Size of the house (in square feet)
SQFT2	Size of the house squared
DISTO	Distance from the house to one of 26 key locations (see Table 11)
ANNOUNCE1	Date of the Initial BRAC Announcement by the Secretary of Defense
ANNOUNCE2	Date of the BRAC Announcement by the BRAC Commission
ANNOUNCE3	Date of the Final BRAC Announcement by the Secretary of Defense
CLOSE	Actual Date of the Base Closing (for Reese AFB monthly data only).
INTER1	$ANNOUNCE1 * DISTO$
INTER2	$ANNOUNCE2 * DISTO$
INTER3	$ANNOUNCE3 * DISTO$

down. Thus, if the base closure had a net negative (positive) expected impact on the community's attributes, I anticipate each announcement to correspond with a decrease (increase) on house prices in the locally affected community, relative to the surrounding areas.

I have also included two instrumental variables which serve to capture the overall effect of the changes in residential real estate at both the national level as well as the local level, in order to preclude any autocorrelation between the transactional real estate prices and real estate price in general. At the national level, I have used a composite index of seasonally-adjusted home price values from the Case-Shiller Home Price Indices, which captures the value at real estate across the entire nation. At the local level, I have used the average value of homes in the Texarkana, Texas area, as captured in data from the Texas A&M University Real Estate Center.

Using Stata, I also utilize a Generalized Least Squares (GLS) estimator that takes into account possible heteroscedasticity and spatial autocorrelation. Since I cannot reject

that the error term has a common component at the city level, my estimator allows the variances to differ across geographic areas. First, I determined the exact latitudinal and longitudinal coordinates for these key areas in the community: (1) the main gate of Red River Army Depot; (2) the one college and four major high schools; (3) the five major middle schools; (4) the fourteen major elementary schools; (5) the four major hospitals; (6) the Texarkana Regional Airport; (7) the Amtrak Station; (8) the Greyhound Bus Terminal; and the access roads to all major highways in the Texarkana regional area (see Table 12). The inclusion and use of these key areas is consistent with existing historical hedonic pricing literature, particularly the inclusion of the major schools and hospitals. As the nearest major airport, Dallas-Fort Worth International Airport, is approximately 175 miles from Texarkana, the existence and location of the regional airport, Amtrak station, and Greyhound bus terminal take on a much greater importance than one would assume for a larger city. Also, I have included the main gate of Red River Army Depot because it is truly the only way on an off the installation; anyone desiring to enter the base must use this gate.

Then, utilizing a convention consistent with the methodology of Read (2008), GIS software was used to identify the location of each property in the dataset based on its sale address.⁸¹ Each individual property was then geo-coded with its exact latitudinal and Longitudinal coordinates, and the distance from each of the properties to the key locations in Table 12 was determined.⁸²

⁸¹ See Read (2008), p. 105. I made the decision to utilize this methodology in my own study based on several conversations that I had with Dr. Read in early 2009.

⁸² Thomas Luddens, a GIS specialist in The Center for Applied Geographic Information Science (CAGIS) at UNC Charlotte, executed the actual geo-coding of this data for me.

Table 12: GIS Spatialization Data

Variable Name	Key Locations
DISTTO1	Main Gate, Red River Army Depot
DISTTO2	Texarkana Regional Airport
DISTTO3	Texarkana Greyhound Bus Terminal
DISTTO4	Texarkana Amtrak Station
DISTTO5	Living Hope Hospital
DISTTO6	Christus St. Michael Hospital
DISTTO7	Healthsouth Rehabilitation Hospital
DISTTO8	Wadley Regional Medical Center
DISTTO9	Arkansas High School
DISTTO10	Texarkana College
DISTTO11	Texas High School
DISTTO12	Liberty-Eylau High School
DISTTO13	Pleasant Grove High School
DISTTO14	I-30/ HWY 98 (Exit 198)
DISTTO15	I-30/ HWY 82 (Exit 199)
DISTTO16	I-30/ HWY 8 (Exit 201)
DISTTO17	I-30/ RRAD #1 (Exit 206)
DISTTO18	I-30/ RRAD #2 (Exit 208)
DISTTO19	I-30/ RRAD #3 (Exit 212)
DISTTO20	I-30/ HWY 151 Loop (Exit 220A)
DISTTO21	I-30/ HWY 93 (Exit 222)
DISTTO22	I-30/ HWY 71 (Exit 223)
DISTTO23	I-30/ HWY 245 Loop (Exit 2)
DISTTO24	I-30/ HWY 108 (Exit 7)
DISTTO25	HWY 82/ 245 Loop
DISTTO26	HWY 549/ 245 Loop

Approximately 90% of the homes in the original Miller County dataset were successfully located using this method, while only 75% of those homes in the original Bowie County dataset were located. I did not take into account the quality of either schools or hospitals in this study. Though I know from previous research that some hospitals and schools have a better reputation than others and it is thus more desirable for homeowners to buy a home nearer these locations, I have treated each major hospital and high school equally.

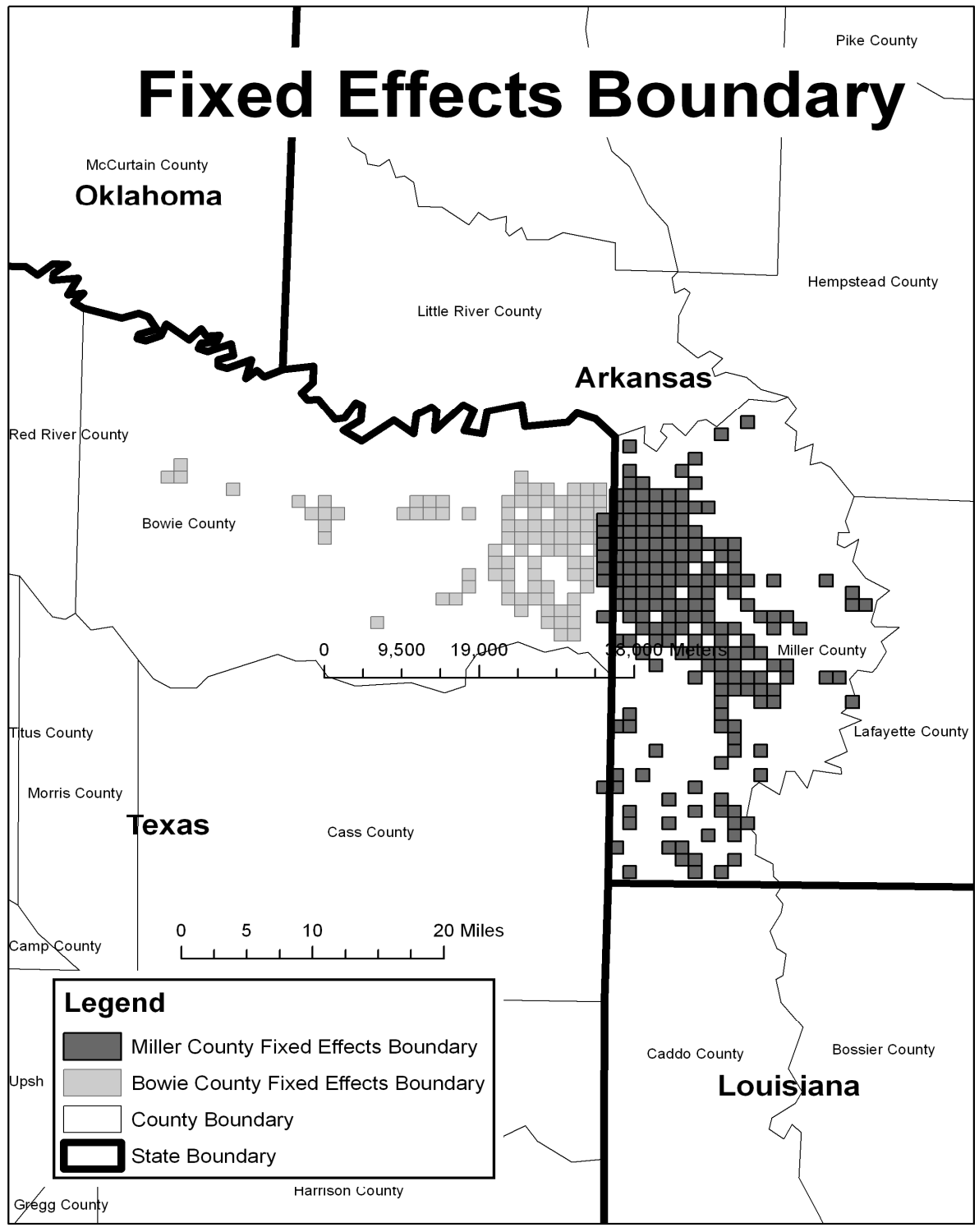


Figure 4: Fixed Effects Grid Zone Designators

Using Stata, I use a robust GLS estimator that allows for fixed-effects and clustering based on all of the aforementioned community and transportation nodes. Again, using GIS, I have overlaid both counties with a grid system whereby each property in the database falls into one of 299 grid squares (99 in Bowie County, Texas, and 199 in Miller County, Arkansas; see Figure 4). Thus, using this fixed-effect estimator I am harnessing the collective effects of over fifty separate variables in the community.

My data include two samples of residential property sales in the Texarkana metropolitan area, from one year prior to the BRAC announcement through one year from the date that the base was either shut down or removed from the list. The residential property sales data were collected from the Multiple Listing Service. I subtract thirty days from the closing date, reported by the MLS, to more closely align house contract dates with the announcement effects, as thirty days is the approximate time it takes most residential home sales to go to closing once an initial contract has been signed. To avoid the undue influence of outliers in the dataset, I have excluded observations that corresponded to houses older than fifty years old, more than 6,000 square feet or less than 500 square feet, and valued at more than \$1,000,000 or less than \$10,000.00. I also included only those properties that were within twenty miles of Red River Army Depot, in either Bowie County, Texas or Miller County, Arkansas. I use this number because according to the latest survey conducted by the Bureau of Transportation Statistics (BTS) in the United States, sixty-eight percent of Americans have an average one-way commute to work of approximately fifteen miles, while another twenty-two percent of Americans are willing to drive between sixteen and thirty miles to work each day.⁸³

⁸³ Department of Transportation, Bureau of Transportation Statistics, *OmniStats Report*, October 2003, Volume 3, Issue 4.

CHAPTER 5: EMPIRICAL RESULTS AND DISCUSSION

I utilized Stata regression software to execute an Ordinary Least Squares (OLS) regression in order to estimate the preliminary hedonic price equations, in accordance with the conventions of previous hedonic pricing literature. Specifically, I estimate the difference-in-difference model described in equation (4), including the community fixed effects found in Table 12. I account for any spatial correlation among the home prices by clustering the error terms in the fixed-effect boxes shown in Figure 4.

Descriptive statistics of the variables in the model are found in Table 13. The home characteristics utilized in my hedonic pricing model are generally consistent across the two counties, Bowie County, Texas and Miller County, Arkansas. For example, the average age of homes in the data sample is just over 16 years for Bowie County, and approximately 17.5 years for Miller County. The average size of the homes across the sample is 1822 square feet for Bowie County, and 1792 square feet for Miller County. The average acreage across both counties is also fairly similar, with an average lot size of 1.15 acres in Bowie County, and 1.09 acres in Miller County. The monthly breakdown in the data is also consistent with historical residential property sales statistics, and shows that there is a spike in sales during the summer months of June, July and August, while there is a sharp downturn in sales in the fall months of October and November.

Table 13: Descriptive Statistics⁸⁴

LN Sale Price	11.2998	0.7394	10.9805	1.1834
Age (Years)	16.2705	12.4579	17.6313	11.9735
Size (Square Feet)	1822.42	663.68	1791.89	777.30
Acres	1.1472	0.3985	1.0891	0.4864
February	0.0787	0.2819	0.0768	0.2819
March	0.0823	0.2776	0.0837	0.2717
April	0.0792	0.2882	0.0814	0.2879
May	0.0877	0.2765	0.0909	0.2664
June	0.0947	0.2911	0.0939	0.2898
July	0.0986	0.2844	0.0947	0.2777
August	0.0950	0.2901	0.0961	0.2888
September	0.0788	0.2561	0.0767	0.2652
October	0.0598	0.2525	0.0644	0.2508
November	0.0618	0.2447	0.0589	0.2486
December	0.0684	0.2559	0.0613	0.2613
Distance to Main Gate	12.0663	3.3043	18.9077	4.2199
Distance to Texarkana Airport	8.5667	6.6714	4.2920	4.5826
Distance to Greyhound Terminal	6.5670	6.5479	4.7000	5.2511
Distance to Amtrak Station	6.4379	6.4310	4.5604	4.3910
Distance to Wadley RMC	6.0185	6.4755	4.5585	4.5794
Distance to St. Michael Hospital	5.1622	6.2326	5.9384	5.0584
Distance to Living Hope Hospital	6.5654	6.6176	4.2220	5.1387
Distance to Texarkana College	4.8828	6.1302	5.9300	4.7656
Distance to Texas High School	5.2447	6.4022	-----	-----
Distance to Arkansas High School	-----	-----	3.9388	4.6937
Announcement 1	0.6452	0.4785	0.6217	0.4386
Announcement 2	0.5615	0.4963	0.5327	0.4763
Announcement 3	0.3597	0.4800	0.3421	0.4727
Interaction 1	12.0014	9.5778	12.6437	8.9917
Interaction 2	10.4008	9.7700	11.6349	9.1774
Interaction 3	6.5938	9.1697	8.7329	9.3428
Number of Observations	573		2013	

⁸⁴ Data reflects residential property sales transactions from 1 January 2004 through 31 December 2006 of all residential property located within thirty miles of Red River Army Depot, in both Bowie County, Texas and Miller County, Arkansas. January is the reference month (and is thus not reflected in the descriptive statistics). Data was obtained from the office of the Tax Assessor for both Bowie and Miller Counties.

The data also shows that the average distance from property in Miller County to the main gate of Red River Army Depot (DISTTO1) is over 50% greater (18.91 miles) than the same distance from property in Bowie County (12.07 miles). Conversely, property in Miller County tends to be much closer to the primary transportation centers, the Texarkana Regional Airport, Greyhound Terminal, and Amtrak Station, than property across the state line in Bowie County.

The combined table of complete regression results can be found in Appendix A. The primary hedonic regression results of concern are found in Table 14 and Table 15. Table 14 details the results for Bowie County and Miller County separately, while Table 15 displays the results of the combined data regression. In both cases, the results are consistent with the results and conventions of previous studies on hedonic pricing models. For example, the results in Tables 14 and 15 demonstrate that, as we would expect, for each additional year of age for a home in the sample, the value of the home decreases by approximately 3% (2.54% for the Bowie County sample and 3.12% for the Miller County sample). Conversely, and again as we would expect to find, every additional 58 square feet would lead to a 1% increase in the value of the home (58.96 feet for Bowie County and 57.77 feet for Miller County). The same is true with regard to additional acres of land, that is, every acre of additional land increase the value of the property by approximately 4.5%. These are all significant at the .001 level.

Of additional note in the hedonic regression results are those of the distance variables. As Tables 14 and 15 demonstrate, an additional one-mile in the distance of the property from the front gate of Red River Army Depot leads to an approximately 6% decrease in property value (7.07% for Bowie County; 6.18% for Miller County). This is

Table 14: Hedonic Pricing Regression Results by County

Variable	Bowie County Sample	Miller County Sample
Age	-0.0254*** (0.0115)	-0.0312*** (0.0093)
Age Squared	0.0011*** (0.0003)	0.0012*** (0.0004)
Square Feet (x .001)	0.1696*** (0.0384)	0.1731*** (0.0391)
Square Feet Squared (x .00001)	-0.0002*** (0.0002)	-0.0002*** (0.0003)
LN Acres	0.0432* (0.0417)	0.0469* (0.0428)
Distance to Main Gate	-0.0707*** (0.0081)	-0.0618*** (0.0074)
Distance to Airport	-0.0621*** (0.0038)	-0.0511*** (0.0049)
Distance to Bus Station	-0.0444 (0.0056)	-0.0508 (0.0044)
Distance to Train Station	-0.0239 (.0037)	-0.0242 (.0021)
Constant	11.6446	12.0218
F-stat	111.45	132.27
R ²	0.6384	0.6099
Observations	573	2013

*** Significant at the 0.01 level

** Significant at the 0.05 level

* Significant at the 0.1 level

Table 15: Combined Hedonic Pricing Regression Results

Variable	Combined Texarkana Sample
Age	-0.0296*** (0.0115)
Age Squared	0.0012*** (0.0003)
Square Feet (x .001)	0.1721*** (0.0395)
Square Feet Squared (x.00001)	-0.0002*** (0.0004)
LN Acres	0.0448* (0.0463)
Distance to Main Gate	-0.0637*** (0.0090)
Distance to Airport	-0.0539*** (0.0087)
Distance to Bus Station	-0.0483 (0.0053)
Distance to Train Station	-0.0241 (.0025)
Constant	11.8754
F-stat	123.76
R ²	0.6147
Observations	2586

*** Significant at the 0.01 level

** Significant at the 0.05 level

* Significant at the 0.1 level

also true of the distance from the property to the Texarkana Regional Airport (5.39%), the Greyhound Bus Terminal (4.83%), and the Amtrak Station (2.41%); the distance to the main gate and the airport are also both significant at the 1% level.

Though, as previously detailed, I did not have access to transactional real estate data for the period in which Reese AFB and Lubbock County, Texas underwent the BRAC closing process, I nonetheless utilized the availability of monthly average selling price data (through the Texas A&M University Real Estate Center) to study the effects of the BRAC process in this region. These results are shown in Table 16, and clearly illustrate that there is a definite negative effect from both the BRAC closure announcements for Reese AFB as well as the actual closure of the base itself.

Though based on monthly data and thus built around only 60 observations, the results nevertheless demonstrate that the month after the Department of Defense announced that Reese would close down (February 1995; ANNOUNCE1), the value of property in Lubbock County declined by just over 3%. This was also true just after the BRAC Commission issued its final report in May 1995 (ANNOUNCE2), though unlike ANNOUNCE1, this result is not significant at even the 10% level. However, when the President approved the final BRAC Commission recommendations in December 1995 (ANNOUNCE3), the value of real estate fell almost 6% in Lubbock County (and this result is significant at the 5% level. Finally, and most importantly as it agrees with the earlier studies on the immediate economic impact of the BRAC process on Lubbock County, the month after Reese closed its gates for good on 30 September 1997, the value of real estate in Lubbock County fell over 7.5% (and this is significant at the 1% level).

Table 16: Regression Results for Reese Air Force Base BRAC Closure Announcements

Variable	Lubbock County Monthly Data
ANNOUNCE 1	-0.0303** (0.0450)
ANNOUNCE 2	-0.0288 (0.0474)
ANNOUNCE 3	-0.0572** (0.0394)
CLOSE	-0.0760*** (0.0245)
F-stat	71.56
Prob > F	0.0000
R ²	0.2881
Observations	60

*** Significant at the 0.01 level

** Significant at the 0.05 level

* Significant at the 0.1 level

Table 17: Regression Results for Red River army Depot BRAC Closure Announcements

Variable	Texarkana, Texas Monthly Data
ANNOUNCE 1	-0.1007** (0.0648)
ANNOUNCE 2	0.0317 (0.0700)
ANNOUNCE 3	0.0190 (0.0418)
F-stat	61.62
Prob > F	0.0000
R ²	0.5008
Observations	36

*** Significant at the 0.01 level

** Significant at the 0.05 level

* Significant at the 0.1 level

In the same manner, I utilize monthly average real estate prices in Bowie County, Texas during the 2005 BRAC process timeline in order to draw some preliminary results on the effect of the BRAC base closure announcements on the value of residential real estate in the local community. Table 17 details these results.

Though the explanatory power of a model utilizing only three variables and thirty-six observations may be less than ideal, at the same time these results provide a good basis with which to understand the expected results of a dataset with a substantially larger sample population. We see that after the month of the first BRAC announcement (ANNOUNCE1), the value of real estate in Texarkana fell by 10%. This result is significant at the 5% level and, indeed, makes perfect intuitive sense, as Red River Army Depot was recommended for closure by the Department of Defense in its initial report. Though not significant at even the 10% level, the results of the second (ANNOUNCE2) and third (ANNOUNCE3) on the value of residential real estate in the Texarkana, Texas area still agree with what we would expect if both those announcements signaled a positive result for Red River Army Depot and the surrounding community.

Thus, I did have access to good transactional residential real estate data for the Texarkana, Texas/Arkansas region in order to look at the effects of the 2005 BRAC process at Red River Army Depot on local real estate prices. The dependent variable is the natural log of the sale price of the home. As demonstrated in the hedonic pricing results, all three specifications include the following independent variables: age of the home, age squared, size of the home (in square feet), size squared, the natural log of the lot size (in acres), month-specific dummy variables, 26 individual geo-coded distance variables (see Table 12), three BRAC announcement dummy variables, three interactive difference-in-difference variables, and community wide fixed-effects clustered in the series of 299 different grids depicted in Figure 4.

These results are shown in Tables 18 and 19. They tell us an interesting story as it relates to the value of residential real estate values in and around Red River Army Depot

Table 18: Results of BRAC Closure Announcements on Real Estate Prices in Bowie County, Texas and Miller County, Arkansas

Variable	Bowie County Sample	Miller County Sample
ANNOUNCE1	-0.0446*** (0.0316)	-0.0512*** (0.0274)
ANNOUNCE2	0.0348 (0.0489)	0.0414 (0.0617)
ANNOUNCE3	0.0549 (0.0340)	0.0522 (0.0388)
INTER1	0.0242** (0.0307)	0.0316** (0.0399)
INTER2	-0.0125 (0.0302)	-0.0211 (0.0104)
INTER3	-0.0507*** (0.0197)	-0.0618*** (0.0318)
Constant	11.6446***	12.0218***
F-stat	111.45	132.27
R ²	0.6384	0.6099
Observations	573	2013

*** Significant at the 0.01 level

** Significant at the 0.05 level

* Significant at the 0.1 level

Table 19: Combined Results of BRAC Closure Announcements on Real Estate Prices in Texarkana, Texas/Arkansas

Variable	Combined Texarkana Sample
ANNOUNCE1	-0.0494*** (0.0207)
ANNOUNCE2	0.0392 (0.0576)
ANNOUNCE3	0.0528 (0.0444)
INTER1	0.0277** (0.0385)
INTER2	-0.0192 (0.0374)
INTER3	-0.0547*** (0.0276)
Constant	11.8754***
F-stat	123.76
R ²	0.6147
Observations	2586

*** Significant at the 0.01 level

** Significant at the 0.05 level

* Significant at the 0.1 level

as a result of the depot's navigation of the 2005 BRAC process. First, in the period following the first announcement by the Department of Defense (ANNOUNCE1), the value of residential real estate fell by nearly 5% in the Texarkana, Texas/Arkansas region. This seems to be counter-intuitive, except that we again recall that in the Department of Defense's initial BRAC recommendation in 2005, Red River Army Depot was scheduled to close down. This result is also significant at the 1% level. After the BRAC Commission released its own recommendations on 15 September 2005 (ANNOUNCE2), the value of real estate in the region rose by nearly 4%, though this result is not significant even at the 10% level. This result makes sense, as well, as in its final report, the BRAC Commission recommended that Red River Army Depot remain open and operational. Finally, after the President approved the BRAC Commission's recommendations, a solid confirmation that Red River Army Depot would remain open, the value of real estate in the Texarkana region rose again by approximately 5%, and this result is significant at the 1% level.

The results of the difference-in-difference variables also tell a compelling story with respect to the Red River Army Depot and the BRAC process. As Table 19 details, the variable INTER1, denoting the interaction between the first announcement by the Department of Defense (ANNOUNCE1) and the distance from the property to the main gate at Red River Army Depot (DISTTO1), leads to a 2.77% increase in the value of real estate in the Texarkana region. This again makes intuitive sense, as the first announcement signaled the closing of Red River Army Depot, which leads to a negative effect on real estate in the region, as does the increasing of distance between any one property and Red River Army Depot, thus resulting in an overall positive increase on real

estate in the region (this result is significant at the 5% level). Conversely, the variable INTER3, denoting the interaction between the final announcement by the President (ANNOUNCE3) and the distance from the property to the main gate at Red River Army Depot (DISTTO1), leads to a 5.47% decrease in the value of real estate in the Texarkana region. This also makes intuitive sense, as the final announcement signaled the continued operation of Red River Army Depot, which leads to a positive effect on real estate in the region, while the increasing of distance between any one property and Red River Army Depot results in a negative effect on real estate, thus resulting in an overall negative effect on real estate in the region. This result is significant at the 5% level.

Finally, in order to determine whether the sum of the three announcements had a net overall positive or negative effect on the value of real estate in the Texarkana region during this period, I tested all three announcements using the linear combination command in Stata. Using conventional significance levels, the results indicate that the overall effect of the three announcements, though slightly positive, is a zero net impact over the course of this period, and that this result is significant at the 10% level. This is very important, as if this result had been less than zero, then we could only assume that the negative effect of the initial announcement, that is, that Red River Army Depot was going to close down, had a permanent negative effect on property values, one that even subsequent favorable announcements could not correct. Thus, from a DoD policy perspective, the damage done by this initial “false” announcement has a negative short term effect, but no long term impact on the value of residential property in the community surrounding the base initially marked for closure.

CHAPTER 6: CONCLUSIONS

I have shown that the Department of Defense occupies expansive property in the way of military installations in the United States and its territories, and that these installations are as much the fabric of the American landscape as any large corporate operation in the nation. I have also shown that the Base Realignment and Closure (BRAC) Process is a long and tedious bureaucratic process, shaped in its infancy as a method to deal with the realities of the Cold War in the 1960s, then used to reconsolidate U.S. national interests both at home and abroad as a result of the end of the Cold War, and now continued in the spirit of the ongoing transformation of the U.S. military as the nation continues to prosecute the Global War on Terror around the globe.

I have also demonstrated that the results of this bureaucratic process nonetheless have a very real economic impact on the communities in which the residents of these bases call home. Some bases, like Reese Air Force Base, weather the storm and rebuild themselves into thriving business entities, contributing more to the local economy after their closure than they did before. Others do not, and there is a significant body of literature from the early rounds of the BRAC process that points to the dire economic consequences for a community beset with the closure of a major military installation, especially one away from any large metropolitan area and bereft of any other large industry.

In light of this knowledge, I postulated the research question, namely, what are the effects, if any, of the BRAC closure process on the value of residential real estate in the communities in which these bases are located. The research question was accompanied by the hypothesis that if these bases are truly valuable as economic contributors to the local community, as various studies have shown they are in the amount of real dollars they bring to the economy through property tax, sales tax, and other revenues, then their closure surely ought to have a significant effect on the local economy, and this effect should manifest itself in the decrease of home values when a base shuts down.

Then using a dataset consisting of both average monthly real estate values and transactional home sales prices from a sample set of two military bases, Reese Air Force Base and Red River Army Depot, both of which met a set of straightforward and common sense criteria established to ensure that they were characteristic of other military installations across the country, I tested the theory utilizing a difference-in-difference regression model encompassing both hedonic pricing and event study methodology.

The empirical results, as discussed in Chapter 4, present solid evidence supporting the original research question and hypothesis. In the case of Reese Air Force Base, which closed its gates for good on 30 September 1997, the empirical results of the model clearly indicate that there was a significant effect from the series of announcements that occurred prior to the closure of the base, and a most significant effect from the actual shutting down of the base altogether. These results are consistent, in both sign and magnitude, with the research hypothesis, as well as with the empirical results of other studies.

In the case of Red River Army Depot, the results are also consistent with both the research hypothesis and the conventions of both hedonic pricing models and event study literature. As the Department of Defense signaled the closing of Red River Army depot through its initial announcement on 13 May 2005, the model revealed a decrease in home values, as could be expected. Conversely, as the BRAC Commission signaled the intention to keep Red River Army Depot open and operational with the release of its Final Report on 8 September 2005, the model revealed a slight increase in home values, again, as one would expect in a community in receipt of “good news” in the real estate market. Thus from a solid research question and hypothesis, a solid empirical model was developed, and solid, clearly explainable results were manifested through the process.

The single biggest issue with this process is, of course, the strength of the data. Literally hundreds of military bases have closed down as a result of the BRAC process since 1988, and I am attempting to provide credible support of an affirmative answer to the research question by studying only two of those bases, and by utilizing a robust dataset with only one of them. This is indeed the case, and I make no attempt to explain this away. The original research methodology called for the exploration of the research hypothesis through the study of two other bases, Fort Chaffe and Fort McClellan, but at a specific point in the research process it became clear that the data to test these two among the sample simply did not exist (at least in a format in which to test it reasonably). Clearly more and better data would have made the results more credible and significant; an extension of this study to include that data, along with the transactional real estate data from other bases that have closed down as a result of the BRAC process is certainly of valid academic viability.

CHAPTER 7: POLICY IMPLICATIONS AND FUTURE RESEARCH

7.1 Policy Implications

The policy implications at the national level inherent resulting from this study abound. My empirical work and analysis have clearly demonstrated that there is a direct economic effect on a community, manifested in the decreased value of residential real estate values, simply when the Department of Defense makes an announcement to close down a military installation in the vicinity. I have also shown that if this base is then closed down, as in the case of Reese Air Force Base in 1995, property values continue to decline throughout the closure process. Furthermore, I have also shown that if a base initially marked for closure by the Department of Defense is taken off the list by the BRAC Commission and ultimately remains open and operational, as in the case of Red River Army Depot, then property values will actually show a significant increase when the announcement is made by the BRAC Commission.

If we do take these results to be worthwhile and significant, as I think we should, then there are a whole set of policy implications inherent in the results of this study. First and foremost, it is clear that if the value of residential homes are negatively impacted by both the BRAC process as well as the announcements of DoD intentions to shut a base down, then the sooner a community can react to this news, and the better off it will be, in both the short and long term. The 2005 BRAC Commission set forth a legislative agenda by which it would both be given more time to confront the initial base closure

recommendations from the Secretary of State before its own recommendations were due to the President, as well as be given an extended period of service as a Commission in order to effectively manage the repercussions caused by the process they finalized.

Expanding the scope and authority of the BRAC Commission in these two simple ways might also assist the communities dealing with the future closing of an installation inside its borders, as well, giving them more warning and additional resources to combat the probable economic downturn that would inevitable come as the community prepares for the base's eventual shut down.

This, in turn, might very well serve to turn an economic downturn into an economic opportunity, resulting in a perceived positive effect from the effect of a looming BRAC base closure announcement. Thus, the research hypothesis, that the announcement of a base closure affects the value of residential real estate in the local community in a negative way, would actually be reversed. If policy makers, both in the Department of Defense and the United States Congress, as well as those who sit as members of future BRAC Commissions, recognize this trend, they might very well be able to provide economic assistance ahead of any impending base closures, thus preventing the economic downturn in communities that we have witnessed in the past.

These results also lead to three clear implications for the Department of Defense with respect to the BRAC process as a whole. First, the Department of Defense must recognize that residents of the communities in the bases marked for closure are directly affected by the BRAC process in the way of declining property values, and that these property values actually begin to decline when the announcement of an impending closure is made, not simply when the base closes down. This is critical information in

light of the fact that all previous studies on the economic impact of BRAC focused on lost jobs (on the installation) and lost revenue in the community by way of lost sales revenue, sales taxes, and property taxes. Second, the Department of Defense must not deviate from the timeline for the BRAC process, as clearly specified in Public Laws 100-526 and 101-510, as it did in 2005. The BRAC Commission received the list of recommended closures from the Secretary of Defense on 13 May, 2005, nearly seventy-five days after it was required (by law) to be released. This then gave the BRAC commission less than one-hundred twenty days to complete their work (which, in many cases, entailed multiple visits by multiple commissioners to many of the bases that were marked for closure) and publish their own recommendations for the President. The Department of Defense is doing a huge disservice to its own people, as well as the populations of those communities surrounding military installations, by not rigidly adhering to the timeline requirements mandated by law.

Finally, the results of this study make it clear that the BRAC process as it stands today, despite some of its identified shortcomings, is a necessary process required to ensure as neutral and bipartisan assessment of the Department of Defense's plan for closing bases as possible. This process must remain neutral and bipartisan in order to safeguard these installations, vast and valuable resources of land and capital that serve in the best interest of our national security when utilized efficiently and to their full potential, and not wantonly wasted. Any abrogation of this process would serve to do exactly the opposite.

7.2 Areas for Future Research

This study lends itself to many extensions. Primarily among them is the answer to the one, overriding socio-economic question surrounding the effect of the BRAC process: does the formal BRAC process as established by law in 1988 facilitate or hinder the process of shutting down U.S. military bases across the country? A study of the effectiveness and viability of the DoD base closure process prior to 1988, compared to the results of the BRAC process after 1988, should be able to definitively answer this question.

A clear extension of this paper must also include elements of the original study I wished to undertake, that is, a study of four separate and distinct bases, on four different BRAC closure lists, in different geographic regions of the country, and which followed four different processes and timelines with respect to their own individual circumstances. Including Fort Chafee, Arkansas (BRAC 1991), Fort McClellan, Alabama (BRAC 1995), Reese Air Force Base (BRAC 1995), and Red River Army Depot (BRAC 2005) in a future study, given the availability of good data, is certainly a worthwhile and useful future study.

Another study that stems directly from the results found in this paper is one that extends the results of the original paper to examine the effect of the BRAC announcement for base that are designated for realignment, the so-called joint bases outlined by the Secretary of Defense in the 2005 BRAC guidance. Using nearly identical methodology and data sets, one can test the same hypotheses that I test here, except look exclusively at bases that are expected to grow as a result of the realignment process. Since income from the military along with other economic opportunities for the

communities would increase as a result of a realignment, one would assume that there would be a positive correlation between these announcements and the value of real estate in the community effected by the announcement. By law, these twelve installations are required to complete all of their realignment and consolidation actions by 15 September 2011, so this study can actually be started now and completed within the next three years.

In line with this, and in light of the ongoing housing dilemma in this nation, a study of the value of property in the counties containing military bases around the nation, compared to similar counties across states in the same regions, would also seem to be a very viable study. The 2008 AP study looked at the value of real estate in and around four major bases in the United States; this study could be extended using econometric tools and analysis to investigate the linkage between the value of real estate and the proximity to a military base of some kind in the United States. This data can be compared with local real estate data from around the county. The mere results of the AP story itself are intriguing enough to want to undertake this study.

This topic also lends itself to further investigation concerning the real option value of the land on bases designated for closure throughout the BRAC process. For example, if a firm begins the negotiation process for the purchase of this land from the DoD, at what point is the option to purchase, and then develop, the land most valuable? Also, in light of some of the findings from both the Rand study (1996) and Hooker and Knetter (2001), it would certainly be worthwhile to look at the effects of the BRAC closure process in order to determine whether military bases are actually wealth-destroying for the local communities surrounding them. In other words, if base closings

potentially yield a net economic benefit to the local community, as some of the results of these two studies appear to indicate, then this implies that military bases have a negative net economic effect on the community. This is very counter-intuitive result, and thus one that bear further research.

A study of the effect of environmental waste and hazards on the value of real estate in communities adjacent to bases which underwent an exceptionally long period of transition to closure once they were identified would also be a very viable study. As I have stated previously, environmental waste and contamination is one of the characteristics that makes a base much less attractive to outside business investment once it has been identified for closure through the BRAC process. Once it has been approved for closure by the BRAC Commission, an installation undergoes a detailed period of intense environmental scrutiny by both the Environmental Protection Agency (EPA) and the office of the Deputy Under Secretary of Defense (Installations & Environment). If the base is identified as having serious environmental issues, it will not be allowed to close down until it solves these problems. An event study could be undertaken into the value of real estate in communities adjacent to these sorts of installations, similar to this study, except that the event window could be extended closely to include this extra period of required environmental clean-up.

Finally, the effect of the BRAC process on the value of real estate as it relates to overseas base closures is another intriguing study unto itself. Though it is not an official component of the BRAC process (due to the obvious fact that DoD land overseas does not warrant Congressional oversight in the manner that bases in the United States, inside Congressional districts, does), there must almost certainly be an economic effect on the

local community overseas when a U.S. base is announced for closure, and eventually, when it shuts down for good. The vast majority of U.S. military bases overseas are under the control of the United States as a result of U.S. involvement in the Second World War, and, indirectly, as a result of the U.S. involvement in the Cold War with the Soviet Union. As to the winner goes the spoils, so, too, did the U.S. government seize the best and most centrally located real estate within the major cities of Germany, Italy, the Republic of Korea, and Japan. This real estate is extremely valuable to the host nation in which it is located, and, in most cases the host nation has paid a great price to extricate the property out from under the control of the U.S. government. A study investigating the history of that property once it has been given up by the U.S. would go a long way to determining the value of the land for future U.S. land sales overseas.

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APPENDIX A: COMBINED REGRESSION RESULTS

Variable	Bowie County Sample	Miller County Sample	Combined Texarkana Sample
Age	-0.0254*** (0.0115)	-0.0312*** (0.0093)	-0.0296*** (0.0115)
Age Squared	0.0011*** (0.0003)	0.0012*** (0.0004)	0.0012*** (0.0003)
Square Feet (x .001)	0.1696*** (0.0384)	0.1731*** (0.0391)	0.1721*** (0.0395)
Square Feet Squared (x .00001)	-0.0002*** (0.0002)	-0.0002*** (0.0003)	-0.0002*** (0.0004)
LN Acres	0.0432* (0.0417)	0.0469* (0.0428)	0.0448* (0.0463)
Distance to Main Gate	-0.0707*** (0.0081)	-0.0618*** (0.0074)	-0.0637*** (0.0090)
Distance to Airport	-0.0621*** (0.0038)	-0.0511*** (0.0049)	-0.0539*** (0.0087)
Distance to Bus Station	-0.0444 (0.0056)	-0.0508 (0.0044)	-0.0483 (0.0053)
Distance to Train Station	-0.0239 (.0037)	-0.0242 (.0021)	-0.0241 (.0025)
ANNOUNCE1	-0.0446*** (0.0316)	-0.0512*** (0.0274)	-0.0494*** (0.0207)
ANNOUNCE2	0.0348 (0.0489)	0.0414 (0.0617)	0.0392 (0.0576)
ANNOUNCE3	0.0549 (0.0340)	0.0522 (0.0388)	0.0528 (0.0444)
INTER1	0.0242** (0.0307)	0.0316** (0.0399)	0.0277** (0.0385)
INTER2	-0.0125 (0.0302)	-0.0211 (0.0104)	-0.0192 (0.0374)
INTER3	-0.0507*** (0.0197)	-0.0618*** (0.0318)	-0.0547*** (0.0276)
Constant	11.6446	12.0218	11.8754
F-stat	111.45	132.27	123.76
R ²	0.6384	0.6099	0.6147
Observations	573	2013	2586

*** Significant at the 0.01 level

** Significant at the 0.05 level

* Significant at the 0.1 level

APPENDIX B: DEPARTMENT OF DEFENSE 2005 BRAC COVER LETTER

**THE SECRETARY OF DEFENSE
1000 DEFENSE PENTAGON
WASHINGTON, DC 20301-1000**

May 13, 2005

Honorable Anthony J. Principi
Chairman
Defense Base Closure and Realignment Commission
2521 S. Clark Street, Suite 600
Arlington, Virginia 22202

Dear Mr. Chairman:

The decade since the last BRAC has been a period of dramatic change. The U.S. national security strategy addresses the new challenges posed by international terrorism, the proliferation of weapons of mass destruction, ungoverned areas, rogue states, and non-state actors. BRAC 2005 provides the Department a unique opportunity to adjust U.S. base structure to meet these developments, and to be positioned to meet the challenges envisioned during the next two decades.

As required by Public Law 101-510, as amended, I am providing to the Commission the Department of Defense Base Closure and Realignment Report containing the Department's recommendations to realign or close military installations within the United States and its territories. These recommendations strengthen national security by reshaping the domestic installations at which U.S. military forces perform their assigned missions. Volume I describes the Department's overall BRAC selection process; provides an unclassified version of the force structure plan; and details the Department's closure and realignment recommendations and their justifications. Eleven other volumes (II-XII) will be provided under separate cover. Volume II is the classified force structure plan, which is available on a restricted basis. Should you have any questions about the proper handling of classified material, the Department stands ready to assist. Volumes III-XII further describe the analytical processes and recommendations of each of the Department's 10 proponent organizations -- the three Military Departments and seven Joint Cross-Service Groups (JCSGs).

The Department's recommendations will align U.S. base structure with the force structure that is expected to be needed over the next 20 years. These proposals will implement the Department's global force reposturing; facilitate the ongoing transformation of U.S. forces to meet the challenges of the 21st Century; and restructure important support functions to capitalize on advances in technology and business practices. The Department's BRAC recommendations address almost every Defense mission area and affect most of the Department's major U.S. installations. Overall, these recommendations support force transformation; address new threats, strategies, and force

protection concerns; consolidate business-oriented support functions; promote joint- and multi-service basing; and provide significant savings.

As required by law, the BRAC process entailed comprehensive and comparable analyses of all installations in the United States and its territories, using military value as the primary consideration. In reviewing its base structure, the Department considered the capabilities needed to support potential mobilization and surge requirements, as well as the unique installation needs of Reserve Component forces. The Department placed emphasis on retaining the infrastructure and capabilities necessary to respond to contingencies. The Military Departments and Joint Cross-Service Groups incorporated surge assessments throughout their analyses.

The Department organized its analysis into two categories: seven Joint Cross-Service Groups scrutinized the bases and functions that constitute the Department's common support infrastructure, while the Military Departments analyzed installations devoted exclusively to those Department's requirements, as well as supporting operational forces. The joint groups were composed of senior representatives of the Military Departments, the Joint Staff, and OSD, and were empowered to issue candidate recommendations that were considered jointly by the executive groups with responsibility for overseeing the entire process. In performing these analyses, all proponents were challenged to look beyond Service boundaries, and particularly to consider joint basing options, including the joint use of critical assets and the creation of centers of excellence. This work was difficult, and the accomplishments of each of the 10 proponents were significant.

The individual groups conducting the BRAC 2005 analyses reviewed each installation from its functional perspective. Their candidate recommendations were then integrated, or "knitted" together, based on functional or strategic relationships. The resulting recommendations consequently should be viewed as interdependent. This interdependence will need to be considered as the Commission conducts its review.

The Joint Staff actively participated in the development of the BRAC recommendations. The Chairman of the Joint Chiefs consulted with the combatant commanders to ensure that the recommendations would not degrade operational capabilities. The Military Departments retained critical real estate and facilities that would be difficult to reconstitute through reinvestment or reliance on the private sector. They ensured that the U.S. base structure could support the forces that remain deployed overseas. The Secretaries of the Military Departments, the members of the Joint Chiefs of Staff, and the Chairman and Vice Chairman of the Joint Chiefs of Staff all support the Department's recommendations.

The Department is confident that these recommendations will improve the posture of U.S. forces for years to come. Increasing combat effectiveness and transforming U.S.

forces are critical if our country is to be able to meet tomorrow's national defense challenges. Because the dynamism of the current environment will continue to require the Department to optimize its resources, we recommend that a BRAC review be conducted every five to ten years.

A number of the recommended actions will present challenges to local communities as they face a drawdown of military missions or, in some instances, significant increases in military presence. The Department stands ready to assist communities affected by BRAC 2005.

The Department is providing identical letters, with enclosures, to the Chairmen of the House and Senate Armed Services Committees and the House and Senate Appropriations Committees and all Members of Congress. The list of recommended closures and realignments is also being published in the *Federal Register*. Copies of the unclassified portion of the report will be available on the website www.defenselink.mil/BRAC.

I thank each member of the Commission for agreeing to perform this challenging task for the American people. Your review is an essential confirmation of the reasonableness of the military judgment behind each BRAC recommendation, as well as the fairness of the overall BRAC analytical process. The Military Departments and the Joint Cross-Service Groups stand ready to assist the Commission during its review, providing information and sharing the rationale for the recommendations that have been made. You have a critical role in securing and strengthening tomorrow's armed forces.

Sincerely,



Enclosure:
As stated

APPENDIX C: 2005 BRAC COMMISSION REPORT COVER LETTER

DEFENSE BASE CLOSURE AND REALIGNMENT COMMISSION

2521 South Clark Street, Suite 600

Arlington, VA 22202

Telephone: 703-699-2950

September 8, 2005

George W. Bush
President of the United States
1600 Pennsylvania Avenue, N.W.
Washington, D.C. 20500

Dear Mr. President:

The 2005 Defense Base Closure and Realignment Commission is proud to present its Final Report for your consideration. As required by law, the Commission thoroughly and objectively reviewed the domestic installation closure and realignment recommendations proposed by the Secretary of Defense on May 13, 2005.

In 2005, the Secretary made more recommendations, with more complexity, than all four previous base closure rounds combined. We held ourselves to a high standard of openness and transparency in all our activities and deliberations as we assessed these recommendations. Over the past four months, the Commission conducted 182 site visits, held 20 legislative and deliberative hearings, hosted 20 regional hearings, and received well over 200,000 written and electronic communications from the public. We publicly sought, and received, expert analysis and commentary from a variety of governmental and non-governmental sources to assist our independent analysis.

We recognize that our final recommendations will have profound effects on many communities and the people who bring them to life as well as on the uniformed men and women embodying our Armed Forces. We are confident that the recommendations contained in our Final Report will positively shape our military for decades to come. The warfighters securing our way of life will depend on the successful implementation of our recommendations to shape the infrastructure supporting their current and future missions.

In addition to the Commission's assessment of the Secretary's recommendations, we have addressed issues relevant to future rounds of base realignment and closure.

Chairman: Anthony J. Principi

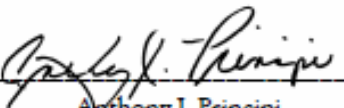
Commissioners: The Honorable James H. Bilbray, the Honorable Philip E. Coyle III, Admiral Harold W. Gehman Jr., USN (Ret), the Honorable Jim Hansen, General James T. Hill, USA (Ret), General Lloyd Newton, USAF (Ret), the Honorable Samuel K.

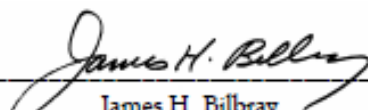
Skinner, Brigadier General Sue Ellen Turner, USAF (Ret)

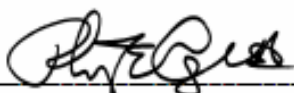
Executive Director: Charles Bataglia


Mr. President, it has been an honor and privilege for us to serve on the 2005 Defense Base Closure and Realignment Commission.

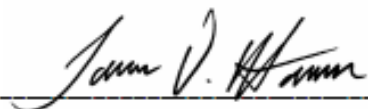
Respectfully Yours,

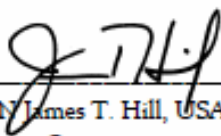

 Anthony J. Principi
 Chairman

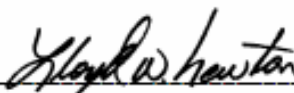

 James H. Bilbray
 Commissioner

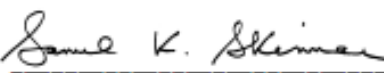

 Philip E. Coyle III
 Commissioner


 ADM Harold W. Gehman Jr., USN (Ret)
 Commissioner


 James V. Hansen
 Commissioner


 GEN James T. Hill, USA (Ret)
 Commissioner


 Gen. Lloyd W. "Fig" Newton, USAF (Ret)
 Commissioner


 Samuel K. Skinner
 Commissioner


 Brig. Gen. Sue Ellen Turner, USAF (Ret)
 Commissioner

APPENDIX D: 2005 BRAC DEFINITIONS⁸⁵

BASE CLOSURE LAW

The provisions of Title II of the Defense Authorization Amendments and Base Closure and Realignment Act (Pub. L. 100-526, 102 Stat.2623, 10 U.S.C. S 2687 note), or the Defense Base Closure and Realignment Act of 1990 (Pub. L. 100-526, Part A of Title XXIX of 104 Stat. 1808, 10 U.S.C. S 2687 note).

BRAC

"BRAC" is an acronym which stands for base realignment and closure. It is the process DoD has previously used to reorganize its installation infrastructure to more efficiently and effectively support its forces, increase operational readiness and facilitate new ways of doing business. DoD anticipates that BRAC 2005 will build upon processes used in previous BRAC efforts.

Closure

All missions of the installation have ceased or have been relocated. All personnel positions (military, civilian and contractor) have either been eliminated or relocated, except for personnel required for caretaking, conducting any ongoing environmental cleanup, and disposal of the base, or personnel remaining in authorized enclaves.

COBRA

Cost of Base Realignment Actions (COBRA), is an analytical tool used to calculate the costs, savings, and return on investment, of proposed realignment and closure actions.

Commission

The Commission established by section 2902 of the Defense Base Closure and Realignment Act of 1990, as amended.

⁸⁵ This appendix appears as Appendix O of the Department of Defense 2005 BRAC document.

Community preference

Section 2914(b)(2) of BRAC requires the Secretary of Defense to consider any notice received from a local government in the vicinity of a military installation that the government would approve of the closure or realignment of the installation.

Data certification

Section 2903 (c)(5) of BRAC requires specified DoD personnel to certify to the best of their knowledge and belief that information provided to the Secretary of Defense or the 2005 Commission concerning the realignment or closure of a military installation is accurate and complete.

Force structure

Numbers, size and composition of the units that comprise US defense forces; e.g., divisions, ships, air wings, aircraft, tanks, etc.

Infrastructure Executive Council (IEC)

One of two senior groups established by the Secretary of Defense to oversee and operate the BRAC 2005 process. The Infrastructure Executive Council, chaired by the Deputy Secretary of Defense, and composed of the Secretaries of the Military Departments and their Chiefs of Services, the Chairman of the Joint Chiefs of Staff and Under Secretary of Defense (Acquisition, Technology and Logistics)(USD (AT&L)), is the policy making and oversight body for the entire BRAC 2005 process.

Infrastructure Steering Group (ISG)

The subordinate of two senior groups established by the Secretary of Defense to oversee and operate the BRAC 2005 process. The Infrastructure Steering Group, chaired by the Under Secretary of Defense (Acquisition, Technology and Logistics) (USD(AT&L)), and composed of the Vice Chairman of the Joint Chiefs of Staff, the Military Department Assistant Secretaries for installations and environment, the Service Vice Chiefs, and the Deputy Under Secretary of Defense (Installations & Environment) (DUSD(I&E)), will oversee joint cross-service analyses of common business-oriented

functions and ensure the integration of that process with the Military Department and Defense Agency specific analyses of all other functions.

Military Departments

The Military Departments are the Department of the Army, Department of the Navy, which includes the Marine Corps, and Department of the Air Force.

Military installation

A base, camp, post, station, yard, center, homeport facility for any ship, or other activity under the jurisdiction of the Department of Defense, including any leased facility. Such term does not include any facility used primarily for civil works, rivers and harbors projects, flood control, or other projects not under the primary jurisdiction or control of the Department of Defense.

National Environmental Policy Act (NEPA) Analysis

An analysis conducted to evaluate an installation's disposal decisions in terms of the environmental impact. The NEPA analysis is useful to the community's planning efforts and the installation's property disposal decisions. It is used to support DoD decisions on transferring property for community reuse.

Realignment

Includes any action that both reduces and relocates functions and civilian personnel positions, but does not include a reduction in force resulting from workload adjustments, reduced personnel or funding levels, or skill imbalances.

Redevelopment authority

In the case of an installation to be closed or realigned under the BRAC authority, the term "redevelopment authority" means an entity (including an entity established by a State or local government) recognized by the Secretary of Defense as the entity responsible for developing the redevelopment plan with respect to the installation or for directing the implementation of such plan.

Redevelopment plan

In the case of an installation to be closed or realigned under the BRAC authority, the term “redevelopment plan” means a plan that (A) is agreed to by the local redevelopment authority with respect to the installation; and (B) provides for the reuse or redevelopment of the real property and personal property of the installation that is available for such reuse and redevelopment as a result of the closure or realignment of the installation.

Secretary

Secretary of Defense.

Transformation

According to the Department’s April 2003 Transformation Planning Guidance document, transformation is “ a process that shapes the changing nature of military competition and cooperation through new combinations of concepts, capabilities, people and organizations that exploit our nation's advantages and protect against our asymmetric vulnerabilities to sustain our strategic position, which helps underpin peace and stability in the world.”

United States

The 50 states, the District of Columbia, the Commonwealth of Puerto Rico, Guam, the Virgin Islands, American Samoa, and any other territory or possession of the United States.

APPENDIX E: MAJOR BASE CLOSURES BY BRAC ROUND

BRAC 1988

16 Major Closures

1. Army Material Tech Lab, MA
2. Cameron Station, VA
3. Chanute AFB, IL
4. Fort Douglas, UT
5. Fort Sheridan, IL
6. George AFB, CA
7. Jefferson Proving Ground, IN
8. Lexington Army Depot, KY
9. Mather AFB, CA
10. Naval Station Brooklyn, NY
11. Naval Station Lake Charles, LA
12. Naval Station, Galveston, TX
13. Norton AFB, CA
14. Pease AFB, NH
15. Philadelphia Naval Hospital, PA
16. Presidio of San Francisco, CA

BRAC 1991

26 Major Closures

1. Bergstrom AFB, TX
2. Carswell AFB, TX
3. Castle AFB, CA
4. Chase Field NAS, TX
5. Eaker AFB, AR
6. England AFB, LA
7. Fort Benjamin Harrison, IN
8. Fort Devens, MA
9. Fort Ord, CA
10. Grissom AFB, IN
11. Hunters Point Annex, CA
12. Loring AFB, ME
13. Lowry AFB, CO
14. Moffett NAS, CA
15. Myrtle Beach AFB, SC
16. Naval Electrical Systems Engineering Center, San Diego, CA
17. Naval Station Long Beach, CA
18. Naval Station Philadelphia, PA
19. Naval Station Puget Sound, WA
20. Philadelphia Naval Shipyard, PA
21. Richards-Gebaur ARS, MO
22. Rickenbacker AGB, OH
23. Sacramento Army Depot, CA
24. Tustin MCAS, CA
25. Williams AFB, AZ
26. Wurtsmith AFB, MI

BRAC 1993

28 Major Closures

1. Charleston Naval Shipyard, SC
2. Defense Per. Support Center, PA
3. Gentile Air Force Station, OH (DESC)
4. Homestead AFB, FL
5. K.I. Sawyer AFB, MI
6. Mare Island Naval Shipyard, CA
7. MCAS El Toro, CA
8. Naval Air Station Agana, Guam
9. Naval Air Station Barbers Point, HI
10. Naval Air Station Cecil Field, FL
11. Naval Air Station Dallas, TX
12. Naval Air Station Glenview, IL
13. Naval Air Station Alameda, CA
14. Naval Aviation Depot Alameda, CA
15. Naval Aviation Depot Norfolk, VA
16. Naval Aviation Depot Pensacola, FL
17. Naval Hospital Oakland, CA
18. Naval Station Charleston, SC
19. Naval Station Mobile, AL
20. Naval Station Staten Island, NY
21. Naval Station Treasure Island, CA
22. Naval Training Center Orlando, FL
23. Naval Training Center San Diego, CA
24. NESEC, St. Inigoes, MD
25. Newark AFB, OH
26. O'Hare IAP ARS, IL
27. Plattsburgh AFB, NY
28. Vint Hill Farms, VA

BRAC 1995
27 Major Closures

1. Bayonne Military Ocean Terminal, NJ
2. Bergstrom Air Reserve Base, TX
3. Defense Dist. Depot Memphis, TN
4. Defense Distribution Depot Ogden, UT
5. Fitzsimmons Army Medical Center, CO
6. Fleet Industrial SU. Center, Oakland, CA
7. Fort Chaffee, AR
8. Fort Holabaird, MD
9. Fort Indiantown Gap, PA
10. Fort McClellan, AL
11. Fort Pickett, VA
12. Fort Ritchie, MD
13. McClellan AFB, CA
14. Naval Air Facility, Adak, AK
15. Naval Air Station, South Weymouth, MA
16. Naval Air Warfare Center, Aircraft Division, Indianapolis, IN
17. Naval Shipyard, Long Beach, CA
18. NAWC, Aircraft Div., Warminster, PA
19. NAWC, Crane Division Detachment, Louisville, KY
20. NSWC, Dahlgren Division Detachment, White Oak, MD
21. Oakland Army Base, CA
22. Ontario IAP Air Guard Station, CA
23. Reese AFB, TX
24. Roslyn Air Guard Station, NY
25. Savanna Army Depot Activity, IL
26. Seneca Army Depot, NY
27. Ship Repair Facility, Guam

APPENDIX F: MAJOR BASE REALIGNMENTS BY BRAC ROUND

BRAC 1988

11 Major Realignments

1. Fort Bliss, TX
2. Fort Devens, MA
3. Fort Dix, NJ
4. Fort Holabird, MD
5. Fort Huachuca, AZ
6. Fort McPherson, GA
7. Fort Meade, MD
8. Fort Monmouth, NJ
9. Naval Station Puget Sound, WA
10. Pueblo Army Depot, CO
11. Umatilla Army Depot, OR

BRAC 1991

19 Major Realignment

1. Aviation Systems Command/Troop Support Command, MO
2. Beale Air Force Base, CA
3. Fort Chaffee, AR
4. Fort Polk, LA
5. Letterkenny Army Depot, PA
6. MacDill Air Force Base, FL
7. Naval Air Development Center, Warminster, PA
8. Naval Air Engineering Center, Lakehurst, NJ
9. Naval Air Propulsion Center, Trenton, NJ
10. Naval Avionics Center, Indianapolis, IN
11. Naval Coastal Systems Center, Panama City, FL
12. Naval Ordnance Station, Indian Head, MD
13. Naval Ordnance Station, Louisville, KY
14. Naval Surface Weapons Center, White Oak, MD
15. Naval Undersea Warfare Engineering Station, Keyport, WA
16. Naval Weapons Center, China Lake, CA
17. Naval Weapons Support Center, Crane, IN
18. Pacific Missile Test Center, Point Magu, CA
19. Rock Island Arsenal, IL

BRAC 1993

14 Major Realignments

1. Anniston Army Depot, AL
2. Fort Belvoir, VA
3. Fort Monmouth, NJ
4. Griffiss Air Force Base, NY
5. Letterkenny Army Depot, PA
6. March Air Force Base, CA
7. Marine Corps Logistics Base Barstow, CA
8. Naval Air Station Memphis, TN
9. Naval Education and Training Center, Newport, RI
10. Naval Surface Warfare Center (Dahlgren)
11. Naval Weapons Station Seal Beach, CA
12. Ogden Air Logistics Center, Hill Air Force Base, UT
13. Tooele Army Depot, UT
14. White Oak Detachment, White Oak, MD

BRAC 1995

14 Major Realignment

1. Charles E. Kelly Support Center
2. Defense Contract Management Command International, Dayton
3. Defense Distribution Depot Columbus
4. Eglin Air Force Base
5. Fort Dix
6. Fort Lee
7. Grand Forks Air Force Base
8. Guam Fleet and Industrial Supply Center
9. Guam Naval Activities
10. Guam Public Works
11. Hill Air Force Base (Utah Training and Test Range)
12. Kelly Air Force Base
13. Naval Air Station Corpus Christi
14. Naval Air Station Key West
15. Naval Information Systems Management Center, Arlington
16. Naval Undersea Warfare Center Keyport
17. Red River Army Depot, Texarkana, TX

APPENDIX G: MAJOR BASE CLOSURE RECOMMENDATIONS, 2005

<u>State</u>	<u>Installation</u>	<u>Net Gain/Loss</u>
CA	Naval Support Activity Corona	-1,795
CT	New London Submarine Base	-15,806
DC	Walter Reed Army Medical Ctr	-9,797
GA	Fort Gillem	-1,823
	Fort McPherson	-6,846
	Naval Air Station Atlanta	-2,304
LA	Naval Support Activity New Orleans	-4,726
ME	Portsmouth Naval Shipyard	-9,165
MS	Naval Station Pascagoula	-1,760
ND	Grand Forks AFB	-4,928
NJ	Fort Monmouth	-9,736
NM	Cannon AFB	-4,778
NY	Niagara Falls International Airport Air Guard Station	-1,072
SC	South Naval Facilities Engineering	-1,730
SD	Ellsworth AFB	-6,765
TX	Brooks City Base	-5,722
	Naval Air Station Ingleside	-4,799
	Red River Army Depot	-4,175
VA	Fort Monroe	-7,982

APPENDIX H: MAJOR BASE REALIGNMENT RECOMMENDATIONS, 2005

<u>State</u>	<u>Installation</u>	<u>Net Gain/Loss</u>
AK	Eielson AFB	-4,710
AL	Anniston Army Depot	1,705
	Fort Rucker	3,820
	Maxwell AFB	-2,187
	Redstone Arsenal	4,880
AR	Little Rock AFB	3,182
CA	Naval Air Weapons Station China Lake	5,809
	Naval Base Ventura County	-4,084
CO	Fort Carson	7,627
FL	Eglin AFB	2,560
	Naval Air Station Jacksonville	4,371
GA	Fort Benning	13,955
IL	Scott AFB	1,165
KY	Fort Knox	-3,121
KS	Fort Riley	4,486
MA	Hanscom AFB	2,224
MD	Aberdeen Proving Grounds	2,500
	Bethesda National Naval Med Ctr	3,350
	Fort Meade	8,790
ME	Brunswick Naval Air Station	-4,264
NC	Fort Bragg – Pope AFB	8,052
OK	Fort Sill	5,451
TX	Fort Bliss	20,403
	Fort Hood	8,521
	Fort Sam Houston	17,061
	Lackland AFB	-4,155
	Naval Air Station Corpus Christi	-2,063
	Sheppard AFB	-3,961

VA	Fort Belvoir	20,217
	Fort Eustis	-4,375
	Fort Lee	10,442
	Naval Shipyard Norfolk	3,228
	Quantico Marine Corps Base	5,221
WA	Naval Shipyard Bremerton	2,788