The Untold Story of the ZIP Code

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Executive Summary

In 1963 the Post Office Department introduced and vigorously promoted the use of the Zone Improvement Plan (ZIP) Code. The code was originally intended to allow mail sorting methods to be automated but ended up creating unimagined socio-economic benefits as an organizing and enabling device. The ZIP Code became a social tool for organizing and displaying demographic information, a support structure for entire industries such as insurance and real estate, and even a representation of social identities as observed in the television series *Beverly Hills, 90210*. Today, the ZIP Code is much more than a tool for moving mail efficiently, and its positive spillover effects are enormously beneficial to society. Consequently, it is time for the Postal Service to explore new ways to improve the ZIP Code, both to save postal costs and to enhance the opportunity for third party innovators to discover new uses and applications. This paper estimates the economic value of the ZIP Code and examines potential enhancements to strengthen it for the digital age.

One such enhancement would be to combine the ZIP Code with the precision of geocodes (latitude and longitude coordinates). This could have a direct impact on the U.S. Postal Service's bottom line by facilitating delivery route reconfiguration. Historically, the Postal Service has delivered mail via set delivery routes where each carrier visits the same homes every day. With the anticipated growth of parcel delivery, including the possibility of same-day delivery, the Postal Service will find it necessary to develop dynamic carrier routing. Combining the ZIP Code with the geocoding of addresses could ease the processing necessary to improve the efficiency of parcel delivery.

Another benefit of linking address geocodes to ZIP Codes would be to facilitate communication between the ZIP Codes and geographic information system (GIS) mapping software packages. Such software can define areas of the country not labeled through the addressing system, such as undeveloped land, by associating them with latitude and longitude coordinates. For example, the software could theoretically map high risk areas for sink holes or forest fires. Those risk areas could then be connected to ZIP Code and addressing information to notify residents of risks or identify the risk of developing these areas. Additionally, linking geocodes to ZIP Codes and addresses could help align government investments to serve public needs by assisting disaster recovery efforts, tracking population "flight paths" to unaddressed areas, and increasing the capability to map demographic information to surface areas.

Another enhancement we recommend is linking demographic information with the ZIP Code and offering smaller mailing groupings to improve target mailings. This would increase the value of mail for senders and receivers by connecting recipients with more precisely targeted mailings and reducing less valuable broad mailings. Naturally, such

programs should be pursued on an “opt-in” basis to protect privacy. Details regarding these enhancements are provided in the body of the report.

To understand how best to implement these enhancements, the history of the ZIP Code is explored first. Examination of the development of the ZIP Code reveals that its unanticipated external benefits occurred because the Post Office Department took initiative and experimented with a series of steps to ensure the innovation’s adoption and success. The Post Office Department embraced a new idea, found executive sponsorship, examined foreign posts for successful comparisons, developed a consistent stakeholder outreach program, and remained committed to implementing the ZIP Code in spite of resistance by mailers. It was only after this extraordinary effort by the Post Office Department that other, non-postal innovators were able to conceive new applications. The postal initiative was narrow in its originally intended purpose to promote the ZIP Code’s use in mail sorting, but ultimately universal and foundational in its benefits.

The ZIP Code story also brings to light two interesting aspects of the Postal Service when it comes to innovation. On the one hand, the Postal Service is a slow and accidental innovator. Twenty years lapsed between conception of the original idea and its implementation, although a case can be made that some of the ZIP Code’s success is due to the Post Office’s methodical and deliberate implementation. On the other hand, because its innovations are offered as a foundational layer on a public open platform, Postal Service initiatives have the potential for a tremendous and wide impact. This is perhaps not surprising given the Postal Service’s ubiquity, importance in facilitating communication and commerce, and public service nature. The ZIP Code represents one of these far-reaching initiatives that is a true public service — only a small fee based on the cost of maintenance has ever been charged for use of the ZIP Code and no specific appropriation has ever been made for its development. It exists out of pure good will, and the sheer extent of the impact of the ZIP Code has more than compensated for the low clock speed at which it was developed.

This impact was realized through the innovative concept the ZIP Code provided — the “digitization” of surface space, not just in the sense of converting names to numbers, but also in the grouping of surface spaces into zones for mechanization and ease of mail flow. Other organizations and businesses soon realized the ZIP Code possessed an elegant simplicity for efficiently organizing data by geography. The U.S. Census Bureau, for example, uses the ZIP Code to organize its statistics. Other industries, like real estate and target marketing companies, redefined the way they do business by basing their informational structure on the ZIP Code. The ZIP Code is solicited or used in a variety of transactions, such as buying gas with a credit card at an automated pump. Today, a ZIP Code and physical mailing address are widely recognized attributes of an individual’s identity.

Yet the full benefits of the ZIP Code are still largely unrecognized. To remedy this oversight, the U.S. Postal Service Office of Inspector General worked with IBM to present important insights from the history of the ZIP Code, provide an estimate of the

economic value of the ZIP Code system, and discuss ways to further enhance it. Preliminary research uncovered no previous attempts to value the ZIP Code.

IBM computed the additional revenues and reduced costs that result directly from the ZIP Code, in all of its uses, postal and non-postal. The estimate shows that the ZIP Code adds close to $10 billion annually in value across the economy. The magnitude of this number is impressive, but some caveats should be kept in mind. Providing a precise estimate for the economic value of the ZIP Code is a difficult task. Many beneficiaries are inevitably overlooked and not all those identified can have their benefits properly estimated due to unreliability or unavailability of information. Nonetheless, this rough but conservative estimate is useful for providing insight into the important role the ZIP Code continues to play in today's economy. It shows that its value is in the billions of dollars and that the value to external firms and organizations far exceeds the internal value to the Postal Service.

The Postal Service has consistently maintained the ZIP Code over the 50 years of its existence. It has created and deleted ZIP Codes as needed, and expanded the ZIP Code itself from 5 digits to 9 and then to 11. The usefulness of the ZIP Code depends crucially upon this continued maintenance. Without the Postal Service's effort to enhance the ZIP Code and increase its utility as a tool in the 21st century it is likely that its value as a public good will diminish. For example, if the Postal Service does not take the opportunity to link geocodes and ZIP Codes perhaps other organizations will no longer utilize ZIP Codes in mapping and grouping as they will not have the level of precision required. But if history is a guide, the potential societal benefits can be expected to exceed the advantages we currently enjoy. The Postal Service should explore seizing these immediate identified opportunities and open up this new enhanced ZIP Code for outside innovators to continue to conceive new uses beyond our current imagination. This is the opportunity to innovate anew on an old innovation frontier — this is our 1963.

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Introduction

The Postal Service has a lot going for it: its trusted brand and an advanced infrastructure that includes a ubiquitous physical delivery network, facilitated by a thorough national Addressing Management System (AMS). A critical but often overlooked postal asset is the Zone Improvement Plan (ZIP) Code™ System (ZIP Code). The ZIP Code organizes the vast geography of the U.S. into well-defined areas for the purpose of efficient mail delivery. Evolving beyond its initial intended purpose as a mail delivery tool, the ZIP Code has energized new business, enabled government services, and even helped to define communities. Today, a ZIP Code and physical mailing address are widely recognized attributes of an individual's identity. They not only connect individuals to the mail system, but they also create a framework for social interaction and institutional coordination.

ZIP Codes and physical addresses are important attributes of individuals, companies, and even communities in today's data driven society.

To understand the importance of an addressing system, consider for a moment what conditions are like in countries that do not have one.[1] The clear societal benefits derived from proper addressing systems and efficient logistics services are absent, limiting the prospects for success in multiple sectors. An effective addressing system can deliver benefits well beyond mail delivery, such as coordinating disaster relief, tracking the spread and patterns of disease, catalyzing commerce, and supporting critical public sector functions. There is strong evidence that implementing addressing systems in impoverished neighborhoods can actually increase the overall quality of life by allowing basic infrastructure, such as electricity, water, communication, and government services to be delivered to the area.[2] This was seen in the slums of Calcutta, for example, where spray-painting unique addressing numbers on houses yielded significant positive effects on overall quality of life in the city's neighborhoods. This effort has allowed the local

[1] Current estimates show as many as 4 billion people worldwide are unaddressed and approximately sixty Universal Postal Union countries have no postal code system. James Cartledge, "Addressing the world: How geocodes could help billions start using the mail," *Post& Parcel*, November 9, 2011, http://postandparcel.info/43564/in-depth/addressing-the-world-how-geocodes-could-help-billions-start-using-the-mail/.

[2] Universal Postal Union, *Addressing the world – An address for everyone*, 2012, http://www.upu.int/fileadmin/documentsFiles/activities/addressingAssistance/paperAddressingAddressingTheWorldAnAddressForEveryoneEn.pdf and Alberto Chong, Rafael La Porta, Florencio Lopez-de-Silanes, and Andrei Shleifer, *Letter Grading Government Efficiency*, National Bureau of Economic Research, Working Paper No. 18268, August 2012, http://www.nber.org/papers/w18268.

government to organize the delivery of water and electrical utilities to the slums and residents now have the legal identities required to apply for bank accounts and jobs.[3]

The United States possesses one of the most mature addressing systems in the world with one of the most developed postal code systems — the ZIP Code. The ZIP Code has taken on a life of its own, acquiring independent value that extends beyond its role in facilitating postal delivery services. Its contribution to the nation's soft infrastructure is as significant as the Postal Service's contribution to the development of highway, railroad, and air infrastructures.[4] Furthermore, despite declining mail volumes, use of the ZIP Code by individuals and businesses has expanded over the years.

The ZIP Code grew beyond its use as a mail delivery facilitator into improving the national infrastructure.

The purpose of this paper is to explore the importance of the ZIP Code through an examination of its historical creation, intended use, and positive spillover effects. The ZIP Code is revealed to be a public good that has far surpassed its original intent. The paper also presents an initial estimate of the economic value of the ZIP Code to the U.S. economy. Finally, it outlines potential enhancements to this vital Postal Service asset to ensure its continued usage and reap additional social benefits.

History

Currently, the Postal Service delivers 40 percent of the world's mail to 5 percent of the world's population, a task made more daunting by the geographical size of the United States.[5] The Post Office Department's original sorting methods depended solely on local addresses and hand sorting.[6] But this became impractical as the country expanded westward and the population boomed. Before the advent of the ZIP Code and automated sorting mechanisms, the average mailed letter was handled by eight to 10 postal employees.[7] This manual sorting became even more laborious as customers' use of the mail grew by almost 160 percent from 1940 to 1965.[8]

With the examples of industrialization and standardization in trades like the automobile fresh in their minds, forward thinking Postmasters General envisioned using automation

[3] Go Code and the Hope Foundation, *Addressing the Unaddressed: Case Study*, 2012, http://www.globaladdress.org/wp-content/uploads/downloads/2012/07/Addressing-the-Unaddressed-Project-for-Hope-Kolkata-Foundation-2.pdf.
[4] U.S. Postal Service Office of Inspector General, *Postal Service Contributions to National Infrastructure*, Report No. RARC-WP-12-012, July 9, 2012, https://www.uspsoig.gov/foia_files/rarc-wp-12-012.pdf.
[5] U.S. Postal Service (John Mazzone and Samie Rehman), *The Household Diary Study: Mail Use & Attitudes in FY 2011,* April 2011, http://about.usps.com/studying-americans-mail-use/household-diary/2011/fullreport-pdf/usps-hds-fy11.pdf.
[6] The Post Office Department was a cabinet-level department responsible for post offices and mail services up until 1971 when it was reorganized into the current independent establishment of the executive branch: the United States Postal Service.
[7] U.S. Post Office Department, *The Last Word in Mail Addressing*, 1963.
[8] U.S. Congress, House of Representatives, Committee on Post Office and Civil Service, Subcommittee on Postal Facilities and Modernization, *Hearings on H.R. 5180, [H.R. 9551], ZIP Code System in the United States Postal Service*, 89th Cong., 1st Sess., March 24, 1965.

to handle this increased workload. The Post Office identified best practices for mechanization to further the goal of increased efficiency and used them to establish the Nationwide Improved Mail Service (NIMS) program. This program, started in 1961, standardized the physical dimensions of the mail through the establishment of envelope sizes and shape limitations.[9] The next step was to establish some type of machine-readable code to facilitate the sorting of the mail on a national level.

A nationwide standardized coding system for mail would increase processing efficiency. Consider just a few examples. A code could resolve problems associated with nonspecific references such as multiple cities in the United States with the same name. A code could also allow further mail grouping for easier distribution, logistics handling, and transportation routing. For example, the code would increase cross country shipping densities while allowing mail to be sorted into smaller groups than the city level. Lastly, a code is easier for computerized equipment to recognize than addresses.

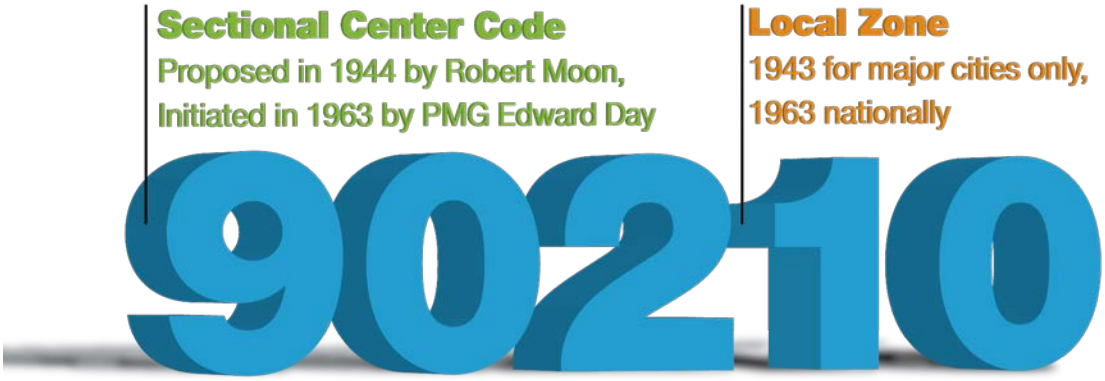
To develop this nationwide code, the Post Office Department looked to a sorting system that it had started using in a limited capacity in 1943. This system divided up large cities into multiple 2-digit postal zones, which were written by mailers in the lower line of addresses and called local zone numbers.[10] The 2-digit code was successful in gaining sorting efficiencies but was limited to large cities, was not a mailing requirement, and was used primarily by large mailers.

Philadelphia Postal Inspector Robert Moon saw the value of coding early on and in 1944, he submitted a proposal to create a new national 3-digit code system to assign the country to various processing hub centers represented by sectional center codes. He strongly believed that a national coding system was "necessary for the post office to keep up with the mail volume after WWII."[11] After persistent submissions of his proposal to management, Moon finally found an audience in Postmaster General Edward Day. Day was intrigued by Moon's idea and combined it with the 2-digit local zone numbers to create the 5-digit ZIP Code that is utilized today as shown in Figure 1.[12] This system served as the basis for future postal code expansion and mechanical sorting.[13]

Postal Inspector Robert Moon proposed the idea and Postmaster General Edward Day spearheaded the initiative for the modern ZIP Code.

[9] Edward Day, *Mr. ZIP and how he came to be,* U.S. Post Office Department,1963.
[10] U.S. Congressional Research Service, *Changing Postal ZIP Code Boundaries*, by Nye Stevens, Report No. RL33488, June 23, 2006, accessed at http://www.dtic.mil/cgi-bin/GetTRDoc?AD=ADA462043.
[11] Datasheer, LLC, "The Two 'Mr. ZIP Codes,'" http://www.zip-Codes.com/mr_zip.asp.
[12] There are five types of ZIP Codes: (1) the standard ZIP Code, which refers to a post office for a city or a division of a city that has mail service; (2) the P.O.-Box-only type is used for P.O. boxes at various facilities; (3) the military ZIP Code given to military bases overseas and also often to ships; (4) unique ZIP Code types given to organizations that receive large quantities of mail; and (5) Legacy ZIP Codes, which are those which are no longer in use but retained for old data purposes. Uniform Data System Mapper, http://www.udsmapper.org/ziptozctacrosswalk.cfm.
[13] Edward Day. Today, addresses are read by optical character readers (OCR) and can be sorted through a remote coding system to determine the destination of each address. Despite this capability, the OCR first reads the 5-digit ZIP Code to process a destination sort in 180ms and avoid the time consuming remote coding system. The speed gain from reading the 5-digit ZIP Code and efficiency gain is only possible through the innovation of the ZIP Code. Managing Automation for Postal Supervisors (MAPS) Student Training Manual, April 2008, Book 1, p. 8-14.

Figure 1: What the Digits Mean



Executives at AT&T warned Day that they had experienced difficulty getting people to use area codes for telephone numbers and that the public might likewise be hesitant to adopt the ZIP Code. But Day had reason to believe otherwise; in his study of the West German postal code in the early 1960s, he was amazed that the country achieved an 80-percent public adoption rate in its first year of use.[14] The West German postal service's extensive promotion campaign was credited for the successful introduction of the new system.

Day learned from his international colleagues that a pre-introduction public campaign to educate and excite the public about the ZIP Code was crucial. When Day unveiled the nationwide 5-digit ZIP Code at a postmasters' convention in October of 1962, he simultaneously introduced the world to "Mr. ZIP" — the cartoon character whose body language symbolizes speedy delivery. Mr. ZIP touted the ZIP Code for its power to increase the accuracy and speed of delivery, thereby allowing the Postal Service to limit future rate increases.

Figure 2: Mr. ZIP

[14] Edward Day.

This extensive campaign should be credited with much of the ZIP Code's popularity and successful adoption. The Post Office Department adopted a "saturation campaign," and distributed promotional materials to Post Offices around the country. Mr. ZIP could be seen on posters in every Post Office, on decals on mail trucks and carrier bags, and even on buttons postal employees were instructed to wear. The Post Office Department partnered with AT&T to put images of Mr. ZIP in their offices and on their service trucks and ZIP Code maps were frequently included in the local yellow pages. Public service announcements were broadcast on radio and TV, one of which featured a group called the Swingin' Six singing the benefits of the ZIP Code.[15] Lesson plans were designed to encourage teachers to introduce the ZIP Code to young children. Mr. ZIP was seemingly everywhere, and his whimsical characteristics helped win over the American public — by 1969 the vast majority of Americans were in favor of the ZIP Code system.[16] Mr. ZIP had helped the Postal Service achieve almost 100 percent ZIP Code compliance before he was retired in 1983.[17]

Table 1: Survey of Public Acceptance of ZIP Code

Survey Questions	1966	1969
Good Idea for ZIP Codes	67%	90%
Currently Use ZIP Codes	50%	83%
Will make an effort to learn more ZIP Codes	33%	67%

Source: Roper Research Associates. *Study on public opinion of the Postal Service*, 1969

While Mr. ZIP was finding popularity among the general public, large mailers, on the other hand, were less than pleased to be told they would be required to use ZIP Codes by 1967. In fact, shortly after the 5-digit ZIP Code was implemented, a survey of over 1,900 mailers found only 25 percent supported the ZIP Code plan.[18] They expressed initial skepticism that the Post Office Department's estimated $22 to $72 million in annual savings would justify their own costs — estimated to be a one-time expense of over $200 million — to comply with the new requirements.[19] At Congressional hearings in the spring of 1965, the large mailers expressed their desire to push the conversion requirement to a later date than 1967. Congress, however, ultimately maintained the 1967 requirement. The Postal Service fought hard for their new system and won, possibly because it had earned the public's support for

Large mailers were skeptical that the $72 million savings from the ZIP Code justified their implementation costs of $200 million.

[15] A video of the Swingin' Six is available at the National Postal Museum's YouTube site at http://www.youtube.com/watch?v=QIChoMEQ4Cs.
[16] Roper Research Associates, *Study on public opinion of the Postal Service*, 1969.
[17] Much of this discussion of the history of Mr. ZIP comes from the National Postal Museum's exhibit on the subject, which can be accessed online via http://postalmuseum.si.edu/zipcodecampaign/.
[18] U.S. Congress, House of Representatives, Committee on Post Office and Civil Service, Subcommittee on Postal Facilities and Modernization, *Hearings on H.R. 5180, [H.R. 9551], ZIP Code System in the United States Postal Service*, 89th Cong., 1st Sess., March 24, 1965.
[19] Ibid.

the ZIP Code through the extensive public outreach program. Ironically, by 1970, 84 percent of the large business mailers agreed that the ZIP Code was a good idea.[20]

In 1983 the Postal Service, which replaced the Post Office Department in 1971, expanded the number of digits in the ZIP Code to nine (ZIP + 4). These additional digits identify a side of a street or an office building. The Government Accounting Office concluded in 1983 that this 4-digit expansion coupled with new automation equipment would save the Postal Service and external mailers a total of $5.26 billion over the next sixteen years.[21] The magnitude of this savings highlights the Postal Service's foresight and puts into context the $200 million initial implementation cost borne by mailers. As this paper shows, a stamp would cost significantly more had the Postal Service not introduced the ZIP Code system when it did.

Today, the 9-digit ZIP Code has been expanded to 11 digits which allow ordering by carrier-walking sequence. The average customer only needs to supply the 5-digit ZIP Code to the Postal Service for mailing, but the additional digits increase accuracy, provide better service, and are partially responsible for worksharing. From 1992 to 2012, the amount of mail accurately delivered was reflected through the improved rates for on-time overnight First-Class Mail deliveries, which increased from 82 to over 96 percent.[22] Worksharing represented over 80 percent of mail volume in fiscal year (FY) 2008.[23] All of these developments, which increased delivery speed and savings, have their roots in Moon and Day's 5-digit ZIP Code.

There are no intellectual property fees for use of the ZIP Code.

The ZIP Code was established as an open use product publicly accessible from the outset. In fact, the Postal Service only filed a trademark for the "ZIP Code" name in 1973.[24] The openness of the ZIP Code as a platform for economic activity is part of the reason for its immense success far beyond its initial conception. Unlike most commodities, the ZIP Code is not rivalrous; use by one party does not exclude its use by any other. The Post Office took no steps to make the ZIP Code exclusive but rather provided it as a public good for use by any party, free of charge.[25]

The Postal Service's efforts in creating the ZIP Code can be seen as a pioneering "digitization" of surface space, converting names to numbers and dividing space into

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[20] Roper Research Associates, *Study on opinions of the Postal Service among high volume business mailers*, 1970.
[21] General Accounting Office, *Conversion to Automated Mail Processing Should Continue: Nine-Digit ZIP Code Should Be Adopted If Conditions Are Met*, Report No. GAO/GGD-83-24, January 6, 1983, http://www.gao.gov/assets/140/139259.pdf, pp. ii-vii and 151-158.
[22] U.S. Postal Service, *2004 Comprehensive Statement on Postal Operations*, http://about.usps.com/strategic-planning/cs04/, p. 65.
[23] U.S. Postal Service Office of Inspector General, *Assessment of Worksharing,* Report No. RARC-WP-10-005, July 12, 2010, http://www.uspsoig.gov/foia_files/RARC-WP-10-005.pdf.
[24] U.S. Postal Service, ZIP CODE, U.S Patent 1,042,499, filed September 7, 1973 and issued June 29, 1976.
[25] The Postal Service only charges a small fee when providing ZIP Code information to cover the cost of maintenance. The Postal Service has contributed many open initiatives to national infrastructure development including support of railroads, stage coaches, and commercial air transportation as discussed in U.S. Postal Service Office of Inspector General, *Postal Service Contributions to National Infrastructure,* http://www.uspsoig.gov/foia_files/RARC-WP-12-012.pdf.

zones for ease of mail and information flow. Other organizations and businesses soon realized the ZIP Code possessed an elegant simplicity for efficiently organizing geographic data and began to use it in ways far outside the sorting, routing, and delivery of mail.

The U.S. Census Bureau (USCB) was one of the first entities to utilize the ZIP Code innovatively. Instead of a strictly name-based system, USCB utilized the ZIP Code to efficiently identify households that had not responded to its surveys and cost-effectively persuaded these households to respond. The USCB also uses the ZIP Code to create their "ZIP Code tabulation areas," their methodology for displaying and organizing demographic information by localized geographic areas.

The use of the ZIP Code outside the Postal Service exploded and the ZIP Code evolved into a public good that is part of the national infrastructure. For example, real estate firms utilize the ZIP Code in order to organize their listings and homebuyers can then also search by ZIP Code.[26] The key spillover benefits and uses by many entities in a variety of economic activities touch everyday commerce and provide a framework, in some cases, for entire industries. A sampling of today's many uses of the ZIP Code appears below in Table 2.

Table 2: Sampling of Industries that Currently Use the ZIP Code

Industry	Spillover Uses of the ZCS
Federal Agencies	*IRS, FBI, Policy Decisions; Allocating Funds and Resources*
Local Governments	*Fire-Fighting and Emergency Services*
Public Utility Companies	*Phone, Gas, and Electricity*
Public Health Organizations	*Epidemiological Databases*
Banks and Financial Services	*Calculate Risk Profiles for Mortgage and Loan Applications by Geography*
Insurance Providers	*Calculating Risk Premiums by Geography*
Retailers and Professionals	*Optimally Locate Businesses Based on Demographic Data*
Merchants and Self-Service Stations	*Validate Card Users Prior to Approving Transactions*
Directory Services	*Internet Searches, Geographical Categories*
Real Estate Companies	*Pricing and Listing Properties for Rent and Sale*
Marketing Companies	*Targeted Marketing to Demographic Groups*
U.S. Armed Services	*Targeted Recruitment*
Universities	*Diversifying the Student Body; Tracking the Migration of Graduates*

[26] See, for example, www.trulia.com and www.mls.com.

The ZIP Code has energized and enabled business and other commerce well beyond anything imagined at the time of its invention, often in ways that have been largely unnoticed. It has saved, and continues to save, the Postal Service billions of dollars by streamlining the processing of mail. It is important to recognize, though, that the Postal Service did not just invent the ZIP Code and leave its success to chance. The Post Office Department took important steps to ensure the ZIP Code's success by implementing the technology to use the ZIP Code for mechanical sorting, and embarking on a comprehensive public education campaign that lasted two decades.

Further, over the 50 years of the ZIP Code's existence, the Postal Service has devoted consistent maintenance and care to the ZIP Code brand. It has created and deleted ZIP Codes as needed, and has expanded the ZIP Code itself from 5 digits to 9 and then to 11. Without consistently updating ZIP Codes and linking them to the address management system, the ZIP Code would quickly lose its utility and spillover would decline. This vital Postal Service maintenance will, if history is a guide, continue to deliver potential societal benefits that exceed the advantages we currently enjoy.

Economic Valuation Model

The ZIP Code is an intangible asset currently owned by the Postal Service and utilized by the public. It has value to the Postal Service and also value across the economy at large. An attempt is made here to estimate the economic value of the ZIP Code.

In considering its overall value, it is useful to first list the groups of "economic agents" that derive value from the ZIP Code. There are four main groups:[27]

- The Postal Service;[28]
- Firms that use the ZIP Code to enhance mail-related products, such as courier firms (UPS/FedEx) and catalog merchandisers;
- Firms that use the ZIP Code to enhance non-mail-related products, such as real estate firms that use the ZIP Code to organize their listings; and
- Consumers, government agencies, and the nonprofit sector that use the ZIP Code for informational purposes.

The capitalization method was used to calculate the economic value of the ZIP Code.[29] This method relies upon computing the discounted present value of the future economic benefits that would be created by the ZIP Code over the next ten years. The future benefits may arise from additional revenues generated by the asset, from a reduction in

[27] It is important to keep in mind that one business may belong to more than one group as they may use the ZIP Code in more than one way.
[28] The benefits "to the Postal Service" flow through to its customers, who would otherwise face higher prices.
[29] There are a variety of economic evaluation techniques to value an intangible asset. The Appendix includes a full discussion of why the capitalization method was chosen.

cost caused by the asset, or from both. This method was applied to each of the four groups listed above. The results of this valuation are displayed in Table 3. For a full discussion of the methodology and how these results were obtained, see the Appendix.

Table 3: Economic Value of the ZIP Code by Use Groups

User Type Categories	Value in the First Year (in billions)	10 Year Value (in billions)
Value To The Postal Service	$2.2	$16.8
Value To Firms that Enhance Mail-Related Products	$2.1	$21.3
Value To Firms that Enhance Non-Mail-Related Products	$2.4	$24.4
Value To Consumers, Governments and Non-Profits	$2.9	$30.6
Total	**$9.5**	**$93.1**

A number of important caveats must be kept in mind when assessing these values. First, there are many other uses for the ZIP Code that could not be calculated due to a lack of data, such as entire unquantifiable sectors and inseparable uses such as worksharing. Second, in many instances, it was necessary to make assumptions about critical factors such as percentage of operational cost savings due to the use of the ZIP Code. For these assumptions, conservative values were used. Third, in some instances, the data that are available are dated and may not fully reflect current conditions. For these three reasons, the estimate likely understates the true economic value.

These caveats notwithstanding, this initial estimate is useful for providing insight into the important role the ZIP Code continues to play in today's economy. It shows that the value to external firms and organizations has exceeded the internal value to the Postal Service by over four times.

Enhancing the ZIP Code System

The estimate above illustrates the extent to which the ZIP Code system adds value to the economy. But why does it have such monumental value? As mentioned earlier, although the ZIP Code was intended to categorize regions to ease mail sortation, it additionally allowed for simple geographic groupings to which demographic information could be applied. This provided an important translation between the physical world and the computer databases that describe geographically based demographics and many other characteristics of the population. The ZIP Code remains the principal vehicle in

The ZIP Code itself was an early effort to link the physical and digital — by coding analog addresses into a series of digits that were meant to be read by computer technology.

this decoding process, allowing the messy "real world" to be described in a quantifiable manner. Some strengths of the ZIP Code are listed below:

1) The ZIP Code allowed the Postal Service to automate their sorting process – The ZIP Code continues to be the best system to sort mail efficiently and has been a model for countless other posts.

2) The ZIP Code groups geographies – As described above, the ZIP Code creates groups that include their contents: addresses, people, businesses, landmarks, and more.

3) The ZIP Code allows analog information to be categorized in a digital manner – Evidence suggests that people think in "analog" terms and not digital. This creates a significant challenge in moving reference information to the digital space. When asked about their residential location, people are more likely to respond with a city or state than a ZIP Code. People's references to analog terms may, in fact, never go away, meaning that the analog addressing infrastructure may never be rendered entirely obsolete. Yet computers are also here to stay, so the ZIP Code provides a transition from one medium to the other.

4) The ZIP Code evolved into a widely referenced system – Similar to other technology such as modern computer keyboards or the combustible engine, the ZIP Code is so widely used and efficient at so many tasks that implementation and learning costs of alternatives outweigh any savings from alternatives. For example, packages sent through FedEx and UPS utilize the ZIP Code because it would not be economically efficient to replace it with another system. Another example would be the potential to replace ZIP Codes with latitude and longitude data from Google and other mapping services. Despite this technology's existence, the ZIP Code remains the prevailing preferred reference due to such vast acceptance.

5) The Postal Service has tremendous reach – Everyone has day-to-day experience with using the ZIP Code. This means Postal Service actions, especially if they involve infrastructural improvements, have an inherent potential to affect the future of the national economy. This is a fundamental reason for the widespread adoption of the system and is a strength, in and of itself, when considering the ZIP Code's placement in our future economy.

This list helps identify opportunities to enhance the ZIP Code that would supplement these strengths. The history of the ZIP Code demonstrates that it is the openness of the ZIP Code platform and serendipitous by-products, rather than the Postal Service's initial intended strategy, that have created positive spillover. However, that added value was only possible after the Postal Service initiated the innovation.

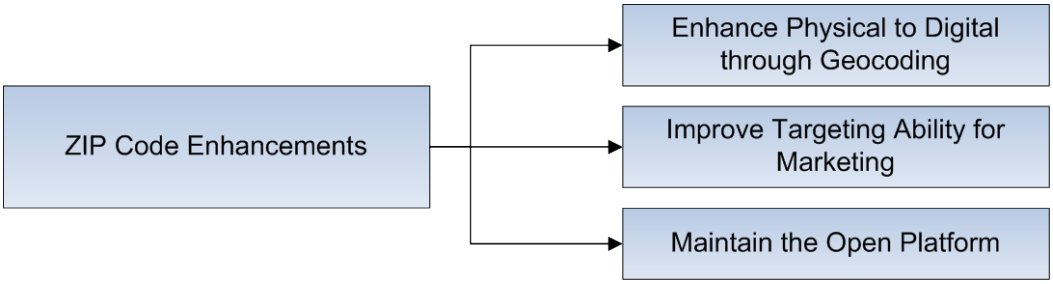
None of the positive spillover would have taken place if the Postal Service did not have the foresight to establish the ZIP Code, the openness to examine foreign posts' successes, the wisdom to popularize the innovation via public outreach, and the

Positive spillover is only possible if the Postal Service initiates a strategy to adapt to new innovative technologies or an enhancement to an existing system and has the persistence and foresight to navigate the rough seas of stakeholder resistance.

persistence to educate the vast stakeholder network about the ZIP Code's benefits. In today's environment, the stakeholder network has multiplied. The Postal Service touches so many aspects of the country and our economy that there will almost always be numerous stakeholders affected by any innovative proposal introduced. Therefore, this recognized pathway to success learned from Mr. ZIP, where a high investment in stakeholder engagement was of utmost importance, is especially relevant in today's entwined environment.

Now is the time for the Postal Service to seize opportunities. The Postal Service can undertake low risk, potentially high reward initiatives in this area, further linking physical to electronic information and improving the ZIP Code's utility as a tool for commerce and information.

Figure 3: Strategies to Enhance the ZIP Code



The Postal Service can initiate some enhancements in the near term, but its major challenge will be to anticipate the types of postal products and services future generations will consume and how the ZIP Code could facilitate their delivery. One certainty is that keeping the ZIP Code as an open platform is essential if further innovation and ideas are to emanate from the economic agents using the ZIP Code. While it is clear there are widespread opportunities, it is likely the ideas with the greatest potential influence and impact are yet to be envisioned. The openness of the platform encourages these unknown, serendipitous events and also allows for pertinent new technologies to be integrated with the ZIP Code as they develop.

Enhance Physical to Digital through Geocoding

The ZIP Code itself was an early effort to convert, link, and relate physical addresses to digital information. This has expanded over time, but there remains unmet demand for additional physical-to-digital translation. This presents an opportunity for the Postal Service to increase the accuracy and precision of their addressing system.

The Address Management System (AMS) is the Postal Service's master database of addresses and is maintained with the help of business mailers and other organizations in order to promote address quality. It represents an exhaustive list of every delivery point in the United States. Using ZIP Codes, groups of addresses can currently be created for use quite easily in high-power computer modeling, point-to-point analytics, and targeted marketing. However, finer levels of grouping precision than the address system currently provides, could enhance group creation and spark future innovations.

Geographic information system (GIS) mapping software packages, such as ESRI's ArcGIS, provide spatial analysis for areas of the country potentially not labeled through the addressing system. These GIS mapping packages provide powerful analysis for critical society needs. For example, tectonic shifts can be mapped to identify high risk earthquake areas. If the high risk areas could be easily linked to communities through addresses and ZIP Codes, public community notification would be eased and value might be gained. Similar applications include emergency planning, weather hazard identification like fire or flood hazard zones, and community planning. These are just a few practical solutions these GIS mapping applications can provide. These GIS applications categorize space through geocodes and if they could be easily linked to the AMS, unforeseen value might be recognized.

Geocoding is the process of associating precise geographic latitude and longitude coordinates with physical addresses, including street addresses and ZIP Code boundaries. As of December, 2012, the AMS had not been geocoded, and there were no plans to incorporate geocoding technologies.[30] This information can be coded into GIS and used by technology tools in myriad ways with clear benefits outside the mail industry. For example, imagine a large hurricane is approaching the outer banks. The regions of highest risk could be identified through GIS mapping software. Then, if the AMS were geocoded, citizens in ZIP Codes of the high risk areas could be identified and alerted through the Postal Service's vast communication network. This is the type of unintended societal benefit that may be realized through enhancing the ZIP Code and AMS with geocodes.

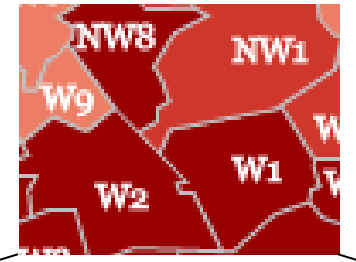
Geocoding the AMS could assist government services, such as disaster tracking, and provide a means for faster alert notification.

Some benefits are already realized with the current ZIP Code and addressing system, but geocoding would allow the construction of more meaningful geographical groupings. For example, real estate values in the United States, currently, are largely grouped by ZIP Code so analysis is limited to this restriction. Adding geocodes (available in the UK) allows for more precise analysis across grouping boundaries. The difference of these analyses can be seen in the comparison shown in Figure 4 where values of real estate are demonstrated through colors (red is the highest and green is the lowest). The two pictures illustrate the level of detail observable using the UK ZIP Code equivalent grouping for downtown London, UK, which is shown on the top, versus using geo-coding level grouping for the same area, which is shown on the bottom. As is noticed in

[30] Interviews with multiple Postal Service officials in December 2012.

the pictures, the ZIP Code groupings create large blocks with one average home value. The level of variation in each ZIP Code is unknown. The bottom picture illustrates the granularity of specific points of interest if the values are derived from points or geocodes. The UK ZIP Code equivalent area W2, for instance, has within it high value and low value areas, so the average real estate value for W2 is not very meaningful. Home buyers, businesses, and others might find a higher value in more detailed information than a ZIP Code can provide.[31]

Figure 4: Real Estate Values Grouped by ZIP Code (above) and Geocode (below)



Downtown London shown
above, then magnified below
to demonstrate additional geocode details

Source: Top Image: ft.com, 2013. Bottom Image: zoopla.co.uk, 2013

Enhancing addresses and ZIP Codes with geocoding can also have great benefits for the mail industry, since "addresses complement these technologies by providing

[31] Home prices for London grouped by the United Kingdom's equivalent to a ZIP Code can be found at http://www.ft.com/cms/s/0/06b9f73c-48f9-11e1-974a-00144feabdc0.html#axzz2OgDqrRgV. Home prices for London by geocode can be found at http://www.zoopla.co.uk/heatmaps/.

baseline information that serve to more efficiently locate places for delivering services, streamlining internal government administration, and linking physical and electronic addresses."[32] Examples from foreign posts illustrate geocoding's capacity to improve address hygiene and optimize routing of delivery services.[33] For instance, faced with an existing address structure that lacked precision and standardization, the United Kingdom's Royal Mail assigned geocodes to every delivery point. The ability to more efficiently locate places has had a big financial impact in the UK, as "research has suggested that a 1% improvement in the government's own address data would bring a €25 billion reduction in costs."[34] Ireland utilizes a 7-character GO Code that identifies any location to the accuracy of 5 square meters.[35] In South Africa, there was a mandate to understand how to deliver mail in the absence of an address structure, especially in smaller townships. The country implemented a system that assigned geocodes to delivery points and created a tool to simplify the process of complex route planning, significantly reducing the overall costs of delivery.[36]

These examples illustrate the potential geocoding brings as an enhancement to point-to-point information. This feature could be extremely useful in calculating optimized routing of delivery services, and allowing for dynamic delivery. Dynamic delivery represents a break from traditional fixed carrier routes to delivery routes that change depending on the daily volume at each delivery point, including same-day delivery services. This is a new business arena with high demand and many businesses, including Amazon, Google, and Wal-Mart, are experimenting with the delivery model currently. The Postal Service has created a same-day delivery pilot called MetroPost. This pilot program, limited to the San Francisco area, utilizes the ZIP Code first to set the boundaries of what delivery points are eligible for same day service. Then each address that has a package to be delivered is geocoded so that an optimized point-to-point route can be set. This represents yet another way that ZIP Codes and geocodes can work together to improve a product.

Geocoding could allow for faster and more widespread dynamic delivery implementation.

Although the current address system and ZIP Code are very advanced in the United States, geocoding represents an opportunity to enhance these existing systems. Combining the widely used traditional addressing and ZIP Codes systems with the more flexible abilities of geocoding may produce a whole greater than the sum of its parts. It is likely that this coupling will enable the creation of expanded uses and benefits well into the future, just as the uses of the ZIP Code have evolved since its creation.

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[32] Universal Postal Union, *Addressing the world – An address for everyone,* http://www.upu.int/fileadmin/documentsFiles/activities/addressingAssistance/paperAddressingAddressingTheWorldAnAddressForEveryoneEn.pdf.

[33] The United States. has significantly better addressing systems than most other countries, including those mentioned here; however, maintaining address quality and hygiene is still a concern for the Postal Service.

[34] James Cartledge, "Addressing the world: How geocodes could help billions start using the mail*,"* 2011, http://postandparcel.info/43564/in-depth/addressing-the-world-how-geocodes-could-help-billions-start-using-the-mail/.

[35] Go Code, http://www.gocode.ie/.

[36] IBM consultants interview with Dave Bowne, Director of Software Architecture at Address Vision, Inc. See also Serena Coetzee and Antony Cooper, "What is an address in South Africa," *South African Journal of Science*, 103, 2007.

Improve Targeting Ability for Marketing

Direct mail advertising is an ever-growing portion of the mail stream, and a key metric for direct mailers is the return on investment (ROI) for each piece of a mailing campaign. The overall goal of a mailing campaign is to achieve a greater response rate, so it is critical that the direct mail pieces are appropriately targeted to the most appropriate audience. Much of this targeting currently is done by the ZIP Code, and demographic information tied to each ZIP Code. However, improving targeting abilities would help increase the value of the mail to both senders and receivers, avoiding the connotation of "junk" mail and possibly allowing the Postal Service to provide more desired service and therefore higher value to direct mailers.

One way to identify that mail is being delivered to the desired targeted audience is to gain more information about the recipients. By linking consumer preferences and demands to their actual physical address, great value could be added, not only to the ZIP Code, but also mail in general for both recipients and senders. The Postal Service has strict privacy laws that prohibit it from selling information about its customers, but potentially recipients might want to opt-in and benefit from sharing their preferences so they could receive a larger portion of mail tailored to their interests. The value of mail to senders would increase as they would have a higher probability of connecting with interested receivers. The Postal Service could consider expanding its data gathering of the already implemented Intelligent Mail barcode (IMb) which currently allows senders to track their mail through all stages of the mail system but doesn't necessarily capture consumer demand information. Supplementing the IMb with more recipient demand information would add value to the ZIP Code. However, any informational pursuit should place individual privacy as the critical important factor to any considered solution.

The ZIP Code has frequently and successfully been used as a means to organize consumer demographic information. For example, marketing companies often send mass mailings to households in high-income ZIP Codes. This ability to communicate with a higher percentage of their target audience is valuable to companies and other organizations, and could be enhanced further. Utilizing average measures for each ZIP Code can unfortunately ignore the heterogeneity contained in each ZIP Code, as seen with the previously discussed real estate values example from Figure 4 above. The most useful way to draw demographic boundaries may be to collect and organize data by more precise clusters. A larger number of homogeneous groupings of demographic data will help raise the ROI potential for all direct mail by better matching recipients with information they desire. This variety of grouping could be done in multiple ways – by carrier route, ZIP+4's, or even geocodes.

The Postal Service has recently implemented a new saturation advertising product based on tighter clustering via carrier routes called Every Door Direct Mail (EDDM). Previously, for example, the owner of a new restaurant might send a mailing to people that live in the nearest 5-digit ZIP Codes. With EDDM, he or she can narrow the campaign to the nearest carrier routes (which also happen to be organized by ZIP Code). However, each carrier route still services up to hundreds of delivery points and that grouping is constrained by the Postal Service carrier route assignment.

An alternative opportunity to facilitate more precise grouping and increase mail value would be to create groups based on the last 4 digits of the 9-digit ZIP Code. These digits would provide smaller grouping than carrier routes as they often represent one side of a street or larger buildings.

The most precise grouping mechanism would be the use of geocodes to create tighter clusters. Geocoding allowed The Holistic Centre, an alternative health center based in Surrey, UK, to focus on areas more receptive to a particular message and save £1,000s in marketing costs. In addition to saving money, this better targeting has resulted in a 20-percent increase in business.[37]

Grouping data into more homogeneous clusters will eliminate a large portion of the "noise" in a dataset and create commensurately better analysis, leading to better hypothesis testing and predictive modeling.

Maintain the Open Platform

Innovation is driven by business needs and opportunities, whether cost-driven, revenue-seeking, or simply a matter of enduring and surviving. Openly collaborating with stakeholders by "mashing up" continues to be a valuable strategy to identify innovative opportunities to transform businesses and their assets.[38] While the closed innovation approach has worked well for some firms, the Postal Service will be better served by employing a collaborative approach to explore the opportunities to enhance and protect the ZIP Code. For example, the Postal Service could follow the "Apps for Democracy" approach and use crowdsourcing as a means of exploring additional valuable uses and enhancements for the ZIP Code. In 2008, Washington, D.C.'s Office of the Chief Technology Officer (CTO) launched an Apps for Democracy contest to solicit ideas on the best means to utilize a comprehensive catalog of school test scores, poverty indicators, real-time crime feeds and other data. The contest cost Washington, D.C. only $50,000 and resulted in the creation of 47 iPhone, Facebook, and web applications with an estimated value in excess of $2.6 million to the city."[39] Like the Office of the CTO in Washington, D.C., the Postal Service possesses a valuable asset and could realize new benefits from outside ideas for enhancing it.

As a public institution, the Postal Service has myriad stakeholders and must operate in a transparent manner. The Postal Service needs to have open systems that invite the "wisdom of crowds" to create innovative uses of its assets, such as the ZIP Code. Like other successful firms that openly collaborate and crowdsource, the Postal Service can continue to mash-up firms and industries that are

The Postal Service can best realize the full potential of its innovations by continuing the deep history of the open platform.

[37] Aligned Assets, "Geocoding," accessed January 4, 2013, http://www.aligned-assets.co.uk/solutions/geocoding.html.
[38] "Mashing up" describes a collaboration, perhaps including leading thinkers, stakeholders, businesses, developers, and end users to develop new innovative ideas.
[39] Apps for Democracy, http://www.appsfordemocracy.org.

significant consumers of the ZIP Code. The economic valuation of this paper points toward industries and firms that inherently value ZIP Code information. The Postal Service might collaborate with and engage in future mash-ups with these stakeholders to best understand the desired direction and continued evolution of the ZIP Code and geocoding technology. Furthermore, the Postal Service can collaborate with Postmasters in new neighborhoods to explore how addresses are allocated, how Postmasters interact with the public and local businesses, and what opportunities to create additional value have been identified through collaborating with local stakeholders. The future enhanced ZIP Code should continue to be a shared resource with the purpose of continually creating more uses via external and internal innovations.

Conclusion

The evolution of the ZIP Code from Robert Moon's vision to today's practical and very valuable use is telling. This innovation saved the Postal Service billions of dollars in costs, which they passed along in savings to customers. But in addition to these cost savings, the unforeseen positive externalities have been monumental and helped to reframe American economic expansion throughout the 20th century.

The ZIP Code is also an example of the phenomena of localized innovations implemented as an open system and then adopted by a wider network. The Postal Service assists the communication growth of the country through many channels. The scale and size of the Postal Service enhances the potential for great innovative successes like the ZIP Code to grow as nearly everyone in the country is affected. The Postal Service would best learn from the ZIP Code story to initiate innovative programs and expand already successful ones.

Appendix

Detailed Economic Model

Statement of Issue

The ZIP Code System (ZIP Code) can be thought of as an intangible public asset currently owned by the United States Postal Service. It has value to the Postal Service and, because it is a public asset, it has value across the broader economy. In this context, a public asset is one which is noncompetitive in use, meaning one person's use does not reduce the asset's value and does not preclude others from using it. It thus continues to be fully available for subsequent uses. To the extent that the knowledge generated by an intangible asset is noncompetitive, then there will be positive externalities generated by the asset. This means that its social value will exceed its private value and a broad measure of its value to society would be appropriate.

In considering the overall value of the ZIP Code, it is useful to enumerate the groups of "economic agents" that derive value from the ZIP Code. Note that these groups of economic agents are defined by the activities they undertake and an individual person or firm could be in more than one category. For example, consider a household that is also the sole proprietor of a small business. Depending on its actions, that household could sometimes be considered a "consumer" and at other times a "firm." Similarly, an individual firm, depending on its actions, could participate in more than one of the following four categories of users of the ZIP Code:

- The first category includes the Postal Service.[40]
- The second category includes producers that make use of the mail system and benefit from the ZIP Code for reasons other than its capacity to provide efficient postal services and lower rates. For these firms, the ZIP Code allows them to provide a better version of their mail-related product. Examples include a clothing firm that uses the ZIP Code to target the recipients of its catalogs, a direct marketing firm that uses the ZIP Code to construct customized mailings for specific groups of customers and a restaurant that uses the ZIP Code to identify where to send its advertising fliers.
- The third category includes firms for whom the use of the ZIP Code allows them to provide a better, more efficient product without major use of the mail system. Examples include a real estate firm that uses the ZIP Code to organize its listings and help it determine offering prices and an insurance company that uses the ZIP Code to determine the risk and thus set appropriate premiums for subsets of its customers.

[40] Although the first category includes just the Postal Service, the benefit of the ZIP Code does not end with the Postal Service but flows to mailers and, possibly, the general public. This flow of benefits arises because the Postal Service is a public institution which has been, at best, a break-even organization. This means there are no owners of the Postal Service to benefit from the ZIP Code and its impact shows up in the form of better service and/or lower rates.

- The last category includes those that use the ZIP Code for informational purposes other than sending mail but do not use it to provide a good or service. These users are not directly producing additional economic value through their actions; rather, they benefit through a more efficient use of their time and/or other resources. This group includes the non-profit sector, government agencies, and consumers. Examples of usage include scientists that use ZIP Codes in their research, governments that use ZIP Codes to allocate funds, nonprofit organizations that use the ZIP Code to target fundraising or households who use ZIP Codes as a locating device.

Note that the first three categories reflect what is called "value in production," because these categories relate to economic agents that use the ZIP Code when producing additional goods and services to be sold. The last category represents "value in use," because these uses of the ZIP Code generally do not lead to production of other goods and services for sale.

Methodologies for Valuing Intangible Assets

Intangible assets can be classified into three general types:[41]

1) Innovation-related intangibles, such as research and development or new products.

2) Human resource intangibles, such as the knowledge and skills embodied in a firm's workforce. This is sometimes called the firm's human capital.

3) Pure organizational intangibles, like management schemes or the ZIP Code.

Although it can be difficult in practice to value intangible assets, the theory valuing them is really no different from the theory for valuing tangible assets, like buildings. There have been four main approaches for valuing either type of asset. We introduce and briefly discuss each these main approaches below.

The Original Cost Method

This approach determines the value of an intangible asset as the original cost of acquiring or producing the asset. The original cost method has the advantage of simplicity and relatively low data requirements, but is generally considered to be the least accurate. This is because it does not reflect any current or future economic benefits associated with the intangible asset.

The Replacement Value Method

In this approach, the value of an intangible asset is identified as the cost to currently recreate that asset. The recreation exercise can be applied to either the original

[41] See Baruch Lev, *Intangibles: Management, Measurement and Reporting*, (Washington, D.C.: Brookings Institution Press, 2001).

intangible asset or to another intangible asset that is functionally equivalent. In either case, the estimated value represents what it can cost the firm to replace the asset. While the replacement value approach does recognize the current economic cost of the intangible asset, it does not account for economic benefits created by the asset.

The Capitalization Method

This method relies upon computing the discounted present value of the future economic benefits that would be created by the intangible asset. The future benefits may arise from additional revenues generated by the asset, from a reduction in cost caused by the asset or from both. One application of the capitalization method uses additional or incremental future profits to identify the economic benefit. That is, it estimates the discounted vale of any additional future profits that accrue to the firm as a result of owning the intangible asset.

The Market Value Method

This approach determines an intangible asset's value by estimating the price at which the intangible asset could be sold or licensed in the open market. It makes this estimate by examining the sales prices for similar intangible assets and inferring the value for the asset at hand. This method depends upon having market transactions for intangible assets that are sufficiently similar to the asset being investigated.

In considering which method would be best for valuing the ZIP Code, several issues arise. First, the ZIP Code was developed a long time ago, so data on the cost of its construction are not available. This fact rules out use of the original cost method. In addition, because of the unique nature of the ZIP Code, it is difficult to think of a functionally equivalent intangible asset that could be used to proxy replacement cost, ruling out that method. The uniqueness of the ZIP Code also reduces the utility of the market value method because it is unlikely that a sufficient number of similar intangible assets have been sold on the open market that would permit inferring the value of the ZIP Code.

Taken together, these considerations suggest that the capitalization method is most likely to be the best approach for valuing the ZIP Code. This is fortunate because this is generally thought to be the most theoretically sound method even if it can be difficult to calculate. This is the method we will apply to valuing the ZIP Code.

Estimating the Value of the ZIP Code for the Postal Service

In this section, we first describe, in general terms, the existing methodologies for finding the value of an intangible asset within an individual firm. We then modify the approach to make it applicable to the Postal Service.

We estimate the value of the ZIP Code using the capitalization method. Conceptually, the capitalization method attempts to estimate the economic benefit to the firm from acquiring or developing the intangible asset. Typically, that benefit is captured by the change in the firm's profits that is caused by acquiring the intangible asset.

To make the approach more concrete, we start with a mathematical expression for the discounted present value of a firm's future profits. In the following equation, we identify that discounted value as Λ. It is calculated as the difference between the firm's future revenues and its future costs. The firm's revenues are determined by the product of the firm's future prices, p_{t+j}, for *t* years from current period and product *j*, and its future volumes sold, v_{t+j}. The future volumes sold are themselves functions of the firm's price. In general, total revenue is calculated across all the firm's products, but for simplicity we will assume that the firm is selling a single product.[42] Also, to simplify the notation, we will assume that the firm has constant marginal cost, ψ_{t+j}, so the firm's total cost is just the product of that marginal cost and the firm's volume plus any fixed cost, Γ_{t+j}, that it incurs. Finally, β^j is the discount factor used to convert future profits to current values.

With this mathematical structure in place, the discounted present value of future profits can be expressed as

$$\Lambda = \sum_{j=0}^{T} \beta^j \{p_{t+j} v_{t+j}(p_{t+j}) - \psi_{t+j} v_{t+j}(p_{t+j}) - \Gamma_{t+j}\}$$

Now suppose that the firm acquires or develops an intangible asset, like the ZIP Code, which allows it to provide its products more efficiently and therefore at a lower cost. We capture this in our analytical structure by specifying a new marginal cost, $\hat{\psi}_{t+j}$, which is less than the original marginal cost. In addition, we allow for the possibility that the intangible asset may allow the firm to provide new services, s_{t+j}, such as address management, at price p^s_{t+j} and at marginal cost ψ^s_{t+j}.[43] The discounted present value of profits, after the introduction of the intangible asset is given by[44]

$$\hat{\Lambda} = \sum_{j=0}^{T} \beta^j \{p_{t+j} v_{t+j}(p_{t+j}) - \hat{\psi}_{t+j} v_{t+j}(p_{t+j}) - \Gamma_{t+j} + p^s_{t+j} s_{t+j}(p^s_{t+j}) - \psi^s_{t+j} s_{t+j}(p^s_{t+j})\}$$

The value of the intangible asset is just the difference between the two discounted profit streams. For private-sector firms, one of the important mechanisms for increasing profit is taking advantage of the cost reduction to lower the profit-maximizing price and increasing the total quantity sold. Thus, to implement the capitalization method for a

[42] Note that v_{t+j} can be thought of as the vector of the firm's products and p_{t+j} as a vector of the firm's prices without forcing any change in the approach.

[43] It is also likely that the Postal Service could use the ZIP Code in the future to enhance existing services and to thus increase the demand for its existing products, such as advertising mail. We do not include this additional benefit in our analysis because we know of no data to estimate the impact of the ZIP Code on future mail volume. If such data becomes available this additional aspect could be added. This is not to say that ZIP Code did not enhance mail volumes in the past. One could argue that the tremendous growth in workshared volume is linked directly to the existence of a numerical system that enabled presorting. In this way the ZIP Code may have been a primary contributor to expansion of total volume through worksharing.

[44] It is a possible that when a firm acquires new intangible capital, it could also incur additional new fixed costs. In the case of the ZIP Code, such cost is negligible, so we omit an additional fixed cost term from the mathematical formulation.

private-sector firm requires finding the profit-maximizing prices for both profit streams with and without the intangible asset. Once these profit-maximizing price vectors have been found, they are substituted back into the above valuation equations to find each total discounted present value.[45]

In contrast, the Postal Service is constrained from charging the profit-maximizing price by the price cap regulation that exists under the Postal Accountability and Enhancement Act (PAEA).[46] We will thus take the price vector as given by the cap. In other words, our model assumes that prices for mail products did not change due to the ZIP Code and this is indicated in the analytical model by designating the product price vector as $\bar{p}_{t+j}$.[47]

With these specifications in place, we can write the value of the ZIP Code as the discounted value of the difference between the two profit streams:

$$\hat{\Lambda} - \Lambda = \sum_{j=0}^{T} \beta^j \{\bar{p}_{t+j} v_{t+j}(\bar{p}_{t+j}) - \hat{\psi}_{t+j} v_{t+j}(\bar{p}_{t+j}) - \Gamma_{t+j} + p^s_{t+j} s_{t+j} - \psi^s_{t+j} s_{t+j}(p^s_{t+j}) - \bar{p}_{t+j} v_{t+j}(\bar{p}_{t+j}) + \psi_{t+j} v_{t+j}(\bar{p}_{t+j}) + \Gamma_{t+j}\}$$

Cancelling like terms allows us to write the expression in simpler terms:

$$\hat{\Lambda} - \Lambda = \sum_{j=0}^{T} \beta^j \{(\psi_{t+j} - \hat{\psi}_{t+j}) v_{t+j}(\bar{p}_{t+j}) + p^s_{t+j} s_{t+j} - \psi^s_{t+j} s_{t+j}(p^s_{t+j})\}$$

This equation shows that the value of the ZIP Code is the sum of the discounted cost savings and any additional profits generated by new services that the ZIP Code introduced. We can use this equation to generate an estimate of the value of the ZIP Code to the Postal Service. Because we know of no information about the amount of value of additional services that the Postal Service provides as a result of the ZIP Code, we omit that part of the value from the calculation. However we can form an estimate of the cost savings portion of the valuation.

We start that valuation by recognizing that the product of the Postal Service's marginal costs and its volume sold generates a measure called "attributable" or "volume variable" cost.[48] In our analytical model, this is given by the term $\hat{\psi}_{t+j} v_{t+j}$. Note that because the Postal Service already has the ZIP Code in place, its reported attributable cost already includes the benefit of that intangible asset. This means that to apply the capitalization

[45] The profit maximizing prices are found through solving a series of first order conditions. A complete explanation of this optimization process can be found in any advanced microeconomic theory textbook. For example, see Geoffery A. Jehle, *Advanced Microeconomic Theory* (Englewood Cliffs, NJ: Prentice Hall, 1991), p. 241.
[46] Evidence that the Postal Service has been constrained from charging the profit-maximizing price is given by the fact that the elasticity for the market dominant products are well below 1 in absolute value. A profit-maximizing monopolist will always charge a price along the elastic portion of the demand curve.
[47] Prices for postal products could change for reasons other than the ZIP Code.
[48] Technically, attributable cost is slightly larger than volume variable cost because it contains a very small amount of something called product-specific cost. However, the difference is so small it can safely be ignored. In FY 2011, volume variable cost was 99.9 percent of attributable cost.

method, we must calculate an estimate of what the attributable cost would have been in the absence of the ZIP Code. Clearly, no actual estimates of this counterfactual cost exist, but we can calculate such a measure under different possible scenarios. We do this by making use of the mathematical relationship between attributable costs with the ZIP Code in place and attributable costs without the ZIP Code. We let ρ represent the percentage reduction in attributable costs that the ZIP Code generates. Then, the mathematical relationship between attributable costs with the ZIP Code and without the ZIP Code is given by

$$\hat{\psi}_{t+j} v_{t+j} \;=\; (1-\rho)\psi_{t+j} v_{t+j}$$

This equation can be rearranged to provide an estimate of the volume variable cost without the ZIP Code, which is

$$\psi_{t+j} v_{t+j} \;=\; (1/(1-\rho))\hat{\psi}_{t+j} v_{t+j}$$

We are now ready to estimate the value of the ZIP Code through the cost savings channel. To do so, we use the following version of the capitalization equation:

$$\hat{\Lambda} - \Lambda \;=\; \sum_{j=0}^{T} \beta^{j} \left\{ \left(\left[\frac{1}{1-\rho} \right] \hat{\psi}_{t+j} - \hat{\psi}_{t+j} \right) v_{t+j} \left(\bar{p}_{t+j} \right) \right\}$$

Four additional specifications are required to use this equation to estimate the value of the ZIP Code. First, we must specify a value for the time horizon over which the value is calculated. We do so by specifying a 10-year horizon (T=9) on the basis that 10 years is a conservative guess as to how much longer the Postal Service will be using the ZIP Code. Second, we must specify the appropriate discount rate. We will the current U.S. Treasury Bond 10-year rate, which is 0.016, because it matches our time horizon.

Third, we must estimate the values for attributable cost for the next 9 years. We do this by estimating a trend equation for the fiscal year (FY) 2008 through FY 2011 period.[49] We then use that trend equation to forecast future values for attributable cost.

Our estimated trend equation is given by:

$$AC_t \;=\; \underset{(46.535)}{46{,}514.3} \;-\; \underset{(-3.996)}{1458.6} * time, R^2 \;=\; 0.89$$

This equation indicates that attributable cost has been declining by $1.46 billion per year and we use this estimated change to predict the value for attributable costs for the next nine years starting with data for FY 2011, which is the last fiscal year for which the Postal Service has calculated attributable cost. The following table provides the

[49] U.S. Postal Service, *Public Cost and Revenue Analysis Fiscal Year 2011*, http://about.usps.com/who-we-are/financials/cost-revenue-analysis-reports/fy2011.pdf.

attributable cost for the base year (Year 0 which is the FY 2011 actual value) and the forecasts for the subsequent nine years.

Table 4: FY 2011 and Estimated Future Values for Attributable Cost

Year	Attributable Cost (in millions)
0	$41.3
1	$39.8
2	$38.3
3	$36.9
4	$35.4
5	$34.0
6	$32.5
7	$31.0
8	$29.6
9	$28.1

Finally, we must estimate the percentage of attributable cost saved by the introduction of the ZIP Code. (This percentage cost saving is represented by ρ in the valuation equation.)

Cost savings might arise in a number of postal functions. For example, the ZIP Code allows for more efficient sorting of mail by automated equipment. Mail can be sorted in a logical hierarchy and, as a result, mail sorting can take place at the most efficient physical locations. The ZIP Code also facilitated the use of bar coding of mail which greatly increased sorting efficiency. The ZIP Code is a natural level of organization of carrier delivery, allowing for more efficient use of the carrier workforce and, consequently, reducing delivery costs.

The ZIP Code served as an innovative enabling structure that changed the way the mailing business was performed. Studies have been done on similar innovations and their effects on their respective industries. For example, the use of broadband compared to previously used dial-up Internet service, the more recent use of social technologies and their effects on individuals and communities, and lastly even the innovations surrounding the coffee industry over the last decade. The studies concluded that these innovative industry changing technologies caused increased value to those industries ranging from 40-75 percent.[50]

[50] Shane Greenstein and Ryan C. McDevitt, "The Broadband Bonus: Estimating Broadband Internet's Economic Value," Kellogg School of Management and Department of Economics, Northwestern University, April 2010, http://www.kellogg.northwestern.edu/faculty/greenstein/images/htm/Research/WP/Broadband%20Bonus%20-
(continued on next page)

These previous studies serve as a comparison to establish a very conservative range of values for ρ. The assumed ρ values range from a low of 3.0 percent to a high of 7.5 percent. The following table presents our estimates of the value of the ZIP Code for the range of possible cost savings, using a 10-year horizon. The annualized ZIP Code value is the benefit for the first year which is $2.2 billion.

Table 5: Estimated ZIP Code Values for Different Values of ρ

ρ	ZIP Code Value (in billions)
3.0%	$9.9
5.0%	$16.8
7.5%	$25.9

There are number of things to note about these estimates. First, they represent a lower bound on the value of the ZIP Code, because they omit any additional profit derived from new services or increases in volume of existing products that the ZIP Code may generate. In addition, it is quite likely that the Postal Service will continue to use the ZIP Code beyond a 10-year horizon. If additional years are included, then the estimated valuation would rise substantially under the capitalization method.

Second, although these calculations are designed to estimate the value of the ZIP Code for the Postal Service, in reality the benefits likely flow to many sectors of society and affect multitudes of stakeholders. The Postal Service is a public institution which does not have owners or shareholders, the estimated value of the ZIP Code represents the value of the resources the broader economy saves in having ready access to postal services. In other words, without the ZIP Code the discounted present value of the additional cost to the economy of providing postal services over the next 10 years would be between $9.9 billion and $25.9 billion.

Estimating the Value of the ZIP Code for Firms that Use the ZIP Code to Enhance their Mail-related Products

Economic agents in this group use the ZIP Code to provide a better version of their own mail-related product. In other words, they use the ZIP Code as an input into their production process and in this way, the ZIP Code contributes to the value added they

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%20GreensteinMcDevitt-4.pdf, pp. 43-44; McKinsey Global Institute, "The Social Economy: Unlocking value and productivity through social technologies," July 2012, http://www.mckinsey.com/~/media/McKinsey/dotcom/Insights%20and%20pubs/MGI/Research/Technology%20and%20Innovation/The%20social%20economy/MGI_The_social_economy_Full_report.ashx, pp. 11-12; and Bain and Company, "The Great Eight: Trillion-Dollar Growth Trends to 2020," 2011, http://www.bain.com/Images/BAIN_BRIEF_8MacroTrends.pdf, p. 35.

provide. For example, the ZIP Code is probably the most recognized geography known to marketers.[51]

Knowledge of geographic distribution of a firm's customers may allow it to better design systems to service those customers. Moreover, the ZIP Code provides more than geographic information. This is because people who live within a ZIP Code share common associations.[52] To analyze this additional source of value, we must therefore look within these industries or sectors of the economy that benefit from the ZIP Code.

We start by representing those sectors symbolically through specifying their production functions. We employ a widely used production function of the Cobb-Douglas type. For a given industry, such a production function would look like:

$$Y_i = A_i K_i^{\alpha_{1i}} N_i^{\alpha_{2i}} H_i^{\alpha_{3i}} R_i^{\alpha_{4i}} Z_i^{\alpha_{5i}}$$

where:

- Y is industry value added or GDP
- A is productivity
- K is physical capital
- N is labor
- H is human capital
- R is natural resources
- Z is ZIP Code

Under conditions of constant returns ($\sum_{j=1}^{5} \alpha_{ji} = 1$), each input's exponent represents it share of the sector's value added. This means the share of value added attributed to the ZIP Code is given by α_{5i}. We can use this parameter to calculate the level of the sector-specific valued added that the ZIP Code creates as it is given by the product of the total sector value added and the ZIP Code's share. Mathematically, this is given by $Y_i * \alpha_{5i}$.

Collecting the data necessary to estimate industry-specific product functions is beyond the scope of this paper, but we can identify relevant sectors and their use of postal services in order to make some rough estimates of how much value the ZIP Code provides. Specifically, we can estimate α_{5i} for each industry by recognizing that it can be approximated by the product of two terms. Those terms are the proportion of value added attributed to all postal services, λ_i and the proportion of postal service value created by the ZIP Code, σ_i. In other words

$$\alpha_{5i} = \lambda_i * \sigma_i$$

This means we can calculate the annual value added due to the ZIP Code as:

$$Y_i^{ZCS} = \lambda_i * \sigma_i * Y_i$$

[51] Wendy Cobrda, "Zip Codes and Beyond," *American Demographics*, March/April 1995, pp. 6-9.
[52] Thomas J. Steenburgh, Andrew Ainslie, and Peder Hans Engebertson, "Massively Categorical Variables: Revealing the Information in ZIP Codes," *Marketing Science*, Vol. 22, No.1 (Winter 2003), pp. 40-57.

The U.S Department of Commerce Bureau of Economic Analysis (BEA) uses a national benchmark input-output model to estimate how much of the economy's inputs various sectors use in their production of other goods and services. For example, some postal services are used in the production of other goods and some postal services are used by final consumers. The BEA's national input-output model estimates this split.

Table 6 illustrates various sectors' use of postal services. Note that it includes both the use in production and final consumption. The latter measured is identified as "Personal Consumption Expenditures." The table provides both the dollar value of uses by sector as well as the percentage of overall postal services provided to the whole economy.

Table 6: Distribution of the Uses of Postal Services by Economic Sector

Economic Sector	Use (in millions)	Proportion of Total
Agricultural and Food Processing	$64.2	0.1%
Mining, Manufacturing, Energy Production and Construction	$1,497.8	2.3%
Wholesale trade	$7,154.1	10.8%
Transportation, Couriers and Warehousing	$10,170.8	15.3%
Retail trade	$6,521.2	9.8%
Publishing, Music, Software, and Video Publishing	$2,080.4	3.1%
Telecommunications, Internet and other Information Services	$1,177.1	1.8%
Financial, Banking, Insurance and Real Estate	$2,814.2	4.2%
Professional, Management, and Technical Services	$5,092.5	7.7%
Educational Services	$820.0	1.2%
Medical, Family and Child Care Services	$4,706.1	7.1%
Entertainment, Hotel and Recreational Services	$4,825.2	7.3%
Food Services and Drinking Places	$4,838.6	7.3%
Commercial and Personal Care Services	$808.7	1.2%
Religious and Other Non-profits	$1,191.3	1.8%
Personal Consumption Expenditures	$7,913.8	11.9%
Exports of Goods and Services	$237.6	0.4%
Federal State and Local Government Services	$4,587.2	6.9%
Total	**$66,500.8**	**100.0%**

Source: Bureau of Economic Analysis (BEA) 2002

Unfortunately, the most recent benchmark for the BEA national input-output model is 2002. The last Economic Census was taken in 2007 and the results were processed by 2010, but the BEA has yet to update its input-output model for this data. Note that the $66.5 billion in postal "uses" matches the $66.5 billion in postal revenues the Postal Service earned in 2002. For example, BEA estimates that that households' final

consumption of postal services was $7.9 billion in 2002. This represents about 12 percent of postal services.

Sectors that make heavy use of postal services include wholesale trade, retail trade, medical care, food services, entertainment, hotel services, transportation, couriers, and warehousing.

Note that not all industries that are heavy users of postal service will be in this group. A firm might be a heavy mail user but not use the ZIP Code to enhance its own mail-related product.

Identifying a complete enumeration of the industries included in this group is beyond the scope of this paper, but a number of important industries can be identified. For each of the industries in this category, we can estimate the value of the ZIP Code in a two-step process. First, we use the 2002 BEA data to calculate the proportion of the sector's inputs devoted to postal services.[53] We use that proportion as our proxy for λ_i.

Table 7: Calculation of Estimated Proportion of Inputs in Postal Services (λ_i)

Industry or Sector	2002 Use (in millions)	2002 Total Input	Estimated Proportion of Inputs in Postal Services (λ_i)
Transportation, Couriers, and Warehousing	$10,170.8	$476,315	2.1%
Entertainment, Hotel and Recreational Services	$4,825.2	$295,645	1.6%
Food services and drinking places	$4,838.6	$364,996	1.3%
Wholesale trade	$7,154.1	$753,362	0.9%
Publishing, Music, Software, and Video Publishing	$2,080.4	$249,526	0.8%
Retail trade	$6,521.2	$858,963	0.8%
Medical, Family, and Child Care Services	$4,706.1	$1,031,811	0.5%
Educational Services	$820.0	$142,056	0.6%

If we multiply our estimate of λ_i by the sector's 2010 value added from the BEA, we have a more current estimate of the contribution to value added for all postal services.

To get the proportion of value added associated with the ZIP Code, we must multiply the postal service value added by the proportion of postal value added accounted for by the ZIP Code. We are unaware of any estimates of this ratio and collecting the raw data to calculate it is beyond the scope of this paper. Thus, we will use an estimated value of

[53] This proportion is found by taking each sector's Postal Service input and dividing it by the sector's total inputs.

5 percent again with the studied effects from innovative industry breakthroughs as a basis.[54]

Table 8: Estimate of ZIP Code's Value Added for Important Postal-Using Sectors

Industry or Sector	Estimated Proportion of Inputs in Postal Services (λ_i)	2010 Value Added (in millions)	Estimated Postal Value Added (in millions)	Estimated ZIP Code Value Added (in millions)
Transportation, Couriers, and Warehousing	2.1%	$402,524	$8,595	$430
Entertainment, Hotel and Recreational Services	1.6%	$139,112	$2,270	$114
Food services and drinking places	1.3%	$416,693	$5,524	$276
Wholesale trade	0.9%	$797,348	$7,572	$379
Publishing, Music, Software, and Video Publishing	0.8%	$623,472	$5,198	$260
Retail trade	0.8%	$884,877	$6,718	$336
Medical, Family, and Child Care Services	0.5%	$1,109,187	$5,059	$253
Educational Services	0.6%	$163,101	$941	$47
Total		**$4,536,314**		**$2,094**

The total annual estimated ZIP Code value added for all of these important sectors is about $2.1 billion. This does not represent the total discounted net present value of the ZIP Code. As an intangible asset, that value must be calculated using one of the methods described above. As with finding the value for the Postal Service, we will employ the capitalization method. That is we will take the expected stream of value added created over the next 10 years for the category and discount that to the present.

In other words, we will use the following formula to estimate the value of the ZIP Code for this group of economic agents, Φ_2:

$$\Phi_2 = \sum_{j=0}^{10} \beta^j \{Y_{2,t+j}^{ZCS}\}$$

Note that $Y_{2,t}^{ZCS}$ is the value added created by the ZIP Code for this group in year "t." As we don't know the values for this quantity over the next 10 years, we will assume a

[54] Greenstein and McDevitt, http://www.kellogg.northwestern.edu/faculty/greenstein/images/htm/Research/WP/Broadband%20Bonus%20-%20GreensteinMcDevitt-4.pdf, pp. 43-44; McKinsey Global Institute, http://www.mckinsey.com/~/media/McKinsey/dotcom/Insights%20and%20pubs/MGI/Research/Technology%20and%20Innovation/The%20social%20economy/MGI_The_social_economy_Full_report.ashx, pp. 11-12; and Bain and Company, http://www.bain.com/Images/BAIN_BRIEF_8MacroTrends.pdf, p. 35.

conservative 2 percent growth rate. Finally, as before, we will assume a discount rate of 1.6 percent, which is the current U.S. Treasury Bond 10-year rate. Applying this formula provides an estimate of $21.3 billion for the value of the ZIP Code for firms that use it to enhance their mail-related products.

Estimating the Value of the ZIP Code for Firms that Use the ZIP Code to Enhance their Non-mail-related Products

Firms in this group are not major mail users but still use the ZIP Code to provide a better, more efficient product. For example, insurance companies use ZIP Codes in determining insurance offerings and rates and real estate companies use ZIP Codes in preparing their listings. Additionally, engineering, consulting, and technical services use ZIP Codes to organize data instrumental to their industries. Identifying a complete list of sectors that fit into this group is beyond the scope of the paper but two major Census Department defined sectors are the Professional, Management, and Technical services sector and Financial, Banking, Insurance and Real Estate sector.

The approach to calculating value added for these firms is similar to the approach used for firms that use the ZIP Code to enhance their mail-related projects. The primary difference is that the calculation does not directly depend upon identifying the proportion of postal services that the firms use, because the product enhancement does not directly depend upon a mailing. This means the formula used to calculate the annual value added due to the ZIP Code is

$$Y_i^{ZCS} = \alpha_{5i} * Y_i$$

While that would seem to be a simplification compared with the previous group, it actually highlights a limitation of existing data. Without launching a field survey, we have no data on the contribution of the ZIP Code to value added for firms and thus we have no direct measure of the required proportion, α_{5i}. However, we can calculate the average percentage of value added attributable to the ZIP Code in the previous group. This is calculated by dividing the estimated annual ZIP Code added value of $2.094 billion by the total added value of $4.536 trillion to get the average percentage of value added attributable to the ZIP Code of 0.0005. In the absence of an alternative figure, we apply this average to the two non-mail-related sectors that we identified. Table 9 presents the two sectors we are examining along with their 2010 value added from the Bureau of Economic Analysis and the computed value added due to the ZIP Code.

Table 9: Estimate of ZIP Code's Value Added for Important Non-Mail-Related Sectors

Industry or Sector	2010 Value Added (in millions)	Estimated ZIP Code Value Added Proportion	Estimated ZIP Code Value Added (in millions)
Professional, Management, and Technical Services	$1,782,837	0.0005	$891
Financial, Banking, Insurance, and Real Estate	$3,007,185	0.0005	$1,504
Total	**$4,790,022**		**$2,395**

This approach produces an annual contribution to value added by the ZIP Code of $2.4 billion. It does not represent the total discounted net present value of the ZIP Code. As an intangible asset, that value must be calculated using one of the methods described above. As with the previous two groups, we will use the capitalization method to estimate the value of the ZIP Code for firms that use the ZIP Code to enhance their non-mail-related products, ϕ_3. It is calculated through the following formula:

$$\phi_3 = \sum_{j=0}^{10} \beta^j \{Y_{3,t+j}^{ZCS}\}$$

Applying this formula provides an estimated value of the ZIP Code in this group of $24.4 billion.

Estimating the Value of the ZIP Code for Consumers, Governments, and Nonprofit Organizations

Economic agents in this last group are not directly producing additional economic value using the ZIP Code but benefit through a more efficient use of their time and/or other resources. For example, nonprofit organizations use the ZIP Code to more efficiently solicit donations.[55]

Similarly, federal, state, and local government make use of ZIP Codes in carrying out their functions. For example, the federal government makes extensive use of the ZIP Code in both collecting and disseminating the information contained in the decennial census. Finally, consumers make use of ZIP Codes for a variety of functions such as use as identification for debit and credit card transactions and use as a search tool for find commercial and retail establishments.

Calculating the economic value for the first two sub-groups of final users of the ZIP Code — nonprofit organizations and government agencies — can make use of methods

[55] Michael Sexauer and Mildred S. Myers, "The Value of a Zip Code," *Nonprofit World*, Vol. 30, No. 4 (July/Aug 2012), pp. 8-10.

similar to what we applied above. These methods, however, are not directly applicable to the third sub-group, consumers. This is because consumers use the ZIP Code as a time-saving device, and thus a formula for calculating its value requires not only an estimate of the amount of time consumers use the ZIP Code (for reasons other than mailing letters) but also the total time they use in broader consumer activities in which the use of the ZIP Code takes place (like using credit cards or searching for residents). To our knowledge, there are no measures of the time consumers use the ZIP Code for purposes other than mailing so it is not possible to calculate an estimate of the resulting economic value to consumers.

We can calculate estimates for the other two sub-groups, however. The nonprofit sector uses the ZIP Code to target potential donors and can thus increase the efficiency of their fundraising efforts. The value of the ZIP Code to these organizations is that it frees resources from fundraising and allows them to be applied to the organizations' goals. Data from the BEA indicates that just under 1 percent (0.0074) of nonprofits' inputs were made up of postal services. Given the importance of targeting donors, it is likely that the ZIP Code substantially reduces the cost of reaching a specific fundraising goal; to reflect this, we are going to assume that the amount the ZIP Code saves the nonprofit sector equals 25 percent of its postal resources. Combining these two numbers provides an overall annual savings, as shown in the following table.

We have less information about government agencies' usage of the ZIP Code in carrying out their duties but suspect that the ZIP Code does permit them to save resources in ways similar to those in the private sector proportion of 0.0019. However, without any specific information, we propose taking a conservative approach and assume that the ZIP Code allows governments to save an amount equal to one-tenth of 1 percent of their expenditures.[56]

Table 10: Government and Nonprofit ZIP Code Resource Savings

Industry or Sector	2010 Resource Consumption (in millions)	Estimated ZIP Code Resource Savings	Estimated ZIP Code Resource Savings (in millions)
Nonprofit Institutions	$723,300	0.0019	$1,338
Federal Government	$468,500	0.0010	$469
State and Local Government	$1,067,700	0.0010	$1,068
Total	**$2,259,500**		**$2,874**

Source: Bureau of Economic Analysis (BEA) 2010 for resource consumption

The final step is to turn these annual economic benefits in to a single capitalized value. We apply the same method as used before, with one exception. Because the nonprofit

[56] Note that these government spending figures include expenditures on resources like labor or energy and do not include transfers.

and government sectors have been growing faster than the economy, we use a 3-percent growth rate for them. With the growth rate in place, the formula for calculating the economic benefit is similar to the one used above where "Z," the annual resource savings, replaces the value added used for the previous two groups:

$$\phi_4 = \sum_{j=0}^{10} \beta^j \{Z_{4,t+j}^{ZCS}\}$$

Applying this formula provides an estimated value of the ZIP Code in this group of $30.6 billion.