Iowa Department of REVENUE

Iowa's High Quality Jobs Program

Tax Credits Program Evaluation Study

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Preface

During the 2005 Legislative Session the Iowa Department of Revenue received an appropriation to establish the Tax Credits Tracking and Analysis Program to track tax credit awards and claims. In addition, the Department was directed to assist the legislature by performing periodic economic studies of tax credit programs. This is the first evaluation study completed for the Iowa High Quality Jobs Program.

As part of the evaluation, an advisory panel was convened to provide input and advice on the study's scope and analysis. We wish to thank the members of the panel:

Paul Stueckradt	Iowa Economic Development Authority
Pat Callan	Iowa Workforce Development
Jeff Smith	formerly Iowa Taxpayers Association
Peter Orazem	Iowa State University
Nicolas Ziebarth	University of Iowa
Luciano de Castro	University of Iowa
Elliott Smith	formerly Iowa Business Council

The assistance of an advisory panel implies no responsibility for the content and conclusions of the evaluation study.

This report was also reviewed by Angela Gullickson and Amy Rehder Harris. This study and other evaluations of Iowa tax credits can be found on the Tax Credits Tracking and Analysis Program Web page on the Iowa Department of Revenue website.

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Executive Summary

The High Quality Jobs Program (HQJ) was enacted in tax year 2005. The program was established to promote businesses investment and employment in Iowa. The Iowa Economic Development Authority (IEDA) works with businesses interested in making capital investments in Iowa with the intent of either creating or retaining high-quality jobs to determine whether those businesses could qualify for benefits under HQJ. If approved, IEDA signs a contract with the business and monitors the agreement over a five year period to ensure contract terms and conditions are met.

The HQJ program provides several tax incentives and direct financial assistance including a nonrefundable Investment Tax Credit, a Sales and Use Tax refund of taxes paid during construction, a Supplemental Research Activities Tax Credit, and forgivable loans offered by IEDA. Awards made under the High Quality Jobs Program were capped at $130 million per year between fiscal year 2012 and 2016, but that cap has been lowered to $105 million during fiscal years 2017 through 2021.

The main findings of the evaluation study are the following:

Economic Development Programs Available in Other States

- Iowa's neighboring states and four additional Midwest and Southern states are considered direct competitors for business investments: Illinois, Indiana, Kansas, Kentucky, Minnesota, Missouri, Nebraska, South Dakota, Texas, and Wisconsin.

- Programs in Indiana and Wisconsin have no job requirements; Iowa allows projects with no jobs or only retained jobs and Kansas has only wage requirements; all other states require at least two new jobs to qualify for benefits.

- Among these states, only Iowa ($105 million) and Indiana ($50 million) have in place a total award cap to limit the amount of business tax incentives that can be awarded in a year.

- Iowa is the only state where the business tax incentives include a refundable Supplemental Research Activities Tax Credit. However, many of these competing states have tax credits for research and development activities separate from the economic development program.

- For states without income taxes, South Dakota and Texas, economic development programs provide sales and use tax refunds, property tax incentives, loan, or grants for businesses investing in their states.

- Among the eleven states' programs considered, only Iowa and Nebraska have clawback provisions.

High Quality Jobs Program Awards

- Between fiscal years 2005 and 2016, 463 projects were approved for $1.2 billion in incentives under the High Quality Jobs Program. Approved awards peaked at $253.8 million in 2007, before the program was capped. Many projects are terminated by the business or the State before tax credits are awarded if it is determined the pledged investment or jobs are not possible.

- Based on approved incentives between fiscal years 2005 and 2016, there are 373 current valid High Quality Jobs Program awards with pledged investment of $19.5 billion and 12,837 new jobs in Iowa. These include projects that have been successfully completed or are still in progress.

- These 373 awards accounted for $770.9 million of HQJ incentives, including $435.6 million of Investment Tax Credits, $203.9 million of sales and use tax refunds, $92.0 million of Supplemental Research Activities Tax Credit, and $39.3 million of direct funding assistance.

- In fiscal year 2016, among 51 awarded HQJ projects, 33 were awarded for the expansion of existing Iowa businesses with both created and retained jobs, 7 were preventing businesses from leaving Iowa with only retained jobs, and 11 were likely for new businesses to Iowa with only created jobs.

- Manufacturing businesses accounted for more than half of the promised investment and 58.6 percent of the current valid HQJ awards.

- More than 40% of awards are concentrated among businesses promising between $500,000 and $10 million in investment and 16 or more jobs and businesses promising over $10 million in investment and more than 100 jobs.

High Quality Jobs Program Tax Credit Claims

- Between tax years 2005 and 2014, $154.5 million of HQJ tax incentives have been claimed, including $77.1 million of Investment Tax Credits, $39.1 million of sales and use tax refunds, and $38.3 million of Supplemental Research Activities Tax Credits.

- Of the total incentives claimed, 59.6 percent were against the corporation income tax, 25.3 percent were against the sales and use tax, and 14.3 percent were against the individual income tax.

- Claims associated with businesses in the manufacturing industry accounted for more than 70 percent of all HQJ claims, exceeding $108.8 million.

- For valid HQJ awards issued between fiscal years 2005 and 2010, about $115.4 million (59.2%) of HQJ tax incentives have been claimed, out of $195.0 million in total awards. For HQJ awards issued in fiscal years 2011 and beyond, few claims have been made as awarded businesses will make claims over the next few years.

Economic Analysis of High Quality Jobs Program Outcomes

- Economic analysis suggests that businesses are likely to seek a greater HQJ tax incentive package from an Iowa county if the county has a disadvantage related to key factors such as infrastructure and labor pool compared to its competitors. The finding is indirect evidence that the HQJ program functions as a marginal incentive driving location decisions, rather than simply a bonus to businesses.

- Comparing economic outcomes in Iowa cities which had HQJ projects approved between 2005 and 2008 and Iowa cities which only had HQJ projects approved after 2012, it is estimated that those early HQJ projects increased employment growth rates and wage growth rates between 2009 and 2014.

I. Introduction

The Iowa High Quality Jobs (HQJ) Program provides qualifying businesses tax credits and direct financial assistance to encourage those businesses to locate, expand or modernize a facility in Iowa. The Iowa Economic Development Authority (IEDA) works with businesses interested in making capital investments in Iowa with the intent of either creating or retaining high-quality jobs to determine whether those businesses could qualify for benefits under HQJ. If approved, IEDA signs a contract with the business and monitors the agreement over a five year period to ensure contract terms and conditions are met.

The purpose of this evaluation study is to analyze tax data and other pertinent information in order to assess the HQJ program in terms of its utilization and economic impact. This evaluation study is the Iowa Department of Revenue's (IDR) first completed on the HQJ program.

Section II describes the program. A selection of other states' similar income tax credit programs promoting job creation are introduced in Section III. Related literature on development tax incentive programs are discussed in Section IV. Section V provides descriptive statistics of HQJ tax incentives awards and claims. Section VI discusses economic analysis of the impacts of the HQJ tax incentives on business investment and the local economy. The technical details are discussed in the Appendix. The study concludes in Section VII.

II. High Quality Jobs Program Description

The HQJ program was enacted in 2005 to replace the New Jobs and Income Program (NJIP) which was created in 1994.[1] The program provides various forms of tax incentives to eligible businesses that meet certain job creation and capital investment requirements. HQJ is administered by the Iowa Economic Development Authority. Businesses interested in making capital investments in Iowa with the intent of either creating or retaining high-quality jobs must apply to IEDA to be considered for an award prior to the beginning of the project. IEDA negotiates an incentive package under the rules of program. If the investment is over $10 million, the investment project must be approved by the local community where the business plans to undertake the project before negotiations with IEDA are completed. The proposed incentives, business activities, and local support are compiled into a project report which is presented to the IEDA Board for approval. If the approval is granted, the business must sign a contract with IEDA specifying the incentives offered by the State in anticipation of the investment completed and jobs created or retained by the business over the next three years, the performance period specified under the program. Unlike every other State tax credit

[1] The program is established in Iowa Code chapter 15, part 13, Sections 15.326 through 15.337. The administrative rules for the program are found at 261 IAC 68.

program where tax credits are only awarded after the incentivized activity is completed, applicants under HQJ are allowed to claim tax credits during the performance of that investment and job creation. The business must also maintain those jobs during the two years following the project completion, the maintenance period specified under the program.

To be eligible for the tax incentives and financial assistance available under HQJ, the business must meet high-quality job creation or job retention requirements, where jobs are considered high-quality by meeting specified wage thresholds and benefit levels. The qualifying wage threshold equals the laborshed wage estimated for the geographic area surrounding the employment center in which the business is locating or expanding. Iowa Workforce Development (IWD) determines the employment centers and defines the boundaries of each laborshed area. The tax incentives are contractually tied to the job requirements and the business must meet them in order to retain all of the awarded incentives. Eligible businesses must demonstrate that they have not closed or substantially reduced operations in another area of the state. The business cannot be a retail business, a business that levies a cover charge for entrance or has a membership requirement, or a service business with a consumer market that does not have a significant portion of sales from outside of Iowa.

If the business is creating jobs, all created jobs must pay 100 percent of the qualifying wage threshold at the start of the project, at least 120 percent by the end of the project performance period, and at least 120 percent during the maintenance period. If the business is retaining jobs, the requirement is those jobs pay 120 percent of the qualifying wage threshold at all times during the contract period. A business locating in a brownfield or grayfield site or in an economically distressed area may be awarded incentives for jobs that will pay less than 120 percent of the qualifying wage threshold. The business must also provide a sufficient benefits package to all full-time employees that includes at least one of the following: 80 percent of medical premiums for single coverage plans, 50 percent of medical premiums for family coverage plans, or some level of medical and dental coverage and provides the monetary equivalent value through other employee benefits.

Since fiscal year 2012 HQJ awards can include direct financial assistance, including loans and forgivable loans. The tax incentives available under the HQJ program since its inception are the focus of this study.

- Investment Tax Credit (ITC): This is an income tax credit equal to a maximum of 1 to 10 percent of the new qualifying investment directly related to jobs created or retained by the business' project. Qualifying investment means a capital investment in real property including the purchase price of land, existing buildings and structures; site preparation; improvements to real property; building construction and long-term lease costs. It also includes capital investment in depreciable assets. The maximum credit percentage depends on the amount of pledged investment and jobs (see Table 1). The ITC is nonrefundable, nontransferable, and amortized equally over five years, which means the tax

credit cannot reduce tax liability below zero in any year of claim, it cannot be sold to another taxpayer, and at most one-fifth of the award can be claimed in each of the five years of the project. Any credits not used in the first year of claim can be carried forward for seven tax years or until used, whichever is earlier. Beginning in fiscal year 2006, a limited refundable ITC was available, allowing IEDA to award up to $4 million per fiscal year for businesses engaged in value-added agricultural products or biotechnology-related processes; that credit is no longer available. The ITC can be claimed against individual income, corporation income, insurance premium, franchise, and moneys and credits tax. If the participating business is organized as a pass-through entity, the claims for the ITC will be made by shareholders based on their ownership share of the business.

- Supplemental Research Activities Tax Credit (SRAC): If the eligible business is increasing research and development activities in the state and eligible to claim the Research Activities Tax Credit (RAC), the business may be eligible for a supplemental tax credit during the period the eligible business is participating in the HQJ program. The SRAC is refundable which means if the claim exceeds tax liability, the taxpayer receives that amount of the tax credit as a refund from the State. The award is based on the estimated amount of research that the business will conduct during the five years covered by the contract. Claims to the tax credit in any tax year are a function of incremental qualifying research expenditures in that year and the business's gross revenues. Companies with annual gross revenues exceeding $20 million can claim a credit just under 50 percent of their RAC; companies with annual gross revenues of $20 million or less can claim a credit that more than doubles their RAC. The SRAC can only be claimed against individual income and corporation income tax. If the participating business is organized as a pass-through entity, the claims for the SRAC will be made by shareholders based on their ownership share of the business.
- Sales and Use Tax Refund: A sales and use tax refund may be awarded for taxes paid on gas, electricity, water, or sewer utility services, goods, wares, or merchandise, or on certain services related to the investment in construction or equipping of the facility covered under the HQJ contract. Sales and use refund awards are typically based on the assumption that roughly one-half of the qualifying investment will be subject to sales and use taxes. For distribution center projects, a refund of sales and use taxes paid on racks, shelving, and conveyor equipment can also be awarded, but claims for those refunds are limited to $500,000 per fiscal year.
- Corporation Income Tax Credit for Third Party Sales Tax: This is an income tax credit awarded for sales taxes paid by certain third-party developers on gas, electricity, water, or sewer utility services, goods, wares, or merchandise, or on certain services related to the construction or equipping of the business' facility. This credit is awarded as an alternative to a sales and use tax refund when the participating business is not building the facility, but instead will lease the new facility. Because this business would not have paid any of the sales tax during the construction of the facility, the business is instead awarded an income tax credit that equals the taxes paid by the lessor. The income tax credit is

refundable and can be claimed against corporation income, insurance premium, franchise, and moneys and credits tax.

- Value-added Property Tax Exemption: The participating local community may exempt all, or a portion, of the actual value added by improvements to real property from property taxation directly related to the new jobs created by the project. The exemption cannot exceed 20 years from the year the improvements are first assessed for taxation.

The program was initially called the High Quality Job Creation Program and required businesses to create new jobs in order to be eligible. Effective July 1, 2009, the program was renamed by dropping “Creation” and retained jobs were included as qualifying toward high-quality jobs. At that time, a cumulative tax credit cap of $185 million per fiscal year was also established for certain tax credits awarded by IEDA, including those awarded under the HQJ program. IEDA also has the ability to award 20 percent of next year’s cap in advance so that it has the flexibility to negotiate for large projects. Facing a tight State budget, the IEDA cap was reduced to $120 million per fiscal year on July 1, 2010. In addition, the provision that allowed up to $4 million of refundable Investment Tax Credits awards per fiscal year for projects involving value-added agricultural products or biotechnology-related processes was repealed effective on April 15, 2010. Effective July 1, 2012, the IEDA cap was increased to $170 million per fiscal year. Subtracting the four other tax credit programs currently included under the IEDA cap that can award at most $40 million per fiscal year leaves $130 million in available awards for HQJ. During the 2016 Legislative session, the award cap for HQJ was temporarily reduced by $25 million per year to offset the creation of the Renewable Chemical Production Tax Credit, allowing only $105 million in HQJ awards during fiscal years 2017 through 2021.

The maximum ITC rates are established by Iowa Code, but IEDA can negotiate with a business and award tax incentives below the maximum levels (IEDA, 2016). Actual award amounts are based on the business's level of need, the quality of the jobs, the percentage of created or retained jobs defined as high-quality, and the economic impact of the project. The economic impact is based on estimates of the contribution to State revenues resulting from the created or retained jobs. IEDA uses a model to estimate a proposed project’s contributions to State revenues measured as the Fiscal Impact Ratio (FIR). “Fiscal impact ratio” is defined in the Iowa Code as a ratio calculated by estimating the amount of taxes to be received from a business by the State and dividing the estimate by the estimated cost to the State of providing certain project completion assistance and tax incentives to the business, reflecting a ten-year period and expressed in terms of current dollars. Projects with a FIR greater than one suggests that the State revenues attributed to the project over the following ten years exceed the expected costs of the incentives.

Once a contract is signed, IEDA monitors the progress of each project during the performance period and the maintenance period. If IEDA determines that the business has not met the terms of the contract, the business can be placed into default with a

warning that incentives will be recaptured if the business does not make adjustments to meet those terms. If the business cannot cure the shortfall in either jobs or investment, IEDA determines the share of incentives that must be repaid and notifies the Iowa Department of Revenue (IDR) about the default. IDR then bills the taxpayers who have made tax credit claims or refund claims under that contract, where a full 100% default would require full repayment.

III. Economic Development Programs Available in Other States

Every state has some kind of economic development program that offer tax credits to businesses to invest in the state and create jobs. To narrow down the comparison of tax credit programs across states, only those tax incentive programs offered by Iowa's neighboring states and additional states which IEDA considers direct competitors for business investments are discussed. These include the ten states of Illinois, Indiana, Kansas, Kentucky, Minnesota, Missouri, Nebraska, South Dakota, Texas, and Wisconsin (see Table 2).

The list includes Iowa's six neighboring states, two additional Midwestern states, and two southern states. Among these ten states and Iowa, only two states limit the eligible geographic areas of the program. Minnesota's Greater Minnesota Job Expansion Program can only be awarded to businesses locating in rural areas. Texas's Enterprise Zone program only applies in designated enterprise zones. Programs from the other nine states can be applied to businesses located statewide. Only Iowa and Indiana have a total award cap in place, $105 million and $50 million, to limit the amount of tax incentives that can be awarded in a year.

Minnesota, Missouri, and Texas have no requirement on the industry of the participating businesses. The other states typically do not allow retail businesses to participate in their programs. Six states require businesses to create a minimum number of jobs to be eligible for tax incentives; Iowa, Indiana, Kansas, South Dakota, and Wisconsin do not require a minimum number of new jobs to be created by the business. Iowa and Kansas require the wages of created jobs to exceed certain wage levels; wage requirements are not universal in the programs offered by the other seven states. Programs in Illinois, Iowa, Missouri, and Nebraska have minimum investment provisions for business projects to be eligible for the tax incentives; the other states have no investment floor.

Programs in South Dakota, Minnesota, and Texas do not include any type of investment tax credit and the second two only include a sales and use tax refund as a tax incentive. Illinois's program calculates the investment tax credit award as a percentage of the payroll taxes paid to the State for related new jobs. The investment tax credit under the Kentucky Investment Fund Tax Credit allows the business to claim a tax credit equal to 100 percent of tax liability generated as a result of the awarded project. Wisconsin's Business Development Credit program offers an investment tax credit equal to 7.5 percent of qualified income generated by the awarded project. The other six states with

investment tax credits determine the award amount as a percentage of qualified investment.

Iowa, Kansas, Minnesota, Nebraska, and Texas provide sales and use tax refunds or exemptions to businesses participating in their economic development tax incentive programs. Iowa's HQJ program uniquely offers additional research and development tax credits; six other states have research and development tax credits separate from its economic development program. Among all eleven state's economic development programs, only Iowa and Nebraska have clawback provisions. Only Iowa offers a refundable tax credit as part of its program. Minnesota, Texas, and Wisconsin do not allow the unclaimed investment tax credits to be carried forward. Other states permit businesses to carry forward unused tax credits between 5 and 16 years. None of the states offering investment tax credits allow those to be sold to another taxpayer.

Among Iowa's neighboring states, Nebraska has a complex business incentive program titled the Nebraska Advantage Act. The program categorizes businesses into six tiers based on investment and projected job creation:

- Tier 1: $1 million new investment and 10 new jobs;
- Tier 2: $3 million new investment and 30 new jobs;
- Tier 3: 30 new jobs;
- Tier 4: $10 million new investment and 100 new jobs;
- Tier 5: $30 million new investment;
- Tier 6: $10 million new investment and 75 new jobs, or $100 million new investment and 50 new jobs.

Businesses in Tier 1 can claim an investment tax credit equal to three percent of the investment. Businesses in Tier 2 or Tier 4 can claim an investment tax credit equal to ten percent of investment, a refund of the sales tax paid on qualified capital purchases, and a property tax exemption. Tier 5 businesses can claim a refund of sales tax paid for qualified capital purchases and a property tax exemption. For businesses in Tier 6, the investment tax credit rate is 15 percent. Businesses in Tier 6 may also be eligible for a refund of the sales tax paid on qualified capital purchases and a property tax exemption.

The Illinois Economic Development for a Growing Economy (EDGE) Program offers a business a negotiable tax credit for up to ten years. The credit is calculated based on the income taxes paid by employees filling the new and retained jobs related to the project. The program requires a business with more than 100 employees to invest at least $5 million in capital improvements and create a minimum of 25 new full-time jobs in Illinois. A business with 100 or fewer employees must make a capital investment of at least $1 million and create at least five new full-time jobs. Businesses in retail trade and personal service are not qualified for the credit. This tax credit is nonrefundable and cannot be carried forward. The EDGE program has no claw back provision if businesses do not meet the investment and jobs requirements but benefits cease if the shortfall is identified within the ten-year benefit period.

Besides Iowa's neighboring states, economic development programs in states in the Midwest and the South competing with Iowa also offer tax incentives to attract investments. Indiana's Hoosier Business Investment Tax Credit provides an investment tax credit up to ten percent of qualified investment for businesses in industries such as telecommunications, manufacturing, mining, and transportation. The tax credit is nonrefundable and can be carried forward for nine years. Total tax credit awards cannot exceed $50 million annually for all projects.

Kansas's High Performance Incentive Program awards tax credits equal to ten percent of qualified investment for businesses in Kansas, except for retail businesses. Kansas requires that the applicants for the tax credit must create jobs with wages above the average wage in the same industry. The tax credit is nonrefundable and can be carried forward for 16 years.

Texas does not have a corporation or individual income tax. However, the Texas Enterprise Zone Program does provide a sales and use tax refund for businesses investing and creating at least ten jobs in Enterprise Zone Regions in Texas.

IV. Review of Related Literature

The economic analysis later in this study will consider two questions about the impact of the HQJ program. Does the HQJ program induce businesses to choose to invest, or invest more, in Iowa? Do HQJ projects have a positive impact on the local economy during and after the capital investment? The evidence from academic studies on both kinds of impacts is mixed (Kline and Moretti, 2014).

Black and Hoyt (1989) was among the first theoretical analysis to explicitly use auction theory to model the process of different jurisdictions competing for the same business investment project. Their model showed that jurisdictions would increase their public subsidies for investments to offset economic and geographic advantages of competitors. If the investment project is large enough so that the jurisdiction believes the multiplier effect will provide additional benefits elsewhere in the economy, the model suggests the jurisdiction would overbid, which means the public subsidy would exceed the net tax receipts expected from the project itself.

Using data from Europe, both Devereux, Griffith, and Simpson (2007) and Brülhart, Jametti, and Schmidheiny (2012) found evidence that public subsidies such as grants and tax incentives had positive effects on inducing new establishments to locate in jurisdictions offering those subsidies. Brülhart, Jametti, and Schmidheiny (2012) found that lower taxes were generally correlated with a higher number of new establishments in Switzerland. However, in regions where businesses were clustered, the impact of business tax incentives on the number of new establishments in the industry cluster is much smaller. Devereux, Griffith, and Simpson (2007) estimated the impact of the local public subsidy in the United Kingdom on the probability of a new plant locating in the jurisdiction. The study first estimated the expected public subsidy that a new plant is

likely to receive in each location. Then, it estimated whether the estimated expected subsidy and the actual subsidy received by the firm could explain the firm's location choice. Their results suggested that the subsidy had a positive effect on the probability of the firm selecting a jurisdiction to invest. However, the estimated effect was quite small; a one percent increase in the subsidy increased the probability of locating in an area by 0.04 percent.

Hanson and Rohlin (2011) used the U.S. federal Empowerment Zone tax incentive program to examine the impact of the program on the number of new establishments in the targeted areas. The study compared the Empowerment Zone areas with areas that applied for the Empowerment Zone but were rejected. The authors found that the Empowerment Zone program was responsible for reducing the number of new establishments that entered the targeted areas by almost 74 percent. The negative impact of the Empowerment Zone reflected that the designation resulted in higher property values in that area which reduced the number of new establishments that could afford the higher rent/location costs.

Another assessment of the impact of incentives on investment decisions relied on opinions of business executives. Jolley, Lancaster, and Gao (2015) used a survey of executives whose companies invested in North Carolina where some of these companies received tax credits from North Carolina and others did not. The study found that only 30 percent of executives in incentivized companies were aware that their companies had received tax credits as a result of the investments, suggesting that business leaders did not consider the incentive a key factor in location decisions. Most executives ranked the availability of skilled labor as the primary factor influencing their investment decisions.

Recent research on impacts of tax incentive policies on local economies have focused on the Enterprise Zone programs created by states and the federal Empowerment Zone tax incentive program. Conclusions are mixed. Ham et al. (2011) studied impacts of state Enterprise Zones, federal Empowerment Zones, and federal Enterprise Community programs on local labor markets. Using data from the 1980, 1990 and 2000 Censuses, the study compared the labor markets in regions awarded those state and federal programs with those in nearby regions. The study found that these programs significantly improved local labor markets. The magnitude of the improvement was large; for example, an area's designation as a federal Empowerment Zones was estimated to reduce unemployment by 8.7 percent and the poverty rate by 8.8 percent. Busso, Gregory, and Kline (2013) examined the impact of federal Empowerment Zones on employment growth. The study used regions that were rejected and future applicants to the federal Empowerment Zone program as controls, compared with regions receiving the federal Empowerment Zone designation. The study found that the federal Empowerment Zones program increased the number of jobs by 12 to 19 percent over ten years.

On the other hand, Neumark and Kolko (2010) found that the California's Enterprise Zone program had little impact on increasing employment. Comparing the subzones where the Enterprise Zone projects are located with nearby subzones with no such projects, the study found that the Enterprise Zone program had no statistically significant effect on the number of jobs or the number of new establishments.

Another line of research that is relevant to this study are reports completed by agencies in other states discussing its business incentive program. The Nebraska Legislature's report on the Advantage Act provided summary statistics of tax incentives information. In 2015, 41 projects were awarded in Nebraska and the total tax credit awards were $85 million. The total investment made by those projects was $3.2 billion and the total number of new jobs created was 5,114.

V. High Quality Jobs Program Awards and Claims

A. High Quality Jobs Program Awards

Every HQJ application needs to be approved by the IEDA Board before a contract is signed and the tax credit award or financial assistance is issued. Between fiscal years 2005 and 2016, the Board approved 463 HQJ applications with the total projected qualified business investment of $26.9 billion (see Table 3).[2] The total approved HQJ incentives for these 463 applications exceeded $1.1 billion, including $754.5 million of Investment Tax Credits, $261.0 million of sales and use refunds including about $1.0 million of Corporation Tax Credits for Third Party Sales Tax, $109.6 million of Supplemental Research Activities Tax Credits, and $41.9 million of direct financial assistance (including loans and forgivable loans). The highest annual total was approved in fiscal year 2007 at $253 million, prior to any imposition of a cap, including several biofuel production facilities. The total HQJ incentives approved in 2009 were only $7.8 million, the lowest year, coinciding with the trough of the most recent economic recession. The HQJ incentives approved in 2012 exceeded program caps because one project received significant amounts of additional HQJ incentives under the 2013 and 2014 caps, but are presented here as one application amount. Recall that direct financial assistance was not offered under the HQJ program until 2012.

The High Quality Jobs Program has several tiers of investment and job creation/retention, specified in the Iowa Code that establishes the maximum incentives allowed to participating businesses. One way to assess the attractiveness of the incentives offered is to consider where the contracts between IEDA and businesses fall among those tiers. Among all HQJ agreements approved by the IEDA Board between fiscal years 2005 and 2016, 32.3 percent of agreements pledged to create more than 16

[2] Benefits received by eligible businesses through awards of value-added property tax exemptions are not included in the analysis of this paper because the revenue reduction is realized at the local level and is not available from IEDA or IDR records.

jobs and make more than $500,000 in qualifying investment but less than a combined 31 or more jobs and $10 million in investment, the highest share among all tiers (see Table 4). These agreements accounted for 18.8 percent of promised qualifying investment and 32.2 percent of promised created or retained jobs. Businesses with approved agreements promising to create or retain more than 100 jobs and complete at least $10 million in qualifying investment accounted for 9.1 percent of the agreements, but 23.4 percent of all qualified investment and 45.2 percent of all promised jobs, highest among the tiers. In total, less than one percent of agreements promised qualifying investment under $100,000, just 3.2 percent promised qualifying investment between $100,000 through $499,999, while 71.8 percent promised qualifying investment of $500,000 or more with less than 31 jobs. Agreements with $10 million or more in investment and 31 or more jobs comprised the remaining 24.1 percent of the total number of agreements, but accounted for 69.9 percent of all qualifying investment and 61.2 percent of all promised jobs.

An approved HQJ application does not always lead to a HQJ contract and formal award for various reasons. Businesses can withdraw their applications before the contract is signed. IEDA may decline the approved application before the contract is signed if they cannot agree on contract terms. Additionally, once contracts are signed and incentives awarded, if a business does not meet job creation or investment requirements, IEDA and the business can agree to terminate a contract. Therefore, the total HQJ award amount associated with valid HQJ contracts, contracts in performance, in maintenance, or closed successfully, as of June 2016 is lower than the total HQJ incentive amount from Table 3. Overall, valid contracts represent 80.6 percent of the incentives originally approved by the Board. Not surprisingly, the share of applications in valid contracts is much higher for recent award years than the older years. This reflects that for years that are more than 5 years old, all contracts will have either successfully completed or been terminated. In addition, the recession in 2008 and 2009 also may have contributed to the low success rates of HQJ applications.

It is instructive to compare the tiers in which the approved agreements fall to the subset of agreements that moved forward successfully through the HQJ contract performance and maintenance. For all valid HQJ contracts as of June 2016, those promising to create more than 16 jobs and make more than $500,000 of qualifying investment accounted for 35.4 percent of all valid contracts, higher than the share of all agreements in that tier (see Table 3).Those contracts promising to create more than 100 jobs and at least $10 million of qualifying investment account for 9.3 percent of valid contracts, slightly higher than the 9.1 percent of all agreements. In this tier, the valid contracts account for 29.0 percent of qualifying investment and 53.5 percent of job creation, also higher than those shares when calculated using all agreements. The fact that these shares are higher compared to all agreements implies that projects in these two tiers were more likely to proceed successfully under the HQJ program than projects in other tiers.

As of June 2016, total HQJ tax incentives awarded on valid contracts were $731.6 million and the total direct financial assistance awarded was $39.3 million, only 5.1 percent of total incentives. Those HQJ tax incentives include ITC awards, sales and use tax refunds, and SRAC awards. Among those incentives, the ITC awards are $435.6 million, accounting for 56.5 percent of the total HQJ awards (see Figure 1). Sales and use tax refund awards total $203.9 million including about $1.0 million of Corporation Income Tax Credits for Third Party Sales Tax, 26.5 percent of the total HQJ awards. SRAC awards total $92.0 million, accounting for 11.9 percent of the total HQJ awards.

IEDA reports 373 HQJ awards issued since the inception of the program were in progress or successfully closed through fiscal year 2016 (see Table 6). Businesses receiving these 373 awards promised investments of $19.5 billion in Iowa, 72.3 percent of the total HQJ investment amount from all approved applications. The ratios of HQJ awards to approved HQJ incentives between 2006 and 2009 are below 50 percent based on information provided in table 3 and table 6, suggesting that the economic recession forced many businesses to cancel their investment plans. Coinciding with the ensuing economic recovery, the ratios of HQJ awards to approved HQJ incentives between 2010 and 2015 are above 80 percent. Also, many of the newly approved HQJ projects are still in the performance period or the maintenance period. Some current valid contracts could fall short of the requirements before those projects are closed.

Between 2005 and 2016, the share of ITC to the total HQJ awards declined from above 90 percent in 2005 to below 60 percent after 2012 (see Figure 2). ITC awards include $1.4 million of refundable ITC awards issued between fiscal years 2006 and 2010. The shares of SRAC to the total HQJ awards are significantly lower after 2012, reflecting a jump in the share of sales and use tax refunds and the inclusion of direct financial assistance beginning in 2012.

For the 373 valid HQJ awards, businesses promised to create 12,837 new jobs and retain 5,607 existing jobs (see Table 7). Awarded businesses promised to create 2,905 new jobs in contracts awarded during 2015, the highest number between 2005 and 2016. The average annual wage for promised jobs across all 373 awards was above $43,000, higher than the average annual wage earned by Iowans of $42,500 in 2015.

In the early years of the program when job creation was the focus, nearly all awards only reported created jobs (see Table 7). In 2009 and after, more projects reported retained jobs; in 2012 through 2014, nearly half of the projects included pledged retained jobs. Projects with only retained jobs are approved only when the business indicates it will close a facility and leave the state without the incentives. In fiscal year 2016, of the 51 awarded HQJ projects, 33 were awarded for the expansion of existing Iowa businesses with both created and retained jobs, 7 were preventing businesses from leaving Iowa with only retained jobs, and 11 were likely for new businesses to Iowa with only created jobs, although projects with only created jobs could also reflect the expansion of an existing business.

Among these 373 valid HQJ awards, the majority (242) were awarded to manufacturing businesses. Wholesale trade businesses received 28 HQJ awards, the second highest number of awards among all industries (see Table 8). Awards received by manufacturing businesses totaled $452.1 million, accounting for 58.6 percent of total HQJ awards. Those manufacturing businesses pledged to make capital investments of $10.0 billion in Iowa, 51.4 percent of total pledged investment. Businesses in the information industry pledged to invest $4.5 billion in Iowa (23.1%) and received $107.5 million of HQJ awards (13.9%), the second highest among all industries. These top two industries accounted for close to 75 percent of pledged investment and received more than 70 percent of HQJ award amounts.

ITC awards comprised $303.4 million (67.1%) of the $452.1 million of HQJ awards received by manufacturing businesses and $83.1 million were sales and use tax refunds (18.4%). For information businesses, $28.2 million of the $107.5 million of HQJ awards were ITC (26.3%) and $72.4 million were sales and use tax refunds (67.4%). This difference in the distribution of HQJ incentives by industry likely reflects the fact that manufacturing businesses are able to benefit more from the ITC which is related to the number of jobs created or retained and the amount of capital investment. Businesses in the information industry, many of which are data centers with relatively lower numbers of jobs per investment dollar, could benefit more from tax incentives to refund sales taxes paid on construction materials. Manufacturing businesses were also awarded $44.7 million of SRAC (48.6%) out of the total SRAC awards and agriculture were awarded $41.8 million of SRAC (45.4%), which suggests that much of research is conducted by traditional manufacturing and agriculture businesses in Iowa. Although businesses in retail are not eligible, two businesses were awarded contracts to construct distribution centers in Iowa.

Manufacturing businesses pledged to create 7,680 new jobs and retain 2,256 existing jobs for awards made between fiscal years 2005 and 2016, accounting for 59.8 percent of all pledged new jobs and 40.2 percent of all pledged retained jobs (see Table 9). Businesses in the information industry and agriculture industry pledged to create 1,402 new jobs (10.9%) and 853 new jobs (6.6%) respectively. These top three industries accounted for more than 75 percent of total pledged new jobs for all valid HQJ contracts. The average value of awards per pledged jobs varies widely across the industries, from $5,196 for the one real estate business to over $200,000 for management companies. Manufacturers received an average of $45,502 in awards per job, with the average annual wage reported for those jobs of $41,223.

Most of the HQJ awards were concentrated in counties in central Iowa, eastern Iowa, and along the western borders (see Figure 3). Businesses in Polk, Lee, and Linn counties received $187.1 million, $109.7 million, and $55.0 million of HQJ awards, respectively, higher than any other Iowa county. There were also 40 counties without a single business that received HQJ awards between 2005 and 2016. But after adjusting for population by measuring awards on a per capita basis, the three counties with the

highest HQJ awards per capita were Lee ($3,074), Chickasaw ($1,080), and Greene ($904) counties (see Figure 4).

B. High Quality Jobs Program Tax Credit Claims

Although HQJ awards were first made in fiscal year 2005 with claims first possible in tax year 2005, tracking of income tax credits began in tax year 2006 with the introduction of the IA 148 Tax Credits Schedule. Between tax years 2006 and 2014, more than $154.0 million of HQJ tax incentives were claimed by taxpayers where capture and verification of tax year 2014 claims are incomplete (see Table 10). Each HQJ award is assigned a unique tax credit certificate number. Taxpayers are directed to report that tax credit certificate number when making a claim; however, not all taxpayers include the tax credit certificate number. Although the Department attempts to verify claims by requesting missing information from taxpayers, those efforts were not as thorough in the early years of tracking. Thus the low claim count in 2006 may in part reflect incomplete claim information. Because IEDA also made awards for ITC and SRAC under other incentive programs, only tax credit claims with associated HQJ tax credit certificate numbers are included in the remaining analysis. The ITC claims total $77.1 million, accounting for 49.9 percent of the claimed HQJ tax incentives. Sales and use tax refunds, including a small count of Corporation Tax Credit for Third Party Sales Tax claims, total $39.1 million (25.3%) and SRAC claims total $38.3 million (24.8%). Claims have been reduced by any amounts subsequently repaid to the State as a result of default billings.

The HQJ tax incentives can be claimed against individual income tax (including fiduciary tax), corporation income tax, sales and use tax, franchise tax, insurance premium tax, and moneys and credits tax. Between tax years 2006 and 2014, $92.0 million (59.6% of all claimed HQJ tax incentives) were claimed against corporation income tax, including $55.9 million of ITC (72.5% of ITC) and $36.1 million of SRAC (94.2% of SRAC) (see Table 11). The vast majority of the 25.3 percent of incentives claimed as sales and use tax refunds were claimed against the sales and use tax; the small portion claimed as Corporation Tax Credits for Third Party Sales Tax against corporation income tax is not broken out because the count of claims is too small. An additional 14.3 percent of HQJ tax incentives were claimed against individual income tax. Less than 1 percent of tax incentives were claimed against franchise tax and insurance premium tax.

Among the ITC claims, $0.8 million were refundable tax credit claims with the remaining $76.3 million claimed as nonrefundable tax credits (see Table 12). All refundable investment tax credit claims in the HQJ program were made between tax years 2006 and 2010. On April 15, 2010, the refundable investment tax credits for projects involving value-added agricultural products or biotechnology-related processes under HQJ program were repealed. The number of nonrefundable tax credit claims identified as associated with HQJ awards increased from 60 for tax year 2006 to a peak of 4,689 for tax year 2011. Claims dropped in tax year 2012 and fell to 968 tax year 2014, however the data for the 2014 tax year is incomplete. As more tax incentives are awarded under HQJ, it is not surprising to see that the total nonrefundable tax credit claim is higher in

the later tax years. The count of claims vastly exceeds the count of valid HQJ contracts because taxpayers make multiple claims to one award across tax years and because many awards are made to pass-through entities with multiple individual owners making claims.

As noted above, the first tax year in which ITC claims could be made under the HQJ program was 2005. If taxpayers are unable to fully claim the credit in its first year of availability, taxpayers can carry forward ITC claims up to seven additional tax years. Between tax years 2006 and 2011, the nonrefundable tax credit carried forward from previous tax years increased from $2.5 million to a peak of $40.2 million (see Table 13). After tax year 2011, the tax credit carried forward from a previous tax year has dropped to $17.7 million in tax year 2014, although incomplete. The amount of new tax credits also showed a declining trend after 2011. As a result, the total amount of tax credits available for current year present a similar pattern, equal to $3.6 million in tax year 2006, peaking at $54.4 million in tax year 2011 and dropping to $35.8 million in 2014. The share of available ITC applied against tax liability within a tax year ranged between 10 percent and 30 percent from 2006 to 2012, and rose to close to 40 percent in 2013 and 2014.

Taxpayers associated with awards made to manufacturing businesses have claimed 71.4 percent of total HQJ tax incentives ($108.2 million) claimed between tax years 2006 and 2014 (see Table 14). Among these $108.2 million of claimed tax incentives, were $63.6 million of ITC (82.4% of all claimed ITC) and $30.3 million of SRAC (80.4% of all claimed SRAC). Manufacturing businesses claimed $13.7 million of sales and use tax refunds (39.8% of all sales and use tax refunds), lower than the sales and use tax refund amounts claimed by businesses in the information industry ($16.1 million).

There are several possible reasons why taxpayers would not claim all the approved HQJ tax incentives. First, as discussed above, the approved HQJ contracts could be cancelled before a tax credit certificate is even issued if the business or IEDA determined that the approved project would not achieve the promised goals laid out in the initial agreement or even agreed to in a contract. Second, businesses could proceed with the HQJ contract, receiving a tax credit certificate and making claims, but later fall short of the terms and thus face a full cancellation of benefits and clawback of any tax incentives claimed through the default process. Third, for the sales and use refunds or Supplemental Research Activities Tax Credits, the actual claim amount could be lower than the approved amount because the underlying economic activity might be smaller than the amount estimated for the HQJ contract. For example, the share of qualifying investment that will be subject to Iowa sales and use tax is an estimate; that estimate could have been too high. Fourth, for nonrefundable tax incentives, if taxpayers do not have enough tax liability across the available years, some of the ITC would be left unclaimed.

Details tracking the amount of tax incentives approved under HQJ to tax incentive claims reducing the General Fund are helpful in understanding how any proposed

change to the HQJ program cap is forecasted to impact future revenues. The largest part of the cancelled HQJ contracts, both before and after offering tax credit certificates, which accounted for $394.9 million of unclaimed HQJ tax incentives, were concentrated between 2005 and 2009 (see Table 15). Those canceled incentives totaled more than 50 percent of approved HQJ incentives in that period as the economic recession likely forced businesses to cancel investment projects. Also, in years prior to the cap, the State had less reason to negotiate tax incentive amounts with marginal contracts which may have resulted in the higher cancellation shares. After 2009, shares of incentives associated with the cancelled HQJ contracts are much lower. The economic recession also forced some businesses to reduce their original investment and hiring, and as a result, those businesses could not reach their employment goal set in the HQJ contracts. In many cases, IEDA defaulted those businesses based on the shortfall or renegotiated with those businesses and adjusted the HQJ incentives according to a reduced goal. More than $5 million of HQJ incentives between 2005 and 2008 were eliminated under a partial default. Overall, 38.1 percent of approved HQJ tax incentives over 2005 through 2015 were invalid as of June 2016, with the bulk of those dollars identified for the 2005 through 2009 award years when an average of 67.5 percent became invalid. However, even for the 2010 through 2015 award years, an average of 9.8 percent of approved awards became invalid including 14.4 percent of 2015 awards in as short as one year from approval.

The fiscal impact of HQJ tax incentives is spread over a long period of time. The ITC claims must be amortized over a five-year period and each allocation can be carried forward for an additional seven years. Therefore, the businesses can claim tax credits for as many as twelve years after they were awarded the HQJ incentives. Indeed, ITC awards made in award year 2005 can last be claimed in tax year 2017. If the awarded project has a multi-stage construction period, the sales and use tax refund claims can also spread over several years until all the construction is completed. Consequently, the claiming cycle for the HQJ awards issued near the beginning of the program (for example, 2005-2009) is far from complete. The HQJ awards issued after 2010 are still in the early stage of the claiming cycle and only a very small percentage has been claimed. Therefore, the remaining tracking of tax credit utilization is limited to those awards made through fiscal year 2010.

For HQJ awards issued between 2005 and 2010, about $115.4 million (59.2%) of HQJ tax incentives have been claimed during tax years 2006 through 2014 out of the $195.0 million of total awards (see Table 16). Among those claimed tax incentives, about $65.1 million were ITC claims, accounting for 53.4 percent of ITC awards issued between 2005 and 2010. The ITC credit carry forward reported on the last tax year totaled more than $9 million for those awards issued between 2005 and 2010, accounting for an additional 7.4 percent of the ITC awards. This suggests that at most, 60.8 percent of the ITC awards made on valid contracts and adjusted for partial defaults will be claimed. However, with the difficulty tracking claims in the early years of the program, the claims could be understated. For sales and use refunds, where awards are based on estimated taxability of the qualifying investment made during the three year compliance period,

only 45.1 percent of valid awards ($14.2 million) were claimed. Even for the refundable SRAC, only 82.2% of valid awards have been claimed.

VI. Economic Analysis of High Quality Jobs Program Outcomes

A. Effects of the High Quality Jobs Program on Business Site Selection Decisions

Policymakers are strongly interested in knowing whether state economic development programs including tax incentives for investment induce additional business investment in Iowa, or merely reward businesses that would have made the investments in Iowa anyway. One direct approach is to compare Iowa HQJ award offers with competing incentives made by other states to examine the impact of the HQJ program tax incentivize offers relative to offers from other states in attracting that investment into Iowa. Unfortunately information about competing incentive packages offered by other states to companies that have applied under the HQJ program is not available. Therefore, the study must rely on a more indirect approach of examining whether the HQJ program functions as an incentive for businesses.

Previous empirical studies using surveys have demonstrated that a tax incentive package is just one of many factors that influence a business's investment location decision (Jolley, Jason, Lancaster, and Gao, 2015; Warner and Zheng, 2013; Kline and Moretti, 2014). To analyze the process of the business investment selection among multiple localities, Black and Hoyt (1989) used auction theory. The business, like a seller in an auction, would always choose the jurisdiction presenting the highest bid, which should be equal to the total utility of the location measured as a function of factors including the labor force, natural resources, infrastructure, proximity to suppliers or customers, amenities, regulations, tax burden, and available tax incentives. Implicitly, the theory suggests if a jurisdiction has a shortfall in some of the above factors, it needs to compensate with advantages in others. Among the factors, tax incentives might be the most easily changed.

Consider an example of a business planning to make a fixed amount of investment. Suppose there are only two counties between which the business is choosing: County A and County B. Assume County A has a better business environment, such as a better infrastructure, a larger skilled labor pool, and is closer to suppliers and customers than County B. The business would demand a larger incentive from County B in order for the business to choose it over County A to compensate for B's disadvantage in its business environment.

Following this academic literature, auction theory can be used to examine whether the HQJ program functions as an incentive that changes behavior or is instead a bonus within an action that would have been undertaken anyway with the same outcome. The assumption is that the business makes investment decisions based on its own business strategy. This analysis focuses on whether the HQJ program helps induce where the business chooses to make that investment within Iowa. Because manufacturing businesses have accounted for the majority of the approved HQJ contracts and the total

amount of HQJ tax incentives, this estimation focuses on the HQJ contracts awarded to businesses in the manufacturing industry in Iowa. The technical details of the statistical estimation are discussed in the Appendix, Section A.

There are 269 approved HQJ contracts between 2005 and 2015 in the manufacturing sector in Iowa (see Table 17).[3] The total project investment across those contracts is $14.1 billion with $670.5 million in total tax incentives. A key variable in the analysis is HQJ tax incentives offered as a share of investment for each project. The average share of HQJ tax incentives to total investment is 4.8 percent for all manufacturing projects. Durable manufacturing businesses accounted for 112 contracts with total project costs of $1.8 billion and $102.6 million of tax incentives with an average share of tax incentives to investment of 5.7 percent. Nondurable manufacturing businesses accounted for 157 contracts, $12.3 billion of total project costs, and $568.3 million of tax incentives with an average tax incentives share of 4.1 percent. HQJ contracts issued to all manufacturing businesses before fiscal year 2010 account for $7.6 billion in investment and $385.4 million of tax incentives with an average tax incentives share of 5.8 percent. During and after fiscal year 2010, 171 HQJ contracts were approved for manufacturing businesses offering $285.0 million of tax incentives resulting in an average tax incentives share of 4.2 percent. Note that the variation of the ratios dropped significantly for the later projects with the much lower standard deviation.

The analysis attempts to show what factors can explain the relative size of tax incentives that were accepted by businesses when making a site selection.. As expected, the regression results show that the level of promised job creation has a positive and statistically significant effect on the relative size of tax incentives (see Table 18). Because the number of promised jobs was grouped in class intervals *Job*, when the unit of *Job* increases by one, the number of promised jobs increases by several dozen and the average share of tax incentives to investment is expected to increase by more than six percentage points. The estimated effect is consistent with the expectation because ITC is designed to be calculated based on the number of promised jobs. On the other hand, the effect of the total project investment is statistically insignificant, likely because it is highly correlated with *Job*.

The parameter of interest measures the effect of an Iowa county's business environment the relative size of the HQJ tax incentives. The business environment includes many factors important to businesses. Businesses in different industries also might prioritize these factors differently. If a county is attractive to businesses in a certain industry, investment by others in the industry should have already been made there. Therefore, the number of existing employees in the industry in the year before the

[3] The analysis includes all approved contracts because the estimation focuses on the investment location decision; even if a project is later cancelled, the act of approving the award provides information about how the HQJ program potentially provided incentives to drive that behavior.

HQJ contract is signed is assumed to serve as a measurement of the quality of the business environment in each county to the participating business. In particular, the log value of county employment of the industry in which the participating business is locating before the HQJ contract was approved is used (*Base*) as the key variable to demonstrate whether the HQJ incentives are used to offset a weaker business environment. The business environment is assumed to be friendlier if *Base* is higher. The estimated coefficient of *Base* is expected to be negative if the business facing the friendlier environment requires a smaller HQJ tax incentive from the State to persuade it to make investment there.

The analysis shows that county employment in the industry in the year before the HQJ contract is approved has a negative and statistically significant effect with an estimated coefficient of -0.04. Since *Base* is the log value of the county employment, the estimated coefficient suggests that, while competing for a business investment, a 10 percent disadvantage in county employment in the same manufacturing industry as the business required a 0.4 percentage point higher ratio of HQJ tax incentives to projected investment. The result suggests that businesses do consider HQJ program awards as incentives that can compensate for a weaker business environment to drive investment decisions during a balanced evaluation between different locations. To illustrate the estimated results, suppose the average machinery manufacturing employment is 2,000 in Iowa. If a machinery manufacturing business plans to invest $10 million, an Iowa county with machinery manufacturing employment of 1,800 (10% lower than average) would need the State to offer an estimated $40,000 more in HQJ incentives than average to attract the investment.

The Iowa Legislature added a cumulative tax credit cap to IEDA programs effective in fiscal year 2010 and adjusted the cap several times in the following years. The estimated effect of the dummy variable to capture this policy change (*D_period*) is negative and statistically significant. The negative effect indicates that tax incentives that IEDA offered businesses relative to investment were lowered after the cap was imposed.

One caution about this analysis is that the amounts of local incentives such as property tax exemptions or property tax abatements in conjunction with the HQJ awards were not incorporated in the analysis because data on those incentives were not available. Thus the estimation only analyzes the impact of tax incentives provided by the State. If the relative local incentives are proportionate with the State incentives, the results should not be impacted.

The evidence estimated using awards in the manufacturing sector indirectly supports the hypothesis that HQJ tax incentives are considered by businesses when making decisions between competing jurisdictions in the selection of the location for investment.

B. Effects of the High Quality Jobs Program on the Local Economy

Another question of interest is whether the HQJ program improves local economic welfare. Each HQJ project is expected to benefit the local economy through increased economic activity and, more specifically, incremental spending in the area. That is one reason that the local government is expected to financially support any large project.

The ideal approach to measure the impact of an HQJ project on a local economy would be to conduct an experiment with two identical jurisdictions where only one has an HQJ project, and then measure the difference between the economies of the two jurisdictions after several years. Because identical jurisdictions do not exist, this ideal experiment is not possible. Alternatively, econometric tools can be used to estimate the impact of the HQJ projects. Under the assumption that a pool of jurisdictions shares the same likelihood to attract HQJ projects, those jurisdictions with HQJ projects and are called the "treatment" group. The rest of the jurisdictions in the pool are called the "control" group.

Similar to the ideal experiment, for the treatment group, the difference in economic activity between the periods before and after the HQJ project captures both the impact of the project and economic change caused by other factors. For the control group, the difference in economic activity over the same period only reflects the economic change caused by other factors which are assumed to be the same for both groups because those jurisdictions come from the same pool sharing the same likelihood to attract HQJ projects. Thus the impact of the HQJ project can be identified from the difference between the differences mentioned above measured for the treatment group and the difference measured for the control group.

The sample period compares economic activity in 2002 and 2012. Cities in the treatment group received HQJ projects between 2005 and 2008 and cities in the control group received HQJ projects only after 2012. Jurisdictions that received HQJ projects throughout the decade, mostly large jurisdictions, are not included in either group. There were 23 cities selected in the treatment group and the control group respectively (see Table 19). The average population for cities in the treatment group was 7,251 based on the 2000 Census, and 4,694 for the control group. Based on the IWD data, the average number of people working in each city in 2002, well before any HQJ project was initiated, was 4,318 for the treatment group and 2,741 for the control group. The average share of the treatment group's population working was 59.5 percent and 58.4 percent for the control group. The average wage observed in the cities during 2002 in the treatment group was $23,994 compared to $22,809 for the control group which includes both full-time and part-time workers.

The average employment growth rates of control cities were higher than those of treatment cities for most of years between 1997 and 2004 (see Figure 5). The only exception is 2003, when the average employment growth rate of control cities was -3.1 percent, compared to the average employment growth rate of 0.5 percent for treatment cities. However, the difference between averages growth rates for these two groups of cities was statistically insignificant between 1997 and 2004, suggesting that there was

no fundamental difference between the labor markets of the treatment group and the control group prior to any impact of the HQJ program.

Suppose a HQJ project located in a city in the treatment group in 2007, the average annualized differences between the employment growth rates and the total wage growth rates between 2002 and 2007 would capture the economic development prior to the HQJ project in that city, called the pre-HQJ differences. Differences between 2007 and 2012 would capture the economic development after the HQJ project, called the post-HQJ differences. Differences between the pre-HQJ and post-HQJ differences would capture the impact of the HQJ project and the impact of other factors. For a matching city in the control group, the same differences would only capture the impact of other factors. Taking the difference between those of the treatment group and those of the control group (D_i), the impact of the HQJ project can be estimated. The specification of the regression and the definition of the data used in the regression are detailed in the Appendix, Section B.

The estimation suggests that receiving an HQJ project significantly influences employment growth rates and total wage growth rates in those cities (see Table 20). The HQJ project is estimated to raise the annual employment growth rate of a city by an average of more than two percentage points. Average wage income earned in the city is estimated to increase by an average of more than three percentage points as a result of the HQJ project. To illustrate the estimation results, suppose the average employment in the treatment group in 2008 is 4,400 and the average number of HQJ direct jobs is 37. The average number of indirect jobs is about 2 percent of 4,400 in excess of the 37 direct jobs, which is estimated to be 51, including both full-time and part-time jobs. The average annual wage increase after 2008 in treatment cities is estimated to be $1,000 higher due to the HQJ projects where the average wage per worker, including both full time and part-time workers, was about $24,000.

The regression results (equation (6)) showed that the log value of tax credit awards, the log value of the total project investment, and the number of promised jobs had significant impacts on both the employment growth rate and the average wage growth rate. Specifically, for every 10 percent increase of HQJ tax incentives given that the city had a HQJ project, the employment growth rate increases by an estimated 0.07 percentage points and the average wage growth rate increases by 0.05 percentage points. For every 10 percent increase of HQJ project investment given that the city had a HQJ project, the employment growth rate increases by an estimated 0.1 percentage points and the average wage growth rate increases by 0.06 percentage points. For every ten additional promised jobs from a HQJ project, the city is estimated to raise employment growth rate and the average wage growth rate by an average of 0.4 percentage points respectively every year after the award year.

It needs to be emphasized that the large jurisdictions which often received HQJ projects through the 2005 and 2012 period are excluded from this analysis because they do not qualify as either the control or treatment group. Such jurisdictions are likely to

experience smaller impacts on employment and wage growth rates than those measured here for the smaller Iowa cities because those jurisdictions also have a larger economic base and much more diverse economic activities. Another concern is that information on economic development programs from the federal government or other State programs are not completely available. Thus, they are assumed to affect cities in both groups equally in this analysis.

VII. Conclusion

This evaluation study provides an overview and analysis of the Iowa High Quality Jobs Program. The HQJ program provides tax benefits for businesses making investment in Iowa and creating or retaining jobs through the use of tax credits and, since 2012, direct funding assistance. Between award years 2005 and 2016, $731.6 million of HQJ tax incentives were awarded under 373 contracts that either closed successfully or continue to be monitored by the Iowa Economic Development Authority. Currently, total HQJ claims are about $149 million through an incomplete 2014 tax year. The manufacturing sector claimed most of HQJ tax incentives among all sectors. Businesses participating in the HQJ program pledged to create more than 12,000 jobs in Iowa through 2016.

With an annual cap of $130 million, temporarily reduced to $105 million for the 2017 through 2021 award years, the HQJ program has the potential to significantly impact General Fund revenues. An analysis of Investment Tax Credit, sales and use refunds, and Supplemental Research Activities Tax Credit claims indicates that the fiscal impact of the program is spread out several years. Indeed, awards made in 2005 could still be claimed through tax year 2017.

This evaluation study contributes to an improved understanding of the HQJ program. The study examined the effectiveness of the tax credit on inducing businesses to create more jobs and local economy. Based on several statistical analyses, this study found the evidence that businesses did react to HQJ tax incentives when they make investment decisions. The study also finds that the HQJ program has positive, statistically significant, impacts on local labor markets in terms of the employment growth rate and the wage growth rate.

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Tables and Figures

Table 1. High Quality Jobs Program Maximum Tax Credit Awards Available to a Business

Amount of Qualifying Investment	Number of Jobs Created or Retained That Meet Wage Threshold Requirements for the Laborshed plus Sufficient Benefits				
	No Jobs	1-5	6-10	11-15	16 or More
Less than $100,000	Up to 1% ITC	Up to 2% ITC	Up to 3% ITC	Up to 4% ITC	Up to 5% ITC
$100,000 - $499,999	Up to 1% ITC, Sales Tax Refund	Up to 2% ITC, Sales Tax Refund	Up to 3% ITC, Sales Tax Refund	Up to 4% ITC, Sales Tax Refund	Up to 5% ITC, Sales Tax Refund
$500,000 or More	Up to 1% ITC, Sales Tax Refund, Supplemental Research Activities Tax Credit	Up to 2% ITC, Sales Tax Refund, Supplemental Research Activities Tax Credit	Up to 3% ITC, Sales Tax Refund, Supplemental Research Activities Tax Credit	Up to 4% ITC, Sales Tax Refund, Supplemental Research Activities Tax Credit	Up to 5% ITC, Sales Tax Refund, Supplemental Research Activities Tax Credit

Amount of Qualifying Investment	Number of Jobs Created or Retained That Meet Wage Threshold Requirements for the Laborshed plus Sufficient Benefits				
	31-40	41-60	61-80	81-100	101 or More
$10,000,000 or More	Up to 6% ITC, Sales Tax Refund, Supplemental Research Activities Tax Credit, Property Tax Exemption	Up to 7% ITC, Sales Tax Refund, Supplemental Research Activities Tax Credit, Property Tax Exemption	Up to 8% ITC, Sales Tax Refund, Supplemental Research Activities Tax Credit, Property Tax Exemption	Up to 9% ITC, Sales Tax Refund, Supplemental Research Activities Tax Credit, Property Tax Exemption	Up to 10% ITC, Sales Tax Refund, Supplemental Research Activities Tax Credit, Property Tax Exemption

"Amount of Qualifying Investment" means a capital investment in real property including the purchase price of land, existing buildings and structures, site preparation, improvements to real property, building construction, and long-term lease costs. It also includes capital investment in depreciable assets. "ITC" means Investment Tax Credit. "Sales Tax Refund" means Sales and Use Tax Refund or refundable Corporation Tax Credit for Third Party Sales Tax.

Source: Iowa Economic Development Authority website

Table 2. Economic Development Tax Incentive Programs from Selected States

State	Illinois	Iowa	Indiana	Kansas	Kentucky	Minnesota	Missouri	Nebraska	South Dakota	Texas	Wisconsin
Name of Program	Economic Development for a Growing Economy (EDGE) Program	High Qualiy Jobs Program	Hoosier Business Investment Tax Credit	High Performance Incentive Program	Kentucky Business Investment Program	Greater Minnesota Job Expansion Program	Business Facility Tax Credit Program	Nebraska Advantage Act	Reinvestment Payment Program/South Dakota Jobs Program	The Texas Enterprise Zone Program	Manufacturing and Agriculture Credit
Location Qualification	Statewide	Statewide	Statewide	Statewide	Statewide	Rural areas	Statewide	Statewide	Statewide	Enterprise Zone Regions	Statewide
Industry Qualification	No retail trade and personal services	No retail trade	Telecommunications, manufacturing, mining, and transportation	For profit businesses, not in retail industry	Manufacturing, technology, healthcare, and agriculture	No	No	Manufacture, information, telecommunication, insurance, financial services, transportation, and warehousing	No	No	Manufacturing and agriculture
Job Requirement	Minimum 25 new full-time jobs; For a company with 100 or fewer employees, the company must create at least 5 new full-time jobs	Create new jobs or retain jobs with wage higher than the laborshed wages.	No	Higher than average wage in the same industry	At least 10 new full-time jobs	At least 5 new jobs	At least 2 new jobs	At least 10 new jobs	No	At Least 10 Jobs	No
Investment Requirement	Invest at least $5 million; For a company with 100 or fewer employees, the company must invest $1 million	No	No	No	No	No	At least $100,000 in new investment or $1,000,000 in replacement investment	At least $1 million of new investment	No	No	No
Per Project Cap	No	No	No	No	No	No	No	No	No	No	No
Program Cap	No	$105 million	$50 million	No	No	No	No	No	No	No	No
Investment Tax Credit	A percent of the payroll tax of new jobs but against corporate income taxes	Up to 10% of qualified investment	Up to 10% of qualified investment	10% of qualified investment	100% of income tax liability generated by the awarded project	No	A percentage of qualifed investment	Up to 15% of qualifed investment	No	No	7.5% of qualified income generated by the awarded project
Sales and Use Tax Refund/ Exemption	No	Yes	No	Yes	No	Yes	No	Yes	Yes	Yes	No
Research Activities Tax Credt	No	Yes	No	No	No	No	No	No	No	No	No
Supplemental Research Activities Tax Credit	No	Yes	No	No	No	No	No	No	No	No	No
Credit Carry Forward	Yes, 5 years	Yes, 7 years	Yes, 9 years	Yes, 16 years	Yes, 15 years	No	Yes, 5 years	Yes, 9 years for a tier 1 or tier 3 project, 14 years for a tier 2 or tier 4 project, or 10 year for a tier 6 project.	No	No	No
Transferrable Tax Credit	No	No	No	No	No	No	No	No	No	No	No
Clawback Provision	No	Yes	No	No	No	No	No	Yes	No	No	No

Source: The Council for Community and Economic Research (C2ER), state revenue agencies

Table 3. High Quality Jobs Program Approved Incentives, Award Years 2005-2016

Award Year	Total Number of Approved Projects	Total Pledged Business Investment (in Million $)	Approved Investment Tax Credits (in Million $)	Approved Sales and Use Tax Refunds (in Million $)	Approved Supplemental Research Activities Tax Credits (in Million $)	Total Approved Tax Incentives (in Million $)	Approved Direct Funding Assistance (in Million $)	Total Approved HQJ Incentives (in Million $)
2005	16	$282.75	$9.19	$0.82	$0.75	$10.76	$0	$10.76
2006	54	$3,490.84	$136.55	$20.15	$10.29	$166.99	$0	$166.99
2007	57	$4,984.68	$193.34	$43.05	$17.43	$253.82	$0	$253.82
2008	40	$1,250.16	$54.32	$11.57	$5.00	$70.89	$0	$70.89
2009	18	$187.81	$5.99	$1.57	$0.25	$7.81	$0	$7.81
2010	27	$510.41	$18.06	$4.34	$15.11	$37.50	$0	$37.50
2011	45	$1,758.31	$25.79	$13.33	$9.55	$48.67	$0	$48.67
2012	45	$5,644.34	$132.28	$58.57	$12.88	$203.72	$4.08	$207.81
2013	38	$1,953.38	$47.00	$29.25	$4.72	$80.98	$8.71	$89.69
2014	43	$1,994.42	$21.46	$29.50	$0.65	$51.61	$3.30	$54.90
2015	80	$2,301.49	$80.70	$28.24	$3.32	$112.26	$18.51	$130.78
2016	51	$2,558.72	$29.85	$20.57	$29.62	$80.04	$7.33	$87.38
Total	463	$26,917.31	$754.52	$260.97	$109.57	$1,125.06	$41.94	$1,167.00

Source: High Quality Jobs Program Records from Iowa Economic Development Authority

Table 4. Shares of Approved High Quality Job Agreements by Investment and Jobs, Award Years 2005-2016

Amount of Qualifying Investment	Number of Jobs Created or Retained with a Wage equal to Laborshed Wage plus Sufficient Benefits										
	No Jobs		1-5		6-10		11-15		16 or More		Total
Less than $100,000	Share of Contracts	0.0%	Share of Contracts	0.0%	Share of Contracts	0.2%	Share of Contracts	0.0%	Share of Contracts	0.7%	0.9%
	Share of Investment	0.0%	Share of Investment	0.0%	Share of Investment	0.1%	Share of Investment	0.0%	Share of Investment	0.0%	0.1%
	Share of Jobs	0.0%	Share of Jobs	0.0%	Share of Jobs	0.0%	Share of Jobs	0.0%	Share of Jobs	0.5%	0.5%
$100,000 - $499,999	Share of Contracts	0.0%	Share of Contracts	0.2%	Share of Contracts	0.7%	Share of Contracts	0.9%	Share of Contracts	1.4%	3.2%
	Share of Investment	0.0%	Share of Investment	0.0%	Share of Investment	0.0%	Share of Investment	0.0%	Share of Investment	0.0%	0.1%
	Share of Jobs	0.0%	Share of Jobs	0.0%	Share of Jobs	0.1%	Share of Jobs	0.2%	Share of Jobs	1.2%	1.6%
$500,000 or More	Share of Contracts	4.1%	Share of Contracts	15.9%	Share of Contracts	11.8%	Share of Contracts	7.7%	Share of Contracts	32.3%	71.8%
	Share of Investment	2.5%	Share of Investment	3.5%	Share of Investment	2.8%	Share of Investment	2.4%	Share of Investment	18.8%	30.0%
	Share of Jobs	0.0%	Share of Jobs	0.8%	Share of Jobs	1.8%	Share of Jobs	1.9%	Share of Jobs	32.2%	36.8%
Amount of Qualifying Investment	Number of Jobs Created or Retained with a Wage equal to Laborshed Wage plus Sufficient Benefits										
	31-40		41-60		61-80		81-100		101 or More		Total
$10,000,000 or More	Share of Contracts	5.0%	Share of Contracts	5.5%	Share of Contracts	2.7%	Share of Contracts	1.8%	Share of Contracts	9.1%	24.1%
	Share of Investment	11.3%	Share of Investment	10.2%	Share of Investment	15.7%	Share of Investment	9.2%	Share of Investment	23.4%	69.9%
	Share of Jobs	3.6%	Share of Jobs	5.2%	Share of Jobs	3.7%	Share of Jobs	3.5%	Share of Jobs	45.2%	61.2%

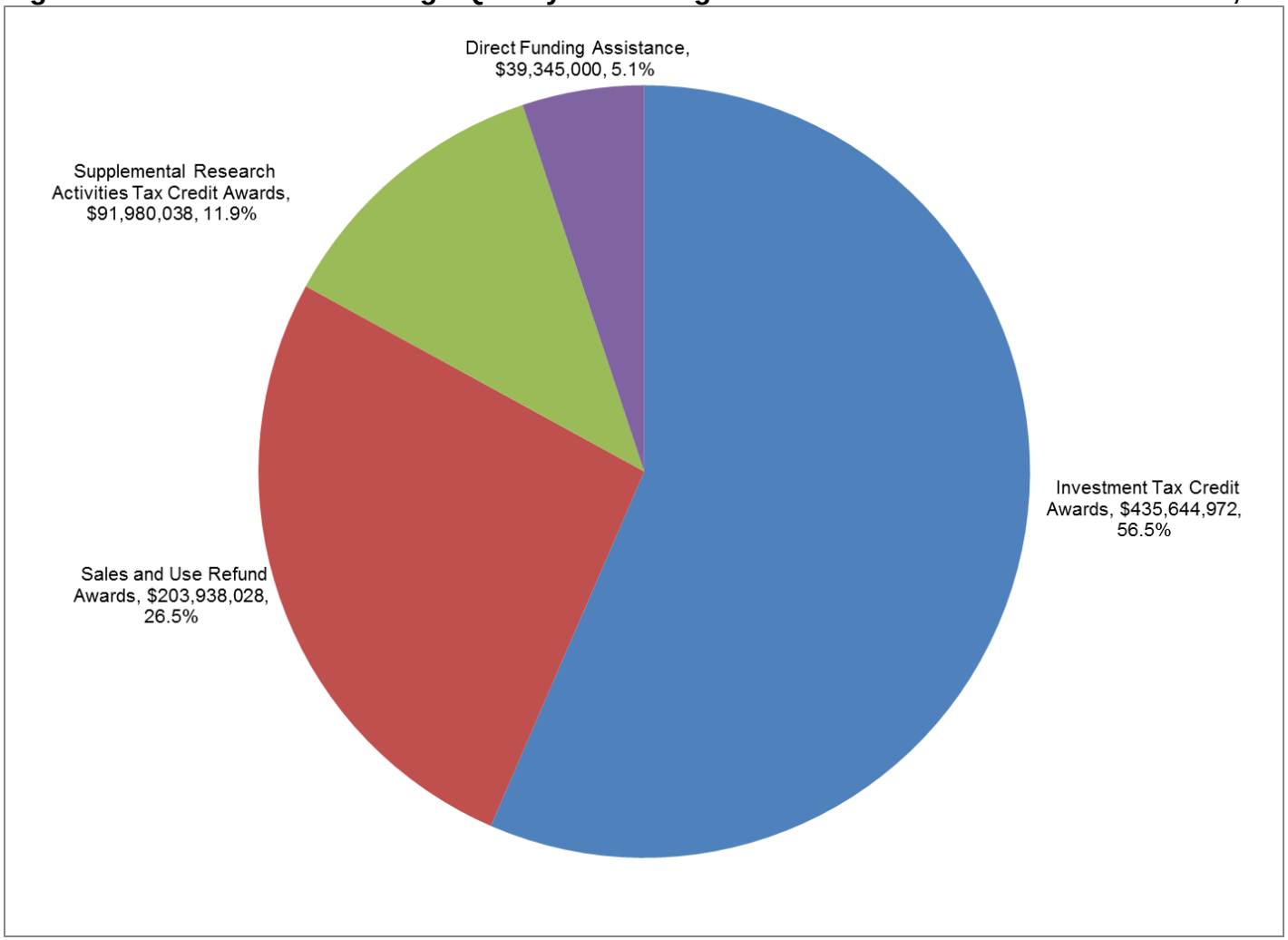
Source: High Quality Jobs Program Records from Iowa Economic Development Authority

Table 5. Shares of Valid High Quality Job Agreements by Investment and Jobs, Award Years 2005-2016

Amount of Qualifying Investment	Number of Jobs Created or Retained with a Wage equal to Laborshed Wage plus Sufficient Benefits										
	No Jobs		1-5		6-10		11-15		16 or More		Total
Less than $100,000	Share of Contracts	0.0%	Share of Contracts	0.0%	Share of Contracts	0.0%	Share of Contracts	0.0%	Share of Contracts	1.0%	1.0%
	Share of Investment	0.0%	Share of Investment	0.0%	Share of Investment	0.0%	Share of Investment	0.0%	Share of Investment	0.0%	0.0%
	Share of Jobs	0.0%	Share of Jobs	0.0%	Share of Jobs	0.0%	Share of Jobs	0.0%	Share of Jobs	0.7%	0.7%
$100,000 - $499,999	Share of Contracts	0.0%	Share of Contracts	0.3%	Share of Contracts	0.7%	Share of Contracts	0.7%	Share of Contracts	0.7%	2.3%
	Share of Investment	0.0%	Share of Investment	0.0%	Share of Investment	0.0%	Share of Investment	0.0%	Share of Investment	0.0%	0.1%
	Share of Jobs	0.0%	Share of Jobs	0.0%	Share of Jobs	0.1%	Share of Jobs	0.2%	Share of Jobs	0.5%	0.8%
$500,000 or More	Share of Contracts	3.0%	Share of Contracts	18.2%	Share of Contracts	11.9%	Share of Contracts	7.6%	Share of Contracts	35.4%	76.2%
	Share of Investment	0.4%	Share of Investment	4.5%	Share of Investment	3.2%	Share of Investment	2.1%	Share of Investment	17.8%	27.9%
	Share of Jobs	0.0%	Share of Jobs	1.0%	Share of Jobs	2.0%	Share of Jobs	2.0%	Share of Jobs	27.2%	32.1%
Amount of Qualifying Investment	Number of Jobs Created or Retained with a Wage equal to Laborshed Wage plus Sufficient Benefits										
	31-40		41-60		61-80		81-100		101 or More		Total
$10,000,000 or More	Share of Contracts	4.6%	Share of Contracts	3.3%	Share of Contracts	1.7%	Share of Contracts	1.7%	Share of Contracts	9.3%	20.5%
	Share of Investment	7.0%	Share of Investment	3.8%	Share of Investment	21.1%	Share of Investment	11.1%	Share of Investment	29.0%	72.0%
	Share of Jobs	3.5%	Share of Jobs	3.4%	Share of Jobs	2.5%	Share of Jobs	3.3%	Share of Jobs	53.5%	66.3%

Source: High Quality Jobs Program Records from Iowa Economic Development Authority

Figure 1. Distribution of the High Quality Jobs Program Incentives on Awarded Contracts, Award Years 2005-2016



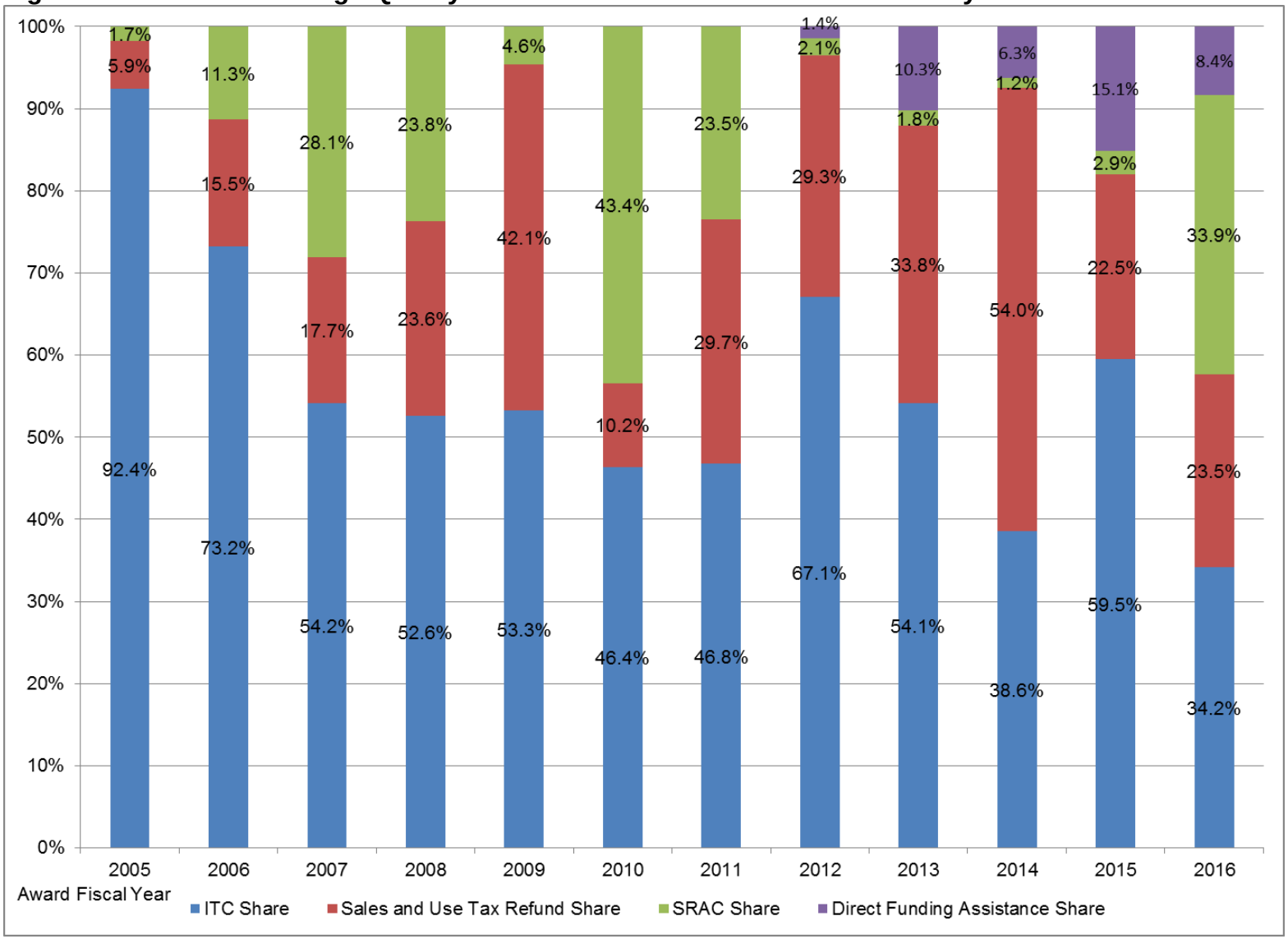
Source: High Quality Jobs Program Records from Iowa Economic Development Authority

Table 6. High Quality Jobs Program Incentives on Awarded Contracts, Award Years 2005-2016

Award Year	Total Number of Awards	Total Business Investment (in Million $)	Investment Tax Credit Awards (in Million $)	Sales and Use Refund Awards (in Million $)	Supplemental Research Activities Tax Credit Awards (in Million $)	Total Tax Incentives (in Million $)	Direct Funding Assistance (in Million $)	Total HQJ Awards (in Million $)
2005	5	$160.79	$7.24	$0.46	$0.14	$7.83	$0	$7.83
2006	30	$1,944.69	$58.57	$12.41	$9.05	$80.03	$0	$80.03
2007	22	$984.34	$28.25	$9.24	$14.68	$52.17	$0	$52.17
2008	21	$492.15	$10.85	$4.86	$4.89	$20.60	$0	$20.60
2009	13	$85.95	$1.39	$1.10	$0.12	$2.60	$0	$2.60
2010	19	$413.34	$15.63	$3.43	$14.63	$33.69	$0	$33.69
2011	35	$1,506.53	$18.39	$11.68	$9.26	$39.33	$0	$39.33
2012	32	$5,496.55	$131.70	$57.54	$4.13	$193.37	$2.82	$196.19
2013	36	$1,874.76	$45.94	$28.69	$1.55	$76.18	$8.71	$84.89
2014	40	$1,880.92	$20.34	$28.44	$0.62	$49.40	$3.30	$52.69
2015	69	$2,061.47	$67.50	$25.51	$3.29	$96.31	$17.18	$113.49
2016	51	$2,558.72	$29.85	$20.57	$29.62	$80.04	$7.33	$87.38
Total	373	$19,460.22	$435.64	$203.94	$91.98	$731.56	$39.35	$770.91
	Ratio of Awards to Approved Amount from Applications							
Ratio:	80.6%	72.3%	57.7%	78.1%	83.9%	65.0%	93.8%	

Source: High Quality Jobs Program Records from Iowa Economic Development Authority
Note: Table includes only projects shown in Table 3 that were not terminated or 100 percent defaulted.

Figure 2. Distribution of High Quality Job Incentives on Awarded Contracts by Award Year



Source: High Quality Jobs Program Iowa Economic Development Authority

Table 7. High Quality Jobs Program Business Investment and Jobs on Awarded Contracts, Award Years 2005-2016

Award Year	Total Number of Awards	Number of Awards with Only Created Jobs	Number of Awards with Only Retained Jobs	Number of Awards with Both Created and Retained Jobs	Pledged Business Investment (in Million $)	Total Projected Jobs Creation	Total Projected Jobs Retention	Average Annual Wage
2005	5	5	0	0	$160.79	71	0	$36,792
2006	30	26	3	1	$1,944.69	948	349	$41,223
2007	22	20	1	1	$984.34	1,049	48	$44,604
2008	21	20	0	1	$492.15	459	21	$51,807
2009	13	9	2	2	$85.95	346	65	$45,633
2010	19	11	2	6	$413.34	895	671	$44,205
2011	35	25	3	7	$1,506.53	851	424	$43,701
2012	32	18	1	13	$5,496.55	1,080	245	$42,567
2013	36	20	1	15	$1,874.76	1,382	1,691	$40,173
2014	40	19	2	19	$1,880.92	908	157	$43,029
2015	69	22	3	44	$2,061.47	2,905	577	$42,546
2016	51	11	7	33	$2,558.72	1,943	1,359	$44,352
Total	373	206	25	142	$19,460.22	12,837	5,607	$43,386

Source: High Quality Jobs Program Records from Iowa Economic Development Authority
Note: All numbers are presented in nominal values with no adjustment for inflation.

Table 8. High Quality Jobs Program Incentives on Awarded Contracts by Industry, Award Years 2005-2016

Industry	Total Number of Awards	Total Business Investment (in Million $)	Distribution of Business Investment	Investment Tax Credit Awards (in Million $)	Sales and Use Refund Awards (in Million $)	Supplemental Research Activities Tax Credit Awards (in Million $)	Direct Funding Assistance (in Million $)	Total HQJ Awards (in Million $)	Distribution of HQJ Awards
Manufacturing	242	$9,995.35	51.4%	$303.36	$83.14	$44.66	$20.94	$452.11	58.6%
Wholesale Trade	28	$397.58	2.0%	$11.32	$4.78	$3.02	$0.26	$19.39	2.5%
Professional, Scientific, and Technical Services	22	$509.48	2.6%	$25.06	$10.80	$0.13	$1.60	$37.60	4.9%
Finance and Insurance	24	$132.88	0.7%	$1.21	$1.84	$1.01	$2.68	$6.74	0.9%
Information	15	$4,489.32	23.1%	$28.22	$72.43	$0.95	$5.88	$107.47	13.9%
Transportation and Warehousing	13	$276.43	1.4%	$7.24	$4.16	$0.00	$1.22	$12.61	1.6%
Agriculture, Forestry, Fishing and Hunting	10	$1,444.31	7.4%	$5.07	$2.96	$41.76	$4.20	$53.99	7.0%
Construction	4	$5.66	0.0%	$0.21	$0.07	$0.13	$0.23	$0.64	0.1%
Management of Companies and Enterprises	6	$1,769.58	9.1%	$19.00	$13.79	$0.31	$2.12	$35.22	4.6%
Other Services	4	$46.05	0.2%	$0.55	$0.54	$0.01	$0.23	$1.32	0.2%
Retail Trade	3	$388.24	2.0%	$34.22	$9.37	$0.00	$0.00	$43.58	5.7%
Real Estate and Rental and Leasing	1	$1.50	0.0%	$0.06	$0.03	$0.00	$0.00	$0.08	0.0%
Administrative and Support and Waste Management	1	$3.83	0.0%	$0.12	$0.03	$0.00	$0.00	$0.15	0.0%
Total	373	$19,460.22	100.00%	$435.64	$203.94	$91.98	$39.35	$770.91	100.0%

Source: High Quality Jobs Program Records from Iowa Economic Development Authority

Table 9. High Quality Jobs Program Pledged Investment and Jobs on Awarded Contracts by Industry, Award Years 2005-2016

Industry	Total Number of Awards	Total Projected Jobs Creation	Distribution of Created Jobs	Total Projected Jobs Retention	Distribution of Retained Jobs	Average Annual Wage	Total HQJ Awards (in Million $)	Average Awards Per Job
Manufacturing	242	7,680	59.8%	2,256	40.2%	$41,223	$452.11	$45,502
Wholesale Trade	28	522	4.1%	58	1.0%	$43,344	$19.39	$33,432
Professional, Scientific, and Technical Services	22	786	6.1%	1,794	32.0%	$50,736	$37.60	$14,572
Finance and Insurance	24	684	5.3%	100	1.8%	$48,531	$6.74	$8,597
Information	15	1,402	10.9%	6	0.1%	$51,198	$107.47	$76,327
Transportation and Warehousing	13	304	2.4%	1,000	17.8%	$51,135	$12.61	$9,674
Agriculture, Forestry, Fishing and Hunting	10	853	6.6%	371	6.6%	$41,769	$53.99	$44,110
Construction	4	93	0.7%	0	0.0%	$44,940	$0.64	$6,874
Management of Companies and Enterprises	6	154	1.2%	22	0.4%	$49,245	$35.22	$200,103
Other Services	4	88	0.7%	0	0.0%	$43,386	$1.32	$15,053
Retail Trade	3	239	1.9%	0	0.0%	$50,421	$43.58	$182,360
Real Estate and Rental and Leasing	1	16	0.1%	0	0.0%	$33,579	$0.08	$5,198
Administrative and Support and Waste Management	1	16	0.1%	0	0.0%	$43,071	$0.15	$9,375
Total	373	12,837	100.0%	5,607	100.0%	$45,583	$770.91	$41,797

Source: High Quality Jobs Program Records from Iowa Economic Development Authority

Figure 3. High Quality Jobs Program Incentive Amount on Awarded Contracts by County, Award Years 2005-2016

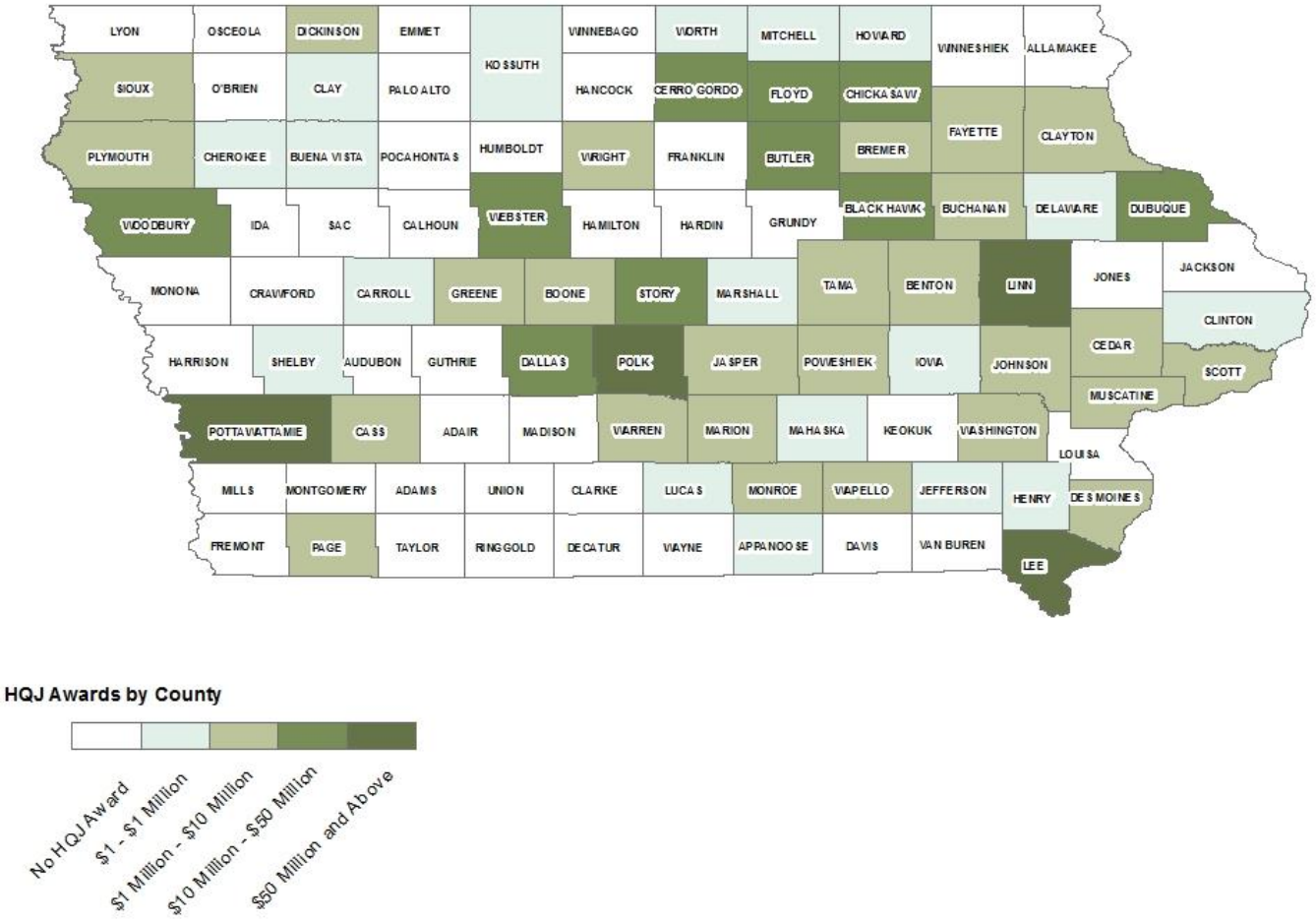


Figure 4. High Quality Jobs Program Incentive Amount Per Capita on Awarded Contracts by County, Award Years 2005-2016

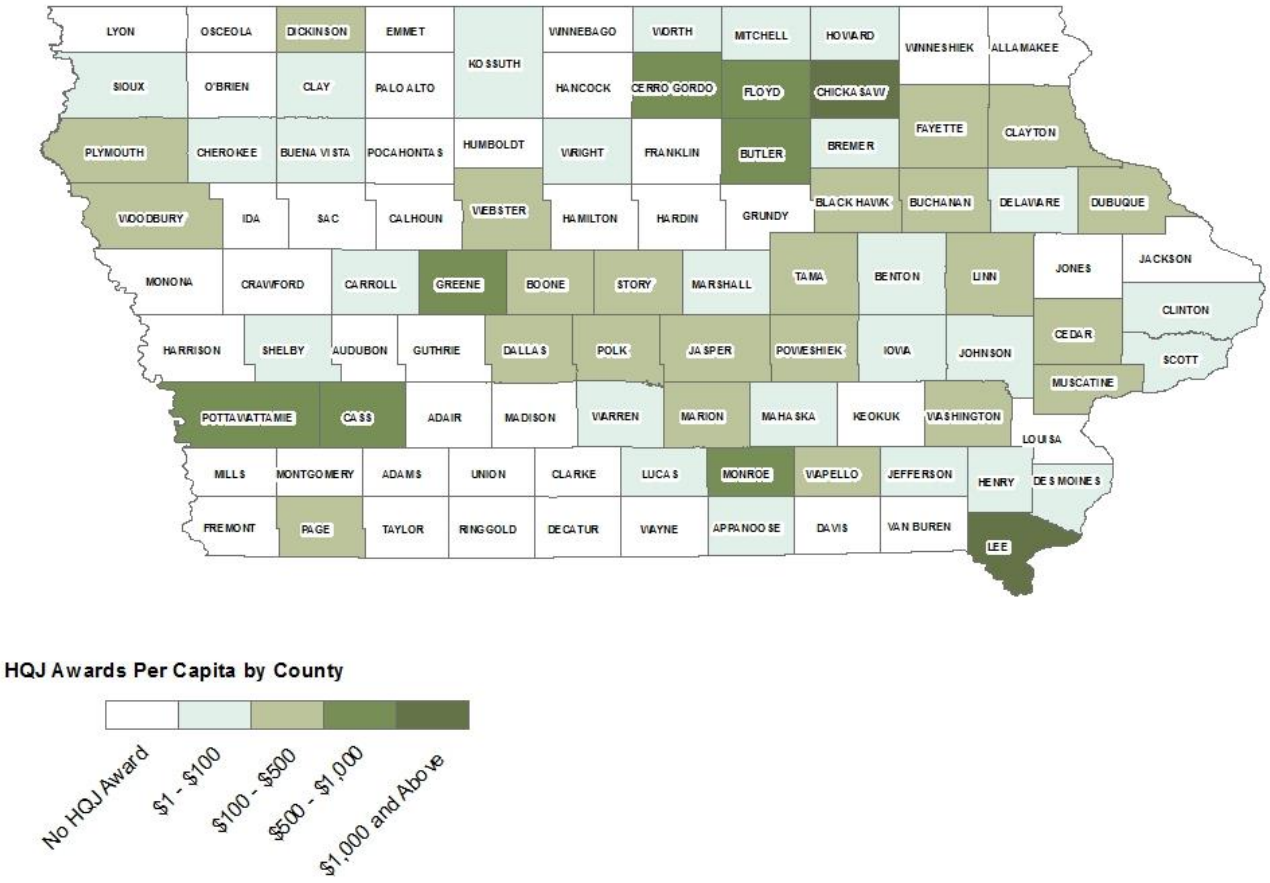


Table 10. Claims of High Quality Jobs Tax Incentives by Tax Year, Tax Years 2005-2014

Tax Year	Amount of ITC Applied in Current Tax Year	Share of ITC	Amount of Sales and Use Tax Refunds	Share of Sales and Use Tax Refunds	Amount of SRAC Claims	Share of SRAC	Total Claimed HQJ Incentives
2006	$0	0.0%	$0	0.0%	$1,964,602	100.0%	$1,964,602
2007	$4,967,463	41.0%	$1,518,921	12.5%	$5,631,457	46.5%	$12,117,841
2008	$3,447,670	27.9%	$2,583,764	20.9%	$6,309,683	51.1%	$12,341,117
2009	$6,816,686	38.9%	$5,112,417	29.2%	$5,576,528	31.9%	$17,505,631
2010	$5,843,925	41.9%	$3,931,209	28.2%	$4,167,015	29.9%	$13,942,149
2011	$14,190,898	60.0%	$1,437,846	6.1%	$8,034,540	34.0%	$23,663,284
2012	$9,806,648	39.6%	$13,857,794	56.0%	$1,086,503	4.4%	$24,750,945
2013	$17,799,765	67.3%	$7,530,037	28.5%	$1,123,260	4.2%	$26,453,062
2014*	$14,220,740	65.5%	$3,083,508	14.2%	$4,416,574	20.3%	$21,720,822
Total	$77,093,795	49.9%	$39,055,496	25.3%	$38,310,162	24.8%	$154,459,453

*Tax year 2014 is incomplete
Source: IA 148 Tax Credit Schedule information from Iowa Department of Revenue

Table 11. Claims of High Quality Jobs Tax Incentives by Tax Type, Tax Years 2005-2014

Tax Type	Amount of ITC Applied in Current Tax Year	Distribution of ITC Claims	Sales and Use Tax Refunds	Distribution of Sales and Use Tax Refunds	SRAC Claims	Distribution of SRAC Claims	Total HQJ Claims	Distribution of Total HQJ Claims
Individual Income Tax	$19,855,537	25.8%	$0	0.0%	$2,234,126	5.8%	$22,089,663	14.3%
Corporation Income Tax	$55,914,994	72.5%	$0	0.0%	$36,076,036	94.2%	$91,991,030	59.6%
Sales and Use Tax	$0	0.0%	$39,055,496	100.0%	$0	0.0%	$39,055,496	25.3%
Franchise Tax and Insurance Premium Tax	$1,323,264	1.7%	$0	0.0%	$0	0.0%	$1,323,264	0.9%
Total	$77,093,795	100.0%	$39,055,496	100.0%	$38,310,162	100.0%	$154,459,453	100.0%

Source: IA 148 Tax Credit Schedule information from Iowa Department of Revenue

Table 12. Claims of High Quality Jobs Refundable and Nonrefundable Investment Tax Credits, Tax Years 2005-2014

Tax Year	Number of Refundable ITC Claims	Amount of Refundable ITC Claimed in Current Tax Year	Number of Nonrefundable ITC Claims	Amount of Nonrefundable ITC Applied in Current Tax Year	Total Number of ITC Claims	Amount of ITC Applied in Current Tax Year
2006 and 2007	121	$459,483	1,653	$4,507,980	1,774	$4,967,463
2008	372	$298,097	2,006	$3,149,573	2,378	$3,447,670
2009	19	$20,094	4,445	$6,796,592	4,464	$6,816,686
2010	16	$11,356	4,085	$5,832,569	4,101	$5,843,925
2011	0	$0	4,689	$14,190,898	4,689	$14,190,898
2012	0	$0	1,843	$9,806,648	1,843	$9,806,648
2013	0	$0	1,456	$17,799,765	1,456	$17,799,765
2014*	0	$0	968	$14,220,740	968	$14,220,740
Total	528	$789,030	21,145	$76,304,765	21,673	$77,093,795

*Tax year 2014 is incomplete
Source: IA 148 Tax Credit Schedule information from Iowa Department of Revenue

Table 13. Claim Details of High Quality Jobs Nonrefundable Investment Tax Credits, Tax Years 2006-2014

Tax Year	Number of Nonrefundable ITC Claims	Amount Carried Forward from Previous Tax Year	Amount of New Tax Credits for Current Tax Year	Total Amount of Tax Credits Available for Current Year	Amount of Tax Credits Applied in Current Tax Year	Share of Applied Tax Credits to Available Tax Credits	Amount of Expired Tax Credits	Amount of Tax Credits Carried Forward to Next Tax Year
2006	30	$365,810	$3,262,400	$3,628,210	$1,106,680	30.5%	$0	$2,521,530
2007	1,623	$4,971,134	$11,009,618	$15,980,752	$3,401,300	21.3%	$3,780	$12,575,672
2008	2,006	$12,653,619	$5,645,983	$18,298,417	$3,149,573	17.2%	$9,572	$15,139,736
2009	4,445	$11,959,154	$21,275,132	$33,233,101	$6,796,592	20.5%	$1,898	$26,480,760
2010	4,085	$25,793,214	$15,636,328	$41,429,542	$5,832,569	14.1%	$4,673	$35,602,899
2011	4,689	$36,820,905	$17,612,486	$54,433,391	$14,190,898	26.1%	$13,327	$40,248,192
2012	1,843	$34,764,032	$13,219,210	$47,983,242	$9,806,648	20.4%	$28,683	$38,199,089
2013	1,456	$36,450,671	$9,782,096	$46,234,151	$17,799,765	38.5%	$1,901,003	$26,584,120
2014*	968	$31,152,344	$4,656,168	$35,808,239	$14,220,740	39.7%	$4,415,018	$17,706,144
Total	21,145		$102,099,421		$76,304,765		$6,377,954	

*Tax year 2014 is incomplete

Source: IA 148 Tax Credit Schedule information from Iowa Department of Revenue

Table 14. Claims of High Quality Jobs Tax Incentives by Industry Receiving the Award, Tax Years 2005-2014

Industry	Amount of ITC Applied in Current Tax Year	Distribution of ITC	Share of ITC	Amount of Sales and Use Tax Refunds	Distribution of Sales and Use Tax Refunds	Share of Sales and Use Tax Refunds	Amount of SRAC Claims	Distribution of SRAC	Share of SRAC	Total Claimed HQJ Incentives
Manufacturing	$63,553,625	82.4%	58.7%	$15,377,736	39.2%	14.2%	$29,288,498	76.5%	27.1%	$108,219,859
Information	$3,709,168	4.8%	18.0%	$16,920,784	43.1%	81.9%	$25,927	0.1%	0.1%	$20,655,879
Wholesale Trade	$1,451,404	1.9%	27.4%	$1,100,207	2.8%	20.8%	$2,744,760	7.2%	51.8%	$5,296,371
Professional, Scientific, and Technical Services	$489,700	0.6%	16.3%	$428,012	1.1%	14.3%	$2,084,945	5.4%	69.4%	$3,002,657
Finance and Insurance	$1,415,322	1.8%	31.0%	$3,156,994	8.0%	69.0%	$0	0.0%	0.0%	$4,572,316
All Other Industries	$6,474,576	8.4%	50.2%	$2,247,890	5.7%	17.4%	$4,166,032	10.9%	32.3%	$12,888,498
Total	$77,093,795	100.0%	49.9%	$39,231,623	100.0%	25.4%	$38,310,162	100.0%	24.8%	$154,635,580

Source: IA 148 Tax Credit Schedule information from Iowa Department of Revenue and High Quality Jobs Program Award file from Iowa Economic Development Authority

Table 15. High Quality Jobs Program Incentives on Approved Contracts and Cancelled Contracts, Award Years 2005-2015

Award Year	Total Approved HQJ Incentives	Cancelled HQJ Awards Before Certificate Issued	Cancelled HQJ Awards After Certificate Issued	Total Valid HQJ Incentives	Total Valid HQJ Incentives Adjusted for Partial Default	Share of Invalid HQJ Incentives
2005 and 2006	$178,039,016	$66,304,623	$23,825,569	$87,908,824	$85,338,048	52.1%
2007	$254,064,313	$140,145,262	$61,503,746	$52,415,305	$50,019,610	80.3%
2008	$71,576,046	$39,034,336	$11,251,821	$21,289,889	$20,930,690	70.8%
2009	$7,808,230	$4,948,173	$259,098	$2,600,959	$2,600,959	66.7%
2010	$39,940,353	$3,759,740	$51,400	$36,129,213	$36,129,213	9.5%
2011	$48,914,933	$8,825,161	$573,000	$39,516,772	$39,516,772	19.2%
2012	$204,789,405	$5,196,081	$5,842,635	$193,750,689	$193,750,689	5.4%
2013	$81,021,544	$3,507,000	$1,286,500	$76,228,044	$76,228,044	5.9%
2014	$52,055,676	$2,209,523	$0	$49,846,153	$49,846,153	4.2%
2015	$113,591,410	$16,365,200	$0	$97,226,210	$97,226,210	14.4%
Total	$1,051,800,926	$290,295,099	$104,593,769	$656,912,058	$651,586,388	38.1%

Source: High Quality Jobs Program Award file from Iowa Economic Development Authority

Table 16. High Quality Jobs Program Incentives on Awarded Contracts and Claims, Award Years 2005-2010

Award Year	HQJ Incentives Adjusted for Partial Default	HQJ Tax Incentive Claims	Share of Claimed Tax Credits	ITC Claims	Share of ITC Claims to ITC Awards	ITC Carry Forward	Share of ITC Carry Forward to ITC Awards	Sales and Use Tax Refunds	Share of Actual Refunds to Sales and Use Tax Refund Awards	SRAC Claims	Share of SRAC Claims to SRAC Awards
2005 and 2006	$85,338,048	$44,155,118	51.7%	$32,145,115	48.8%	$4,672,138	7.1%	$4,044,918	31.4%	$7,965,085	86.7%
2007	$50,019,610	$32,517,322	65.0%	$14,007,153	49.6%	$1,305,602	4.6%	$5,479,830	59.3%	$13,030,339	88.8%
2008	$20,930,690	$17,099,748	81.7%	$8,662,283	79.9%	$1,807,580	16.7%	$3,759,700	77.3%	$4,677,765	95.6%
2009	$2,600,959	$1,248,663	48.0%	$894,520	64.5%	$135,503	9.8%	$327,982	29.9%	$26,161	22.0%
2010	$36,129,213	$20,346,005	56.3%	$9,377,475	60.0%	$1,141,490	7.3%	$605,688	17.6%	$10,049,963	68.7%
Total	$195,018,520	$115,366,855	59.2%	$65,086,546	53.4%	$9,062,313	7.4%	$14,218,117	45.1%	$35,749,313	82.2%

Source: IA 148 Tax Credit Schedule information from Iowa Department of Revenue and High Quality Jobs Program Award file from Iowa Economic Development Authority

Table 17. Summary Statistics of Manufacturing Businesses Participating in the High Quality Jobs Program

	Total	Durable Goods	Nondurable Goods	Pre FY 2010	Post FY 2010
Number of Manufacturing HQJ Agreements	269	112	157	98	171
Total Project Costs (in Million $)	$14,083.4	$1,754.0	$12,329.5	$7,625.8	$6,457.7
Total HQJ Tax Incentives (in Million $)	$670.5	$102.1	$568.3	$385.4	$285.0
HQJ Tax Incentives as Share of Investment	4.8%	5.7%	4.1%	5.8%	4.2%
	(6.7%)	(9.9%)	(2.3%)	(9.2%)	(4.5%)
Total Pledged Jobs	8,612	4,392	4,220	3,607	5,005

Values in parenthesis are the standard deviation of HQJ Tax Incentives as share of investment.

Table 18. Regression Estimates of Effects of Locations on Ratio of High Quality Job Tax Incentives to Investment

Independent Variables	Estimated Coefficients of HQJ Manufacturing Projects	Standard Error	
Job	0.066	0.012	***
Cost	-0.004	0.105	
Base	-0.040	0.016	**
Lpopulation	0.097	0.021	***
D_period	-0.167	0.082	**
D_durable	0.196	0.099	**

** The estimated coefficient is significant at the 5% level.
*** The estimated coefficient is significant at the 1% level.

Table 19. Summary Statistics of Cities in Treatment Group and Control Group

Treatment Group					Control Group				
City	County	2000 Census Population	2002 Employment	2002 Average Wage	City	County	2000 Census Population	2002 Employment	2002 Average Wage
Burlington	Des Moines	26,839	12,504	$29,216	Atlantic	Cass	7,257	4,631	$23,190
Charles City	Floyd	7,812	4,512	$24,700	Bancroft	Kossuth	808	388	$20,855
Cherokee	Cherokee	5,369	3,142	$34,959	Belle Plaine	Benton	2,878	1,096	$24,644
Crawfordsville	Washington	295	125	$12,778	Carter Lake	Pottawattamie	3,248	923	$23,707
Denver	Bremer	1,627	694	$26,792	Cascade	Dubuque	1,958	1,381	$27,702
Durant	Cedar	1,677	879	$17,364	Centerville	Appanoose	5,924	4,318	$21,831
Fairfield	Jefferson	9,509	6,331	$27,216	Clarksville	Butler	1,441	341	$16,827
Fort Madison	Lee	10,715	6,570	$24,405	Clear Lake	Cerro Gordo	8,161	3,925	$24,802
Grand Junction	Greene	964	206	$22,323	Colfax	Jasper	2,223	570	$17,981
Indianola	Warren	12,998	5,383	$23,497	Elkader	Clayton	1,465	1,622	$30,056
Keokuk	Lee	11,427	6,889	$29,696	Glidden	Carroll	1,253	294	$23,918
Lawton	Woodbury	697	314	$20,973	Lake Park	Dickinson	1,023	369	$20,587
Lone Tree	Johnson	1,151	365	$15,034	Lime Springs	Howard	496	152	$19,343
Mason City	Cerro Gordo	29,172	16,351	$39,831	Marshalltown	Marshall	26,009	17,367	$28,358
Merrill	Plymouth	754	249	$12,709	Milford	Dickinson	2,474	1,780	$22,614
Muscatine	Muscatine	22,697	15,667	$43,978	Monona	Clayton	1,550	788	$19,953
New Hampton	Chickasaw	3,692	3,284	$20,992	Norway	Benton	601	548	$23,464
Shell Rock	Butler	1,298	885	$13,929	Oelwein	Fayette	6,692	3,047	$20,588
Shenandoah	Page	5,546	3,296	$30,063	Ottumwa	Wapello	24,998	14,848	$25,795
Superior	Dickinson	142	94	$14,481	Tama	Tama	2,731	2,280	$24,482
Washington	Washington	7,047	4,349	$22,740	Thompson	Winnebago	596	271	$23,790
West Branch	Cedar	2,188	1,797	$14,927	Tipton	Cedar	3,155	1,855	$18,595
West Burlington	Des Moines	3,161	5,422	$29,267	Urbana	Benton	1,019	256	$21,517
	Average	7,251	4,318	$23,994			4,694	2,741	$22,809
	Standard Deviation	8,504	4,795				6,931	4,443	
	Average Share of Employment to Population		59.5%					58.4%	
	Standard Deviation		29.0%					23.6%	

Source: U.S. Census Bureau, Bureau of Labor Statistics

Note: Average wage is measured across all workers, including both full-time and part-time workers

Figure 5. Average Employment Growth Rates of Treatment Cities and Control Cities, 1997-2004

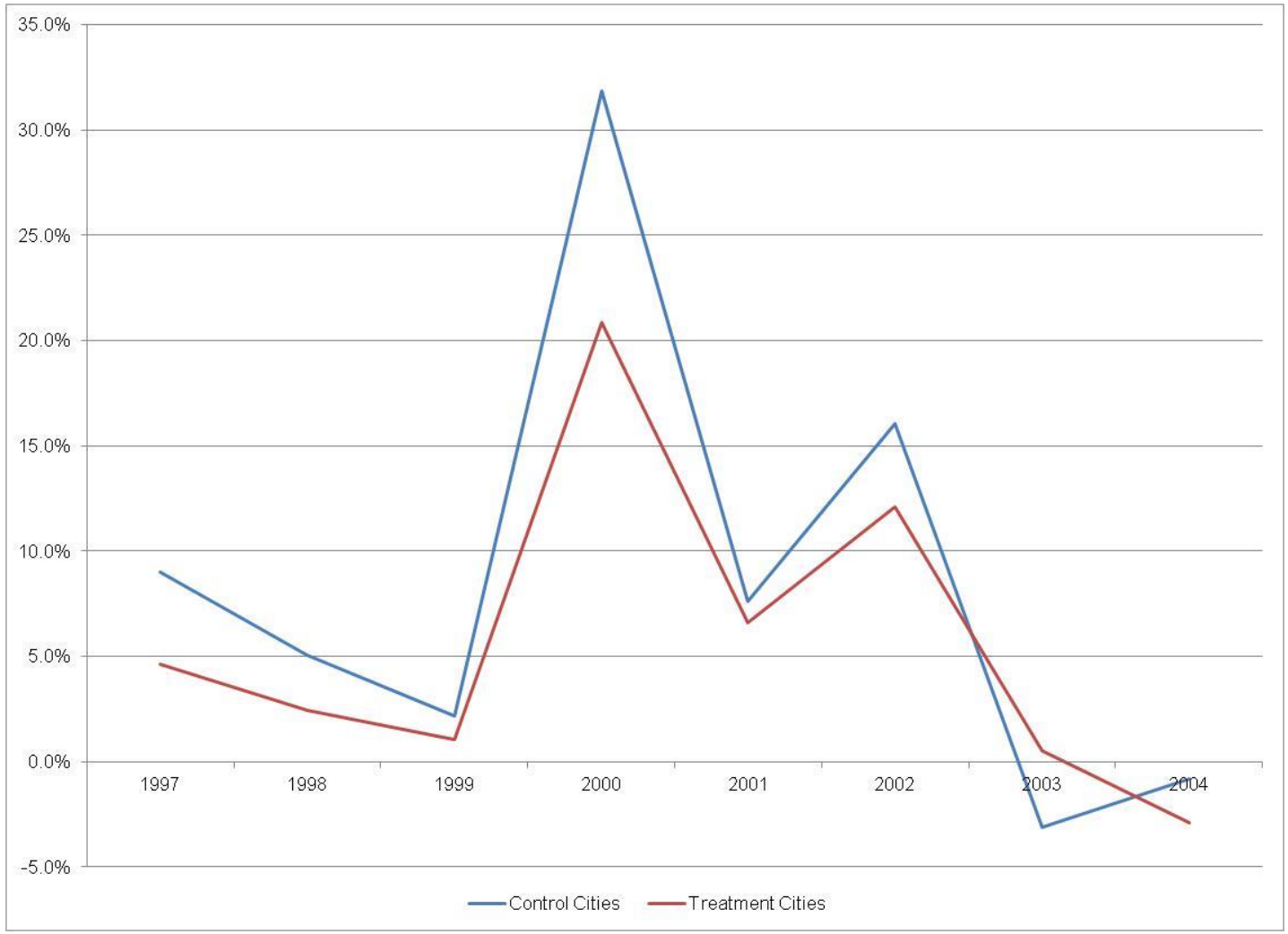


Table 20. Regression Estimates of High Quality Jobs Program Effects on City Economies

		Annual Employment Growth Rate	Annual Total Wage Growth Rate
Equation (4)	HQJ	0.02591***	0.03417***
		(0.004897)	(0.006707)
Equation (6)	HQJ	-0.07447**	-0.04147
		(0.03113)	(0.03891)
	HQJ*Credit	0.007512**	0.005661*
		(0.002302)	(0.002873)
Equation (6)	HQJ	-0.1462**	-0.07631
		(0.04619)	(0.05737)
	HQJ*Investment	0.01021***	0.006550*
		(0.002724)	(0.003380)
Equation (6)	HQJ	0.01102*	0.02133***
		(0.006255)	(0.008198)
	HQJ*Job	0.000569***	0.000491**
		(0.00156)	(0.000199)

* The estimated coefficient is significant at the 10% level.

** The estimated coefficient is significant at the 5% level.

*** The estimated coefficient is significant at the 1% level.

Appendix: Regression Specification and Data Definition

A. Estimation of Effects of the HQJ Program on Business Site Selection Decisions Technical Discussion

The approved HQJ contracts are negotiated between the business and IEDA and approved by both sides, including information on tax incentive amounts across all types of tax incentives, the planned investment by the business, the number of new jobs pledged by the business, the six-digit NAICS code of the business, and the location of the investment. The ratio of the sum of all tax incentives to the planned total investment (*Creditshare*) is used as the dependent variable to measure the relative size of HQJ awards received by the business. One major component of the HQJ tax incentives is the ITC, which is awarded based on the number of new jobs promised by the business and the planned total investment by the business. As a result, it is expected that promised investment and jobs have significant effects on *Creditshare*. Thus both are included as control variables in the regression.

There were several policy changes to the HQJ program since it was enacted in 2005. One relevant significant change was that IEDA became subject to a cumulative tax credit cap for the HQJ program in fiscal year 2010 and beyond, with the option to award 20 percent of the next year's cap in advance if needed. Therefore, there was a potential shift in how IEDA issued HQJ tax incentives beginning July 2009. This shift is captured by using a dummy variable for the period before fiscal year 2010 and after in the estimation.

The parameter of interest measures the effect of an Iowa county's business environment on *Creditshare*. The business environment includes many factors important to businesses. Businesses in different industries also might prioritize these factors differently. To capture the value of the business environment for businesses participating in the HQJ program, the county employment of the industry in which the participating business is locating is used. The underlying assumption is that if a county is attractive to a certain type of businesses, similar investment by others in the industry should have already been made there. Moreover, an existing cluster of similar businesses is likely to provide agglomeration economies to new investment from the same industry. Therefore, the number of employees in the industry in each county the year prior to the investment decision could serve as a measurement of the quality of the business environment to the participating business.

The Bureau of Labor Statistics (BLS) Quarterly Census of Employment and Wages (QCEW) program publishes a quarterly count of employment and wages reported by employers covering 98 percent of U.S. jobs, which is a source of employment at the county level by industry. The first three digits of the NACIS code of the participating business were used to determine its industry. The year before the HQJ contract is approved is used as the base year to proxy for the period when a business selects its investment location. Thus for each participating manufacturing business, the industry employment (*Base*) of the chosen county in the year before the HQJ contract is signed

is used to measure the business environment of the chosen county. The business environment is assumed to be friendlier if *Base* is higher. The estimated coefficient of *Base* is expected to be negative if the business facing the friendlier environment requires a smaller HQJ tax incentive from the State to persuade it to make investment there.

Regression estimates accounting for the influence of HQJ tax incentives are conducted through a truncated regression model. The reason for using a truncated model is that the dependent variable *Creditshare* cannot be negative, nor can it be higher than one since the State cannot fund 100 percent of the project cost. The main independent variable (*Base*) is the log value of the county employment in the industry as the participating business in the year before the HQJ award was made. The number of jobs businesses promised to create (*Job*) and the total project investment (*Cost*) are grouped based on the program award tiers (see Table 1). Other control variables include demographic variables such as the log value of total county population (*Lpopulation*), dummy variables to capture the difference between the pre-FY 2010 period and the post-FY 2010 period (*D_period*), and dummy variables to capture any difference between businesses in the nondurable manufacturing and durable manufacturing sectors (*D_durable*).

There are concerns that the county employment in the industry (*Base*) could be correlated with the number of jobs promised by the awarded business. Running a regression with the number of jobs promised as the dependent variable and other inputs as independent variables, showed that the coefficient of *Base* is statistically insignificant, which suggests that the number of jobs promised by the HQJ project is exogenous to county employment in the industry.

B. Estimation Effects of HQJ Program on the Local Economy Technical Discussion

Similar to previous studies (Ham et al., 2011; Busso, Gregory, and Kline, 2013) that measured the impacts of place-based economic development policies, the second analysis in this study attempts to measure the impacts of HQJ projects on local economies. The technique used starts with the pool of all jurisdictions in which an HQJ project located over the last decade. That pool is divided based on the timing of those HQJ projects. The analysis compares local jurisdictions receiving HQJ projects mostly in the program's early years (the treatment group) with those jurisdictions with similar characteristics except receiving HQJ projects only in later years (the control group). Jurisdictions that received HQJ projects throughout the decade, mostly large jurisdictions, are not included in either group. One advantage of this approach is the elimination of large jurisdictions from the sample which avoids the potential bias caused by differences between the economic development efforts between large jurisdictions and small jurisdictions. A second advantage of this approach is that because jurisdictions in both groups worked with IEDA to negotiate with businesses, went through the similar approval process, and at some point won an HQJ project,

jurisdictions in the control group should have similar economic characteristics attractive to business investments to those in the treatment group.

The specification of this analysis largely follows the work of Ham et al. (2011), with the assumption that the sum of the quadratic and the higher order trends of the observed characteristics and the double difference are equal for jurisdictions in broth treatment and control groups. The assumption suggests that the speeds of the economic growth rate changes in jurisdictions in both groups are the same. More specifically, the economic outcome of jurisdiction k, where k equals i for the treatment group or j for the control group, is determined by

$$Y_{kt}=X_{kt}\beta + \delta HQJ_{kt} +\alpha_k +\gamma T_t +\varepsilon_{kt} \qquad (1)$$

In (1), X_{kt} is a vector of observed characteristics of the jurisdictions, HQJ_{kt} equals 1 after the jurisdiction in the treatment group won the HQJ project and 0 otherwise, α_k denotes group-specific characteristics that do not change over time, T_t denotes time, and ε_{kt} captures the random unobserved characteristics for the jurisdiction.

It is assumed the HQJ project only affects the treatment group. The difference between the economic growth rates before and after the HQJ project is awarded captures both the effect of the HQJ project and effects of other economic trends, for example, the Great Recession during 2008 and 2009. For the control group, the difference between the similar economic growth rates should only capture the effects of other economic trends. Therefore, the double difference between economic growth before and after the HQJ project for a jurisdiction is

$$Z_k=(Y_{klast}-Y_{kHQJ})-(Y_{kHQJ}-Y_{kfirst}) =[(X_{klast}\beta + \delta HQJ_{klast} +\alpha_k +\gamma T_{last} +\varepsilon_{klast})- (X_{kHQJ}\beta + \delta HQJ_{kHQJ} +\alpha_k +\gamma T_{HQJ} +\varepsilon_{kHQJ})] -[(X_{kHQJ}\beta + \delta HQJ_{kHQJ} +\alpha_k +\gamma T_{HQJ} +\varepsilon_{kHQJ})- (X_{kfirst}\beta + \delta HQJ_{kfirst} +\alpha_k +\gamma T_{first} +\varepsilon_{kfirst})] =(X_{klast}-2 X_{kHQJ}+ X_{kfirst}) \beta+ (HQJ_{klast} -2 HQJ_{kHQJ}+ HQJ_{kfirst}) \delta +(T_{last} -2T_{HQJ} + T_{first}) \gamma+ \varepsilon_{kt} \qquad (2)$$

The beginning of the sample period denotes *first*, the end of sample period denotes *last*, and the award year of the HQJ project denotes *HQJ*.

Based on the assumption that the sum of the quadratic and the higher order trends of the observed characteristics and the double difference are equal for jurisdictions in both treatment and control groups, for the jurisdictions in the treatment group i and the control group j, there is

$$(X_{ilast}-2 X_{iHQJ}+ X_{ifirst}) =(X_{jlast}-2 X_{jHQJ}+ X_{jfirst}) \qquad (3)$$

To estimate the HQJ project's effect, eliminating the effects of other economic trends and calculating the triple difference between the treatment group and the control group, the difference-in-difference-in-differences (DDD) estimator is

$$D_i = Z_i - Z_j = HQJ_{ilast}\,\delta + \varepsilon_{kt} \qquad (4)$$

The parameter of interest is δ, which measures the impact of the HQJ project on economic growth of the jurisdiction. It is also assumed that errors are correlated, suggesting that economies of those cities could also be affected by the same random factors.

To further measure the effect of HQJ tax incentives on economic growth, the approach from (Acemoglu, Autor, and Lyle, 2004) is used to restructure equation (1) into the following equation

$$Y_{kt} = X_{kt}\beta + \delta HQJ_{kt} + \mu Credit_{kt} HQJ_{kt} + \alpha_k + \gamma T_t + \varepsilon_{kt} \qquad (5)$$

Here $Credit_{kt}$ is the amount of HQJ tax incentives in the award year and beyond for HQJ projects in the jurisdiction k and $0 otherwise. The DDD estimator then becomes

$$D_i = Z_i - Z_j = HQJ_{ilast}\,\delta + \mu Credit_{kt} HQJ_{kt} + (\varepsilon_{ilast} - 2\,\varepsilon_{iHQJ} + \varepsilon_{ifirst}) - (\varepsilon_{jlast} - 2\,\varepsilon_{jHQJ} + \varepsilon_{jfirst}) \qquad (6)$$

The parameter of interest in (6) is μ, which measures whether jurisdictions with more HQJ tax incentives experienced a greater increase in economic growth. Two alternative measurements of the HQJ projects, such as the number of jobs promised (Job_{kt}) and the total project investment ($Cost_{kt}$), were also used to examine the HQJ program's impacts.

This analysis estimates both (4) and (6) to examine the impact of the HQJ program as a whole and the impact of marginal changes in the amount of tax incentives offered. The estimation is conducted on the city level. The city-level data are collected from the Iowa unemployment insurance payment dataset provided by the Iowa Workforce Development (IWD), which contains monthly employment and quarterly wage information reported by employers for all physical facilities operated in Iowa.

Since economies of those cities could be affected by the same random factors and the error terms could be correlated, the maximum likelihood method is used to estimate the impact of the HQJ program on local economy, assuming the normal distribution.