MEASURING CHANGES IN AGRICULTURE FOR THE AMERICAN SOUTHEAST AFTER NAFTA

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By

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ABSTRACT

In 1994 the North American Free Trade Agreement (NAFTA) was signed between the United States, Canada, and Mexico. The pact’s purpose was to eliminate trade barriers in order to enhance economic interactions between the three parties. This paper intends to gauge the effect of NAFTA on agricultural production and farmer well-being in the Southeastern portion of the United States, specifically for smaller farms (499 acres or less). Over the last twenty years farm consolidation and a trade deficit have developed in the fruit and produce sector for the United States which may be related to NAFTA. Other crops, specifically the grain commodities, however, have benefited from industry growth. Using a novel dataset covering all fifty US states in the time span between 1992 and 2007, this paper compares Midwestern commodity producing states and industries against Southeastern predominately fruit and vegetable growers pre and post-NAFTA. It is apparent from the data gathered there are some stark differences between the two regions. Results infer that the exogenous effect of NAFTA has corresponded with both consolidation of farms and the reduction in percentage of smaller farms in the Southeast. From a policy perspective, my findings imply that trade deals such as NAFTA lead to redistributive outcomes and policymakers should consider ways to support those adversely affected.
The research and writing of this thesis was made possible through the indispensable investment of time and effort by my thesis adviser Dr. Andreas Kern. My thanks to Aaron Albert for his econometric advice. Much appreciation to St. Johns County Commissioner Jeb Smith for his assistance in the development of my research and his exemplification of the Southern farmer statesman. Finally, my gratitude goes out to Dr. Clyde Wilson, Dr. Donald Livingston, Dr. James Kibler and all the scholars at the Abbeville Institute for piquing my interest in the agrarian traditions.

Many thanks,
Stevan Miodrag Novakovic
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Introduction

The number of farms in the United States has been dwindling for as long as records have been kept. New environmental rules are crafted aimed towards agriculture. New plant diseases have crippled certain crops and industries throughout the United States. The average age of farmers is around sixty years as the country becomes more urbanized. Lately there have been numerous instances of food imported to the United States being unfit for consumption. These are all examples of situations facing those involved in American agriculture. It would be impossible to determine the reasons and effects of all the aforementioned issues in this short paper. Instead of delving into those issues, the question debated in the following pages focuses on one exogenous shock that impacts all areas of agriculture from grain to livestock to greenhouse grown tomatoes: the North American Free Trade Agreement (NAFTA).

In particular, my research tries to answer the question: Do free-trade deals adversely affect small-scale farmers, especially in the Southeastern part of the United States? The primary aim is to expand on the existing literature on US agricultural policy with a specific focus on the small scale (generally produce) – not grain commodities (Johnson, 2014). Delving deeper, I intend to contribute to the vast literature evaluating the impact of free-trade agreements on American agriculture (Kennedy and Rosson, 2002). The goal is to focus closely on smaller farms specializing primarily on produce and regionally in the southeast portion of the country – a group that might be overlooked in literature when considering the effects of trade agreements.

My hypothesis is that free trade agreements have negatively impacted the number of small farms while contributing to American farm consolidation and increasing produce imports. To test this hypothesis I use a dataset from the Inter-university Consortium for Political and Social Research as well as data selected from the Bureau of Economic Analysis. This dataset covers all fifty US states in five-year increments from 1992 until 2007 and is thus well suited for my empirical analysis. My primary empirical method is a difference-in-difference model, with
the exogenous treatment being NAFTA. My main dependent variable is the percentage of small farms by state, with NAFTA and region the primary independent variables.

The results of my study infer a positive correlation between NAFTA and farm consolidation, reduction in percentage of small farms, and reduction in number of small farms overall. It is important for policy makers to consider this as trade deals are discussed and in order to develop domestic policy. If expecting redistribution as the result of trade deals, those making policy should be mindful of the “losing” stakeholders and should make attempts to minimize those negative externalities.

**Background and Literature Review**

There are numerous actors involved in the creation of trade agreements as well as those affected by such. Technological advances have helped to allow for greater trade linkages and the world becomes increasingly globalized. “Free-trade” is a generally accepted and supported platform in the American political system and in many other countries around the world (Nau, 1994). As such, American politicians and trade representatives are major actors. Regarding the agricultural portions of the trade agreements, the interests of major lobbying groups hold much sway (Gawande and Hoekman, 2006). Included in these groups are entities such as the National Cattleman’s Association, National Corn Growers Association, American Soybean Association, National Grain Sorghum Producers, National Association of Wheat Growers, and the USA Rice Association. These major commodity interest groups support trade “liberalization” as it increases export opportunities. American commodity crop growers have a competitive advantage in the industry with seed technology, herbicides and pesticides, machinery, superior infrastructure, and economies of scale (Dimitri, Effland, and Conklin, 2005). United States trade representatives, currently working on the Trans Pacific Partnership and Trade Promotion Authority (to name two currently deliberated trade agreements) are inclined towards trade pacts but not without some opposition from the Congress which must decide upon implementation. On the other hand, crops
which are labor intensive and less industrialized, such as produce, face difficulty competing with nations that can depend on lower wages and fewer health and safety regulations.

It is useful to consider the recent history of American “free-trade” agreements in order to better frame the situation. In 1988 the United States and Canada signed the first major American “free-trade” agreement. Since then, that deal has been superseded by NAFTA (the North American Free Trade Agreement) and numerous other pacts have been signed with countries such as Chile, Peru, and Panama. Over the last twenty years there have been arguments regarding how various trade agreements affect American agriculture. On the overall balance, agricultural receipts have been increasing and a trade surplus maintained, due primarily to grain commodity crops such as corn, milo (sorghum) and soybeans. This has coincided with imports increasing in fruits and vegetables as well as aquaculture.

For years the United States (and other countries) had stringent policies on food production which often led to over or undersupply of certain crops. As ideas of a “global marketplace” and a “flat earth” began to take root, policymakers looked at trade agreements in agriculture as a way to open markets, increase liquidity, and spur competition. In the mid-1990’s, the WTO established guidelines regarding agricultural trade and domestic support systems in its “Agreement on Agriculture” (WTO, n.d.). Since the 1990’s there have been perpetual negotiations of American trade agreements. There has never been consensus on the issue, as environmental groups argue that land degradation is increased by such (Hassoun, 2009), grain trading arms support the global marketplace as do many producers (World Grain, 2015), smaller and non-grain producers complain of inability to compete (Stencel, 2008), and policy makers tend to fall on both sides of the issue depending on their constituents (Rosenfeld, 2015). It is possible that there are many other contributing factors to consolidation of farms and increased produce imports, this research will attempt to take into account the reservations those critical of the agreements have presented.
It is difficult to simply separate agriculture from all the other aspects of trade agreements such as manufacturing, technology, services, and other consumer goods. Additionally, the concept of “free-trade” defended by Ricardo and Smith with references to “comparative advantage” and dealing in only a few commodities looks arguably little like modern agreements. All industries involved attempt to influence trade negotiators and policymakers towards their own respective goals. At a national policy level, the United States has consistently worked to enact deals, primarily touting export potential to new markets.

“Free-Trade” agreements in theory are methods to reduce red-tape and barriers in the global marketplace. This usually includes forms of tariff reduction, subsidy reduction, national crop storage reduction, ending of bans on imports/exports, and more. It is apparent that the agreements have had an influence on American food imports, but is that simply due to demand? Are domestic farmers being undercut by cheap goods? Has there been a reduction in American farm production outside of grains? Johnson’s paper (2014) focuses on the produce deficit and the deficiencies in some trade agreements that keep American goods from being competitive overseas including lower tariffs in the US, higher subsidies overseas, exchange rate fluctuations, and more.

There are a host of questions that could be asked in my research, but the primary objective is to ascertain the effect that trade policy has had – whether positive or negative, on American farmers outside of major commodities. As such, export heavy commodities such as cotton, corn, milo, wheat, and soybeans are tangential to this research, but are related because of their influence in formulating policy. Citrus, produce, and fruits are the focal groups representing the major imports. For example, Kennedy and Rosson compare market changes in five crop sectors between the US, Canada, and Mexico and find that trade liberalization helps those able to take advantage of it, it is also mentioned that labor intensive crops find difficulty competing (Kennedy and Rosson, 2002). Of the five crops, the authors concluded only one was not a
commodity (tomatoes) and showed a great increase in Mexican imports as a percentage of US market share while American wheat, corn, and veal increased presence in Mexico.

Establishing methods of determining adverse effects in the marketplace might be somewhat subjective. If South Carolina cucumber producers are hurt by Mexican imports, does the overall deadweight loss in the market for Americans as a whole decrease? Answering this question, Prina (2013) concludes that in Mexico large commodity farmers received lower prices for goods for export and smaller fruit and vegetable growers received higher prices at the border. If the inverse holds true for the United States, it could be quite detrimental to various labor intensive agricultural industries.

In other aspects, if a few hundred farm labor jobs are lost but there is a net gain of a thousand transportation jobs is this a detriment to society? Should this be determined at a macro level or a community and cultural level? American consumers may have more options year-round, but they may lose food security in times of crisis. For example, Westhoff delves more deeply into the obstacles of determining the influence of trade agreements on food production (Westhoff, 2004). The summation of the authors’ conclusion is that to understand any sort of effect multiple models are needed and even so there are still quite a few limitations. Another article, by Zhang concluded that while the US trade deficit (now a surplus) in agricultural value had been on the decline, it was slowed by major increases deficit-wise in “ready-to-eat” food imports such as fresh fruits and vegetables (Zhang, 2008). Stout’s work from 2004 uses data from 2001 and compares US imports and exports of fruits and vegetables. The report stated that the United States was the world’s top produce exporter and importer. This could infer that the US is utilizing competitive and comparative advantages in logistics, production technology and more in the produce industry but this hypothesis still ignores the fact of the increasing produce deficit. A deficit in a few sectors may not be considered by some in itself to be a problem, but it could be if it is a symptom of the possible detriment to smaller farmers.
In 2013 a paper entitled “Economic Impacts of International Trade and Domestic Policies on Southern Agriculture” was terminated. After contacting three of the directors of the project, I learned that it was a “CRIS” project, a government grant for faculty with experimental stations. Such a paper would be closely related to what I am attempting to accomplish and be up to date, yet it is no longer ongoing. Other papers by Marchant (1999) and Burfisher (1992) are dated, especially considering the more recent context of trade agreements and long-term effects.

Expanding on previous evaluations, I propose comparing different types of crops and different geographical regions of the country is important because of the similarity of each group’s objectives. Produce is a high value crop per acre, but is very labor and input intensive putting the United States at a competitive disadvantage to some other countries. For example, in the case of citrus, Florida growers would oppose lessening restrictions on Central American oranges and lemons and the watermelon growers would be wary of Mexican melons increasing market share (National Farmers Union, 2016). On the other hand, for example, grain producers and even apple grower groups support lessening restrictions on imports if a trade surplus as a result is expected. It is a case by case basis (Gawande and Hoekman, 2006).

The hypothesis as it stands is as follows:

\[ H_1: \text{Free trade agreements have negatively impacted the number of small farms while contributing to American farm consolidation and increasing produce imports.} \]

Applying a more differentiated view, one can compare both industrial commodity production and more labor intensive fruit and vegetable production. The next sections sets out my empirical analysis strategy.

**Empirical Analysis**

In order to test this hypothesis, I propose the following empirical modeling: The treatment will be NAFTA itself, by adding a dummy variable for data collected on farmers before NAFTA and then after NAFTA. Next, I construct dummy variables to differentiate farm
data between Midwestern producers and Southeastern growers. The data from each sector pre-NAFTA will be compared to the results post NAFTA to determine if the treatment has affected one industry more than the other in a significant manner. The model can be written such that:

\[ y_{it} = X_{it}\beta + \alpha_i + u_{it} \]

In this equation \( y_{it} \) is my dependent variable, the percentage of small farms in a given state or region \( i \) at time \( t \). The independent variable(s) are represented \( X_{it} \) with \( \beta \) as the respective coefficient. The exogenous, time-invariant effect, NAFTA, is represented by \( \alpha_i \) and the error term by \( u_{it} \). My main dependent variable represents one dimension of a state’s agricultural attributes. My primary interest is in analyzing the percentage of small farms in each state (under the variable name PerSmallFarms). To observe trends but without the scaling effect of state percentages, TOTALSMALLFARMS was the variable name chosen to reflect each state’s total number of farms of 499 acres or less.

In the appendix is a list of important variables used in my models. The first term is the name of the variable and what follows is what that variable entails. In order to differentiate between the effects, I construct a dummy variable with the value “1” for states located in the SOUTHEAST and “0” otherwise.\(^1\) To compare, I also constructed a dummy variable with the value “1” for states located in the Midwest and “0” otherwise.\(^2\) While what is listed is not an exhaustive list, the entire list of variables included in the dataset is available upon request.

Wide variations are apparent for certain variables such as number of corn and soybean farms, total farms, citrus farms, hired farm labor, and more. Some of the variables may be skewed. For example, the results of tomato farms in the Midwest could be affected by the

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\(^1\) States included for SOUTHEAST variable are Alabama, Arkansas, Delaware, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, South Carolina, Tennessee, and Virginia.

\(^2\) States included for MIDWEST variable are Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, Ohio, and Wisconsin.
presence of greenhouse grown tomato nurseries included with field grown tomatoes. It is important to note which variables show differences of means at statistically significant levels between the control (Midwest) and treatment (Southeast) groups. The difference in number of farms is statistically significant at the 1% level, with the Midwest averaging a much greater number of farms. When population by state is taken into consideration, however, this may be of little importance as a comparison. The difference between southeast and midwest regarding average farm size is significant at the 10% level. Farms by size from 1-49 acres are not significantly different across treatment and control groups. Farms 50-179 acres are significantly different between regions at the 10% level, just narrowly outside of the 5% level. The difference of means between groups for farms larger than 180 acres is significant at the 1% level. The percentage of farms that produce corn and soybeans are also much greater for Midwestern states, and that difference is statistically significant at the 1% level. Hired labor per farm is higher for the Southeast at a statistically significant level, lending support to the notion that the overall agricultural makeup of the Southeast is less industrialized. Additionally, the percentage of farms utilizing contract labor is much higher for the Southeast as compared to the Midwest. This also supports the notion of southeastern agriculture being more labor intensive.

The majority of the tests to be run will be based on the United States Agricultural Data (ICPSR35206) Data sets 42 (Yr 1992), 43 (Yr 1997), 44 (Yr 2002), 45 (Yr 2007) sponsored by the Inter-university Consortium for Political and Social Research. The four datasets (each year) have been pared down and combined into one. Additionally, economic indicators and variables not included in the original dataset were added by state. The descriptive statistics below are only a sampling of what was as summaries of all eighty variables for four separate years would be cluttered and take up an inordinate amount of space. In addition, multiple variables have been
acquired from the US Bureau of Economic Analysis. My dataset includes variables for the US state, number of farms, land in farms, average size of farm (acres), estimated market value of land and buildings, farms by size, operators by principal occupation-not farming, various crops, interest paid, property taxes paid, hired farm labor, (workers), family held farms, number of minority farmers, year, and more. The data is in five year increments ranging from 1992 through 2007.

Table 1

<table>
<thead>
<tr>
<th>Variable</th>
<th>1 Midwest</th>
<th>2 Southeast</th>
<th>3 Diff</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farms (number)</td>
<td>72027.44</td>
<td>39292.31</td>
<td>-3.27e+04***</td>
</tr>
<tr>
<td>Average size of farm (acres)</td>
<td>338.11</td>
<td>231.23</td>
<td>-106.880*</td>
</tr>
<tr>
<td>Farms by size - 1 to 9 acres</td>
<td>4446.78</td>
<td>3556.69</td>
<td>-890.09</td>
</tr>
<tr>
<td>Farms by size - 10 to 49 acres</td>
<td>11256.44</td>
<td>10373.38</td>
<td>-883.06</td>
</tr>
<tr>
<td>Farms by size - 50 to 179 acres</td>
<td>22276.89</td>
<td>14454.77</td>
<td>-7822.120*</td>
</tr>
<tr>
<td>Farms by size - 180 to 499 acres</td>
<td>20817.33</td>
<td>7175.00</td>
<td>-1.36e+04***</td>
</tr>
<tr>
<td>Farms by size - 500 to 999 acres</td>
<td>8841.89</td>
<td>2243.92</td>
<td>-6597.966***</td>
</tr>
<tr>
<td>Farms by size - 1000 acres or more</td>
<td>4388.11</td>
<td>1488.54</td>
<td>-2899.573***</td>
</tr>
<tr>
<td>Percentage Farms Corn</td>
<td>0.54</td>
<td>0.17</td>
<td>-0.377***</td>
</tr>
<tr>
<td>Percentage Farms Soybeans</td>
<td>0.42</td>
<td>0.16</td>
<td>-0.260***</td>
</tr>
<tr>
<td>Hired Labor Per Farm</td>
<td>1.29</td>
<td>1.98</td>
<td>0.696**</td>
</tr>
<tr>
<td>Percentage Farms Contracting Labor</td>
<td>0.08</td>
<td>0.12</td>
<td>0.043***</td>
</tr>
</tbody>
</table>

(with P-values instead of Standard Errors)
Significance levels:  * < 10%  ** < 5%  *** <1%
P-Values in parentheses

Source: own work
Empirical Results

In order to empirically test my hypothesis, multiple regressions and tests are run with different variables. The OLS regressions will be a starting point to determine what appears to most influence the estimation such as amount of property taxes, quantity of on-farm labor, quantity of farmers taking off-farm jobs, and corporate versus family owned. These tests are conducted for different types of agriculture and different regions of the country.

Farms producing specific crops and/or located in particular regions might be more vulnerable as a result of enhanced foreign competition. In this case, an example could be farmers facing the high labor costs of tomato maintenance and harvest in the Southeast would be less able to compete with cheap labor in Mexico as compared to industrial and highly technological wheat producers in Kansas (Prina, 2013). Various sets of models were run in an attempt to gauge the possible effects of NAFTA. The baseline model included only one independent variable, “NAFTA,” which controls for results before and after the agreement was signed. The dependent variable being the percentage of small farms in the state. This resulted in the NAFTA dummy being statistically significant at the 1% level, but the coefficient was positive – inferring the possibility of NAFTA influencing an increase in the fraction of farms smaller than 500 acres. (See Appendix: Table 3).

Building upon this baseline model and adding more independent variables returned similar results. The addition of the logs of population estimate, GDP, total jobs, and farm earnings also returned statistically significant results for the NAFTA dummy, though in the positive direction. The log of the population estimate returned a negative coefficient at a statistically significant level, inferring that rising state populations are correlated with a decreasing percentage of small farms in this model. The coefficient for the log of state GDP was
positive and significant, inferring the possibility of high state GDP’s contributing to a greater percentage of small farms. (See Appendix: Table 3)

The addition of interaction terms for region and NAFTA returned statistically significant results at the 1% level. The coefficient on the interaction term for Southeastern states after NAFTA was negative and significant, inferring a decreasing effect of the trade agreement on the fraction of small farms in the Southeast (See Appendix: Table 3). This finding supports the notion that NAFTA contributed to farm centralization across the United States, including the Southeast. Replacing percentage of small farms with the log of total farms as the dependent variable statistically significant results were returned at the 1% level (See Appendix: Table 4). The coefficient for the interaction term of Southeast and NAFTA was negative and significant. This corresponds with the shift nationally towards reduction in number of farms and increase in size of farm. Regressing the same independent variables on the log of vegetable cash receipts returned negative coefficients for the Southeast after NAFTA and for the country as a whole post-agreement (see Appendix: Table 4). These results, however, were not significant at any conventional level.

In order to attempt to measure variation in the dependent variable and observe from another angle, a model was run regressing GDP, population estimates, total jobs, and NAFTA on the log of farm production expenses. The results returned a positive coefficient for the NAFTA variable which was statistically significant at the 1% level (see Appendix Table 5). Farm production expenses fluctuate in accordance with commodity input prices (fuel, fertilizer, herbicide) and labor costs, which if the model has a smoothing effect on these movements would imply some effect of NAFTA on increasing production costs (Zulauf and Rettig, 2015). In
contrast, it is also possible that farm production costs are generally rising year by year regardless of NAFTA.

As a robustness check, fixed-effect models were run for three labor intensive crops predominately grown in the southeast (by total number of farms): strawberries, hot peppers, and sweet peppers. Including the NAFTA variable, NAFTAsoutheast interaction term, and NAFTAmidwest interaction term returned results in line with the previous models utilizing the interaction term between NAFTA and region. For strawberries the resulting coefficient was in the negative direction for the Southeast and the Midwest, but was not significant at any conventional level (see Appendix: Table 6). For sweet peppers the result was a strong negative coefficient for the Southeast term and was significant at the 1% level (see Appendix: Table 6). For hot peppers, a negative coefficient for the Southeast was the result, but significance dropped down to the 10% level (see Appendix: Table 6). In these three cases, all models supported the idea of negative correlation between NAFTA and Southeast producers, but only one of those was statistically significant at any conventional level.

In order to compare the results of predominately Southern crops to Midwestern crops, a similar model was run on both total corn farms (by state) and number of corn acres (by state). This resulted in NAFTA overall returning a statistically significant negative coefficient at the 10% level, NAFTAsoutheast negative coefficient at the 5% level, and NAFTA midwest at the 1% level (see Appendix: Table 6). This infers a decrease in number of corn farms across the board correlating with NAFTA. To build upon this, the same variables were run against the number of corn acres by state. This resulted in a positive coefficient for NAFTA significant at the 5% level, a positive but not significant coefficient for NAFTA midwest, and a negative but not significant level for NAFTA southeast (see Appendix: Table 6). Taking both models (total
corn farms and total corn acres) into account, it can be noted that there is evidence that the number of farms declined post-NAFTA but the number of acres in corn increased or remained stagnant. While it is possible that some of those corn farms switched to other crops, with the popularity of double cropping throughout the country it seems unlikely. Rather, these results appear to support farm consolidation (Sumner, 2014).

Policy Implications

The possible effects of NAFTA on southeastern small scale agriculture hold policy implications as the United States continues to negotiate various trade deals around the world. This should encourage policymakers to attempt to prevent deleterious effects on those possibly harmed through both proactive and reactive measures. While one cannot authoritatively say that NAFTA had an overwhelmingly negative impact on small-scale agriculture in the Southeast, the implication that it contributed to farm centralization and total farm reduction provides another angle with which to approach domestic agricultural policy.

Decreases in the number of farms and increasing farm sizes, the number of individuals employed on farms, farm receipts, and the fraction of farms that are small or family owned can have a major impact on local communities. For many rural communities, the vast majority of jobs may be agricultural and the closure of a few farms could prove devastating. The total number of counties mainly dependent on agriculture has been steadily declining since well before NAFTA. From 1975-1996 Appalachia felt a decline of 30.9% in agricultural jobs, the Delta region a decline of 38.3%, and the rest of the Southeast of 43.2% (Cowan, 2002). While this could potentially pose no problem if individuals were able to switch to new industries, job losses in agriculture have historically occurred simultaneously with outmigration (Drabenstott and Gibson, n.d.). Recently, migration out of farm dominant areas has been exacerbated with nearly two-thirds of rural counties being affected (USDA, 2014). This also coincides with slow
employment growth post-recession. While urban employment grew by 5% from 2010 to 2014, rural employment grew by only 1.1% and hovered at 3% below pre-recession levels as late as 2014 (USDA, 2014). Communities can lose socio-cultural capital when family farms are lost to consolidate into industrial corporate control. Local economies based on agricultural revenues can be drained when receipts decline. On a more macro level, fewer local farms could mean an increase in pollution created by increases in mechanized farming and rising urbanization.

This is not to say that the effects of free-trade agreements will only be negative for agricultural areas. These regions too can benefit from cheaper goods and shifts in job markets. As with all consumers, whether urban or rural, the ability to purchase goods at lower prices frees up more income to greater maximize consumption. It also aids in the ability for individuals to save and potentially invest or act entrepreneurially. Currently, more rural counties are primarily dependent on manufacturing than agriculture, as lower labor and land costs can entice firms to move operations to non-metro regions (Whitener and Parker, 2007). Around 80% of rural counties depend on industries outside of agriculture (including services, mining, and government) for the majority of their economies (Whitener and Parker, 2007). An increase in economic diversification for rural communities can be sustainable. If a rural area is too heavily dependent on one or a few agricultural commodities (tomatoes in Belle Glade, FL or onions in Vidalia, GA) and disaster occurs, the region is not nearly as well prepared to weather the effects compared to a diversified local economy.

Formulating agricultural policy with free trade agreements in mind is still objective driven. For example, should the policy aim to protect the smaller farmers (as they are) or should it encourage producers to diversify or switch to crops that are less likely to be affected by the deal? As the Trans-Pacific Partnership is being debated, the issue of increased pangasius imports...
could negatively impact catfish farmers in Mississippi, Arkansas, and other southern states. Farm groups may attempt to pressure the US trade representatives to carve out protections for the producers, but this is not necessarily possible. Thus, for the USDA and its extension agencies perhaps informing the producers of the risks and possible ways to mitigate those risks would be beneficial. Can catfish ponds be easily transitioned to tilapia ponds or some other form of aquaculture? This holds true for more crops than just catfish. If switching to a new crop with which they have minimal experience farmers might be unaware of marketing programs available. Increasing communication and informing growers of potential risks of trade deals as well as offering support for farm conversions could give them the tools to transition ahead of potential market changes or at least be better prepared. Building upon farm conversion and transition, if farmers and agricultural areas can vertically integrate (slaughterhouses, canneries, food processing) value can be added to products locally. Land-grant universities and research institutions could play a pivotal role in shifting focus to “value-added” opportunities and maximizing educational attainment (Drabenstott and Gibson, n.d).

National policies in reaction to free-trade agreements can be difficult to develop or even counteractive. Trade agreements (at a macro-level) guide policy for an entire nation. Cases of national policy that affect international agricultural trade can be risky. A recent example would be the uproar regarding Country of Origin Labeling (COOL) which required visible markings (in English) asserting country origin for certain foods. This national policy led to Canada and Mexico bringing suit against the United States at the World Trade Organization and an eventual ruling that allowed for $1 billion in retaliatory tariffs against the United States (Zuraw, 2015). The COOL fiasco highlights the issues policymakers face when developing laws and regulations that even tangentially affect international food trade.
In the future, trends have been developing in both policy and agriculture the effects of which are yet to be determined. “Organic” and “local” foods are growing in popularity, especially for urban and millennial consumers. Perhaps down the line there will be a shift for American (especially vegetable) producers in what might be considered traditional agricultural practices into niche markets. If lower labor costs in countries with which the United States has free-trade agreements allow foreign produce prices to undercut those in America, without protective policy farmers are forced to adapt or die. Maybe a renewed interest can be fostered in heirloom crops and varieties that have virtually disappeared, like chestnuts from the American southeast. A good example of a successful heirloom crop that has been popularized through new campaigns and conservation is quinoa, from the Andes (Skarbø, 2015). Around the world, especially in developing countries, initiatives are developed and money spent to support small, local, sustainable farming, could that be applied at the domestic level?

On the state-level political side, very recently Vermont passed a bill requiring products that contain ingredients made with Genetically Modified Organisms (GMO’s) to be labeled as such (Hopkinson, 2016). In response to that law, the United States Senate narrowly blocked a bill that would have made anti-GMO laws at the state-level illegal (Godoy, 2016). While the vast majority of GMO crops are commodity staples (not vegetables), GMO citrus has been developed as well as GMO squash and zucchini. What is important to consider in this situation is not the GMO debate, but whether or not state and local law could become a significant tool to support small, local agriculture. The Vermont bill will likely be challenged in court, but it may be foundational to the development of state level and possibly eventual local level food policy. If a state can enforce GMO labeling, why could it not enforce country of origin labeling? Would Mexico or Canada be able to file suit against the state of Vermont at the WTO? In addition,
small farms might benefit if states increasingly encourage consumers to “buy local” and work to attach intrinsic value to crops unique to or historically tied to a certain state (i.e. Florida citrus, Georgia peaches, South Carolina watermelon).

Tangentially, the consideration of policy in relation to the effects of trade agreements on agriculture could lead to productive conversations about the rural economy as a whole. As previously mentioned, not only is the US becoming less rural and agricultural, even rural areas are becoming less agricultural. Traditionally, American farm policy has been treated as “rural policy,” and even in times of high government crop subsidy payments there existed significant levels of outmigration (Whitener and Parker, 2007). Increasing economic diversity requires strategies that take into account new local industries, reduction in farm labor, and more service jobs. Infrastructure development may become more important, increased vertical integration in agriculture might be encouraged, greater emphasis on higher education to lure in businesses, greater tourism emphasis, and especially astute town and county planning to minimize sprawl and planned obsolescence.

It is possible that buying American or local produce will be more expensive for consumers, laws supporting labeling could increase costs of business, and state and local marketing programs do cost money. More money spent by consumers, businesses, and government that benefits small and local farms means less money for other programs, purchases, and investment. But in attempts to model the cost-benefit analysis of such programs and initiatives, it is difficult to put a price on intrinsic value and national benefit. How does one put a price on small farmers feeling valued by both consumers and government, consumers being tied more closely to the origin of their food and its producers, local pride in unique production services, and the appreciation of consumers now able to maximize product knowledge from
better labeling? Policy decisions then are hinged on the subjective determination of the object of maximum importance for the policy maker: protecting local farms or encouraging cheaper produce; working to increase community interaction or increasing commoditization of consumers; encouraging more detailed food labeling or protecting corporate profit.

Conclusion

Noticeable changes have been occurring in American agriculture over the last twenty years. Export quantities of some crops have increased, imports of some foods have increased. As a percentage of the American workforce, the proportion involved in agriculture is the lowest in history (Johnston, 2012). Increased transactions certainly have an influence on the agricultural market. Each crop has its own eccentricities and thus a labor intensive crop will be affected differently than a commodity utilizing industrial technology. Perhaps the “market knows all” and the trends occurring are the result of the “invisible hand” guiding supply and demand towards equilibrium. It is possible, however, that trade agreements “push” (or even shift) the supply curve more-so than “guide” it. Maybe NAFTA has had no real effect on American agriculture, and industrialization, urban sprawl, lack of unskilled labor, and a rejection of agrarian culture are to blame for the issues farmers in the American southeast face today. But, the results of my empirical analysis imply that there is a chance that NAFTA has had a hand in changing the landscape of southern farming.

The results of my paper are inconclusive as to a causal relationship between NAFTA and the reduction of small farms as a percentage of the total farm population. However, a negative correlation exists between the effect of NAFTA and the percentage of small farms by state indicating a deleterious influence. A positive correlation exists between the exogenous effect of NAFTA and the average farm size indicating an influence towards farm consolidation. It is
possible that as markets work and technologies improve there is momentum towards larger, specialized farms. These farms can utilize economies of scale and intricate financial risk hedging mechanisms to maximize efficiency. On the other hand, it is possible that exogenous effects, such as NAFTA, have exacerbated this trend by providing a rapid shock to those farmers unprepared to adjust. It could be useful to build upon this research with more recent data and fine grained approach, allowing one to observe longer term effects and to derive more specific policy implications.

My results suggest effects on smaller farms in both the Midwest and the Southeast, which could infer that free-trade agreements not only affect labor intensive farms but also support the ability of industrial style farming to consolidate. This corresponds with Stencel’s assertion that free-trade agreements (in relation to agriculture) “encourage dominant players to grow even larger” and “it is not the most efficient that will prevail, but rather those with the deepest pockets who can afford to stay in the game the longest” (Stencel, 2008). The results of my models support a trend towards consolidation of farms, declining number of farms in some sectors, and small farms becoming less of a share of total farms. It can be noted from the research that this is not singular to any one crop, and even extends from some evidence into grains (corn) in the Midwest.

The results in this paper could be further explored from other angles. Attaching causality to trends in agriculture is a gray area. For example, weather patterns can affect agriculture (Lavee, 2010). Major shifts in commodity prices can influence crop choices (Livingston, Roberts & Zhang, 2015). Rapid suburbanization can lead to increased land prices, incentivizing land sales or discouraging new farmer entry (Wu, Fisher & Pascual, 2011). Domestic policy including conservation practices, water use rights, and even degraded infrastructure impose externalities to
which producers must react. Another issue is that my data only provided information from 1992 through 2007. Rapid advancements and changes in agriculture have occurred in the nine years between 2007 and 2016, and if more recent data was used different results are possible. Modeling with more recent data could provide clearer results. Future study into identifying metrics of determining negative effects on agriculture could be beneficial to the literature as intrinsic value of numerous small farms is difficult to quantify, as are new opportunities taken by farmers post-farm life.

Irrespective of this research returning conclusive results stating benefit or detriment to American agriculture and farmers as a result of trade deals, it is my wish that this paper at least can instigate conversation. Perhaps policy makers could better support their constituents by placing greater emphasis on the redistributive elements of free-trade agreements. According to classic trade theory, there are winners and losers, some parties thrive while other parties involved are unable to compete. For domestic, state, and local level policymakers, the knowledge that certain segments of a population maybe adversely affected by new programs and regulations should be considered along with the development of methods to soften the “blow” of such policy shifts. If the gospel truth of trade deals is not singularly positive, then in order to protect possible constituents who “lose” in these agreements policy makers hopefully can anticipate these results and be prepared. Without objective proof for or against the benefit to small farmers from free-trade deals such as NAFTA, my desire is that this research serves just simply as an encouragement to consider the redistributive consequences of trade deals and better prepare rural and agricultural populations for this shift.
Appendix

Figure 1: Trends in US Vegetable Trade

![US Vegetable Trade graph]

Figure 2: Trends in US Fruit Trade

![US Fruit Trade graph]
<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data 13</td>
<td>total number of corn farms in the state</td>
<td>ICPSR35206</td>
</tr>
<tr>
<td>Data 14</td>
<td>total number of corn acres in the state</td>
<td>ICPSR35206</td>
</tr>
<tr>
<td>Data 50</td>
<td>total number of hot pepper farms in the state</td>
<td>ICPSR35206</td>
</tr>
<tr>
<td>Data 52</td>
<td>total number of sweet pepper farms in the state</td>
<td>ICPSR35206</td>
</tr>
<tr>
<td>Data 72</td>
<td>total number of strawberry farms</td>
<td>ICPSR35206</td>
</tr>
<tr>
<td>PopEstimate_log</td>
<td>the log of the population estimate for the state by year</td>
<td>BEA</td>
</tr>
<tr>
<td>gdpmillionsofdollars_log</td>
<td>the log of a state’s Gross Domestic Product by year</td>
<td>BEA</td>
</tr>
<tr>
<td>TotalJobs_log</td>
<td>the log of the total jobs in a state by year</td>
<td>BEA</td>
</tr>
<tr>
<td>farmearnings_log</td>
<td>the log of total farm earnings by state by year</td>
<td>BEA</td>
</tr>
</tbody>
</table>
### Table 3

**Effect on Percentage of Small Farms by State**

<table>
<thead>
<tr>
<th></th>
<th>(1) NAFTA Control Included</th>
<th>(2) Economic Indicators Included</th>
<th>(3) Regional Effects Included</th>
</tr>
</thead>
<tbody>
<tr>
<td>NAFTA</td>
<td>0.0238494 (0.0037276)***</td>
<td>0.0146162 (0.0028936)***</td>
<td>0.0341081 (0.0055353)***</td>
</tr>
<tr>
<td>Log of the State Population Estimate</td>
<td>-</td>
<td>-0.0611039 (0.0276244)***</td>
<td>-</td>
</tr>
<tr>
<td>Log of State GDP in Millions of Dollars</td>
<td>-</td>
<td>0.0451137 (0.0133828)***</td>
<td>-</td>
</tr>
<tr>
<td>Log of Total Jobs in State</td>
<td>-</td>
<td>0.0120581 (0.0319565)</td>
<td>-</td>
</tr>
<tr>
<td>Log of State Farm Earnings</td>
<td>-</td>
<td>0.0018628 (0.0020696)</td>
<td>-</td>
</tr>
<tr>
<td>Southeast Post-NAFTA Interaction</td>
<td>-</td>
<td>-</td>
<td>-0.0188931 (0.0057861)***</td>
</tr>
<tr>
<td>Midwest Post-NAFTA Interaction</td>
<td>-</td>
<td>-</td>
<td>-0.0267325 (0.0056993)***</td>
</tr>
<tr>
<td>Constant</td>
<td>0.8183249 0.0027957</td>
<td>1.018764 0.06148</td>
<td>0.8183249 0.0024778</td>
</tr>
</tbody>
</table>

Observations: 200 196 200 200 200 200
R-Squared: 0.0057 0.0704 0.0025

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1
### Table 4
**Effect on Various Farm Characteristics**

<table>
<thead>
<tr>
<th></th>
<th>(1) Log of Vegetable Cash Receipts</th>
<th>(2) Log of Total Farms</th>
</tr>
</thead>
<tbody>
<tr>
<td>NAFTA</td>
<td>-.0853724 (.2791473)</td>
<td>.1451591 (.0179226)***</td>
</tr>
<tr>
<td>Southeast Post-NAFTA Interaction</td>
<td>-.3038437 (.735428)</td>
<td>-.068164 (.0270577)**</td>
</tr>
<tr>
<td>Midwest Post-NAFTA Interaction</td>
<td>.1406716 (.5150769)</td>
<td>-.1331974 (.0248681)***</td>
</tr>
<tr>
<td>Constant</td>
<td>11.3556 (.1937315)</td>
<td>9.9977 (.0092715)</td>
</tr>
<tr>
<td>Observations:</td>
<td>198</td>
<td>200</td>
</tr>
<tr>
<td>R-Squared:</td>
<td>0.0004</td>
<td>0.0832</td>
</tr>
</tbody>
</table>

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

### Table 5
**Effect of Economic Indicators**

<table>
<thead>
<tr>
<th></th>
<th>(1) Log of Farm Production Expenses</th>
<th>(2) Log of Total Number of Jobs</th>
</tr>
</thead>
<tbody>
<tr>
<td>NAFTA</td>
<td>.4026454 (.1545641)**</td>
<td>10.0256 (1.454536)***</td>
</tr>
<tr>
<td>Log of Population Estimate</td>
<td>-5.468264 (1.182565)***</td>
<td>10.0256 (1.454536)***</td>
</tr>
<tr>
<td>Log of GDP in Millions of Dollars</td>
<td>-3.405114 (.4184053)***</td>
<td>-9.283859 (2.092448)</td>
</tr>
<tr>
<td>Log of Total Number of Jobs</td>
<td>10.0256 (1.454536)***</td>
<td>10.0256 (1.454536)***</td>
</tr>
<tr>
<td>Constant</td>
<td>10.0256 (1.454536)***</td>
<td>10.0256 (1.454536)***</td>
</tr>
<tr>
<td>Observations:</td>
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<td>200</td>
</tr>
<tr>
<td>R-Squared:</td>
<td>0.4648</td>
<td>0.4648</td>
</tr>
</tbody>
</table>

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

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### Table 6

Effect on Farms By Crop

<table>
<thead>
<tr>
<th></th>
<th>(1) Strawberries</th>
<th>(2) Sweet Peppers</th>
<th>(3) Hot Peppers</th>
<th>(4) Corn</th>
<th>(5) Corn Acres</th>
</tr>
</thead>
<tbody>
<tr>
<td>NAFTA</td>
<td>-2.873939</td>
<td>30.6164</td>
<td>0.0341081</td>
<td>-466.0944</td>
<td>111679.8</td>
</tr>
<tr>
<td></td>
<td>(6.928198)</td>
<td>(12.91747)**</td>
<td>(0.0053553)***</td>
<td>(249.7902)*</td>
<td>(49417.84)**</td>
</tr>
<tr>
<td>Southeast Post-NAFTA Interaction</td>
<td>-4.269721</td>
<td>-73.57598</td>
<td>-0.0188931</td>
<td>-1320.716</td>
<td>-90653.18</td>
</tr>
<tr>
<td></td>
<td>(9.908992)</td>
<td>(21.12665)***</td>
<td>(0.0057861)***</td>
<td>(616.6365)**</td>
<td>(72226.15)</td>
</tr>
<tr>
<td>Midwest Post-NAFTA Interaction</td>
<td>-29.13242</td>
<td>15.1412</td>
<td>-0.0267325</td>
<td>-8417.801</td>
<td>144857.1</td>
</tr>
<tr>
<td></td>
<td>(13.88936)**</td>
<td>(31.47084)</td>
<td>(0.0056993)***</td>
<td>(1329.157)***</td>
<td>(140307.9)</td>
</tr>
<tr>
<td>Constant</td>
<td>161.9133</td>
<td>151.394</td>
<td>0.8183249</td>
<td>10062.29</td>
<td>1385556</td>
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<tr>
<td></td>
<td>(3.731501)</td>
<td>(6.983191)</td>
<td>(0.0024778)</td>
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<td>(30989)</td>
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</tbody>
</table>

Observations: 198

R-Squared: 0.028

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1
References


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