

Project 1
Farmers Market Analysis Report

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IE 6600
Computation and Visualization for Analytics

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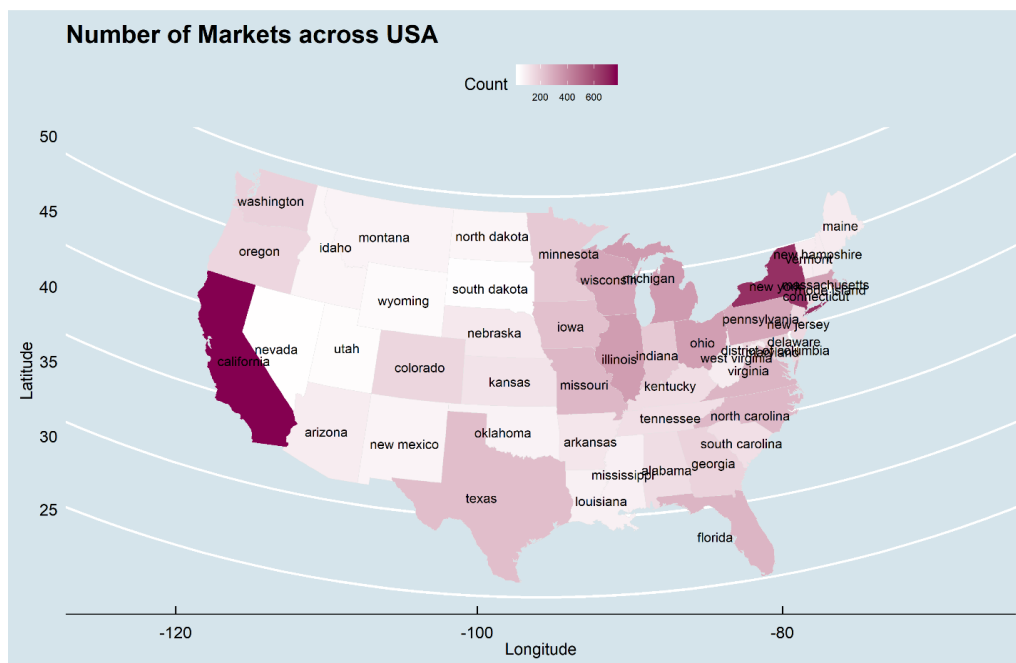
I. Introduction

This report will analyse the dataset stored in “fmarket.csv ” published by The United States Department of Agriculture (USDA). It concludes 8791 objects of 61 variables. The data record 8,791 farmers markets listed in USDA’s National Farmers Market Directory. The information includes variables indicating the geographical location of the farmers market (latitude, longitude, street, county, state, etc.), variables indicating types of products (herbs, vegetables, seafood, etc.), Variables indicating type of payment accepted (cash, WIC, SNAP, SFMNP, etc.), variables indicating online social media presence and variables indicating date and time(Season date and time, update time, etc.).

The subject of this report is providing meaningful insights about Farmers markets located across the USA especially exploring the relationships among the types of products, payment system and geographical distribution of all markets listed.

II. Analysis

1. Overview



According to the dataset published by USDA, the amount of famers market has reached 8791. Figure 1 shows that California has the largest number of farmers market (759) in the whole country with New York taking the second place (with the amount of 673). The two states both have more than 600 markets.

The market amounts among states show extreme variation. The market total numbers of states in US northeast and the eastern of US Midwest are far larger than those of most states in the western and southern of United States.

2. The Growth and Evolution of Farmers Market across USA

To have insights about the growth and evolution of farmers market across the whole country focusing on the change of market quantity, the comparison among the market amounts between the year 2009 and 2020 by states, including the average annual increasing number of markets from 2009 to 2020 which is used to represent the growth rate in this case, has been performed.

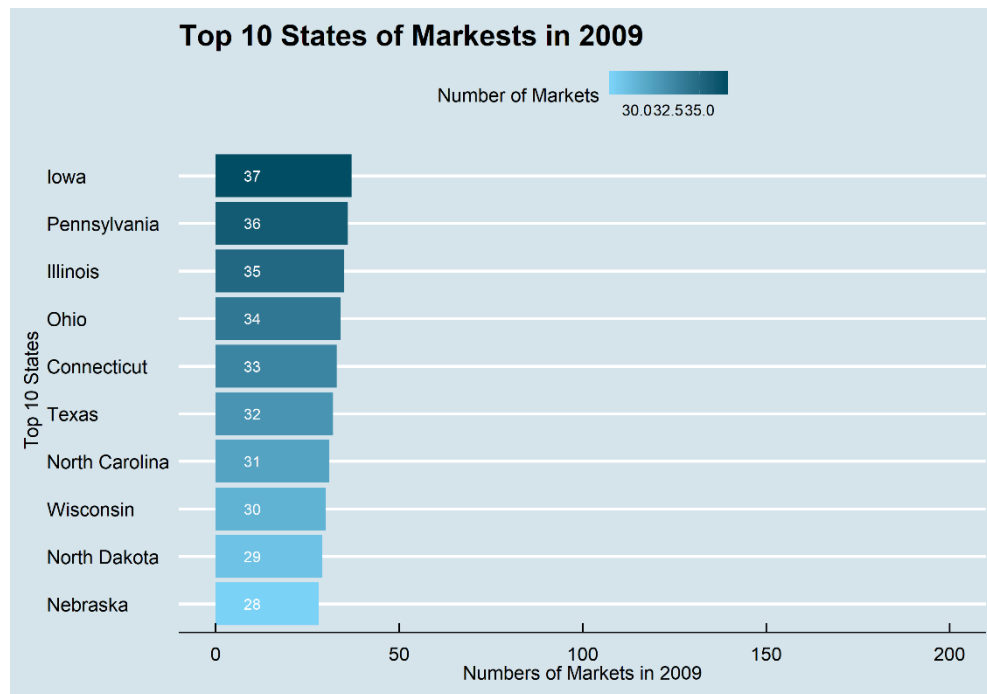


Figure 2

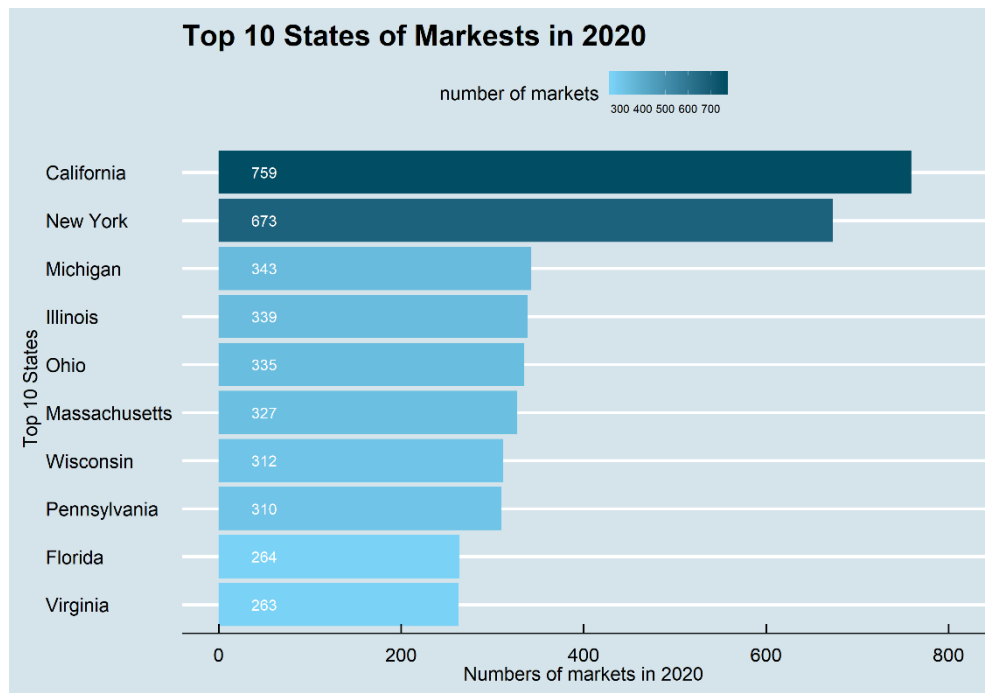


Figure 3

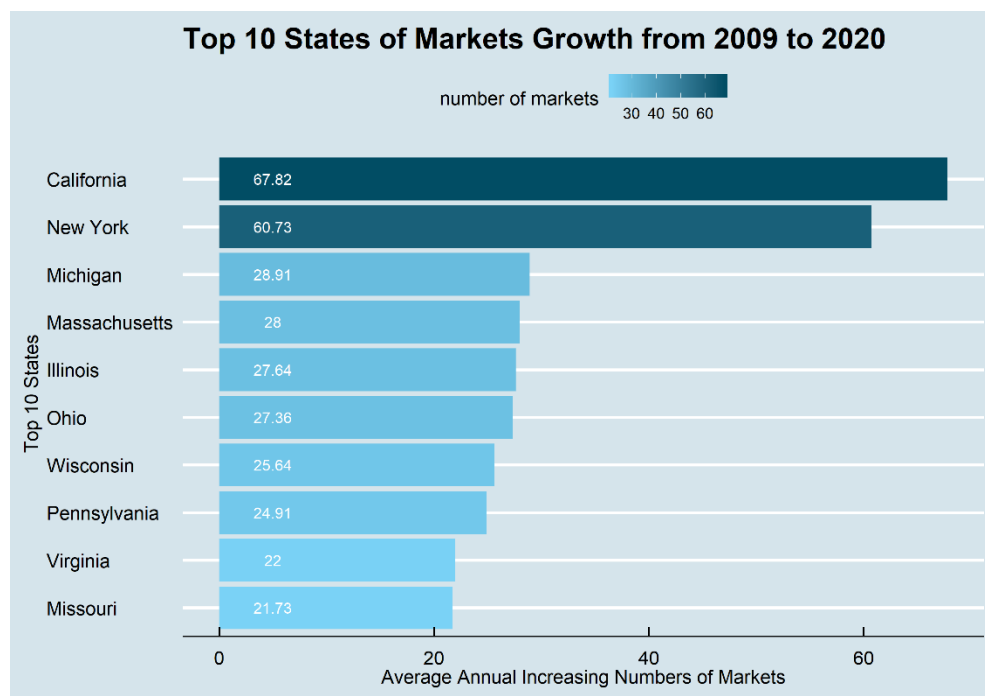


Figure 4

Figure 2 and Figure 3 reveal that farmers market has changed dramatically from 2009 to the present. Not only the number of Top1 market has around 20 times of increase within the past 11 years, but also the top10 states of the original year are nearly different from those at present. In 2009, the market numbers of 6 US Midwest states rank on the top 10 list while 4 US Midwest states and 3 US Northeast states take place in top 10. Illinois, Ohio, Wisconsin, Massachusetts, Pennsylvania and Virginia are still on the list. The result is almost in line with the growth rate ranking (shown in Figure 4). The first No.9 states of the average annual increasing number of markets are the same as that of market amount. It is worth mentioning that the market growth in California and New York is remarkable. The two states were even not on the list while California and New York have been the No.1 and No.2 respectively now both with market amount more than 600 (759 and 673 separately) nearly twice than the amount of No.3 state (Michigan, 343).

Considering the aim of USDA is to build more close relationship between farmers and customers, it can be deduced that the recent structure of farmers market is due to that California and New York city has the largest consumer market of agricultural products. In addition, it seems that agricultural products consumption tends to concentrate in the eastern of US Midwest and US Northeast.

3. The Distribution of Products

In this part, the analysis about the distribution of different types of agricultural products has been performed to view the relationship between products and geographical distribution. The analysis will mainly focus on the distribution of market number by regions.

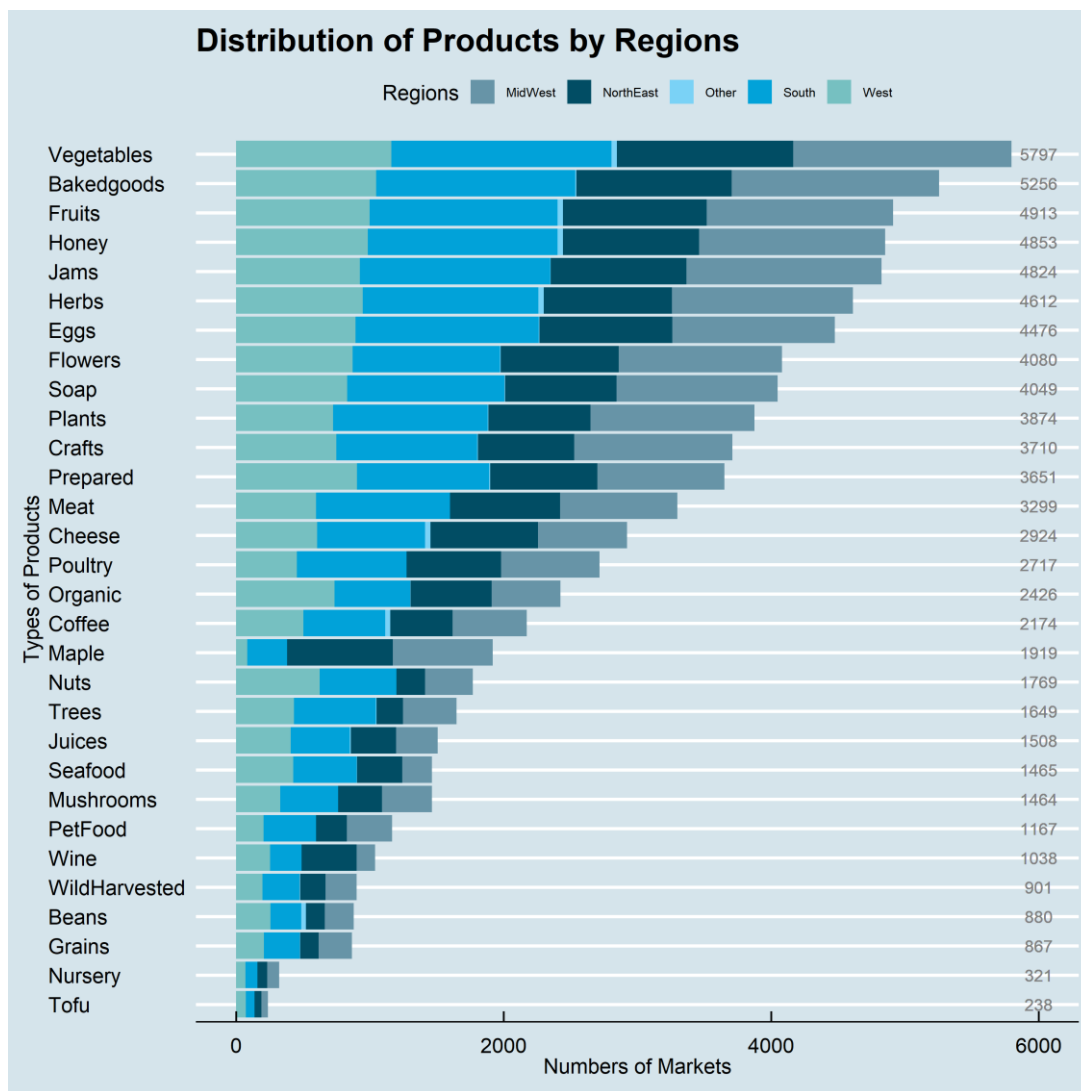


Figure 5

Based on Figure 5, it is clear that vegetable is by far the most popular product followed by baked goods. Generally, the proportion of each kind of product sold in any particular region tends to be similar. Except for the “other” region of which market number is extremely small, the market numbers of a type of product in all regions are of not much difference. However, special cases exist. It is noticeable that the consumption of maple in Southern United States and Western United States is far less than that in the eastern United States and the Midwest. On the contrary, US Northeast and Midwest consumes more nuts, trees, juices and seafood than US West and Southern United States. Besides, the number of markets which sell wine is significantly more than in other regions.

It can be assumed that larger the market amount of a particular type of product is, the more popular the direct consumption mode for this commodity through farmers market is.

4. The Distribution of Payment System

A similar analysis is applied in this part. The distribution of different types of payment systems will have an insight into the relationship between types of payment and geographical distribution.

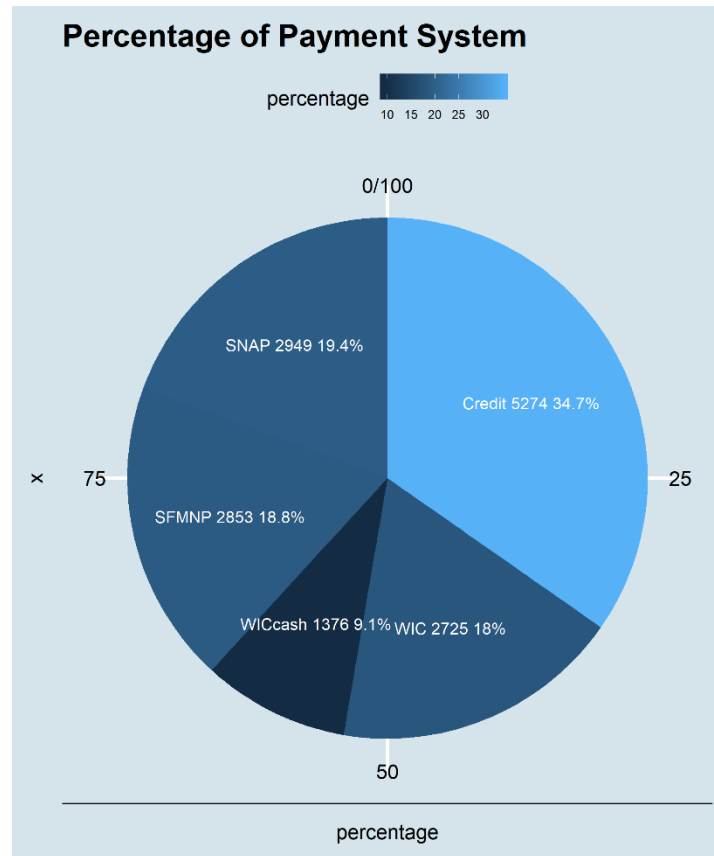


Figure 6

In general, five types of payment are accepted by farmers market including Credit, SNAP, SFMNP, WIC and WIC cash. As shown in Figure 6, Markets accepting Credit make the largest proportion (34.7%) of the amount of farmers market. SNAP, SFMNP and WIC all account for around 18% of the total (19.4%, 18.8% and 18%, respectively). WIC cash is rarely accepted by 9.1% markets.

It is clear that Credit is the most popular payment method for farmers market.

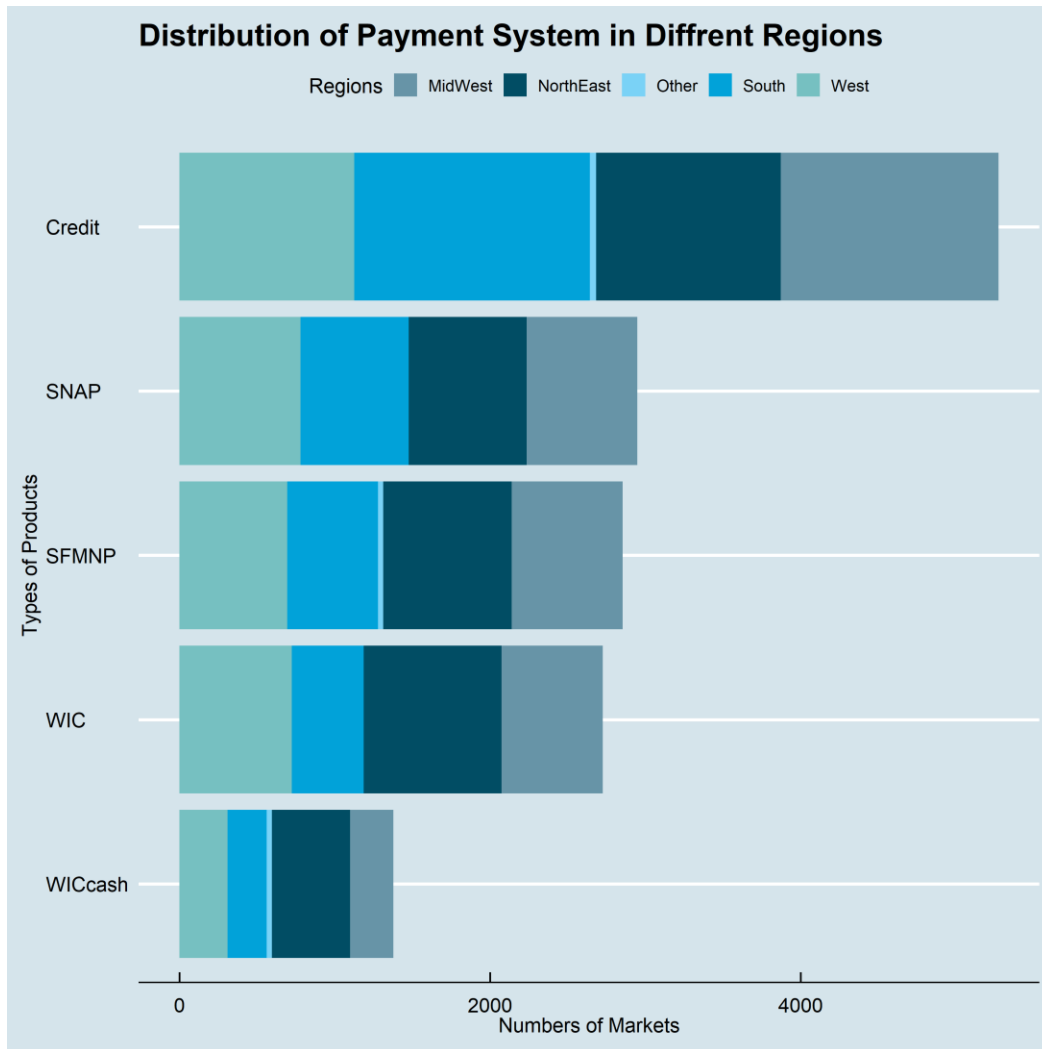


Figure 7

Figure 7 displays that the proportion of each type of payment system accepted by markets in all regions. It is apparent that Southern United States has more markets accepting Credit payment while US Northeast has a smaller number of markets accepting this payment method. Conversely, the other payment systems show the opposite situation with more supporter in US Northeast and less supporting markets in Southern United States.

It appears that US Northeastern has a higher acceptance of the payment system by the government-dominated program.

5. The Effects of SFMNP Payment Systems on The Growth of Farmers Market

In this part, the target is to explore the effects of a particular type of payment system on the growth of farmers market. Due to that the SFMNP payment system provides specific consumption channel to fruit, herbs, honey and vegetables¹, the effects of this method on the four types of agricultural products can be observed more directly. Hence, the analysis will focus on SFMNP payment system.

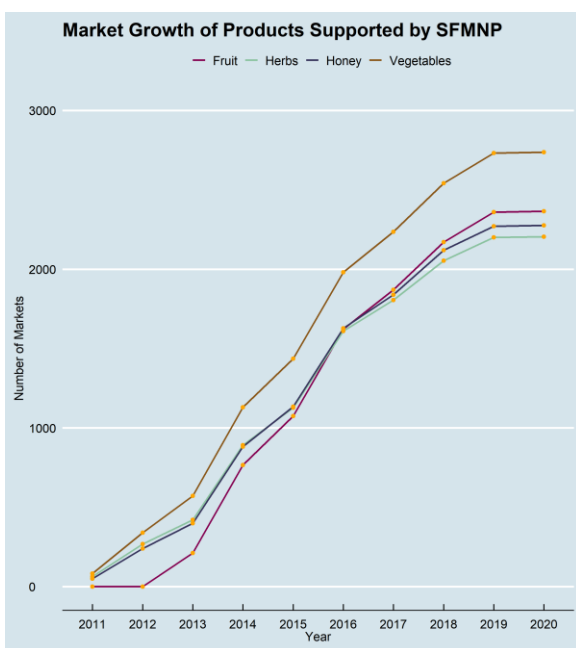


Figure 8

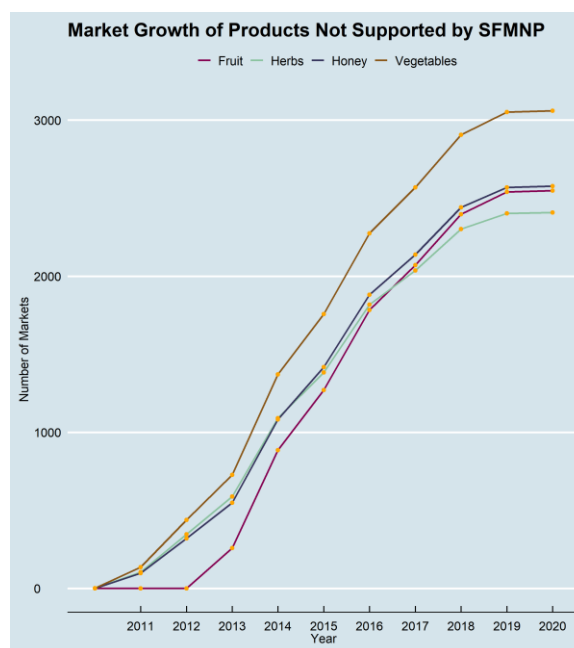


Figure 9

Figure 8 and Figure 9 compare the growth of markets providing fruit, herbs, honey and vegetables supported by SFMNP payment system with that supported by other payment systems.

The markets not supporting SFMNP are a little more than the ones supporting SFMNP with a similar growth trend for vegetables, herbs and honey. However, the rise of SFMNP-backed markets providing fruits is prominent. The total number of SFMNP-backed markets having fruits

¹ <https://www.fns.usda.gov/sfmnp/senior-farmers-market-nutrition-program>

surpassed that of selling honey and herbs in 2016 while non-SFMNP-backed markets having fruits become over herbs markets between 2016 and 2017.

According to results from Figure5, fruit, herbs, honey and vegetables are 4 types of top-ranked popular products with vegetables as the No.1 followed by fruit, honey and herbs separately. The rank matches the result of market number supported by SFMNP. Therefore, it can be inferred that SFMNP payment system has positive effects on the products which it supported and especially have a big boost to the sale of fruit.

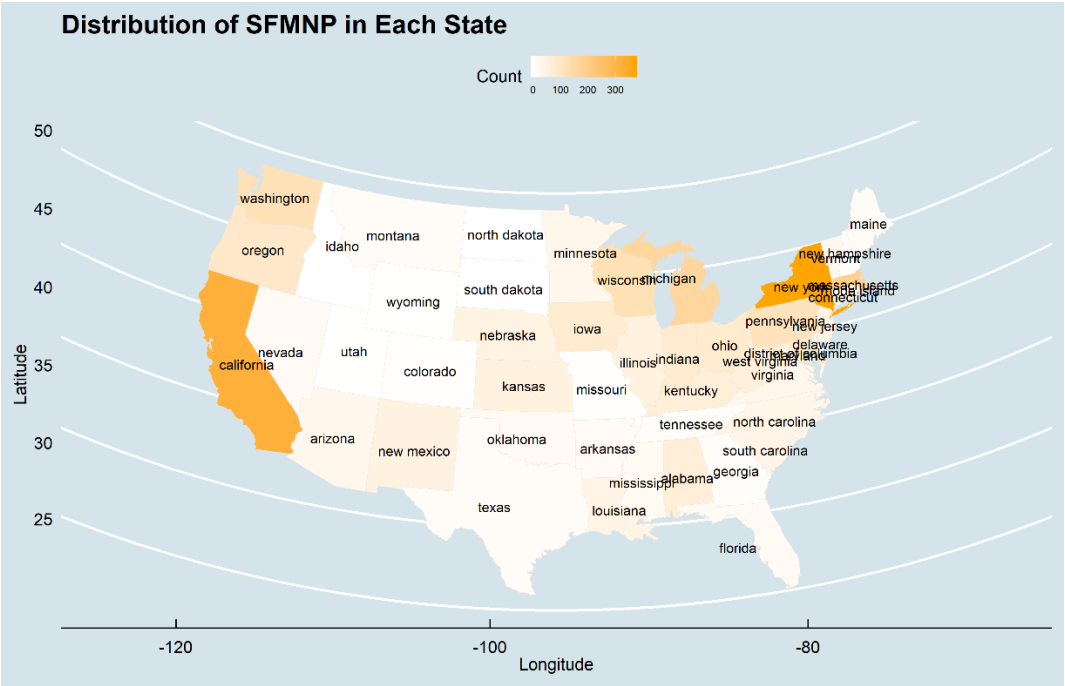


Figure 10

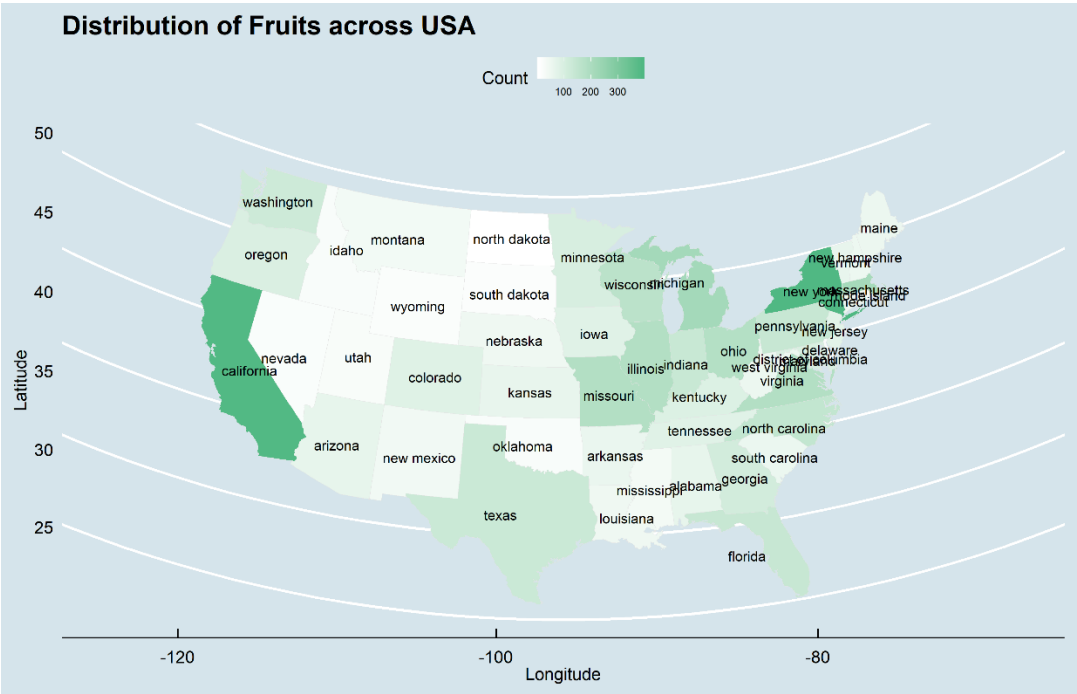


Figure 11

Comparing Figure 10 and Figure 11 which are showing the distribution of SFMNP payment system and fruits respectively, it can be found that the distributions of the two basically have the same trend. If the SFMNP payment system could be popularized in a larger extend in states which lack farmer markets accepting SFMNP, the sale of fruits in these states would be increased accordingly.

III. Discussion

To sum up, USDA has succeeded in improving the growth of farmers markets across the country. This strategy of supplying agricultural products directly to consumers from farmers has worked effectively. The results of the current analysis will help in making strategies for the future. For example, the vast area in the southern and western United States have fewer markets for agricultural products and less acceptance for payment systems which raise market. If government-backed payment systems could provide more preferential policies and promote the acceptance of government-backed payment system in these regions, the farmers market there can be expanded effectively. Besides, the cities and states having a great number of markets now can be viewed as trading hubs of agricultural products with a massive number of consumers. In these regions, keeping providing government-backed payment system programs can affect the market positively and benefit more specific groups of the population.

IV. Reference

Wickham, H., & SpringerLink. (2009). Ggplot2 Elegant Graphics for Data Analysis, Springer eBooks.

“Senior Farmers' Market Nutrition Program.” USDA,

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