Beginning U.S. Farms and Ranches: Characteristics Associated with Business Survival and Financial Resilience, 2007-2017

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Abstract: This paper uses information from three U.S. Department of Agriculture Censuses of Agriculture (2007, 2012, and 2017) to describe characteristics of beginning farmers and ranchers in 2017, and subsequently identify characteristics associated with operations that were beginning in 2007 and survived to 2017. A contribution of this report relative to previous research is to define beginning operations in two ways: if *all operators* are beginning (have less than 10 years of experience as a farm or ranch operator) or if *any operators* are beginning. This more nuanced definition enables us to gain insight into differences across all beginning and multi-generation operations, which may have implications for future policies.

Introduction:

Significant attention has been paid by Federal policymakers to increase viability of beginning farmers and ranchers. For example, Congress mandated that the Farm Credit System serve the credit needs of young, beginning small farmers and ranchers (Farm Credit 2020). Similarly, the U.S. Department of Agriculture (USDA) Risk Management Agency offers preferential treatment to beginning farmers and ranchers that purchase crop insurance, including exemptions from paying certain administrative fees, higher premium subsidies, and less strict yield and production history requirements (Key 2022).[1] The most recent Farm Bill (2018) added several new programs and supports for beginning farmers and ranchers (USDA ERS 2019). These supports come at a time when beginning farmers and ranchers are seen to play an important role in the future of U.S. agriculture given that the average age of farmers continue to increase up 1.2% between the 2012 and 2017 census, with farmers over the age of 65 making up 35% of total farmers (USDA NASS 2017).

A body of research characterizes attributes of beginning farmers and ranchers. Ahearn (2011) uses 2007 USDA Agricultural Resource Management Survey (ARMS) data, as well as linked Census of Agriculture data from 1978 to 1997 (1978, 1982, 1987, 1992, and 1997) to examine farming entry rates and new entrant survival rates. Mishra et al. (2009) use 2005 USDA ARMS data to examine the relationship between the age of the operator and return on assets. Katchova and Ahearn (2016) use USDA Census of Agriculture data from 2002, 2007, and 2012 to understand the trends across beginning farmer land tenure, age and experience. Williamson (2017) uses USDA ARMS data from 1999, and then again in 2014 for cohorts of beginning operators by age to explore how differences in the initial ages of farmers affects farm finances and assets. Katchova and Dinterman (2018) used ARMS data to assess the performance of beginning farmers during the agricultural downturn. Key and Lyons (2019) published a descriptive report on beginning farms and ranches using USDA ARMS data aggregating beginning operators from 2013 to 2017. Most recently, Key (2022) used linked data from the U.S. Census of Agriculture and identifies farm and operator characteristics associated with beginning farm survival, growth, and success (defined as continuing in business for 5 years without a decline in farm real estate asset value).

The contributions of this report are three-fold. First, we provide a more comprehensive characterization of beginning operations in 2017 using the Census of Agriculture data. Understanding how farms operated by new producers differ from their more experienced counterparts may assist policymakers in designing policies and programs that target beginning farmers and ranchers. Second, we provide an in-depth look at the characteristics of the beginning operations that survived from 2007 to 2017, with a focus on land tenure, market differentiation, crop insurance, and government payments. In addition to identifying factors that might be correlated with farm business success, these results could be useful for policymakers who seek to target beginning farmers who have relatively low levels of business success and might therefore be considered in greater need of assistance, or more likely to benefit from program interventions. Third, we disaggregate the definition of beginning operations, focusing on a subset of operations wherein *all operators* are beginning (have less than 10 years of experience as a farm or ranch operator) and *any operators* are beginning. The definition of the former most closely aligns with

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[1] See the beginning farmers webpage on the USDA site (https://www.farmers.gov/your-business/beginning-farmers) or the 2018 Farm Bill page on ERS' website for more information about USDA programs for beginning farms (https://www.ers.usda.gov/agriculture-improvement-act-of-2018-highlights-and-implications/beginning-socially-disadvantaged-and-veteran-farmers-and-ranchers).

new operators, whereas the latter indicates multi-generation operations. The results illustrate how the types of operations that a program targets depends on the definition of a beginning farm used.

Specifically, this paper sets out to answer: What do we know about operations that were beginning (*any* or *all*) in 2017? What do we know about operations that were beginning (*any* or *all*) in 2007 and continued to survive in 2017? More specifically, we look at how beginning farmers differ from *established operations* and if these differences depend on how a beginning farmer is defined. Finally, we look at what factors are correlated with higher survival rates for beginning operations, with a focus on land tenure, market differentiation, crop insurance, and participation in government programs.

Key Variables of Interest
In this paper, we pay particular attention to four key beginning farmer attributes: land tenure, market differentiation, crop insurance, and participation in government programs.

- Land tenure: As the U.S. farming population ages, American Farmland Trust estimates that 40 percent of America's agricultural land will be in transition within the next 15 years (Freedgood et al. 2020; Jablonski et al. 2022). Approximately 39% of U.S. farmland in the contiguous 48 states is rented, with small family farms being more likely to be full owner of the land they operate (Ahearn and Newton 2009; Dodson and Ahrendsen 2016; Bigelow et al. 2016). Land is a primary input to farming and land tenure affects many decisions made on the farm (Bigelow et al., 2016). Programs at the USDA help beginning farmers and ranchers to purchase farmland and to develop and maintain economic viability (e.g., Farm Service Agency, Natural Resource Conservation Service). While several USDA programs promote land ownership, there has been little research exploring relationship between ownership and farm survival. Given that beginning farmers and ranchers face many financial challenges relative to more established operations (Key and Lyons 2019), understanding the importance of farmland ownership in survival would be useful to policymakers seeking to optimize program impacts.

- Market differentiation: Beginning producers often take advantage of differentiated markets that provide a premium over commodity prices as they cannot yet take advantage of economies of scale, and subsequently, have higher costs of production (Jablonski et al. 2017). In 2012, beginning farmers and ranchers produced 15% of the value of agricultural products sold, yet accounted for 22% of sales through direct markets and 26% of the value of organic sales (USDA NASS 2014). Preliminary evidence demonstrates conflicting results of the performance impacts to beginning farms and ranches of sales through local food channels. Beginning farms that marketed food through direct channels had a greater change of reporting positive sales in 2007 and 2012, when compared to beginning producers who only used traditional channels. Direct marketing was also associated with higher survival rates, but conversely also with slower growth among beginning farms and ranches (Low et al. 2015). National research on the profitability impacts of local food markets not specific to beginning farms and ranches demonstrates important differences across types of local food market channels, including direct and intermediated markets (e.g., Bauman et al. 2018a, 2018b). Further, there is case study evidence that financial performance varies significantly within direct and intermediated channels – for example, there are different financial impacts of sales through farmers markets compared to roadside stands (e.g., Jablonski et al. 2019).

- Crop insurance: Access to crop insurance allows producers to mitigate some of the risks inherent in farming and ranching. Research has found that there is a positive and significant effect of crop insurance on farm survival (e.g., Kim et al. 2020). In an effort to support beginning farmers and ranchers, the USDA RMA provides crop insurance benefits including an exemption from paying some administrative fees, an additional 10 percentage points of premium subsidy, use of previous producer's history if land was transferred, and an increase in the substitute Yield Adjustment (USDA RMA, n.d.).
- Government programs: Many USDA programs include specific set asides or higher payment rates for beginning farmers. Yet according to Ahearn (2011) in 2009 only 17% of beginning operations participated in commodity programs, compared to 30% of established operations. She notes that the lower participation rates by beginning operations may be due to challenges in securing land, the types of commodities grown, and the markets in which they are sold. Further, participation in government programs (without a focus on beginning operations) has shown that there is a significant and positive effect on farm business survival (Key and Roberts 2007).

Farm business survival

Past research using farm-level panel data provides insight into some of the key determinants of farm business survival. Weiss (1999) found that for Austrian farm households, initial farm size and the age, schooling and sex of the farm operator were all significant determinants of farm growth and survival. In particular, he found that smaller farms are found to grow much faster than larger farms, presumably because smaller farms have higher returns to scale. Kimhi and Bollman (1999) found that the effect of initial farm size on survival depends on the national context: the exit probability decreases with farm size in Canada but increases with size in Israel.

Other research using panel data has focused on the influence of government farm payments on farm growth and survival. Using U.S. Census of Agriculture data, Key and Roberts (2006) found that government payments were positively associated with the likelihood of farm survival and with farm size growth - and that the magnitude of this association was generally greater for larger farms. Also using Census data, Key and Roberts (2007) estimated the effect of government payments on the probability of a farm business failure using a Cox proportional hazards model. They found that an increase in government payments has a small but statistically significant negative effect on the rate of business failure. Storm et al. (2015) estimated a spatial model to explain the survival of Finnish farms based on the characteristics of the farm and of neighboring farms. The authors found that while direct payment increase the probability of survival, the effect is mitigated by the fact that a farm's survival is negatively affected by its neighbors' receipt of payments.

Some studies focusing on beginning farmers have used panel data to examine the relationship between operator age and farm size growth. Using Census of Agriculture data, Katchova and Ahearn (2016) found that farms operated by older beginning farmers tend to be smaller and do not tend to grow as much over time. Their results show that it is mostly young farmers, as opposed to all beginning farmers, who rapidly expand their farm operations after entering agriculture. Williamson (2017) also explored how differences in the initial ages of farmers affects farm finances and assets. The study used a synthetic panel of data consisting of age cohorts of beginning farmers and compared them in two time periods. His results indicate farmers who are under 45 years old saw a much larger increase in production, assets and liabilities than older farmers. A drawback to the cohort approach is that it only provides

information on surviving operations, so is not able to identify the factors that caused some farm businesses to fail.

Nadolnyak et al. (2019) used farm-level panel data from the U.S. Census of Agriculture to examine how weather variability, along with other economic and demographic factors, affect beginning farm exits. The authors found that profitability and off-farm employment does not affect beginning farm exit rates, but farm size (sales) lowered the probability of exit. The study also found that weather impacts on exits were mostly attributable to droughts.

More recently Key (2022a) used farm-level panel data from the U.S. Census of Agriculture to examined farm business survival and growth. The study's findings suggest that efforts to increase farm productivity, farmer participation in direct-to-consumer marketing, and the share of farmers who receive agricultural program payments could improve outcomes for beginning farms. In a related study, Key (2022b) found that farmers who were credit constrained (i.e., who were unlikely to be offered new loans because of their low repayment capacity) take on less new debt and have lower rates of survival and growth than unconstrained farmers. Access to credit was found to be relatively more important for the growth of beginning farms with principal operators less than 40 years old.

Data and methods

Census of Agriculture

The Census of Agriculture is administered by U.S. Department of Agriculture's National Agricultural Statistics Service (NASS) and is taken every five years. It is a complete count of U.S. farms and ranches and the people who operate them and includes data on land use and ownership, operator characteristics, production practices, income, and expenditures. It is the only source of comprehensive data on the current and past state of U.S. agriculture, providing uniform agriculture data for every county. In the Census of Agriculture, a farm is defined as a place from which $1,000 or more of agricultural products were produced and sold, or normally would have been sold, during the census year. This very liberal definition of a farm captures farms that are not aspiring to be a commercially viable operation. Using 2007 ARMS data, Ahearn and Newton (2009) found that about 32 percent of beginning farms did not report any production, compared with 19 percent of established farms. We keep all operations in our data set to capture farms that have no sales while beginning their operation but grow to a commercial size over time. Using 2007, 2012, and 2017 Census of Agriculture microdata, we create a panel data set to track principal operator farmers and ranchers that were beginning farmers in 2007 and then follow them in 2012 and 2017.

In the 2007 and 2012 censuses, data were collected for one principal operator per farm and up to two other operators. After the 2012 Census, data users and stakeholders provided feedback that contributions to all those involved in farm operations were not adequately captured by the one principal operator reported. As a result, 2017 Census improved the question to include demographic data on up to four operators and allowed each producer to indicate if they were a principal operator or senior partner (USDA 2019, USDA NASS 2017a p. B-19). To compare 2007, 2012 and 2017 Census data, NASS created an algorithm for the 2017 data to determine which of the operators listed should be considered the one principal operator. If a determination could not be made from the data, then one of the four producers were chosen stochastically. Due to changes in how demographic data was collected starting in 2017, it is important to view demographic changes over time with caution (Pilgeram 2020).

We use Census weights and standard estimating procedures for variance estimation. Weights account for survey non-response, where weights are a round number between 1 and 6 and denote the number of farms that a particular farm in the sample represents. If we are comparing how variables change over time, then we use the weights from the initial census (i.e., 2007).

Defining Beginning Farmers and Ranchers

A beginning farmer is generally defined as an operator with 10 year or less farming or ranching experience. In the Personal Characteristics section of the 2007 Census, respondents were asked "In what year did the operator begin to operate any part of THIS operation?" In some instances, an operator could be defined as a beginning farmer when they are not because their total years of farming are over 10, but less on their current farm. In subsequent Census years, this issue was addressed, and respondents were asked "In what year did this person begin to operate any part of THIS operation?" *and* "In what year did this person begin to operate ANY farm operation?" (USDA NASS 2012 p B-25), see Table 1. When comparing the two definitions of beginning farmers using the 2012 Census data, the more liberal definition of beginning farms as defined by *this* operation did result in a higher count of beginning farmers than does *any* operation (USDA NASS 2014). We use both questions to define beginning farmers. For those tables that include 2007 data, we must define a beginning operation based on the number of years on *this* operation and note the potential overcounting. When we present 2017 data only, we follow the more accurate definition of a beginning farmer based on the number of years operating *any* operation.

Table 1. Census questions used to define beginning farmer, by year

Definition of a beginning farmer or rancher	2007	2012	2017
An operator with no more than 10 years of experience on the farm or ranch they are currently operating.	"In what year did this person begin to operate any part of THIS operation?"	"In what year did this person begin to operate any part of THIS operation?"	"In what year did this person begin to operate any part of THIS operation?"
An operator with no more than 10 years of farming or ranching experience.		In what year did this person begin to operate ANY farm operation?"	In what year did this person begin to operate ANY farm operation?"

The second way in which we need to consider how a beginning operation is defined is based on the composition of beginning farmers on an operation. Before 2017, the USDA NASS defined a beginning farm in their census publications as one in which the *principal* operator had no more than 10 years of experience on the farm they are *currently* operating (USDA NASS, 2014). Since 2017, the USDA NASS changed their definition in census publications to include two definitions of beginning farmers: one in which *any* producer had no more than 10 years of experience farming and one in which the *principal* producer had no more than 10 years farming experience (USDA NASS, 2019). In recent USDA ERS reports on beginning farmers, beginning operations are defined as those in which *all* operators have no more than 10 years of experience farming (Key and Lyons, 2019; Ahearn and Newton, 2009).

Many USDA programs for beginning farmers define beginning operations differently. To be eligible for USDA Natural Resource Conservation Service programs, a beginning operation is defined as one in which all producers are beginning (USDA NRCS n.d). Other USDA programs such as USDA Farm Service Agency and USDA Risk Management Agency are based on the operator and thus the composition of operators on the farm is not relevant to program eligibility, but rather based on the operator applying. To be eligible for a guaranteed Farm Service Agency loan, a beginning farmer is defined to be any individual substantially involved in the operation of a farm who has 10 or fewer years of farming experience (USDA FSA n.d.). Similarly, USDA Risk Management Agency provides crop insurance benefits for a beginning farmer or rancher defined as an individual who has not actively operated and managed a farm or ranch anywhere, with an insurable interest in any crop or livestock for more than 5 crop years (10 years for Whole-Farm Revenue Protection) (USDA RMA n.d.). In the most recent farm bill, beginning farmers and ranchers are defined as persons who have not operated a farm or ranch or who have operated a farm or ranch for not more than 10 years and meet other criteria as established by USDA (7 U.S.C. §2279).

One contribution of this article is to compare subgroups of beginning farmers based on: 1) whether all of the operators identified as beginning farmers (*all beginning*), or 2) if one or more, but not all, operators identified as beginning operators (*any beginning*) (see Figure 1). In this way, we create a category of beginning farmers that represents truly new operations (*all beginning*) and one that represents multi-generation operations (*any beginning*). The one previous article that took this approach found important differences across these beginning farmer subtypes, with the some beginning definition much more closely mimicking established operations (Thilmany et al. 2021).
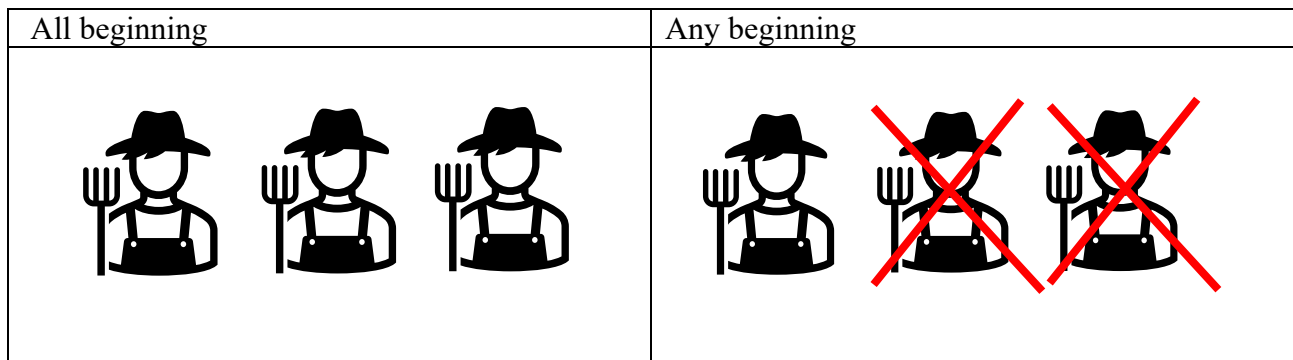

Figure 1. Visual depiction of subgroups of beginning farmers

Figure 2 shows the proportion of operations that are all beginning, any beginning and established operations in 2007, 2012 and 2017. In this figure, a beginning operator is defined as beginning if they have no more than 10 years of experience on the farm or ranch they are currently operating. We see that beginning operations account for around 30% of all producers with the majority of beginning operations as *all beginning*. The number of beginning operations has changed slightly over time with *all beginning* operations making up a larger share of total operations in 2007 than in subsequent years, with the smallest proportion of *all beginning* operations occurring in 2012, whereas the proportion of *any beginning* operations remained similar over the same period.
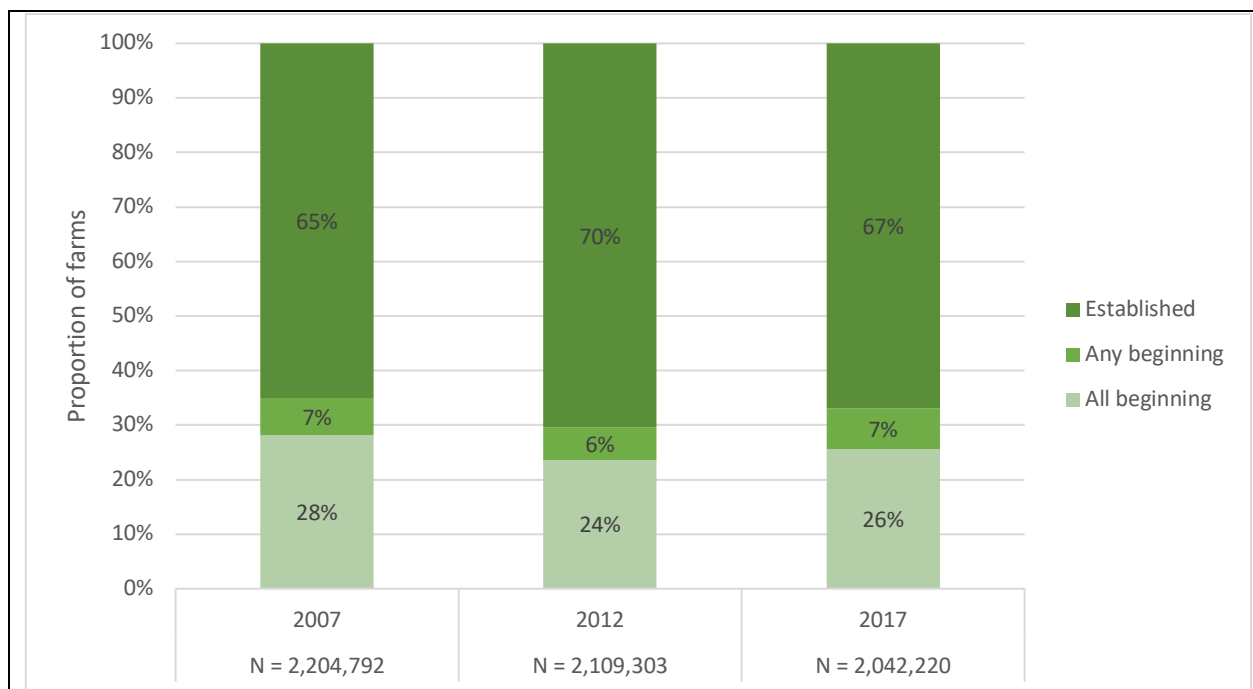
Figure 2. Proportion of operations in each year, by beginning status (where an operator is defined as beginning if they have no more than 10 years of experience on the farm or ranch they are currently operating).

Defining Other Variables

We use the NASS defined "principal operator ID (POID)" to track operations from 2007 to 2017. An operation is defined as survived if the POID existed in 2007 and in the subsequent census period of interest (either 2012 or 2017). One of the challenges to using the POID to track farms over time is that an operator could fill out the census in 2007 but not in a subsequent year and still farm in both periods. This operation would be incorrectly classified as did not survive. These challenges likely only effect a small number of observations, and the linked-farm approach has been used widely to track changes across Census years (e.g., Katchova and Ahearn, 2107; Katchova and Ahearn, 2106; Nadolnyak, 2019).

We have two scale categorizations based on gross cash farm income (GCFI).[2] The first is more disaggregated and used for presentation of farm survival rates and some summary statistics, it includes the following sales categories: $0 to $9,999, $10,000 to $74,999, $75,000 to $149,999, $150,000 to $349,999, $350,000 to $999,999, $1,000,000 or more. For the remainder of our results, we collapse the bottom sales categories to: $0 to $74,999, $75,000 to $349,999, $350,000 to $999,999, and >$1,000,000 (Jablonski at al., 2022, Jablonski et al. 2020). In addition to classifying operations based on GCFI, we also define scale by acres operated. Following Newton (2014) we define scale by acres operated in the following categories: 1 to 9 acres operated, 10 to 50 acres operated, 50 to 179 acres operated, 180 to 499 acres operated, 500 to 999 acres operated, 1,000 to 1,999 acres operated, and 2,000 or more acres operated. Total assets for this analysis include the market value of all land and buildings owned and leased from

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[2] GCFI is defined by NASS to equal total sales plus total dollars received for delivering under contract, plus total government payments plus income from other agricultural related sources minus the landlord's share of total sales.

others plus the current value of machinery and equipment minus market value of land and buildings leased to others.

We classify beginning operators by primary commodity and region. Primary commodity is broken into seven categories and includes: field crops (grains, oilseeds, dry beans, dry peas, tobacco, cotton); fruit and vegetables (vegetables, melons, potatoes, sweet potatoes, fruit, tree nuts, and berries); other crops (nursery, greenhouse, floriculture, sod, cut Christmas trees, short rotation woody crops, grass seed, hay and grass silage, hops, maple syrup, mint, peanuts, sugarcane, sugarbeets, etc.); livestock (hogs, pigs, cattle, calves); dairy; poultry (broilers, chickens, turkeys, ducks, eggs, geese, hatchlings, pheasants, poultry products, etc.); and, other animals (aquaculture, bees, honey, rabbits, fur-bearing animals, semen, manure, other animal specialties, etc.). Primary commodity is assigned based on the commodity that accounts for 50% or more of an operations total value. For those diversified operations where no one commodity makes up 50% or more of the total values of production, NASS uses a set of logic checks to assign the operation a primary commodity[3]. In general, diversified crop operations are classified as "other crop" whereas diversified livestock operations are classified as "other animal." Regions are based on the nine census divisions and include Pacific; Mountain; West North Central; East North Central; West South Central; East South Central; South Atlantic; Middle Atlantic; and, New England. For simplicity we present aggregated regions, including: Northeast, Midwest, South, West.

To capture land use, we include data on total operated acres and the share of operated acres that are owned. We measure profitability using operating profit margin (OPM). OPM is defined as GCFI minus total expenditures plus interest expense, all divided by GCFI. We present data on government payments as a percent of GCFI ($1,000), where government payments include amount received from participation in Conservation Reserve Program, Wetlands Reserve Program, Farmable Wetlands Program, or Conservation Reserve Enhancement Program plus total received from all other Federal agricultural payment programs (excluding insurance). Data on crop insurance is presented based on whether a producer has crop insurance.

Operations were classified as differentiated if they reported sales in one or more of the following categories: agritourism or recreational services (e.g., farm tours, hay rides, hunting, fishing); value-added sales (e.g., jam, wine, cheese, meat, floral arrangements, cider); organic production; or, local food sales. Local food sales include direct-to-consumer sales (e.g., farmers markets, on-farm stores or farm stands, roadside stands or stores, u-pick, CSA (Community Supported Agriculture), online marketplaces, etc.) and intermediated sales (e.g., supermarkets, supercenters, restaurants, caterers, independently owned grocery stores, food cooperatives, K-12 schools, colleges or universities, hospitals, workplace cafeterias, prisons, foodbanks, etc.).

Additionally, we include demographic data on operator characteristics including sex, young (<35 years of age), socially-disadvantaged, military service, and days worked off farm. Data on operator characteristics is presented for the primary operator as well as the proportion of operators within one operation falling into that category. Categories include sex (male, female),

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[3] The first step is to assess whether crops or livestock/poultry is 50% of more total value of production. For those diversified operations where crops account for half or more of total value of production with a combination of grains, sugar beets, peanut sales, etc., the operation will be classified as "other crops." For those diversified operations where livestock/poultry is 50% or more total value of production, but has a combination of cattle, sheep/goats, and chickens the operation will be classified as "other animal." If crop and livestock proportions are 50%/50%, a random number generator routine in the editing system determines whether an operation will be a crop or livestock operation.

young (less than 35), socially-disadvantaged (Hispanic, American Indian, Asian, Black, Native Hawaiian, more than one race reported), and with military service (Veteran). To capture days worked off farm, we calculate the percentage of operators within one operation that spend the majority (50% or more) of his/her worktime on work other than farm or ranch work.

Descriptive statistics from the 2017 Census of Agriculture
In our first set of results, we provide descriptive statistics from the 2017 census on beginning farmers to building on 2017 beginning farmers statistics published by USDA NASS. In this set of tables using data from the 2017 Census, a beginning farmer is defined as an operator with no more than 10 years of farming or ranching experience. Statistics are presented for operations with *all beginning* operators, *any beginning* operators, and *established* operators. The full set of results, presented as a table, can be found in Appendix A.

Farm characteristics
Small farms (GCFI < $75,000) account for the majority of all operations, with *all beginning* operations having a higher proportion of small farms both *any beginning* and *established* operations (Figure 3). Any *beginning operations* have the lowest share of small farms and the highest proportion of operations in all other scale categories. Overall, *any beginning* and *established* operations have a more similar scale distribution compared *all beginning* operations. We see a very similar story when we define farm size by acres (Figure 4). Over half of *all beginning* operations have less than 50 acres, whereas this percentage is much lower for both *any beginning* and *established* operations, with *any beginning* and *established* operations having similar acreage distributions.
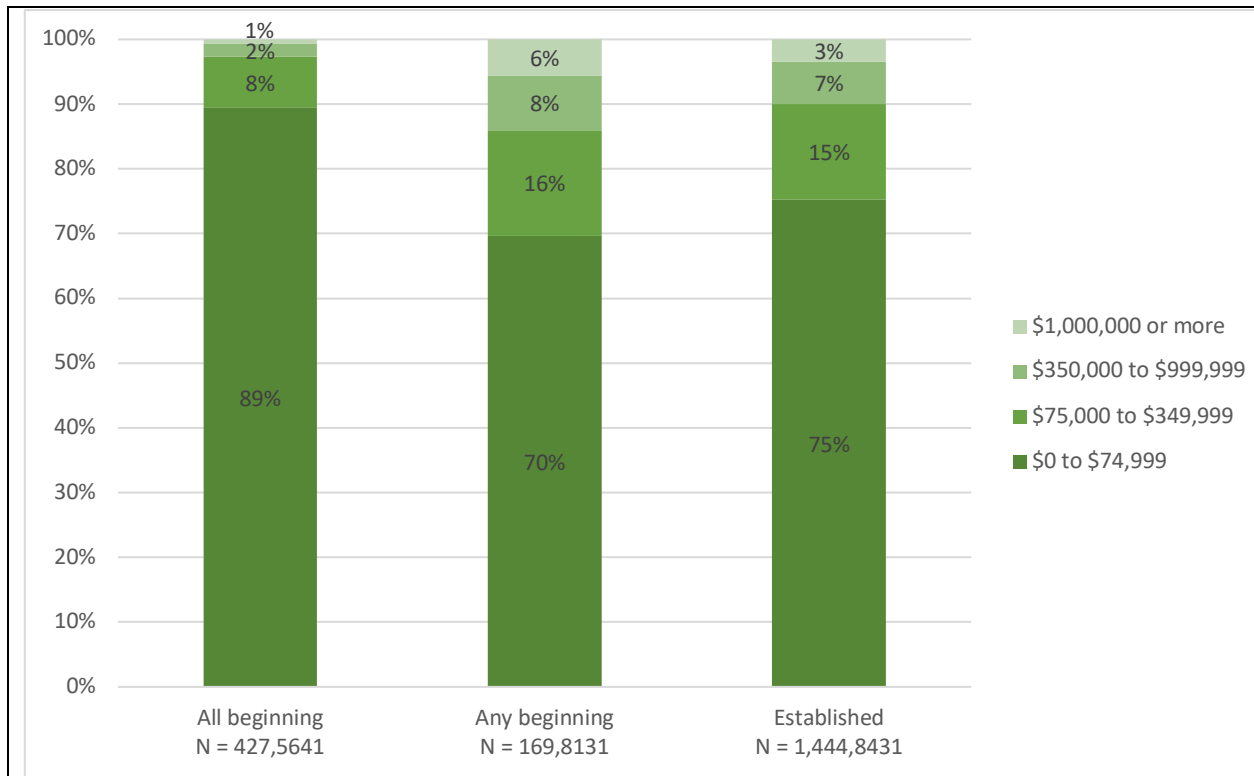
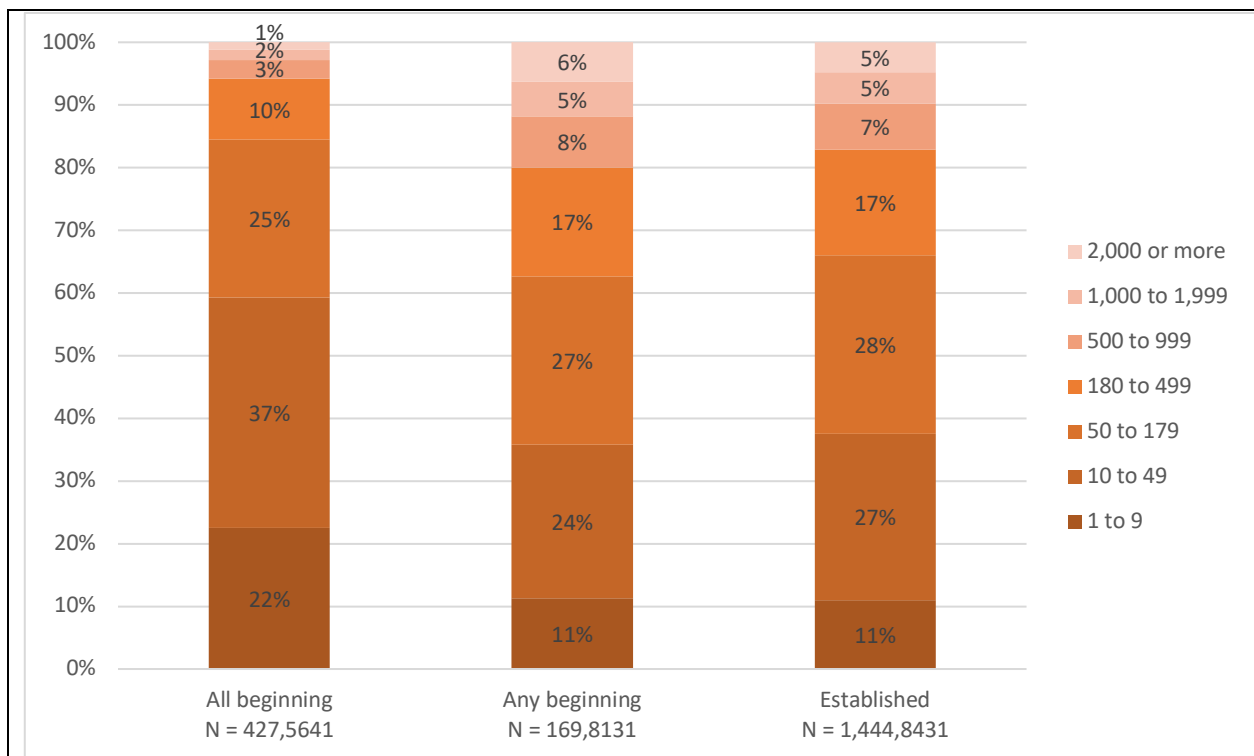**Figure 3.** Farms by size (GCFI) and beginning farmer status, 2017

Figure 4. Farms by size (acres) and beginning farmer status, 2017

We use the share of operated land that is owned to explore differences in land tenure among beginning farmers (Figure 5). Overall, *all beginning* operations own less of the land they operate compared to *any beginning* and *established* operations (i.e., higher share of operated land owned). With the exception of the smallest scale category (GCFI<$75,000), *all beginning* operations own less of the land they operated compared to *any beginning* and *established* operations. The smallest scale category may be an exception as these farms operate on a smaller acreage base compared to the other categories (Figure 4). The top two scale categories (GCFI $35,000 and larger) see the largest difference in share of operated land that is owned with *all beginning* owning the least amount of the land they operate.

> Bar chart with share of operated land owned on the y-axis and gross cash farm income on the x-axis. Three bars in each scale category for beginning types.
> *Chart will be added once approved for export.*

Figure 5. Share of operated land that is owned by scale (GCFI) and beginning farmer status, 2017

Overall, the primary commodity mix across beginning farmer status type is similar (figure 6). The only noticeable difference is between *all beginning* compared to *established* and *any beginning* for fruit/veg. *All beginning* operations appear slightly more likely to be primary fruit/veg operations compared to *established* and *any beginning* for fruit/veg. This may be due to the capital cost requirements.
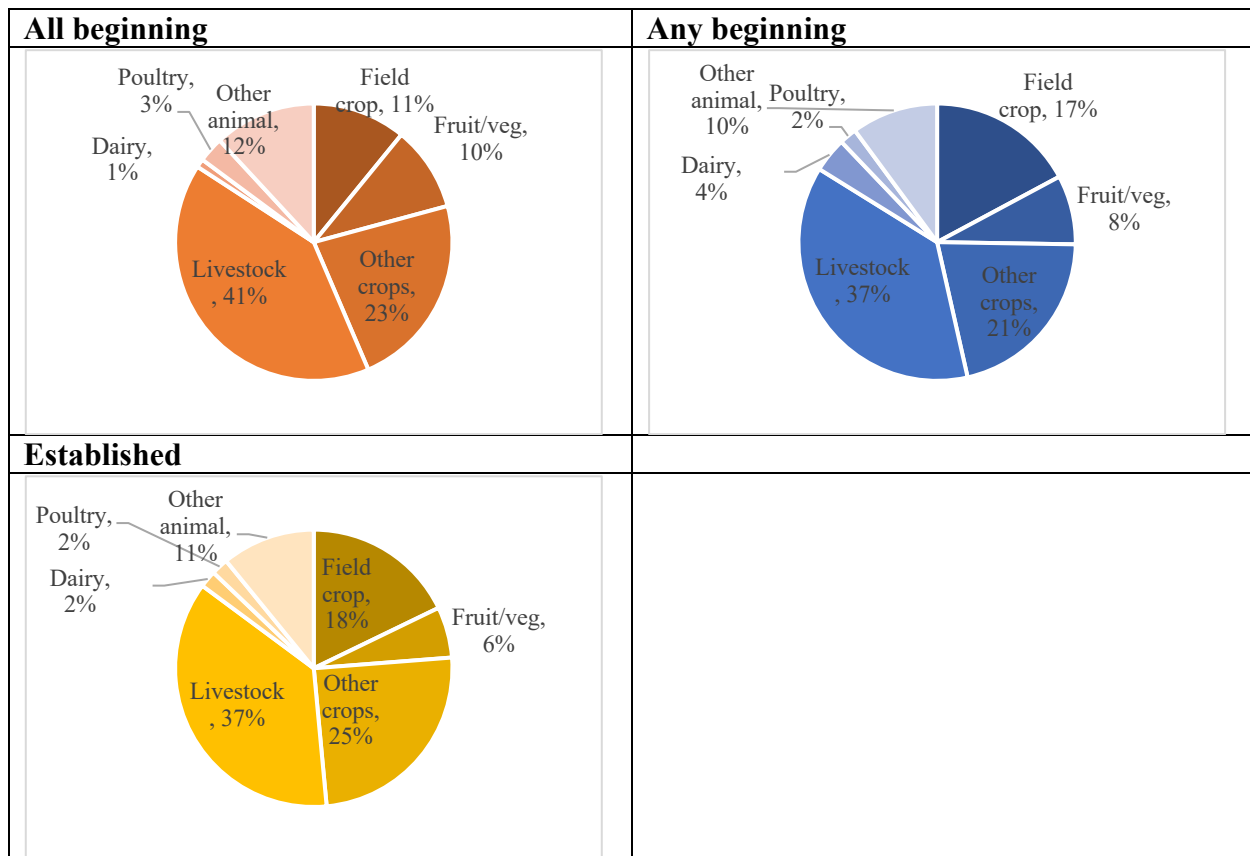
All beginning	Any beginning
Poultry, 3% — Dairy, 1% — Other animal, 12% — Field crop, 11% — Fruit/veg, 10% — Other crops, 23% — Livestock, 41%	Other animal, 10% — Poultry, 2% — Dairy, 4% — Field crop, 17% — Fruit/veg, 8% — Other crops, 21% — Livestock, 37%

Established	
Poultry, 2% — Dairy, 2% — Other animal, 11% — Field crop, 18% — Fruit/veg, 6% — Other crops, 25% — Livestock, 37%	

Figure 6. Primary commodity by beginning status, 2017

We calculate *all beginning*, *any beginning* and *established* operations as a percent of total operations in a region[4]. *Established* operations are dominant (>65%) in all regions with the highest proportion in the Midwest. *All beginning* operations make up the next highest proportion of operations (~20%). The South has the highest percentage of *all beginning* operations followed by the West, Northeast and Midwest (Figure 7). Whereas the West has the highest percentage of *any beginning* operations followed by the Northeast, and then the Midwest and South at the same percentage. Overall, other than a slightly larger proportion of *established* operations in the Midwest, we see consistent distribution of operations by beginning farmer status across regions.

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[4] The proportion of producers in each census region by beginning status is presented in Appendix A.
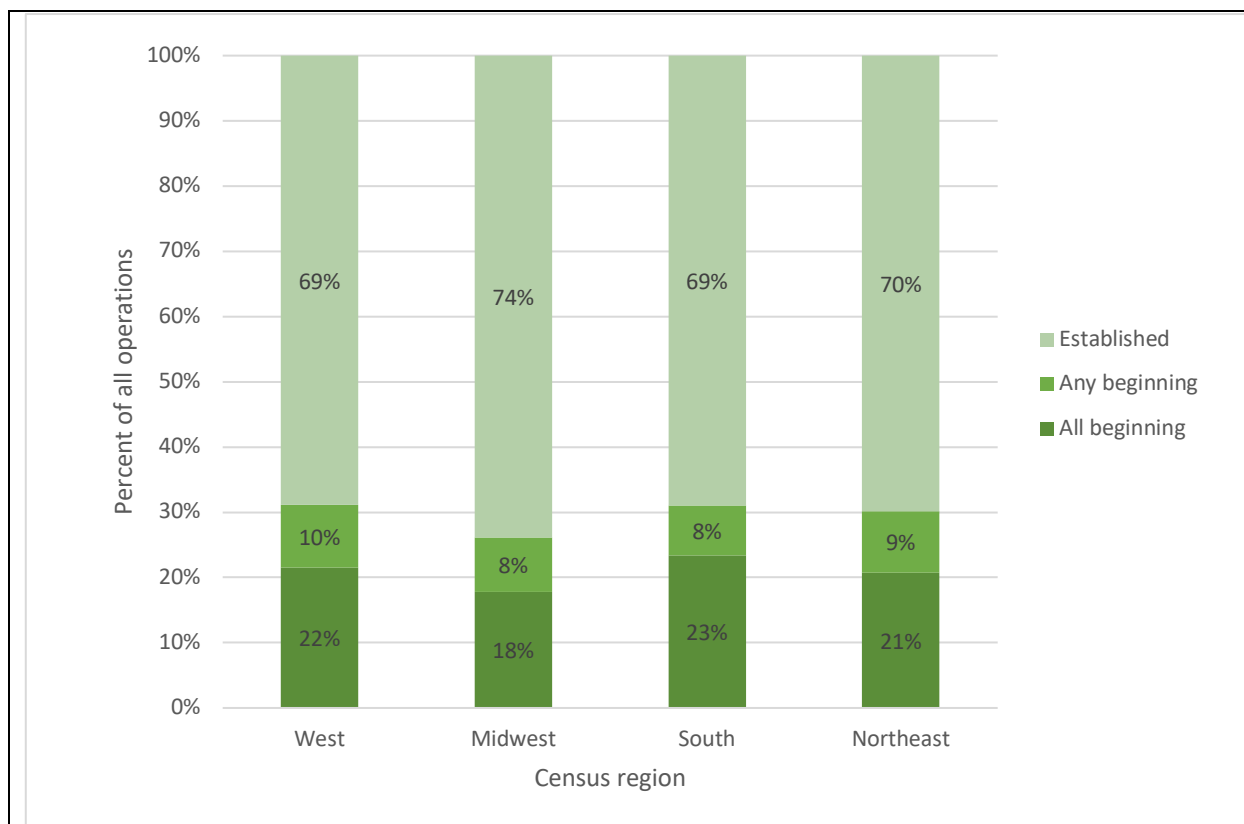
Figure 7. All beginning, any beginning and established as a percent of total producers in each census region by beginning status, 2017

Financial characteristics

When comparing operations within the same scale category, on average, *all beginning* operations have fewer total assets than both *any beginning* and *established* operations (Table 2). *Any beginning* operations have more total assets than *established* operations for those with GCFI less than $350,000, but the opposite is true for larger operations. Additionally, we find that the $75,000 to $349,000 have four times the total assets of our smallest scale category, whereas the top two scale categories have double the total assets of the previous scale category.

We use interest paid on real estate and non-real estate debt to better understand total debt held by beginning operations. Interest paid on both real estate and non-real estate debt is similar across beginning categories within the same scale. For those operations with GCFI<$350,000, *any beginning* operations have the highest debt levels followed by *all beginning* and *established*. Once operations get larger (GCFI ≥ $350,0000), *any beginning* operations still have the highest interest expense, followed by *established* and *all beginning*. Kaufman (2013) finds that compared to established farmers, young and beginning farmers report higher debt-to-equity ratios, with non-real estate debt being the primary contributor to this difference. Similarly, Key and Lyons (2019) find that *all beginning* operations that carry debt are more leveraged than *established* operations, with a debt-to-asset ratio of 29% compared to 18%. This may be due to the fact that as operations get larger, they are more likely to have collateral.

In all scale categories, *all beginning* operations receive lower levels of government payment than both *any beginning* and *established* operations, with *established* operations receiving the most government payments across all scales. Key and Lyons (2019) have similar
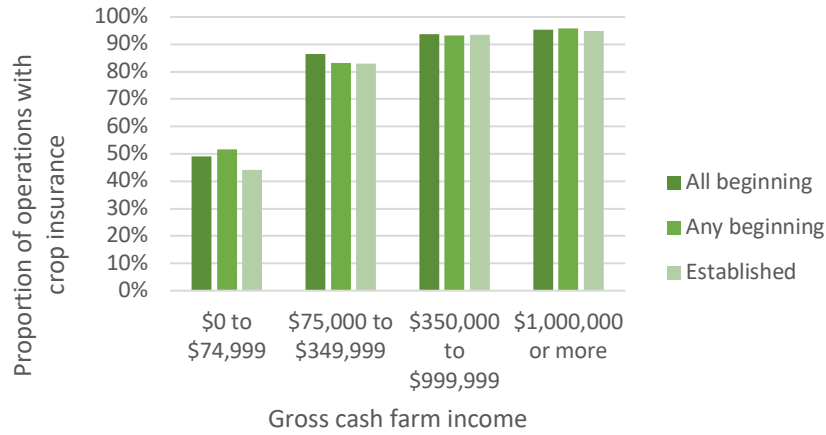
findings, noting that *all beginning* operations are less likely to receive government payments than *established* operations, but that those beginning operations that receive payments are more reliant on payments than established farms. Jablonski et al. (2022) find that beginning farms that are more dependent on government agricultural payments tend to have better business outcomes.

Table 2. Financial characteristics by scale (GCFI) and beginning farmer status, 2017
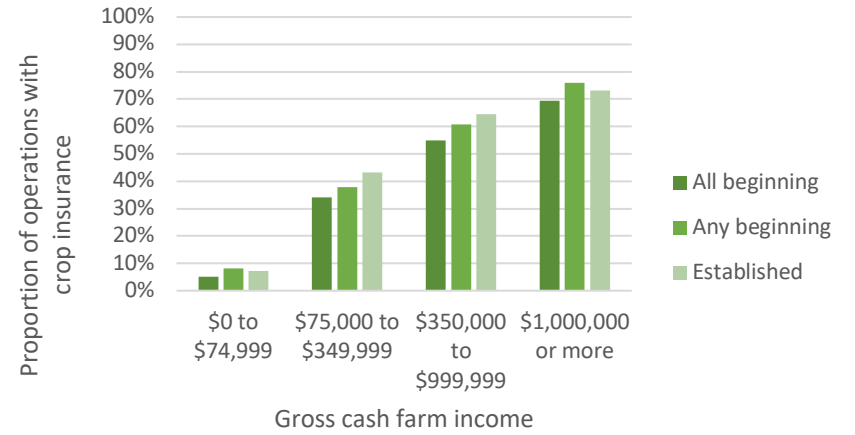
	$0 to $74,999			$75,000 to $349,999			$350,000 to $999,999			$1,000,0000 or more		
	All beginning	Any beginning	Established	All beginning	Any beginning	Established	All beginning	Any beginning	Established	All beginning	Any beginning	Established
Total assets	420,833 (1,168,616)	622,250 (1,472,626)	548,393 (1,145,443)	1,799,243 (4,242,687)	2,315,756 (3,374,641)	2,256,307 (3,054,548)	4,404,722 (4,965,774)	5,432,935 (5,745,312)	5,743,750 (5,500,594)	11,882,562 (32,645,041)	13,634,176 (18,521,868)	13,869,728 (20,402,780)
Interest paid on real estate debt	1,435 (5,570)	1,575 (6,925)	1,227 (5,938)	6,048 (18,438)	6,543 (18,121)	5,952 (17,025)	14,265 (35,162)	17,309 (35,760)	16,602 (33,473)	48,693 (317,373)	54,704 (157,079)	51,965 (162,268)
Interest paid on non-real estate debt	253 (1,347)	334 (1,688)	247 (1,424)	2,005 (6,229)	2,027 (6,429)	1,931 (6,640)	6,434 (16,970)	7,063 (17,081)	6,883 (16,608)	24,283 (92,089)	28,861 (91,095)	27,828 (99,221)
Government payments	733 (3,422)	1,083 (4,324)	1,200 (4,361)	6,396 (16,609)	6,830 (16,269)	8,258 (17,375)	15,897 (29,950)	18,872 (32,448)	21,896 (31,925)	28,259 (55,106)	39,318 (80,034)	42,719 (70,809)

We compare the proportion of producers with crop insurance by scale (GCFI), commodity, and beginning status (Figure 8). Field crop producers have the highest use of crop insurance, followed by fruit and vegetable producers. Livestock, dairy, and other crops see similar use of crop insurance with the lowest for other animal and poultry. For field crop farmers, *all beginning* and *any beginning* operations both have higher or the same proportions of famers with crop insurance compared to *established* operations, across all scale categories. But for fruit and vegetable, livestock, and dairy producers, *all beginning* operations have the smallest proportion of producers with crop insurance compared to *any beginning* and *established* operations across all scale categories.
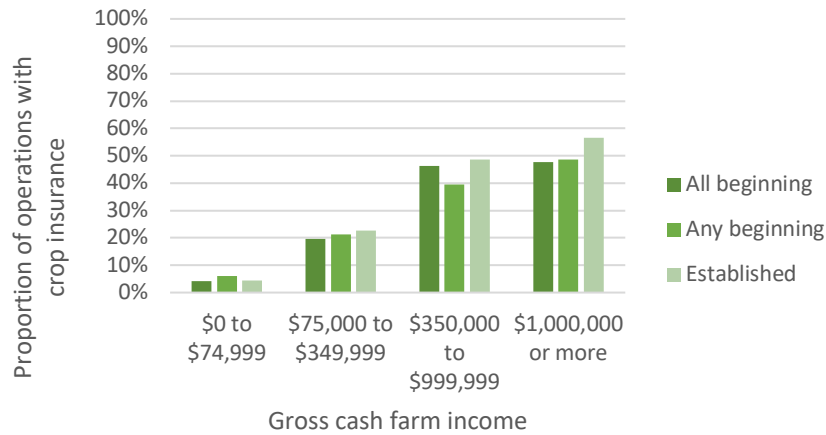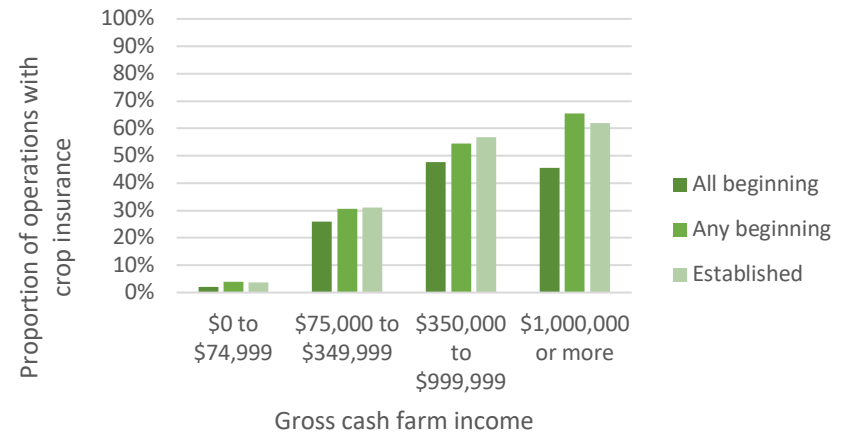
Field crop

Proportion of operations with crop insurance

Gross cash farm income

- All beginning
- Any beginning
- Established

Fruit and Vegetable

Proportion of operations with crop insurance

Gross cash farm income

- All beginning
- Any beginning
- Established

Other crops

Proportion of operations with crop insurance

Gross cash farm income

- All beginning
- Any beginning
- Established

Livestock

Proportion of operations with crop insurance

Gross cash farm income

- All beginning
- Any beginning
- Established

Dairy

Poultry
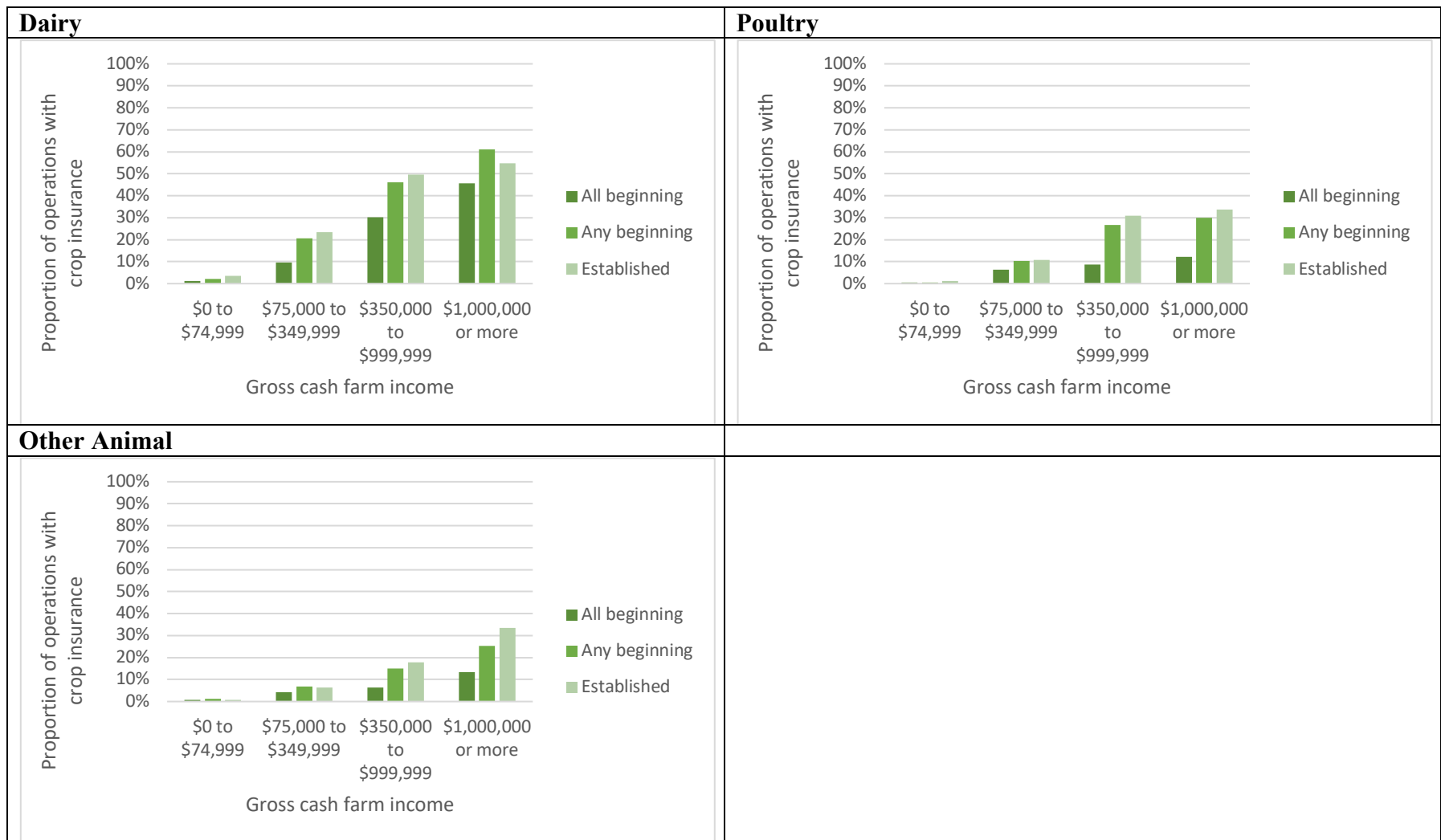

Other Animal

Figure 8. Proportion of producers with crop insurance by scale (GCFI), commodity, and beginning status, 2017

Differentiated sales

Operations with differentiated sales are defined as those with sales through local food marketing channels (including direct-to-consumer and intermediated), sales of value-added products, sales of organically produced commodities, or income from agritourism and recreational services. Overall, we see that very few operations (*any, all, or established)* have organic sales, agritourism income, or value added sales. And further, that there are not noticeable differences across beginning farmer status (Figure 9). Though it is a small portion of operations that have local food sales, it is a larger portion than the other categories of differentiated sales. And, we find that a larger proportion of *all beginning* operations have local food sales relative to established operations.
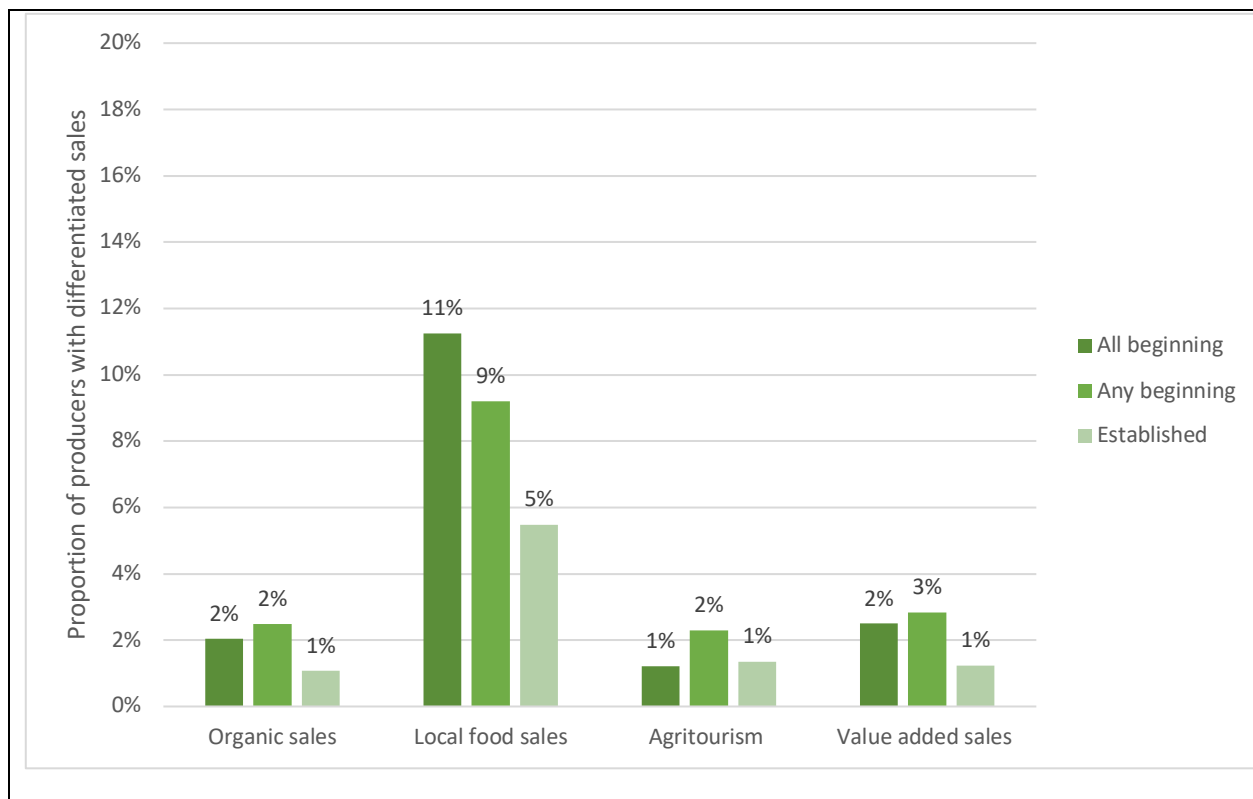

Figure 9. Proportion of producers with differentiated sales by beginning status, 2017

For those operations with positive sales in a differentiated sales category, we compare average sales by scale for each beginning farmer type and find that, in general, beginning operations have higher average differentiated sales than established operations (Table 3). *Any beginning* and *established* operations with positive organic sales have higher sales of organic commodities across all scale categories than *all beginning* with the exception of GCFI $75,000 to $349,000 (*all beginning* and *established* are nearly equal).

Any beginning operations with positive differentiated sales, have the largest sales in the two lowest scale categories (GCFI<$350,000). The story across type of differentiated sales categories becomes more nuanced in the two larger scale categories. For operations with local food sales, *all beginning* operations having the largest sales when GCFI is between $350,000 and $999,999. At the largest scale (GCFI≥$1,000,000), *established* operations have the highest local food sales, with sales similar to *any beginning* operations and more than double that of *all*

beginning operations. Direct-to-consumer sales make up a smaller portion of all local food sales than intermediated sales for all beginning types across all scales.

Table 3. Differentiated sales for those operations *with a positive value in the category* by scale (GCFI) and beginning farmer status, 2017

	$0 to $74,999			$75,000 to $349,999			$350,000 to $999,999			$1,000,000 or more		
	All beginning, N = 382,524[1]	**Any beginning, N = 118,320**[1]	**Established, N = 1,087,604**[1]	**All beginning, N = 33,463**[1]	**Any beginning, N = 27,660**[1]	**Established, N = 212,304**[1]	**All beginning, N = 8,691**[1]	**Any beginning, N = 14,321**[1]	**Established, N = 95,164**[1]	**All beginning, N = 2,886**[1]	**Any beginning, N = 9,512**[1]	**Established, N = 49,771**[1]
Organic sales	14,853 (36,711)	19,701 (51,213)	17,158 (39,055)	164,096 (278,331)	159,907 (292,917)	164,985 (301,791)	414,428 (414,417)	443,801 (526,440)	447,796 (458,868)	2,860,606 (5,940,701)	2,906,793 (9,247,065)	2,878,217 (7,471,365)
Total local food sales	5,329 (28,885)	11,065 (96,247)	7,328 (49,294)	77,673 (124,947)	106,124 (301,538)	76,911 (328,230)	311,795 (607,360)	271,332 (724,494)	260,437 (671,819)	1,883,610 (4,288,842)	3,143,681 (7,460,048)	3,394,869 (8,819,915)
DTC sales	4,293 (25,519)	8,124 (53,645)	6,157 (44,223)	49,732 (113,299)	77,440 (226,303)	55,044 (202,800)	175,722 (634,606)	180,844 (474,357)	161,608 (407,673)	393,909 (810,014)	533,969 (1,287,487)	677,091 (1,872,633)
Intermediated sales	7,675 (24,079)	19,760 (119,798)	10,552 (38,150)	76,812 (83,243)	95,471 (246,261)	90,555 (444,015)	335,026 (286,227)	276,760 (540,231)	323,045 (606,502)	2,420,298 (4,967,745)	4,361,664 (8,911,352)	4,483,139 (10,316,399)
Agritourism income	6,823 (12,146)	7,356 (11,639)	7,105 (11,054)	43,599 (65,026)	45,357 (70,402)	33,983 (53,669)	147,498 (219,687)	92,688 (156,272)	76,693 (154,411)	545,593 (976,513)	350,838 (822,068)	303,696 (800,682)
Value-added product sales	11,315 (68,608)	40,632 (279,943)	23,618 (160,781)	108,261 (328,619)	223,977 (722,198)	157,865 (752,379)	431,612 (1,392,703)	435,747 (1,468,958)	412,441 (1,510,276)	3,669,718 (8,444,611)	3,872,792 (11,665,558)	2,585,282 (6,441,168)
DTC sales as a % of total sales[5]	0.555 (0.391)	0.476 (0.381)	0.531 (0.392)	0.347 (0.359)	0.365 (0.374)	0.321 (0.365)	0.251 (0.344)	0.264 (0.352)	0.253 (0.353)	0.220 (0.340)	0.244 (0.350)	0.242 (0.347)
Intermediated sales as a % of total sales[6]	0.469 (0.376)	0.451 (0.379)	0.499 (0.384)	0.489 (0.386)	0.428 (0.381)	0.454 (0.389)	0.613 (0.394)	0.452 (0.399)	0.506 (0.394)	0.723 (0.368)	0.614 (0.401)	0.636 (0.390)
[1]Mean (SD)												

[5] Of the sample of producers with positive direct-to-consumer sales, 3.6% report direct-to-consumer sales greater than total value of production. These observations are truncated at 100%.

[6] Of the sample of producers with positive intermediated sales, 4.2% report intermediated sales greater than total value of production. These observations are truncated at 100%.

Demographics

First we look at the proportion of operations with the primary operator's demographics. Subsequently, we look at the demographics of any of the operators within a farming operation. These demographics include: sex, young (under 35 years of age), socially-disadvantaged (Hispanic, American Indian, Asian, Black, Native Hawaiian, more than one race reported), and military service (Veteran). Additionally, we evaluate the level of time worked off-farm (>100 days worked off-farm).

All beginning operations had the highest proportion of operations with a primary operator that is female, young, socially disadvantaged, or worked more than 100 days in an off-farm job, followed by *any beginning*. The opposite is true for Veterans, where the highest proportion of operations with a Veteran as the primary operator are *established* operations. However, overall, a very small proportion of operations across all categories include a primary operator that is socially-disadvantaged. The majority of *all beginning* operations worked more than 100 days off the farm, whereas the other two categories were at lower levels. Not surprisingly, almost no established primary operators are young.
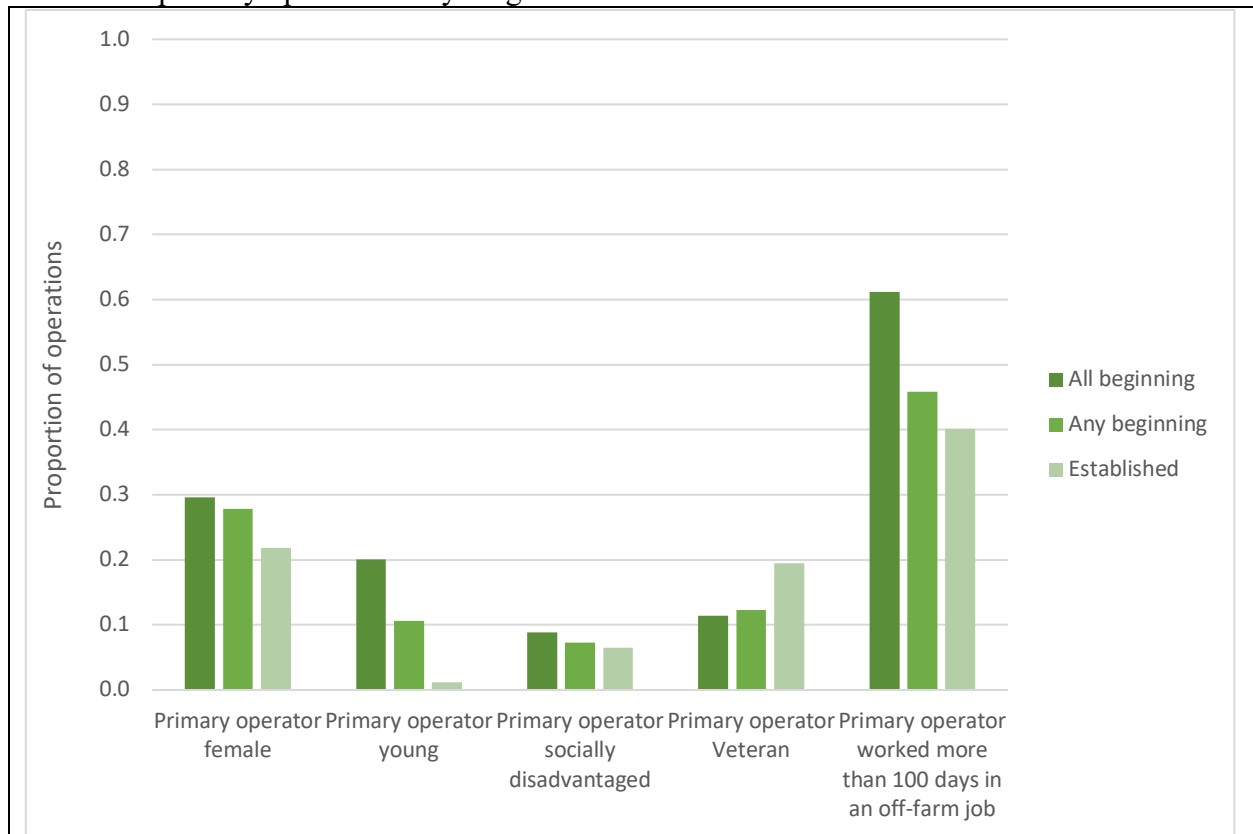

Figure 10. Proportion of operations with primary operator begin each operator characteristics, 2017

When we compare the average proportion of all operators on the farm that are female, young, socially-disadvantaged, Veteran, and operator worked more than 100 days in an off-farm job we see a similar, but slightly different story (Figure 11). Of the demographic categories analyzed, the larger proportion of beginning and established operations are female (though less than half). *Any beginning* operations have the highest average proportion of female operators on an operation, followed by *all beginning*. Similar to looking only at the primary operator, there

are very few operations overall that include socially-disadvantaged operations. Notably, *established* operations have the highest average proportion of Veterans per operation and the lowest number of young operators. The average proportion of operators on an operation working off-farm more than 100 days is the highest for *all beginning* operations followed by *any beginning* and *established*.
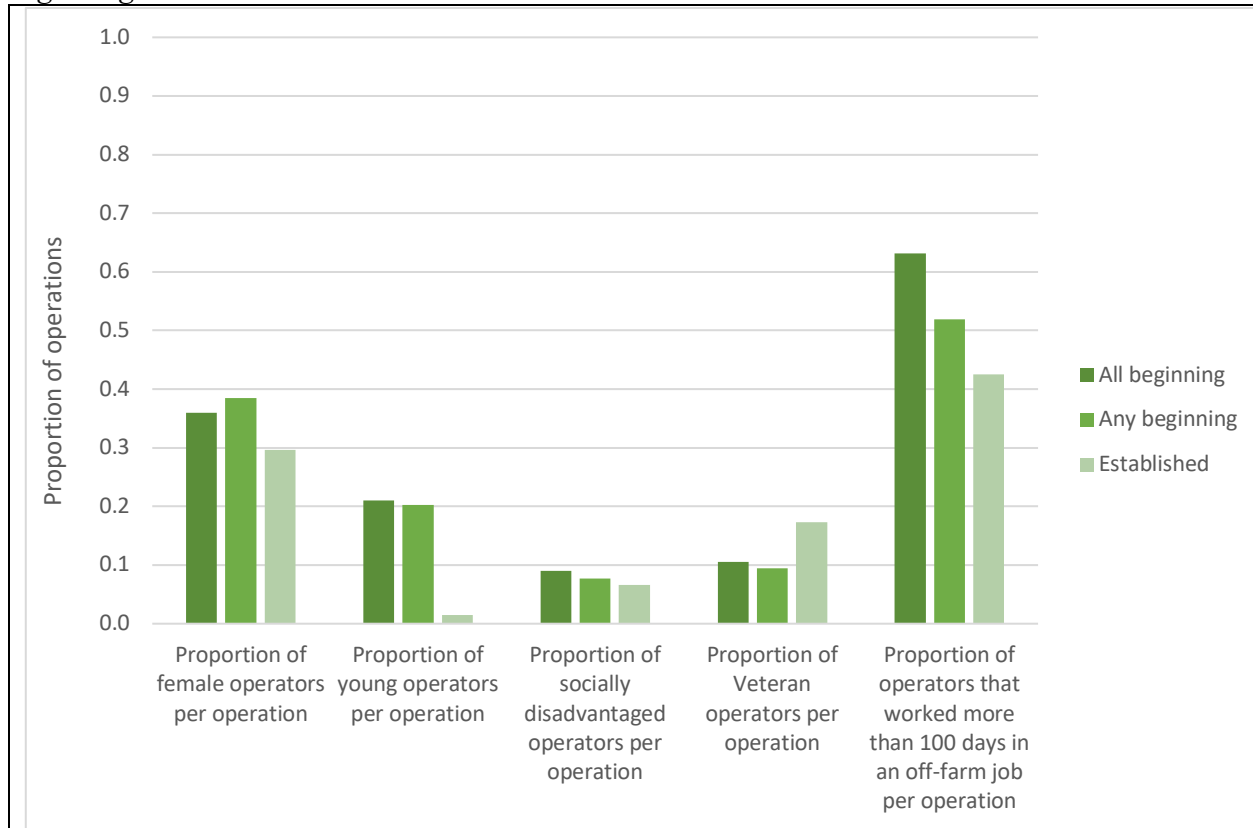

Figure 11. Average proportion of operators on an operation for each operator characteristic, 2017

Business Survival

We now shift focus to farm survival and financial resilience with the goal of better understanding the relationship between farm financial characteristics and survival rates. Following previous research on farm survival (e.g., Katchova and Ahearn, 2107; Katchova and Ahearn, 2106), we use the NASS defined "principal operator ID (POID)" to track operations over time. An operation is defined as survived if the POID existed in 2007 and also in the subsequent census period of interest (either 2012 or 2017). In this section, because we are using 2007 data, a beginning operator is defined as an operator with no more than 10 years of experience on the farm or ranch they are currently operating. The focus is on survival, rather than profitability, as we find that profit might not always be the driving force behind farm survival. For example, when using operating profit margin (OPM) as a measure of profitability, we see many operators (>40%) with an operating profit margin considered high risk (OPM <10%) surviving from 2007 to 2017 (Figure 12).
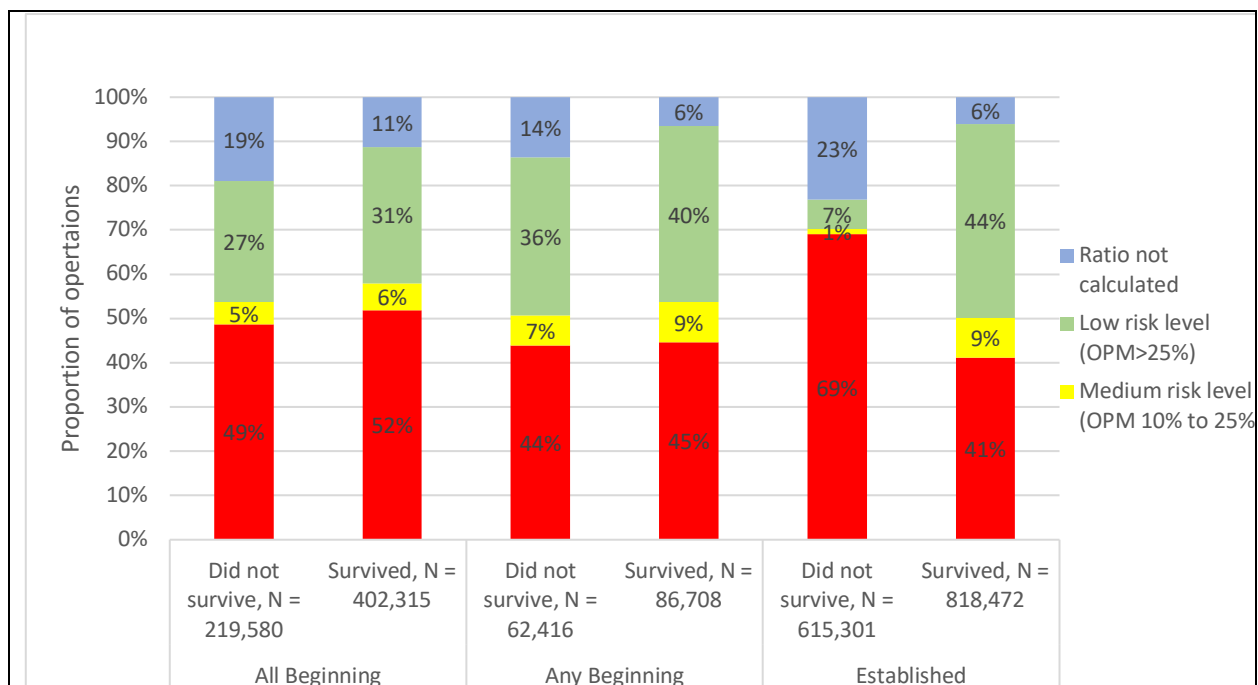
Figure 12. Farms that did and did not survive from 2007 to 2017, by operating profit margin (2007) and beginning status (2007)

In a 5-year time frame, 2007 to 2012 and 2012 to 2017, survival rates range from ~50 to 60%. When we move to a 10-year time frame (2007 to 2017) we find that survival rates fall to ~35-45% when we increase the time frame to 10 years (2007-2017). *All beginning* operations have the lowest survival rates, whereas *any beginning* operations have similar survival rates to *established operations.* Beginning farms and ranches appear to have lower survival rates when compared to nonfarm businesses in the same time period. In the general business literature, Deller and Conroy (2017) find that a little over 60% of start-up businesses started in 2007 survived the first five years. For the remainder of this paper, the focus is on the 10-year time frame from 2007 to 2017.
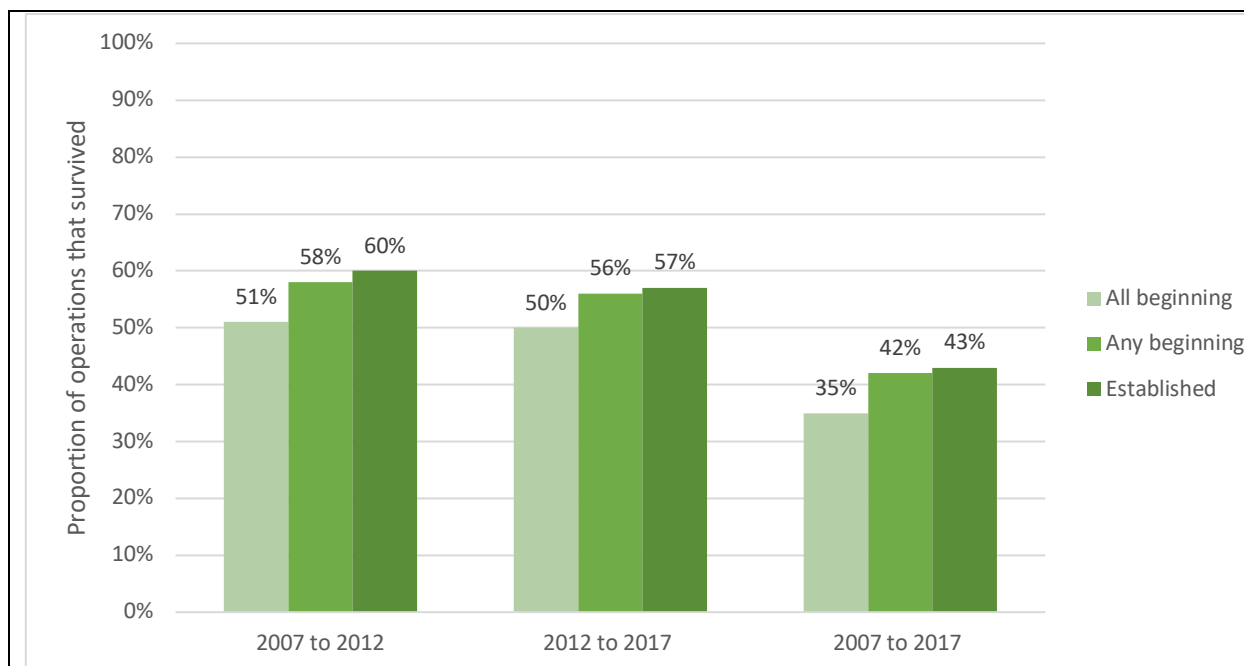
Figure 13. Proportion of operations that survived from 2007 to 2017, by beginning status (2007)

Location

In addition to farm survival varying by beginning type, we also see geographic differences. Figure 14 andFigure **15**5 show the U.S. counties where the share of *all beginning* and *any beginning* operations that survived from 2007 to 2017 was higher than the share of *established* operations that survived[7]. Overall, the maps provide a clear visual that *any beginning* operations have a higher survival rate relative to *all beginning* operations. For *all beginning* operations, there are no clear differences regionally, although we do see some clustering of counties in the region of the country where a lot of pulse crops are grown (e.g., Midwest/plains region). Similarly, for *any beginning* operations, there also are not clear spatial patterns across the U.S.

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[7] Additional maps in Appendix B include the proportion of *all beginning* and *any beginning* operations that survived from 2007 to 2017, by county.
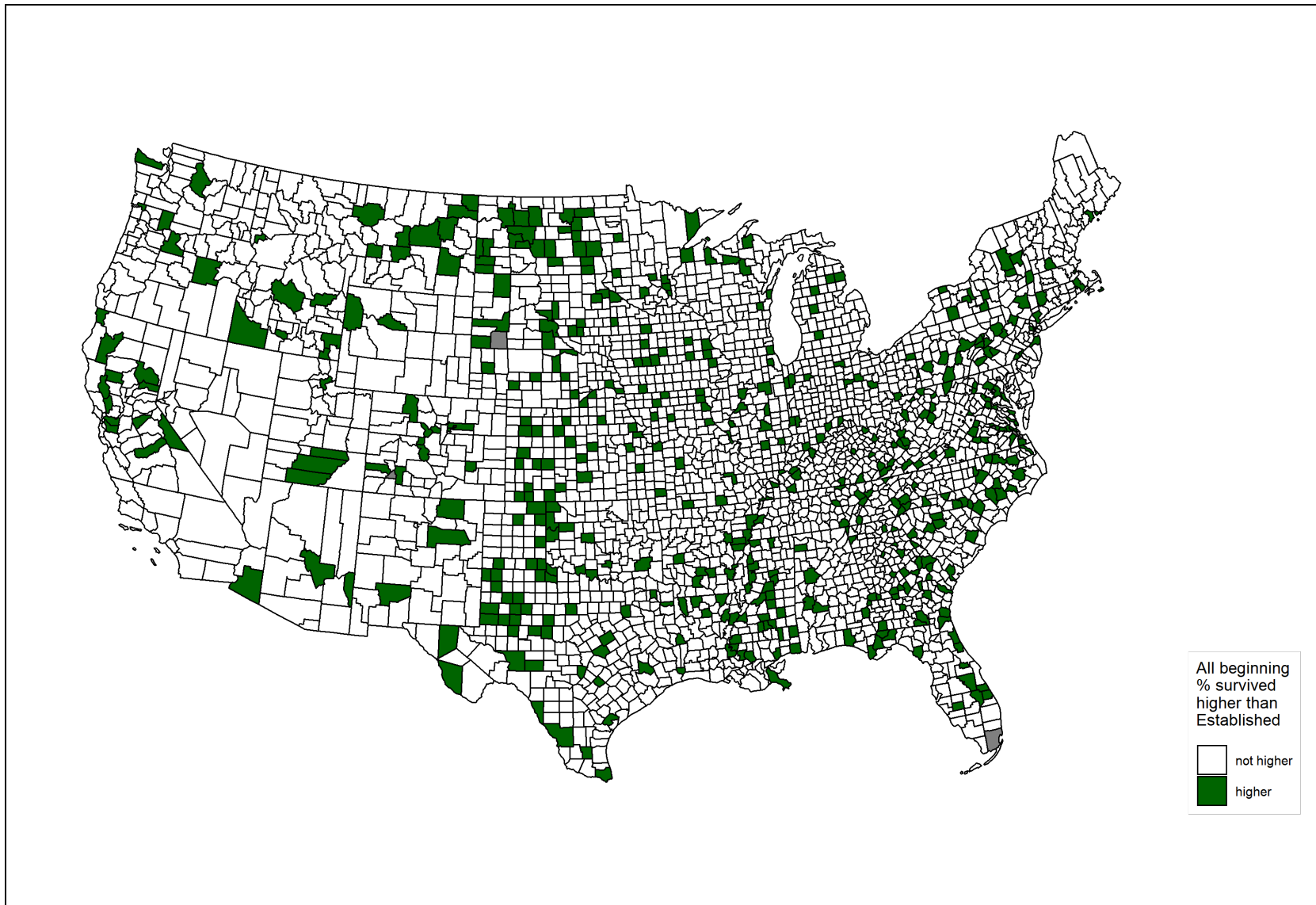
Figure 14. Map of the U.S. counties where the share of *all beginning* operations that survived from 2007 to 2017 was higher than the share of *established* operations that survived
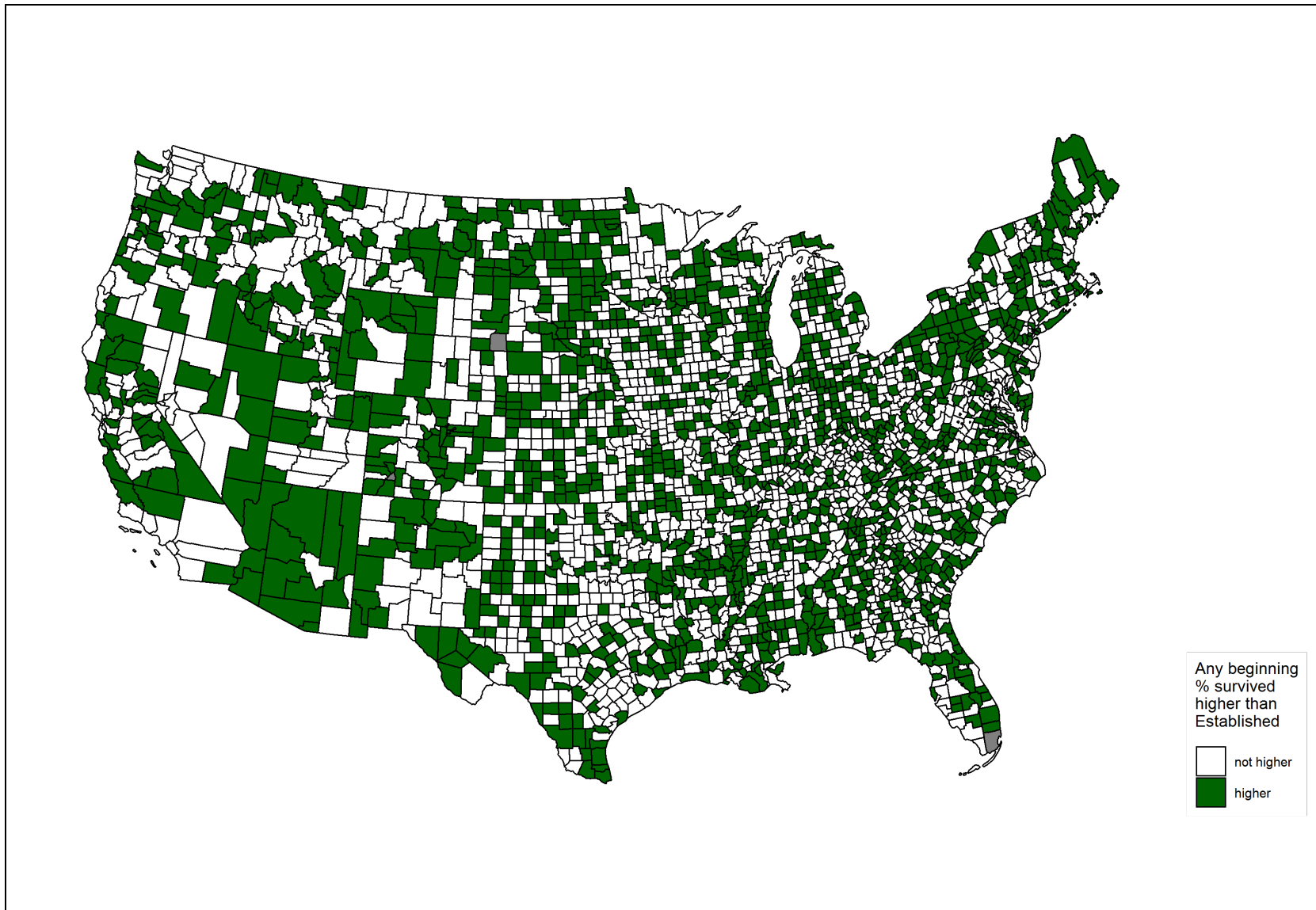
Figure 15. Map of the U.S. counties where the share of *any beginning* operations that survived from 2007 to 2017 was higher than the share of *established* operations that survived

Scale

In general, the likelihood of survival increases with scale, but we do see some important differences across beginning farmer types (Figure 16). *All beginning* operations have the lowest survival rates among beginning farmer types across all scale categories. *Any beginning* operations have survival rates higher than *all beginning* and lower than *established* operations across all scales, except for the largest operations (GCFI≥$1M and acres≥2,000) where *any beginning* operations have very similar survivals rate to *established*. *All beginning* operations have more similar, albeit lower, survival rates than *any beginning* and *established* operations when they are small (GCFI<$350K and acres<500) and that gap increases as they become mid-scale operations (GCFI≥$350K and acres≥500).
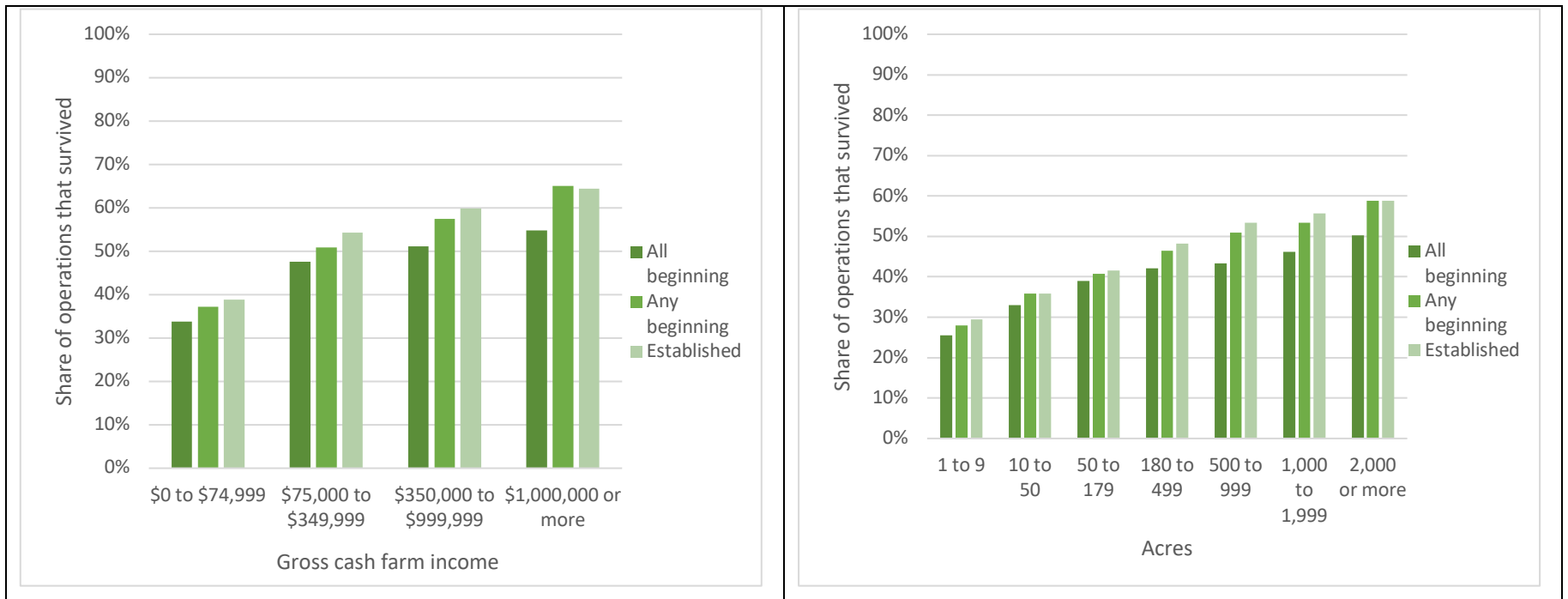
Figure 16. Share of operations that survived from 2007 to 2017, by beginning status (2007) and scale (GCFI and acres in 2007)

Primary commodity

Similar to what we have seen in previous cross tabulations of the data, *all beginning* operations have the lowest survival rates; this is true across all commodities. But, when we look at *any beginning* operations, we see fruit and vegetable, poultry, other animal, and dairy operations have similar survival rates to *established* operations. Overall, other animal operations have the lowest survival rates across all categories of beginning farmer status.
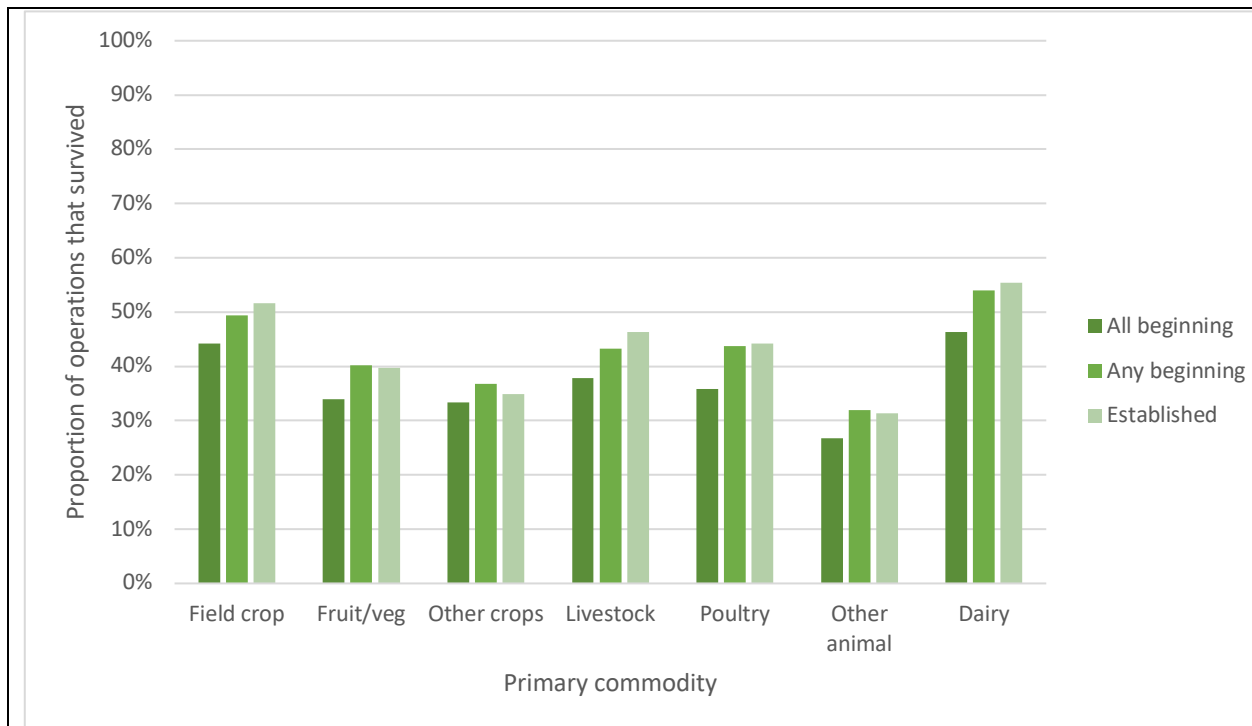

Figure 17. Share of operations that survived from 2007 to 2017, by beginning status (2007) and primary commodity (2007)

Figure 18 shows the proportion of operations that failed and survived from 2007-2017 based on where the primary operator spent the majority of their time, either on farm or ranch work or off-farm. Additionally, data is separated by scale (GCFI) and beginning status. As we would expect, as operations get larger, primary operators are more likely to work primarily on their farm or ranch. For the beginning operations that survived, a higher proportion of operators spent the majority of their time on farm or ranch work (differences statistically significant at 1%) except the smallest scale category (GCFI≥$75K). On average, a larger percent of primary operators on small farms (GCFI<$75K) spend the majority of their time working off-farm. *All beginning* operations in this scale have the highest proportion of operations with a primary operator working mostly off-farm, followed by *any beginning*. Once operations grow to GCFI≥$75K, this shifts and primary producers are more likely to spend the majority of their time working on the farm or ranch.
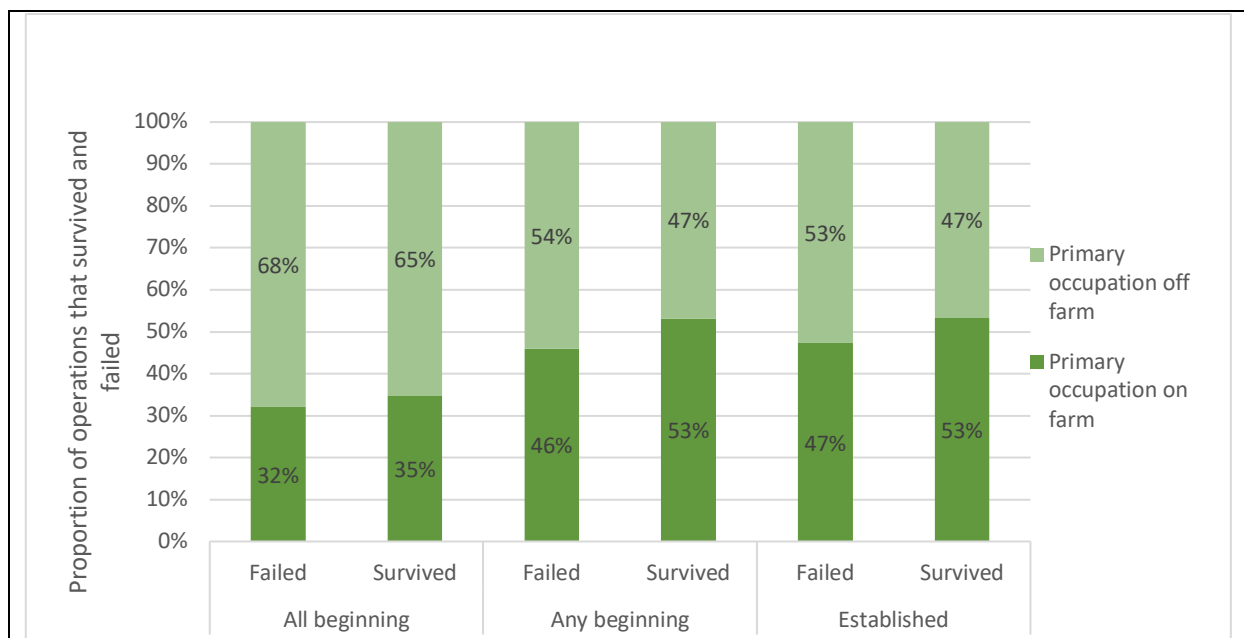
Figure 18. Proportion of operations that failed and survived from 2007-2017, by where the primary operator spent the majority of their time in 2007, beginning status (2007), and scale (GCFI in 2007)

Land tenure
For all small-scale operations (GCFI <$75,000), we see that they have higher survival rates if the majority of their land was rented compared to owned (Table 4). *Established* operations with sales from $75,000 to $349,999 and *any beginning* operations with sales of $350,000 or higher have higher survival rates if they majority of land was rented compared to owned. The relationship between the other land tenure and survivability categories are not statistically significant.

Table 4. Average acres operated as a share of acres owned, by scale (GCFI) and beginning farmer status 2007

	$0 to $74,999			$75,000 to $349,999			$350,000 to $999,999			$1,000,000 or more		
	Failed	Survived	p-value	Failed	Survived	p-value	Failed	Survived	p-value	Failed	Survived	p-value
All beginning	Mean (sd)											
Any beginning												
Established												

Table will be updated when data is approved for export

Another way to view land tenure is to compare farm survival for operations that are majority owners versus majority renters. Across all beginning farmer types and scales, operations that were majority renters in 2007 were more likely to survive from 2007 to 2017 than operations that were majority owners (Figure 19). A higher proportion of operations that failed were majority owners, with statistically significant differences comparing operations that survived and failed within the same beginning and scale category for all scale and beginning combinations.[8]

> Bar chart with proportion of operations that survived on the y-axis and scale and beginning on the x-axis. There are two bars within each beginning/scale section for majority renter/majority owner with the bars filled with the proportion of farms that survived for each of these categories.
>
> *Figure will be updated when data is approved for export*

Figure 19. Proportion of operations that survived from 2007-2017 for operations that are majority renters and majority owners, by beginning status (2007) and scale (GCFI in 2007)

Differentiation

Operations with GCFI<$350K were more likely to survive if they had differentiated sales for all beginning categories (Figure 20), with statistically significant differences across all combinations[9]. There are no statistically significant differences for *all beginning* or *any beginning* operations with GCFI ≥$350K, differentiated sales and survivability.
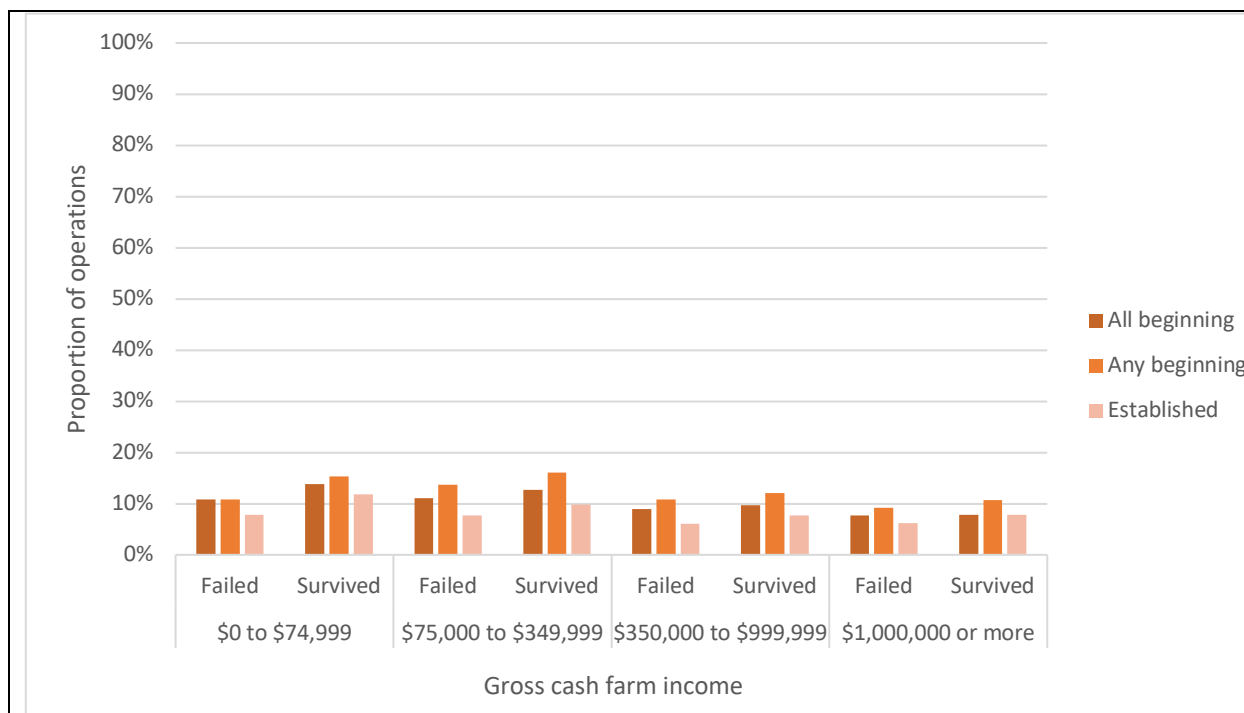

Figure 20. Average proportion of operations that were differentiated in 2007 and survived from 2007-2017, by beginning status (2007) and scale (GCFI in 2007)

[8] See Appendix B for table with results presented in figure 19.
[9] See Appendix B for table with results presented in figure 20.

Crop insurance

Across all commodities and scales, we find that having crop insurance is correlated with higher survival rates. However, when we disaggregate by primary commodity, we find more nuanced differences (Figure 21).[10] Overall, field crop producers have the highest proportion of producers with crop insurance followed by fruit and vegetable producers. Other crop, livestock and dairy producers have lower, but similar crop insurance participation, followed by poultry and other animal producers. This follows the availability of crop insurance by commodity types (O'Donoghue, Roberts, and Key 2009).

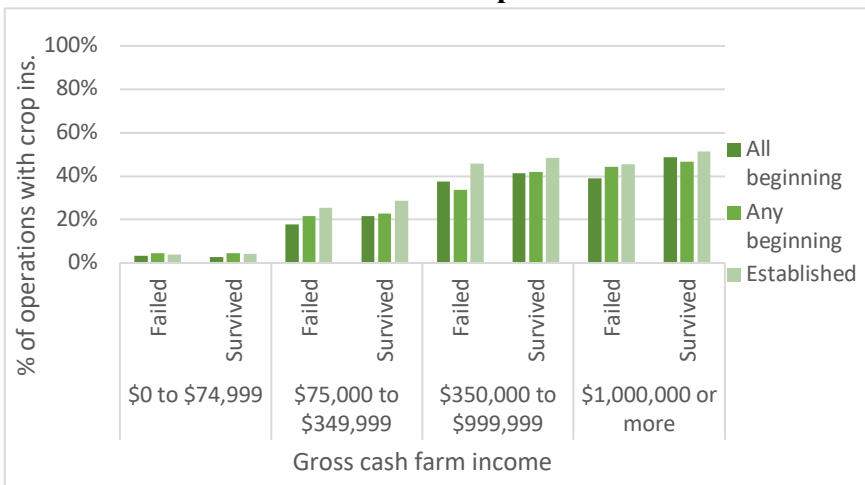[10] See Appendix B for table with results presented in figure 21
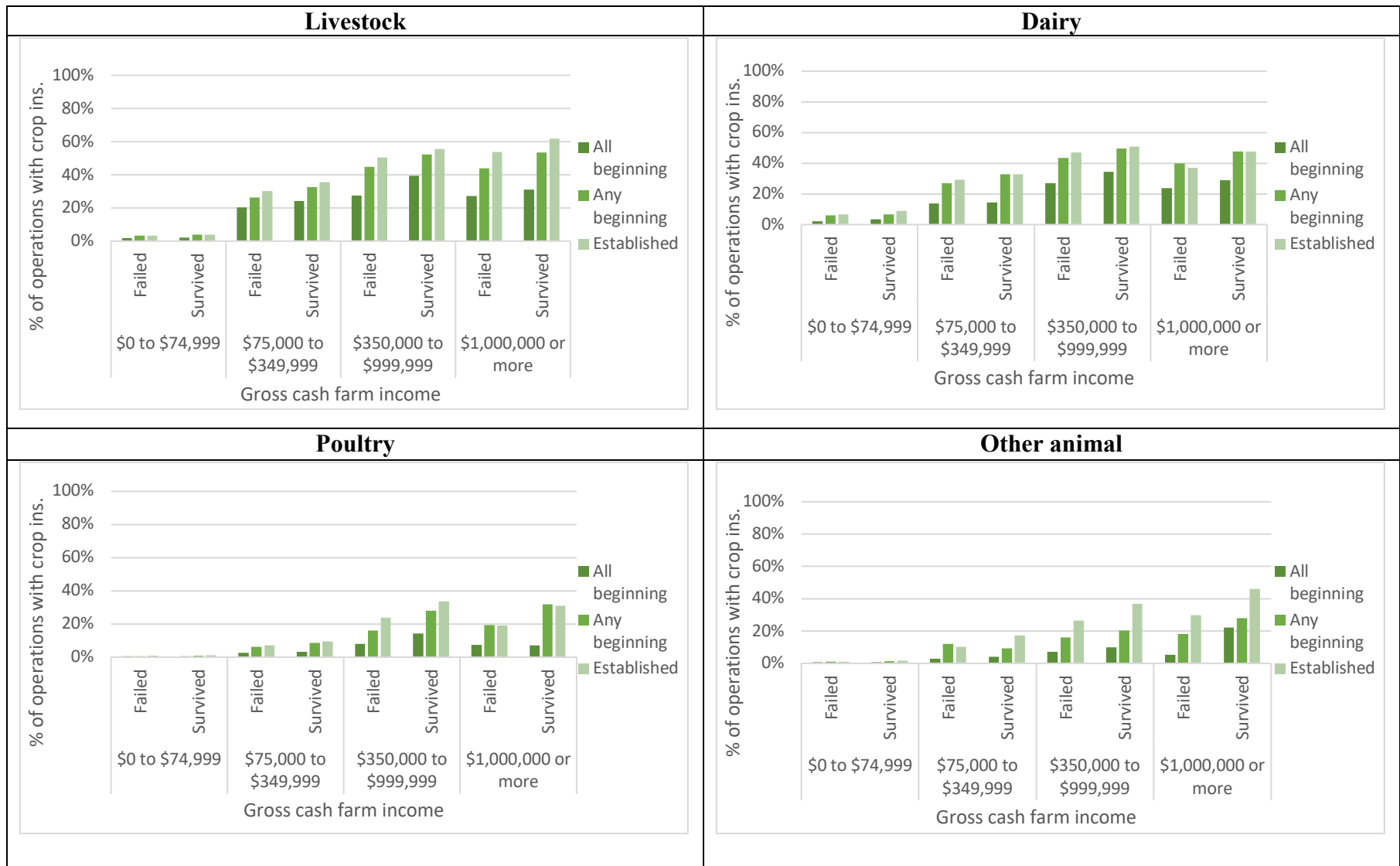
Field crop
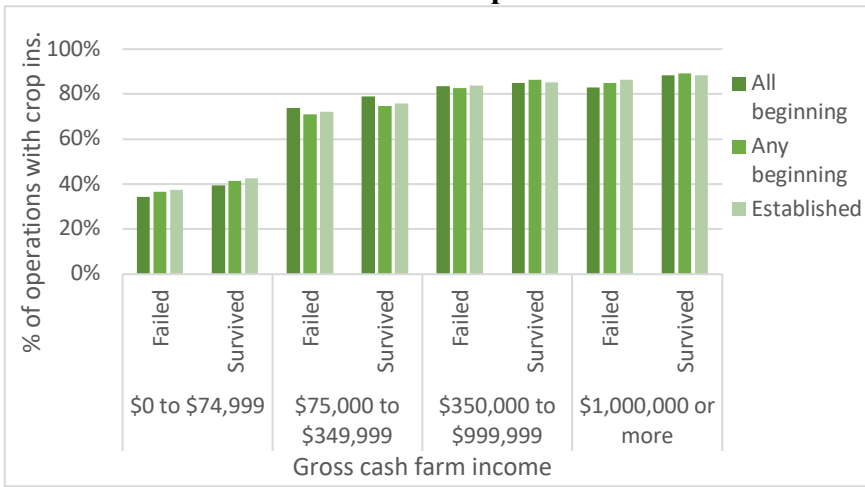
Fruit/Veg
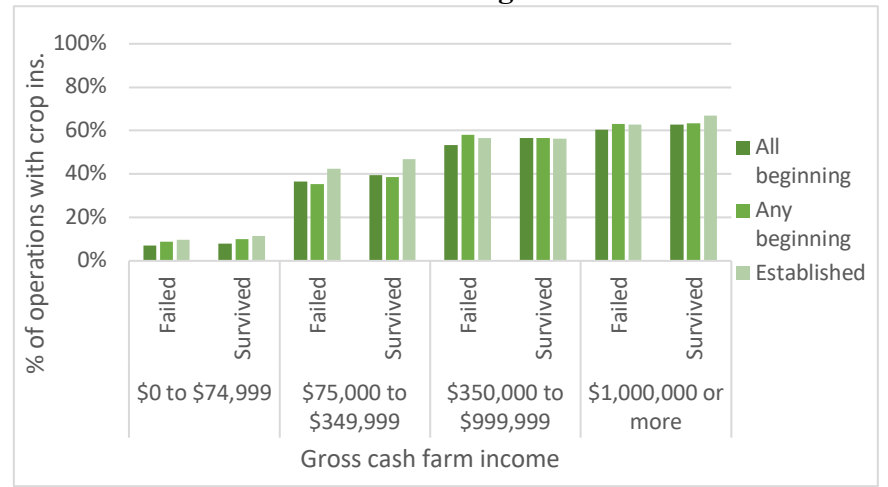
Other crop

Figure 21. Proportion of producers with crop insurance that failed and survived from 2007-2017 by commodity, scale (GCFI in 2007) and beginning status (2007)

We also find differences across beginning farmer type, survivability, and crop insurance. For *all beginning* operations, crop insurance participation is correlated with higher rates of survival for many commodities and scales. Crop insurance and survivability seem to be most closely related for smaller scale operations (except primary commodity dairy and poultry). The relationship is positive for field crops, fruit/veg, and livestock, but negative for other crops.

For *any beginning* operations the relationship between crop insurance and survivability is different from *all beginning* operations in that there are more statistically significant relationships at the mid and large scale (>$350k GCFI). In the small sales classes, the only significant relationships are field crops and livestock (positive correlation between survivability and crop insurance). At the mid and large scales, all but fruit/veg, other animal, and other crop (largest scale only) have positive and statistically significant correlations between survivability and crop insurance.

Government payments
Finally, we evaluate the correlation between government payments and farm survival across scale and beginning type. Larger government payments are correlated and statistically significant with farm survival across all beginning types and scales, with the exception of large (GCFI≥$1M) *any beginning* and mid-scale ($350K≤GCFI<$1M) (Figure 22)[11]. Across all scales and survival, *all beginning* operations have the smallest average amount of government payments. That being said, the smallest scale category had the largest percent of their GCFI from government payments (though a small percent of total GCFI). However, regardless of beginning farmer status in the smallest scale category, these operations received one-quarter of government payment dollars compared to the $75,000-$349,999 sales class. The mid-scale and large-scale categories received double the amount of the $75,000-$349,999 sales class.

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[11] See Appendix B for table with results presented in figure 22
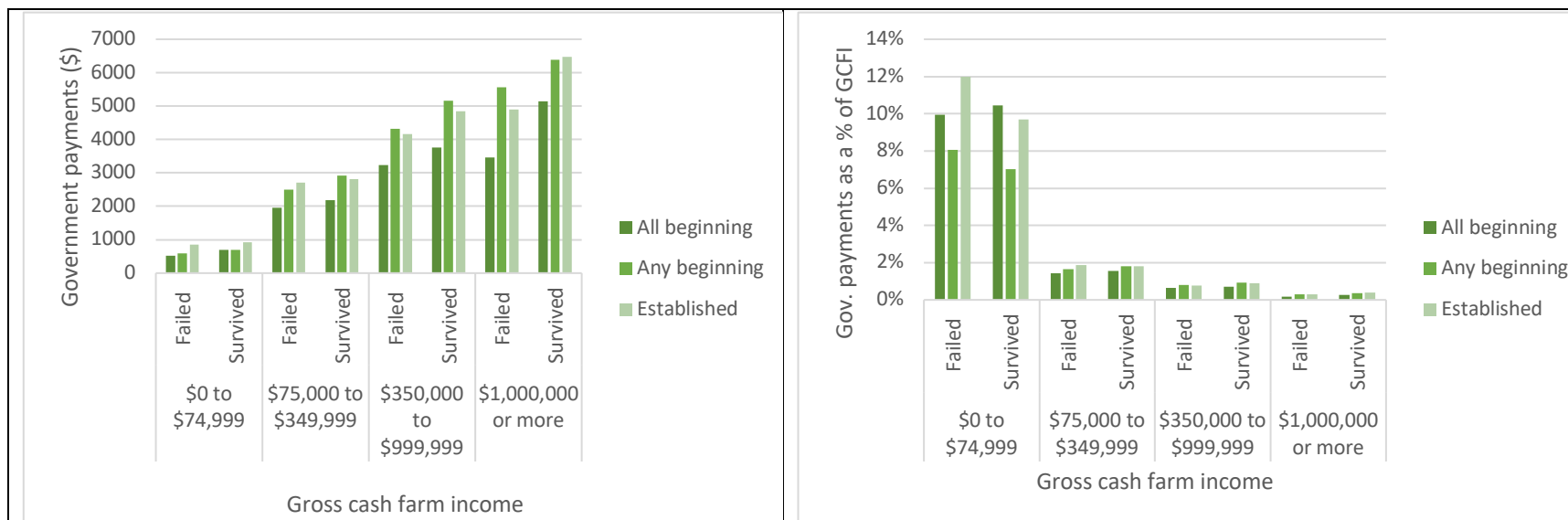
Figure 22. Government payments ($) and government payments as a % of GCFI for operations that failed and survived from 2007-2017 by scale (GCFI in 2007) and beginning status (2007)

Conclusions
This report provided descriptive statistics for beginning farmers and ranchers using the 2017 Census of Agriculture data. This report made three primary contributions: 1) a more comprehensive characterization of beginning operations in 2017 using the Census of Agriculture data; 2) an in-depth analysis of the characteristics of beginning operations that survived from 2007 to 2017; and 3) a more disaggregated definition of beginning operations including *any beginning* and *all beginning*. The results illustrated how the types of operations that a program targets depends on the definition of a beginning farm used.

        We find that overall, *any beginning* operations are more like established operations, than are *all beginning* operations, which have distinct characteristics. For example, we find that *all beginning* operations own less of the acres they operate and are more likely to work more than 100 days off farm than are *any beginning* or *established* operations.

        We also find that overall, beginning and established operators are not racially or ethnically diverse: there are a very small proportion of operations with socially disadvantaged operators. That being said, *all beginning operations* are more likely to have producers that are female or young and are less likely to have producers who are veterans.

        Of the beginning operations that survived from 2007 to 2017, we find that they are more likely than non-survivors to rent most of the acres they operate. This may be because land provides collateral, but also more debt. It may be that operations that own more land are less nimble, and therefore less able to adapt to volatile agricultural markets or other external factors. Additionally, we find that crop insurance and government payments are correlated with farm survival across almost all scales and types of beginning farmers. When we look at government payments as a percent of GCFI we find that these payments are particularly important to smaller operations despite the lower level of payments these farms receive.

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