Socioeconomic threats are more salient to farmers than environmental threats

Kurt B. Waldman [*], Stacey A. Giroux, James R. Farmer, Bradi M. Heaberlin, Jordan P. Blekking, Peter M. Todd

Indiana University, USA

ARTICLE INFO

ABSTRACT

It is a difficult time to be a farmer, particularly in the midwestern US, where a slow-moving farm crisis has been brewing. In recent years farmers have faced multiple socioeconomic threats such as a trade war with China, industry consolidation, and decreasing farmgate prices, as well as multiple environmental threats, including flooding and drought. We analyze farmers' assessments of these concurrent risks and their relationship to stress and farm exit, through a mail survey of 210 soy and dairy farmers in Indiana. On average, environmental threats are perceived as less of a threat to farmers than to immediate socioeconomic threats such as the trade war and, more importantly, long-run economic issues such as price decline and consolidation. We find evidence that farm exit is largely determined by farmer identity, perspectives on the trade war, and stress. The ongoing trade war with China is a key source of stress for soybean farmers and federal payments from the Market Facilitation Program are unlikely to stem farm exit. Addressing the farm exit problem and mitigating the current farm crisis necessitates greater attention to how policies, indirectly lead to farm exit through stress.

1. Introduction: a multi-pronged crisis

Midwestern farmers are currently battling multiple threats, both socioeconomic and environmental in nature. Aside from the COVID-19 pandemic, the most pressing recent threat is the trade war that started in July 2018, when the U.S. levied $34 billion in tariffs on Chinese goods. The Trump administration imposed a 25 % tariff on $200 billion of Chinese imports and threatened to do the same for another $300 billion, causing China to cut back on its imports of agricultural goods from the United States (Reuters, 2019). Tariffs imposed by the United States on Chinese goods were countered with tariffs on American exports, bringing the Chinese import tax on American corn as of December 2019 to 26 % (up from 1 %) and to 28 % on soybeans (up from 3 %) (American Farm Bureau Federation (AFBF), 2019). Since the tariffs were implemented, soybean prices have dropped more than $2.50 per bushel since their previous high, down about 25 %; corn prices have fluctuated and are less than half of their 2012 high (United States Department of Agriculture, 2019). These price changes have emerged during a period of protracted price decline from record highs in August 2012 of more than $8 per bushel of corn and $17 per bushel of soybeans. Trade negotiations with China remain unresolved, and aid administered via the Market Facilitation Program (MFP) to compensate farmers for losses incurred as a result of the tariffs did little to reconcile underlying industry-wide problems farmers face. The medium to long run impact of the trade war on Midwestern farmers is unclear.

Another major trend impacting Midwestern farmers, particularly dairy farmers, is industry consolidation, which has been happening for decades. Milk prices, at the time of data collection for this research study (June/July 2019), had slumped for the fourth straight year (Klein-Davis, 2018) and were at the level of 1980s prices, while input costs, such as those for grain to feed animals, have gone up. Declining milk prices can be partially attributed to the European Union abolishing milk quotas, which led to an increase in production in the EU and more competition for American farmers. A larger impact on dairy farm closures, however, is related to consolidation–for example, Walmart opened its own dairy processing facilities in June 2018, cancelling contracts with smaller dairy processors who in turn have cancelled contracts with small-scale producers (Laca, 2018). These consolidation trends along with changes in consumer preferences have thrown the dairy market into further disarray and led to major processors such as Dean Foods declaring bankruptcy (Yaffee-Bellany, 2019).

In addition to the numerous socioeconomic threats including market,

---

industry, and politically related uncertainties farmers are facing, they have recently been embattled by environmental threats in the form of recurring weather shocks. While uncertainty related to weather is ubiquitous in farming, Midwest farmers have suffered unprecedented setbacks in recent seasons. Among the environmental shocks to hit the Midwest, the most recent are related to flooding. The months from June 2018 to June 2019 were the wettest 12 months in the last century in the Midwest– by mid-June of 2019, when farmers typically have finished planting, only 68 % of corn and 46 % of soybean fields were planted (United States Department of Agriculture, 2020a). Dairy farmers were less impacted by excess rainfall and flooding in general, although the majority, because they also produce feed crops, were impacted. For many farmers environmental shocks presented a two-fold impact since trade assistance payments through the MFP were based on the previous year's acreage planted.

Many farm businesses are suffering financially, and farmers are suffering mentally and physically. The net cash income of farms declined 34 % from 2014 to 2016 and has decreased steadily since then, reflected in farmers' diminishing capacities to repay debt, which has in turn led to more loan delinquencies (American Farm Bureau Federation (AFBF), 2019). The stress that comes with high financial burdens and constant uncertainty is exacting an increasing toll as well. Estimates suggest that from 1992 to 2010 farmers and ranchers committed suicide at a rate of 3.5 times that of the general population (Riggenberg et al., 2018). News reports suggest that farmer suicides are increasing in the wake of heightened economic stress (Weingarten, 2018), and a study by the Centers for Disease Control found that farmers have the fourth highest rate of suicide compared to professions in educational services, health care, real estate, or finance (Center for Disease Control and Prevention, 2020). Suicide in rural areas has become more conspicuous in recent years. In Missouri for example, rural suicides grew by 78 % from 2003 to 2017 (Missouri Hospital Association, 2020). The 2018 Farm Bill recognized the problems of stress and mental health in agriculture, establishing the Farm and Ranch Stress Assistance Network (United States Department of Agriculture (USDA), 2020b).

Midwestern farmers are facing an unprecedented time of uncertainty. There are multiple ways they can respond, including ignoring the uncertainty and carrying on as before, facing the uncertainty and making plans for adapting, and avoiding the uncertainty by exiting farming altogether. The last option is of particular concern because of the importance of food production and the structural changes to the US economy. The decrease in the number of farms over the past decades raises the question of what a sustainable farm economy looks like and whether there are limits to industry consolidation. Academics and policymakers often view this problem as an economic one, neglecting the psychological and emotional dimensions of exiting. The decision to exit farming and factors contributing to this decision are tied into notions of identity and cause stress and health problems for farmers, which impact rural communities more broadly. In this paper, we focus on perceptions of various types of socioeconomic and environmental threats, perceived stress, and farm exit among soybean and dairy farmers in Indiana, who were impacted in different ways. We address the following research questions: a) To what extent do farmers perceive flooding and tariffs to be threats to their livelihood?; b) More conceptually, how do farmers perceive socioeconomic and environmental threats to farming?; c) What role does stress related to socioeconomic and environmental threats and other factors play in farmers' intentions to exit?

In addressing these questions, we consider the role of both economic and psychological factors in farm exit decisions, including stress and anxiety, along with a range of possible cognitive factors including: farmers' tendency to maintain their current status quo, continuing to operate at a loss for years rather than making a change or transitioning out of farming; financial disempowerment, where farmers lack the training or capital to shift to another career; and over-optimism about future industry and farm prospects inconsistent with financial outlook.

2. Background: farm crisis is not new

Much of the current structural change in the farming sector dates back to the farm crisis of the 1980s. The seeds of that crisis were complex—but largely sown in the crop boom of the 1970s and the integration of the US agricultural sector into larger national and global economic systems (Barnett, 2000). Both government tax policies and agricultural policies encouraged investment in agriculture at a time when an inflationary economic environment promoted investment overall. Price support and supply control programs priced commodities at artificially high levels and this attracted investment in agriculture, while the federal government was making loans, through Farm Service Agency at below market rates, primarily for land purchases. All of these factors set the stage for the US to be the "global bargain supplier" (Barnett, 2000) and farmers to be the center of the boom and eventual bust. The net result was that, over the course of a few years farm incomes and the value of assets fell, foreign markets stopped buying expensive commodities and farmers had little capital and a lot of debt. The crisis became an existential one as many farmers were forced to exit farming because they could no longer secure loans and the profits from farming were not enough to pay debts.

While the 1980s farm crisis was driven by a combination of fiscal and monetary policy missteps, what ultimately led to the crisis was the oversupply of grains and resultant declining prices that persist today. There have been both ups and downs in farm gate prices and farm income since the 1980s, but the overall outlook has not been positive and that is particularly true since 2013. Net farm income in 2020 is expected to be 30.5 percent below its peak of $139.1 billion in 2013, with average net cash farm income for commodities like corn and soybeans down 12.4 % and 19.9 % respectively (United States Department of Agriculture (USDA), 2020a). Direct government farm payments are also expected to be lower in 2020, particularly the MFP payments, as the US enters a recession. Measures of solvency including the farm sector debt-to-asset ratio and debt-to-equity ratios are expected to continue their slow increases from 2012 (United States Department of Agriculture (USDA), 2020a). About one-third of U.S. farms raising grain and other row crops are highly leveraged, with debts equal to at least 41 % of their assets. The number of farmers unable to pay back loans rose 20 % and past-due agricultural loans are up 287 % in 2018 (Parker and Levitt, 2019). Chapter 12 bankruptcy filings, which apply to farms with less than $4 million in debt, rose significantly from 2013 to 2016 (American Farm Bureau Federation (AFBF), 2019).

2.1. Stress and farm exit

Previous research on farm stress has attributed it to a number of issues affecting farmers, including legislative changes and the impact of policy changes on farmers (Booth and Lloyd, 2000), financial pressures and difficulties (Yazd et al., 2019) such as those related to "commodity prices, bank pressure and labour supply and costs" (Wheeler et al., 2018), environmental factors (*e.g.,* climate variability; Yazd et al., 2019), physical conditions of farming such as pesticide use and poor physical health (Yazd et al., 2019), and perceived injustices related to their lack of agency in the industry (Bryant and Garnham, 2014). Farm stress is intertwined with the farmer's identity, including feelings of pride, self-worth, and masculinity (Bryant and Garnham, 2014; Roy et al., 2017), and is gendered, affecting farm wives at different intensities than farm husbands (Heffernan and Heffernan, 1985; Booth and Lloyd, 2000; Price and Evans, 2009).

The process of exiting farming involves tremendous stress for farmers. A study of the 1980s farm crisis found that farmers experience a great deal of stress in the choice to leave farming; farm families rated their stress at an average of 8.1 out of 9, with depression rates at 97 % for men and 100 % for women who chose to exit farming (Heffernan and Heffernan, 1985). The same study found that feelings of increased stress and depression were accompanied by a self-reported increase in physical

aggression, mood changes, sleeping and eating problems, and withdrawal from family and community life, even after families had left farming completely. Farm families who were displaced from farming during the 1980s farm crisis reported more stressful life events following displacement than non-farm families or famers who were not displaced during the same interval of time (Lorenz et al., 1997).

Conversely, stress can also contribute to the decision to exit farming. A study focused on stress as a driver of exit found that farmers with poorer well-being and greater psychological distress were approximately three times more likely to exit (Wheeler et al., 2018). The association between farm exit likelihood and well-being is more pronounced among less profitable farmers and younger farmers, farmers with larger farms, and farmers earning low-to-moderate proportions of their household income off-farm (Peel et al., 2016). More educated farmers report lower stress (Wheeler et al., 2018).

Not only does the decision to exit farming cause stress, but so does the broader economic downturn in agriculture and farming communities. Research has found that farmers are largely impacted by an aggregate sense of uncertainty around rural economic prospects, with individual economic prospects taking on a secondary or tertiary role in farm stress (Ortega et al., 1994). The well-being of farmers spills over to rural communities. Ortega et al. (1994) found high rates of depression and anxiety among both rural farm and non-farm residents, suggesting that farmers and rural non-farm residents both feel the impacts of downward trends in the farm economy. The current downward trends in the farm economy come at a time when already scarce health resources in rural areas like hospitals and clinics are closing down, consolidating, or otherwise being hollowed out (Edelman, 2019), leaving many rural communities without resources to manage their mental and physical health.

2.2. Other drivers of farm exit

Economic studies of farm exit naturally model exit as an economic decision. The most articulated economic theory of farm exit comes from Goetz and Debertin (2001), who use county-level farm exit data to understand why farmers quit by examining whether off-farm employment and federal farm programs have had an effect on quitting. They compare the utility farmers derive from farming with the utility they would derive from quitting and becoming fully employed off farm, considering the transaction costs and the enjoyment of self-employment. Goetz and Debertin conclude that off-farm employment has no effect on quitting and are inconclusive about whether farm support programs affect quitting.

Other research has been mixed on both off-farm income and farmer support programs. Kimhi and Bollman (1999) found that off-farm work reduced the tendency to exit while Mishra et al. (2014) found that having an operator spouse who works off the farm increased the likelihood of exit. In terms of government support, a couple of studies have found that it can reduce farm exit. Breustedt and Glauben (2007) found that an increase in subsidy payments and output prices significantly slows the decline in exit and Mishra et al. (2014) found that households that experience a reduced intensity of government payments are more likely to exit farming.

Additional demographic and farm level differences are associated with farm exit. There appears to be a consensus that smaller farms are more likely to exit (Kimhi and Bollman, 1999) and this is particularly true of smaller and less efficient [dairy] farms (Dong et al., 2016). One important driver is retirement– farmers without successors but who are older and more educated are more likely to exit (Dong et al., 2016).

There is less research in terms of socioeconomic versus environmental drivers of farm exit. Katchova and Ahearn (2017) find that exit and entry rates vary over time due to market conditions and policies but that there is little variation in the aggregate exit rates over the long term, even during the farm financial crisis and periods of lower commodity prices. There is some evidence that environmental factors such as

weather events are associated with exit. One study found that the exit intention rate was more volatile during drought years than non-drought years in Australia (Wheeler and Zuo, 2017). Another study in Australia found that environmental drivers (temperature increases and increased drought) and socio-economic drivers were both associated with exit (including falling commodity output prices, increased urbanisation and higher unemployment) (Wheeler et al., 2020). Overall, there is a dearth of literature on environmental drivers of farm exit and the extent to which environmental and socio-economic drivers are linked.

Using farm level data, we explore the impact of simultaneous flooding and trade war shocks on Indiana soybean and dairy farmers and more broadly how these farmers perceive environmental and socioeconomic shocks. We quantify and compare the perceived threats from various factors, the stress related to them, and assess which of these types of threats are more salient to farmers. Finally, we look at what the drivers of farm exit are in the current climate using a range of demographic variables, farm characteristics, and psychological variables.

3. Methods

3.1. Sample and data

We sought answers to our research questions through a mailed survey sent to 2000 soy and dairy farmers in Indiana. We purchased farmer contact information through the firm Farm Market ID, which builds a database of growers from Farm Service Agency reporting of farmer participation in government programs. Based on this database we were able to target specific sub-sectors of farmers.

We sent 800 dairy farmers (nearly a census of dairy farmers in the state) and 1200 soybean farmers in Indiana a postcard announcing the upcoming arrival of the survey in June 2019. This is close to all of the registered dairy farmers (estimates range from 900 to 1300) and approximately 5 % of registered soybean farmers (estimated to be about 27,000) in the state. Two weeks later we sent the survey instrument and a paid return envelope. Over the next three weeks we received the completed surveys in the mail from farmers. We did not give a participation incentive and we did not send follow-up correspondence. The sample from FarmMarket ID included some farmers who were deceased or had already exited farming, and some addresses that were returned by the US Postal Service. Once we removed the mail-returned surveys and farmers who we learned were deceased we had approximately a 12 % response rate, including 98 dairy farmers and 112 soybean farmers. Our sample also includes farmers who were in the process of exiting farming.

Survey questions focused on two areas that align with the research questions. The first area includes basic farm demographic and socioeconomic indicators including a perceived stress scale, associations with farming identity, and questions about mental health access. The Perceived Stress Scale (PSS) is formulated so that it is appropriate for many educational backgrounds, including those people who have less than a high school education (Cohen et al., 1983). We used 5 of the 10 questions and modified them slightly for a farm context. Respondents were asked how many times in the past month they had experienced the following, using a Likert scale response format (Never = 0; Almost Never = 1; Sometimes = 2; Fairly Often = 3; Very Often = 4):

1. I got upset because of something that happened on the farm.
2. I felt nervous and stressed about my farming operation.
3. I could not cope with all the things that I had to do on the farm.
4. I felt that it was pointless to keep farming.
5. I felt angry because of things that were outside of my control.

The PSS index was then calculated by summing the total of their responses to all five questions (0–20). It should be noted that while Cohen has developed an abbreviated 4-question scale, ours is slightly different and uses 5 questions so is not directly comparable.

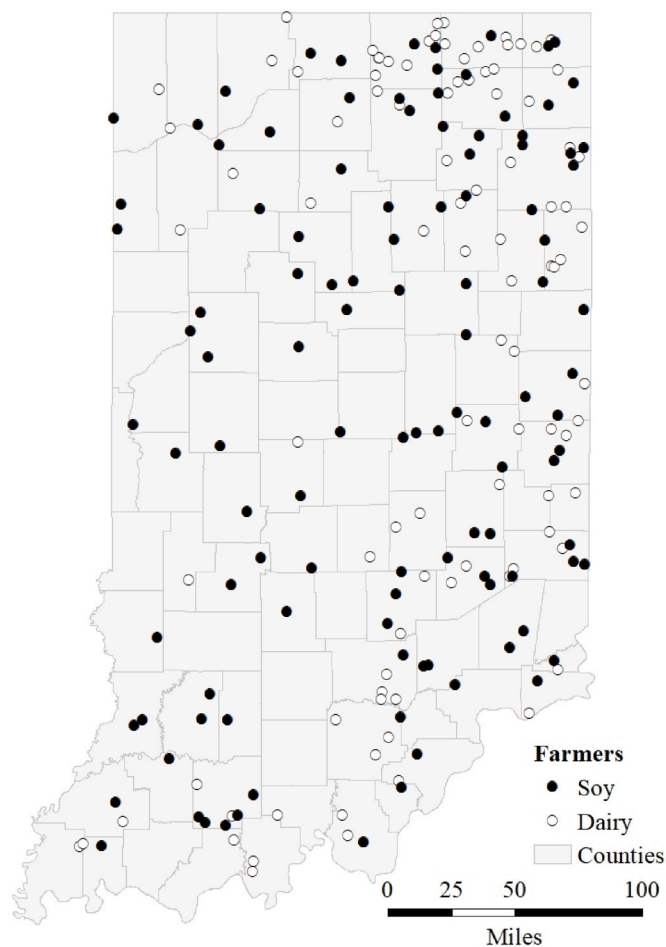The second area covered is perceptions of risk attributable to

Fig. 1. Map of Indiana with approximate location of participating farmers.

environmental threats (specifically flooding) and to social threats (including tariffs and industry consolidation). We asked farmers to rate how much of a threat each factor poses to their farm business (no threat = 1; low threat = 2; moderate threat = 3; serious threat = 4).

Geographical coverage of the survey across Indiana counties is displayed in Fig. 1 below. We had slightly higher responses from the east and north of the state, where dairy farmers are more prominent, but relatively even geographical coverage within the state.

3.2. Modeling farmer stress and farm exit

Treating farm exit as solely an economic decision neglects the emotional and cognitively challenging aspects of such an existential decision, which impacts not just careers but livelihoods, identities, and, for many farmers, their family history, legacy, and the rural communities they live in. We build on the traditional economic approach to farm exit, including off-farm income and government payments, but also consider the role of variables that have been found to be important in the broader rural studies literature including farmer identity, farm stress, and the impact from recent experiences.

We focus first on the compounding dimensions of stress by asking farmers how severe they perceive various stressors to be using a Likert scale. Then we present them with hypothetical scenarios about socioeconomic and environmental stress, and query how they would respond to single shocks of each type and multi-year shocks of each type. We evaluate the consistency of responses between the Likert scale questions and the hypothetical scenarios.

Statistical analysis focuses on determinants of the decision to exit, or

more specifically to be currently considering farm exit, based on a range of sociodemographic and economic variables. We asked whether farmers "have considered exiting farming prior to this year" and whether farmers "are currently considering exiting farming or are in the process of exiting".

We evaluate the decision as a function both of economic factors (including whether they have off farm income or received government assistance) as well as additional psychological factors (including perceived stress, perceived social and environmental threats, and a series of questions gauging farmer's values and identity related to farming). We control for differences in Indiana counties by clustering the standard errors at the level of the county. We felt that this was important given the geographical differences across Indiana counties including the proximity to the urban areas of Indianapolis and Chicago as well as variation in local unemployment levels and population density.

4. Results

In section 4.1 we present descriptive statistics of the sample population, and in 4.2 we summarize psychological factors that could impact farmers' exit decisions such as identity, farm related stress, and perspectives on the trade war. We then consider how farmers perceive various social and environmental threats to their livelihood in section 4.3 and their perceived stress in section 4.4. Finally, we analyze the extent to which all of these factors contribute to farmers' consideration of exiting farming in section 4.5.

4.1. Sample population

Descriptive statistics for the sample of dairy and soybean farmers are provided in Table 1.

Approximately half of farmers have been farming since the onset of the 1980s farm crisis. The average age of farmers is approximately 60 and this is slightly above the Indiana average of 55.5 and the national average of 58.3 (United States Department of Agriculture, 2019). The median soy farm size in our sample (388 acres) is larger than the state average of 265 acres, but the dairy farmers in our sample (76) had a smaller herd size than the state average of 121 (in 2013).

The dairy farmers in our sample have a higher percentage of household members working off farm than the soybean farmers. They have higher gross farm income, smaller operating loans, lower debt and received about 1/3 less trade assistance through the MFP than soybean farmers (11,000 compared to 35,000 for soybean farmers). Farmers of either commodity reported an average debt of about a half of a million dollars. In general, the sample appears to have captured a wide range of farm sizes. While we characterize these farmers in various places throughout the paper in terms of dairy and soy farming, many dairy farmers are also growing soybeans and 94 % of all farmers are also growing corn. In other words, these commodity distinctions of soy and dairy only roughly capture the farm enterprise as income is diversified across multiple activities and crops for most farmers. Soy farmers are generally grain farmers while dairy farmers are generally dairy operations with grain crops.

### 4.2. Farmer identity and values

To understand how factors such as identity and values might be associated with farm exit we use a series of Likert scale questions that highlight the reasons for being a farmer (see Fig. 2). In terms of values, we consider how lifestyle choice, which incorporates the benefits of self-employment and working outdoors, might moderate farm exit. Lifestyle enjoyment had the highest average level of agreement among respondents (mean = 3.63/4 and the most 'strong agreement', followed by the importance of identity as a reason for farming). Less than 5 % of farmers did not agree that lifestyle was an important reason for

Table 1
Descriptive statistics for the sample of dairy and soybean farmers.

Variable	Dairy		Soy		All	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Year started farming	1978	15	1980	20	1979	18
Farm size (acres)	632.65	1146.30	862.89	1875.60	756.20	1565.43
Soybean area (acres)	–	–	388.42	919.83	–	–
Herd size (cows)	76.25	179.95	–	–	–	–
Corn (%)	0.94	0.25	0.91	0.29	0.92	0.27
Pork (%)	0.03	0.18	0.06	0.23	0.05	0.21
Soy (%)	0.75	0.43	–	–	–	–
Dairy (%)	–	–	0.03	0.17	–	–
Off farm income (0/1)	63	36	49	36	56	37
Loan ($)	$ 95,445	$ 297,161	$ 186,226	$ 584,405	$ 142,930	$ 453,690
Debt ($)	$ 450,709	$ 1,155,359	$ 551,411	$ 2,071,735	$ 420,574	$ 1,008,900
Gross farm income ($)	$ 515,068	$ 825,550	$ 325,672	$ 527,116	$ 414,057	$ 687,639
Trade assistance ($)	$ 10,997	$ 22,308	$ 34,809	$ 116,917	$ 23,582	$ 83,370
Observations	98		112		210	

Notes: Binary 'enterprise' variables (0/1) indicate the percentage of dairy and soybean farmers who are producing corn, pork, soy, and dairy in the respective categories. Trade assistance refers to the amount of payment they received up until the point of the survey from the Market Facilitation Program (MFP) for "commodities directly impacted by unjustified foreign retaliatory tariffs". (United States Department of Agriculture, 2020a). This only includes the first $16 billion package.
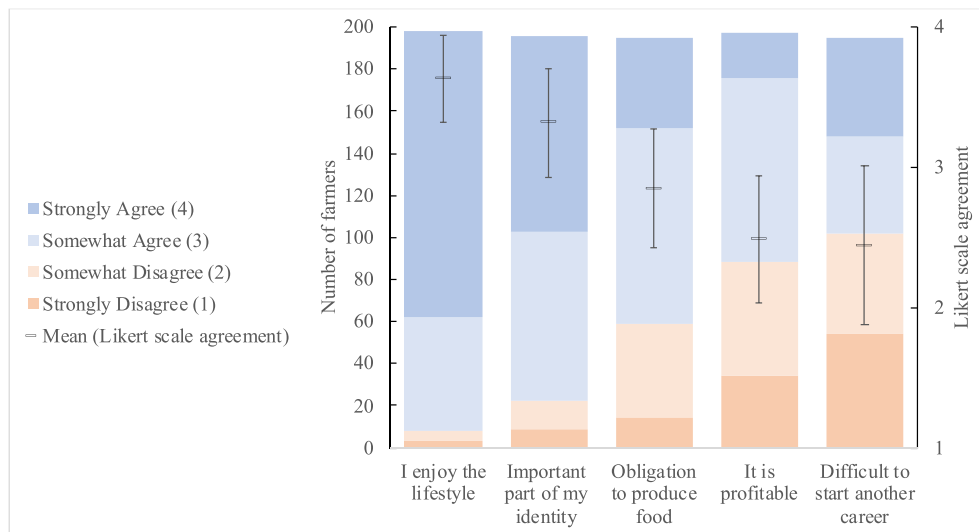
*Note: Error bars represent the standard deviation of Likert scale responses.

Fig. 2. Reasons for operating a farm business (includes both soy and dairy farmer agreement with each statement)*.

operating a farm business, highlighting the importance of self-employment and the ability to independently set one's schedule. Another factor that may inhibit farm exit is the connection between identity and career choice for farmers (Burton, 2004). The importance of farming as an identity had high agreement among farmers (mean = 3.32/4) with almost all indicating some agreement with the statement suggesting that it may contribute to keeping farmers from exiting despite low margins. To investigate the role of social norms around farming we asked farmers about the extent to which they feel a moral obligation to produce food as a reason for farming. The majority of farmers reported feeling a moral obligation (mean = 2.85), either somewhat or strongly agreeing with this statement. To ascertain farmers' perspectives on the economic drivers of farm exit we asked them whether profitability was a reason for operating a farm and how difficult they perceived it to be to start another career. Economic explanations for operating a farm business are the least agreeable to farmers, with an approximately even split on whether they are motivated by profitability or whether the reason they farm is because it is difficult to change careers.

4.3. Perceived threats to farming

Many of the farmers in our sample had recent experiences with environmental events, specifically impact from flooding during the 2019 growing season. Flooding impacted soy farmers more than dairy farmers, with 82 % of soy farmers reporting negative impacts from flooding while 40 % of dairy farmers did. Since most dairy farmers also produce grains for feed, much of the impact to their operations was in terms of their field crops (only 3 % of dairy farmers reported livestock suffering). The biggest impacts across all farmers had to do with planting: 44 % of farmers planted less acreage because the flooding impacted them prior to planting, while 22 % reported planting late and 22 % reported harvesting less.

We also asked the farmers to rate the severity of various economic and environmental threats they faced (Table 2, ordered from highest to lowest severity for soy farmers). The most serious threats for soy farmers are market related: the steady decline in prices (most recently since the peak in 2012), followed by tariffs (the trade war with China), and price fluctuations. Environmental factors such as flooding, rainfall variability and high heat were a low to moderate concern for farmers overall, as

Table 2
Perceived level of threat from various socio-economic and environmental factors.

Variable	Soy		Dairy	
	Mean	Std. Dev.	Mean	Std. Dev.
Steady decline in prices over time	3.30	0.80	3.38	0.82
Tariffs on agricultural products	3.13	0.95	2.86	0.95
Excessive rainfall or flooding	3.08	0.78	2.81	0.90
Fluctuation in prices	3.07	0.76	3.15	0.79
Low or variable rainfall	2.82	0.79	2.71	0.94
High temperatures	2.81	0.77	2.67	0.84
Industry consolidation	2.7	0.88	3.01	0.96

Notes: 1 = no threat; 2 = low threat; 3 = moderate threat; 4 = serious threat.

was industry consolidation.

Dairy farmers also were most concerned with steady price decline, which has been a longer running problem in the dairy sector than soybean sector. Furthermore, they had a slightly different ordering of threats, seeing related issues of price fluctuation and industry consolidation as moderate to serious threats on average. Tariffs and environmental issues were all low to moderate threats for dairy farmers, which is expected as animal agriculture is generally less impacted by these factors.

To more conceptually explore the differences between perceptions of socio-economic and environmental threats we presented farmers with hypothetical scenarios about multi-year threats from each. Fig. 3 displays the response of soybean and dairy farmers to a prolonged socio-economic or environmental threat. Farmers were asked "how much of a threat [each of the following] pose to your farm business?" The responses are separated into dairy and soy farmers to highlight the differences by industry. Soy farmers are generally less likely to exit than dairy farmers from either prolonged socioeconomic or environmental threats. Environmental threats are slightly more concerning to soy farmers than socio-economic threats but not statistically different, whereas with dairy farmers, socio-economic threats would compel almost twice as many to exit as environmental threats would. This highlights how much less exposed dairy farmers are to environmental issues and how much more they have been impacted by socio-economic issues than soybean farmers. The low perceived threat by soybean farmers is surprising given the severe impact from both flooding and tariffs in the previous year and dairy farmers may feel more threatened in general due to recent large shifts in the industry described earlier.
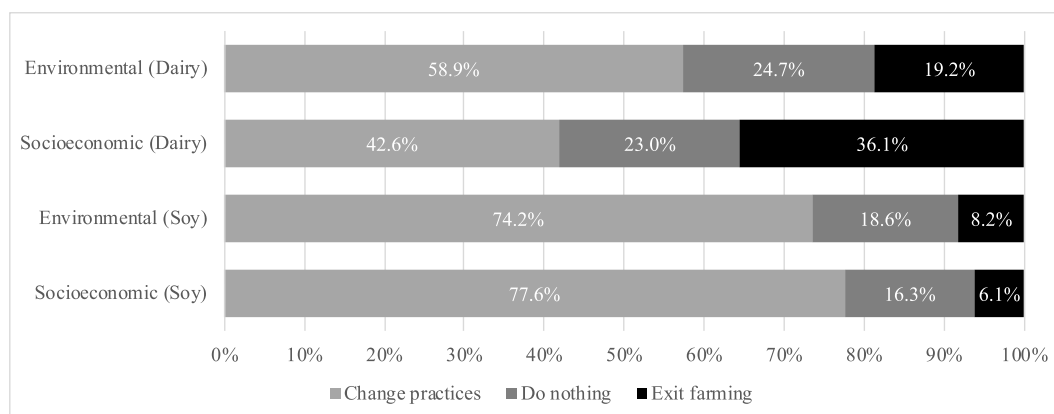
4.4. Perceived stress

We also consider the level of stress farmers experience as a determinant of farm exit. We adapted the Perceived Stress Scale (PSS), to measure the perception of stress (Cohen et al., 1983). The scale measures the extent to which people appraise their lives as stressful. Scale items gauge how unpredictable, uncontrollable, and overloaded respondents find their lives (see Fig. 4).

According to experiments with respondents in other sectors, a normal level of stress for someone from a similar demographic to the average farmer in the sample (i.e. a white male, age 55–64) would be approximately 6 out of 20 on this abbreviated scale (approximately 12/40 for this demographic in Cohen, 1988). Here the mean PSS index was 7.87 out of 20. However, in the histogram of values displayed in Fig. 3, it appears that there are two overlapping sets of farmers—those who are normally distributed around an average stress score of PSS = 5 (93 farmers) and those who are normally distributed around an elevated stress score of PSS = 10 (109 farmers). A third much smaller set (8 farmers) have very high stress levels (>17). Dairy farmers reported higher levels of stress (mean = 8.63) than soybean farmers (mean = 7.20).

There is also evidence that divergent views about the benefits of the trade deal are related to stress. The more a respondent agreed with the statement that the "trade dispute negatively impacted [my] farm business" the higher the stress levels farmers reported. And the more a farmer "expected a long-term positive outcome for [their] farm business from renegotiating trade agreements", the less stress farmers reported (displayed in Fig. 5). When we look at the difference in means between farmers reporting normal levels of stress (PSS<8) versus high levels (PSS ≥ 8) we see several notable differences. Respondents in the high PSS category have almost twice as much debt ($651,548 compared to $316,330 in the low PSS group) and are twice as likely to be considering exiting farming (40 % compared to 20 % in the low PSS group). We conducted a one-way ANOVA of the difference in PSS scores between farmers that are considering exit (9.24 average) and those that are not (7.27) and found the difference to be statistically significant at the 1 % level (F = 9.12). Stress clearly plays a large role in farm exit and this is related to how a farmer was impacted by the trade war and their perspective on whether there will be a benefit to their farm.

4.5. Determinants of farm exit

We investigated farm exit through a series of questions about

	Change practices	Do nothing	Exit farming
Environmental (Dairy)	58.9%	24.7%	19.2%
Socioeconomic (Dairy)	42.6%	23.0%	36.1%
Environmental (Soy)	74.2%	18.6%	8.2%
Socioeconomic (Soy)	77.6%	16.3%	6.1%

Note: Using a chi-square test the differences in exit rate are statistically different between soy and dairy for environment (Pr=0.036) and social threats (Pr = 0.00), between the two scenarios for dairy farmers (Pr=0.00), but not statistically different between the two scenarios for soybean farmers.

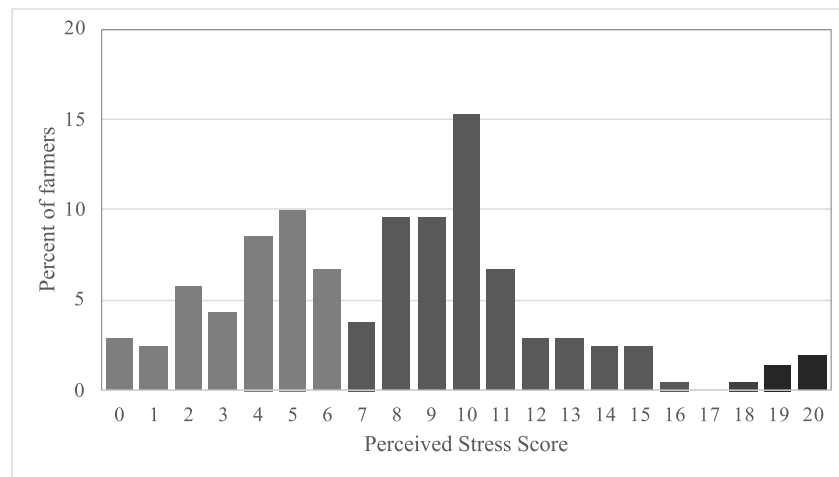**Fig. 3.** Hypothetical scenarios about prolonged socio-economic or environmental threats.

Fig. 4. Perceived stress responses of farmers (0 = no stress; 20 = high stress).
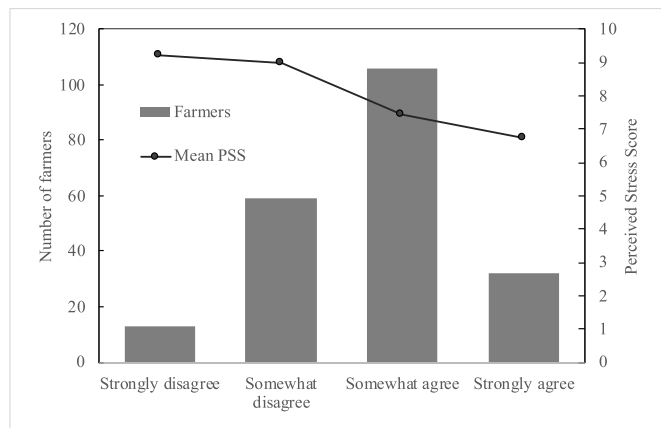

Fig. 5. Stress and views about the trade war (response to question of whether trade negatively impacted one's farm business).

whether they are currently considering exit or are in the process of exiting. Twenty-nine percent of the farmers were currently considering exiting farming or in the process of exiting (35 % dairy; 24 % soy). Of the 30 farmers that were in the process of exiting, three farmers filed for bankruptcy, five farmers sold the farm, and twenty-two farmers were in the process of passing the farm on to relatives. Of the 59 farmers currently considering exit, the main reason cited was financial, differentiated into three subcategories: 33 % of farmers cited low profits or low farm margins, 24 % cited low commodity prices, and 11 % cited high loans or debt. A further 23 % were considering exit for health reasons and 9 % were considering exit due to weather related factors.

We estimated a logit model of farm exit, where the dependent variable is binary for whether they are considering or in the process of exiting or not. We chose to include both as indicators of farm exit since exit is a dynamic decision process that can often take more than a year. As described above, we include a vector of demographic variables, a vector of farm level characteristics, and a vector of psychological or decision variables. We control for differences in farms by Indiana county (some counties have many observations and some have few) by clustering the standard errors at the county level (see Table 3).

In terms of included demographic factors, both farm experience and the quadratic function of age are correlated with exit. For every additional year farming, a farmer is 4 % more likely to exit (than not exit). We used a quadratic function to capture diminishing returns to age and omitted the linear version as the number of years farming is roughly measuring experience which is more precisely what we are interested in.

Table 3
Determinants of farm exit-logit model with standard errors clustered at the county level.

	Coef.	Std. Err.	z	P > z	95 % CI	
Demographics						
Farming experience (years)	0.042***	0.01	3.66	0.00	0.02	0.06
Age (years)	−0.030**	0.01	−2.36	0.02	−0.06	−0.01
Education (1–6; highest)	0.199	0.16	1.26	0.21	−0.11	0.51
Farm characteristics						
Farm size (acres)	−0.001**	0.00	−2.38	0.02	0.00	0.00
Corn producer (0/1)	−1.431*	0.77	−1.87	0.06	−2.93	0.07
Off farm income (0/1)	0.175	0.51	0.34	0.73	−0.83	1.18
Debt ($, in thousands)	0.000***	0.00	−0.43	0.67	0.00	0.00
Trade assistance ($, in thousands)	0.013***	0.00	3.37	0.00	0.01	0.02
Flooding impact (No/Yes)	0.126	0.59	0.21	0.83	−1.04	1.29
Psychological characteristics						
Importance of identity as a farmer (1–4; strongly agree)	−0.446***	0.18	−2.49	0.01	−0.80	−0.09
Stress x concern about industry x (1–4; serious threat)	0.046**	0.02	1.85	0.06	0.00	0.10
Stress x price decline (1–4; serious threat)	−0.015	0.02	−0.62	0.53	−0.06	0.03
Optimism about trade deal (1–4; agree)	−0.467**	0.21	−2.19	0.03	−0.89	−0.05
Constant	1.446	1.09	1.32	0.19	−0.69	3.59
Observations	190					
Pseudo R-squared	0.168					
Log pseudolikelihood	−95.180					
Std. Err adjusted for counties (clusters)	73					

Notes: The coefficients reported in the "Coef" column are odds ratios. Asterisks represent 1***, 5**, and 10* percent significance levels respectively. The dependent variable is whether farmers are currently considering farm exit.

These variables are only moderately correlated (0.59) with acceptable levels of variance inflation (VIF = 2.02; 1.96 respectively). Consistent with other studies, larger farm operators are less likely to exit farming (0.1 % per acre and the median farm size is 365 acres). Whether the farmer produces corn is negatively associated with the odds of

considering farm exit-this effect is significant at the 5 % level and the largest factor in the model (although most farmers grow corn). Corn prices were relatively high during the 2019 period of high tariffs on soybeans so it is not surprising that corn production buffers farmers from exit. Off-farm income is not a deterrent from exit as some other studies have found. As we hypothesized and consistent with prior literature, identity is an important deterrent to farmers-those with stronger farmer identity are less likely to exit- and this is highly significant with a relatively large effect (although this is categorical so for each level of agreement the odds of exiting decrease 44 %). Having received payments through the MFP in 2019 (the first payout) was associated with greater odds of exiting farming or considering exit, although this effect was relatively small, 1 % for every $1000 dollars received. This seemingly counterintuitive finding is robust to numerous model specifications and is slightly collinear with farm size but variance inflation is low (VIF = 2.66 and 2.72 respectively). This effect is moderated by one's perspective on the trade war–farmers who are more optimistic about the outcome of the trade war are less likely to be considering exit (a 53 % decrease for each agreement level). While stress appears to be a moderating variable on exit and highly correlated-specific farm related stress interactions were only marginally significant (concern about industry decline). We did not include the PSS index as a variable in the model out of concerns about the endogenous relationship between stress and the decision to exit.

5. Discussion

Uncertainty is ubiquitous in farming. Agricultural decision-making is characterized by production uncertainty related to spatial and temporal variation in weather conditions, fluctuation in market prices of input supplies, and changing agricultural technologies (Antle, 1983). Additional sources of uncertainty relate to consumer dynamics such as changing demand, consolidation and restructuring of food and agriculture retail markets and competition among related firms, and changes in government policies (Bonnen et al., 1996). In many ways, all farm decisions involve an internalization of some degree of uncertainty and assessment of related risks. When people face rampant uncertainty, the standard rational economic approaches to decision making that determine optimal choices given known utilities and risk probabilities are no longer feasible (Gigerenzer and Todd, 1999) and people instead typically rely on simple rules of thumb or heuristics that use only a few pieces of important information (Gigerenzer, 2007; Tversky and Kahneman, 1974). As a consequence, farmers are likely to use simple decision heuristics based on limited information in complex uncertainty-mired choices such as whether to exit farming. We did not seek to identify particular heuristics that farmers may have used in this decision setting, but simple decision approaches relying on only a handful of key factors appear to underlie much of farmers' thinking about farm exit as described below, without much evidence for rational economic cost-benefit analysis.

5.1. Stress and farm exit

This research demonstrates that farm stress is a powerful moderating factor in farm exit. Farmers who are more pessimistic about the impacts of various socioeconomic factors such as trade deals experience more stress. Farmers who do not expect a positive outcome for their farm from renegotiating trade deals (who either strongly or somewhat disagree on the corresponding question) have higher levels of stress (an average PSS of 9.01) compared to those who do expect a positive outcome (average PSS of 7.27). These same farmers are more likely to exit or consider exiting farming (35 % of pessimistic farmers) than those who are optimistic about the trade deals (26 % of optimistic farmers). Notably, farmers' general optimism or pessimism about the trade deal explains more of their stress than the trade deal's impacts on their individual farming operation. This finding is consistent with Ortega et al. (1994),

who suggest that overarching perceptions of the farm economy may explain farm stress better than individual economic prospects.

5.2. The salience of socio-economic versus environmental threats

Assessing the intensity and duration of different types of shocks is critical for agricultural producers for whom uncertainty is a perennial feature of the production environment (Moschini and Hennessy, 2001). We found that not all types of shocks and threats have the same impact on farmers' exit decisions. Theoretically, short term shocks or 'pulse' events tend to have transformative effects on the production environment because they result in sudden shifts in price or demand and receive more political attention, while longer term, 'press' dynamics are incremental in nature and receive less political attention (Rudel, 2018). We generally think of incremental and less easily observed pressures, such as climate change, as less salient due to their greater 'psychological distance' (van der Linden et al., 2015). On the other hand, 'pulse' events tend to have lower psychological distance and thus come more easily to mind because people attend to and preferentially recall more extreme events (as well as more recent ones), as seen in the oft-cited availability heuristic (Tversky and Kahneman, 1973). However, US farmers may be adding more psychological distance to environmental 'pulse' shocks by spending increasingly more on crop insurance and applying it to more acres (United States Department of Agriculture, 2021). Subsidies for crop insurance can increase its use for protection against 'pulse' shocks, but at the same time create a disincentive for farmers to take adaptive measures and protect their crops from the consequences of long-lasting 'press' impacts of climate change and increasingly common extreme weather events (Annan and Schlenker, 2015). The pervasiveness of crop insurance mutes the signal farmers would otherwise get from environmental shocks, and thereby makes those shocks more psychologically distant. Consequently, the more general effect of pervasive crop insurance may be to subtly change farmer behavior by reducing the salience and attention devoted to extreme weather events compensated by insurance and making farmers less likely to take action to adapt.

Dairy farm consolidation or price decline due to competition are much harder to observe at any given point in time and are incremental 'press' events, which are theoretically less salient. In contrast, our findings demonstrate that farmers' primary concern is about long-term price decline and industry decline. It is surprising that tariffs are not seen by these soybean farmers as the primary threat, given their recency and severity. While MFP payments can offset losses to farmers, they do not entirely mute the shock of the trade war. Additionally, there is no straightforward way for farmers to purchase protection against this type of shock as there is with weather-related insurance. It is less surprising with dairy farmers since although their export markets were harmed by the trade war, the impact was not as severe or direct. It could be argued that industry consolidation is rapid enough to be observable by dairy farmers, and that its effects are salient as neighboring farms are shuttered. Dairy farmers are generally less exposed to environmental events like flooding than grain farmers, but since many have acreage in grains it is understandable that this is still a salient concern.

Longer term weather and climate issues may be of less importance to farmers for many of the same reasons that climate change is not salient to most people (van der Linden et al., 2015). Even though farmers experience weather much more immediately than those who do not depend on it so closely for their livelihood, it is hard for them to mentally account for long-term patterns– which is often the reason cited for why climate change is psychologically distant (Swim et al., 2011). This raises the question however of why they would be attuned to long term trends in prices but not flooding, drought, or heat. It is possible that flooding concerns were overshadowed by the trade war. Presumably farmers rated flooding and other environmental issues as less of a threat than the trade war and other socioeconomic issues because the larger political debates and greater news coverage make these issues more salient. In addition, it is consistent with broader political and cultural consensus to

discount narratives about climate change. Farmers' perceptions of threats about extreme weather events likely align closely with their perspectives on climate change more broadly, which tend to be tethered to political affiliation in the US.

5.3. The politics of a trade war with China

Since many farmers perceive the most salient threats to be related to prices and industry health, the renegotiation of China-US trade relations in the face of unfair trade practices by China becomes an appealing solution. Most of the logic articulated about this trade negotiation appeals to this narrative, effectively framing the solution as part of a wider set of policies related to protectionism (Idrwin, 2017). The reliance of American farmers on export markets since the 1980s and in particular with China suggests that it is hard to disentangle the long-term threat of price decline from the short-term price impacts of the trade war. Blanchard et al. (2019) found that exposure to retaliatory tariffs on agricultural products during 2018–2019 is politically unpopular and concerns about exposure were only partially mitigated by the federal payments through the MFP. While the MFP payments were intended to alleviate some of the economic pain farmers have experienced, they do not appear to stem farm exit according to our findings. Wu and Turvey (2020) estimate that the China-US trade war is likely to increase farm bankruptcy by 25 % while flooding is only likely to increase bankruptcy by less than 1 %. They also project that the MFP payments are likely to reduce the bankruptcy rate related to the trade war which may be optimistic considering our finding that the quantity of MFP payments a farmer received has little impact on whether they are considering exit and the impact payments have is positive.

Perspectives on the trade war and the salience of economic versus environmental threat is also likely shaped by farmers' cultural cognition (Kahan et al., 2011), leading them to align their views on a subject based more on their group affiliation than their individual beliefs derived from their own experience (as in the case of aligning climate change views with political affiliation mentioned in the previous section). In this case, farmers are likely to align their views about the trade war with their political views, which could lead some farmers to perceive unfair trade practices from China as the overall source of their discontent. While they may realize that farm problems and threats to their business are both economic and environmental and much more complex than trade relations with China, pushing back against China could be seen as culturally salient for some farmers. There is evidence here in the large negative effect that optimism about the trade war has on farm exit. This appears to be a much stronger force mitigating farm exit than receiving federal MFP payments.

5.4. Structural change and identity

Theories of structural change often cite economic competitiveness as the main driver, but sociological research has shown that dynamics of farm exit have much more to do with demographic and family dynamics (Jackson-Smith, 1999). Following the 1980s farm crisis, farms that exited tended to be smaller, less intensive, fully owned and debt free, implying that farm exit decisions were not necessarily a reflection of a farm's inability to be competitive (Jackson-Smith, 1999). However, there is a strong link between farm identity and farm productivity– to be a good farmer is to be a productive one (Burton, 2004). A 'productivist' identity can be a powerful deterrent to farm exit in the same way that McGuire et al. (2013) has found it to be a barrier for shifting to a conservation ethos. Part of farmer identity is also that farming is a family tradition and generational business (Burton, 2004). Giving up a farm and the associated identity, history, and lifestyle may be seen as a higher price than any financial gain from switching to a higher paying job. Identity thus contributes to using a "status quo" heuristic to keep doing what one has been doing, which leads farmers to resist exiting, even beyond any natural structural shift related to retirement or health.

6. Conclusions

There are numerous immediate and long-term threats to Midwestern dairy and soybean farmers, but the long-term economic threats are more salient to farmers than more immediate socioeconomic or environmental threats. This appears to be related to the ubiquity of environmental risk in farming, and buffering of that risk through crop insurance, compared to the salience of more persistent economic shocks such as declining prices and industry consolidation. Contrary to research suggesting that people attend to immediate risk or extreme events (Slovic, 1987), Indiana soybean and dairy farmers appear to be more focused on the long-term structural changes in the agricultural economy. Environmental factors, whether they are acute extreme events or longer-term climate-driven changes, will generally be less likely than socioeconomic factors to drive farmers to exit.

At this particular moment in time, the cultural cognition associated with trade policies enacted by the US government may also play a role in mitigating farm exit. Farmers are optimistic that the trade war will ultimately benefit them, leading to fewer farmers exiting because the trade war fits with cultural narratives they already hold. Unfortunately, there is likely to be little benefit from the trade war however, as most farmers are returning to the Chinese export market they were a part of prior to the trade war (Newman, 2021). While the trade war is not collectively the most salient threat to farmers, who are more worried about long-term economic issues, our evidence suggests that the trade war compounds farmer stress which contributes to farm exit and this is hardly buffered by federal payments through the MFP in compensation.

Approximately half of the sample of farmers included in our study have elevated stress levels and higher stress is correlated with farm exit. While farmers' crop and economic losses can be temporarily buffered by other commodities, other income streams, crop insurance or other federal government payments, these losses can nonetheless increase stress. Stress related to downward trends in the farm economy may not be alleviated by the decision to leave farming or otherwise change one's career. A study by Heffernan and Heffernan (1985) showed that farmers continued to exhibit symptoms of stress after leaving farming. Leaving farming, for whatever reason, means that they can no longer produce and maximize the symbols that display this identity to others (Riley, 2016) and could easily evolve into mental health issues. Recent news coverage has suggested that farm-related stress is contributing to relatively high suicide rates among farmers (Weingarten, 2018; Jones, 2019). Farmer stress extends beyond the economic calculation farmers must make about whether or not to exit farming. Studying farm exit decisions and psychological drivers of farm exit can help us discover approaches to aid farmers in making better decisions that will lead to outcomes they are happier with.

Author statement

Kurt Waldman: Conceptualization, Methodology, Funding Acquisition, Formal Analysis. **Stacey Giroux**: Writing- Original draft and Review and editing. **James Farmer**: Conceptualization, Funding Acquisition. **Bradi Heaberlin**: Writing- Original draft and Review and editing. **Jordan Blekking**: Visualization, Writing- Review and editing. **Peter Todd**: Conceptualization, Writing- original draft and review and editing.

References

American Farm Bureau Federation (AFBF), 2019. Farm Loan Delinquencies and Bankruptcies. Market Intel. July 31. https://www.fb.org/market-intel/farm-loan-delinquencies-and-bankruptcies-are-rising.

Annan, F., Schlenker, W., 2015. Federal crop insurance and the disincentive to adapt to extreme heat. Am. Econ. Rev. 105 (5), 262–266. https://doi.org/10.1257/aer.p20151031.

Antle, J.M., 1983. Incorporating risk in production analysis. Am. J. Agric. Econ. 65 (5), 1099. https://doi.org/10.2307/1240428.

Barnett, B.J., 2000. The U.S. Farm financial crisis of the 1980s. Agric. Hist. 74 (2), 366–380.

Blanchard, E.J., Bown, C.P., Chor, D., 2019. Working Paper 19-21: Did Trump's Trade War Impact the 2018 Election? 35. https://www.piie.com/sites/default/files/documents/wp19-21.pdf.

Bonnen, J.T., Browne, W.P., Schweikhardt, D.B., 1996. Further observations on the changing nature of national agricultural policy decision processes, 1946-1995. Agric. Hist. 70 (2), 130–152. http://www.jstor.org/stable/3744530.

Booth, N.J., Lloyd, K., 2000. Stress in farmers. Int. J. Soc. Psychiatr. 46 (1), 67–73. https://doi.org/10.1177/002076400004600108.

Breustedt, G., Glauben, T., 2007. Driving forces behind exiting from farming in Western Europe. J. Agric. Econ. 58 (1), 115–127. https://doi.org/10.1111/j.1477-9552.2007.00082.x.

Bryant, L., Garnham, B., 2014. Economies, ethics and emotions: farmer distress within the moral economy of agribusiness. J. Rural Stud. 34, 304–312. https://doi.org/10.1016/j.jrurstud.2014.03.006.

Burton, R.J.F., 2004. Seeing through the 'good farmer's' eyes: towards developing an understanding of the social symbolic value of 'productivist' behaviour. Sociol. Rural. 44 (2), 195–215. https://doi.org/10.1111/j.1467-9523.2004.00270.x.

Center for Disease Control and Prevention, 2016. Suicide Rates by Industry and Occupation — National Violent Death Reporting System, 32 States. https://www.cdc.gov/mmwr/volumes/69/wr/mm6903a1.htm.

Cohen, S., 1988. Perceived stress in a probability sample of the United States. In: The Social Psychology of Health. Sage Publications, Inc, pp. 31–67.

Cohen, S., Kamarck, T., Mermelstein, R., 1983. A global measure of perceived stress. J. Health Soc. Behav. 24 (4), 385. https://doi.org/10.2307/2136404.

Dong, F., Hennessy, D.A., Jensen, H.H., Volpe, R.J., 2016. Technical efficiency, herd size, and exit intentions in U.S. dairy farms. Agric. Econ. 47 (5), 533–545. https://doi.org/10.1111/agec.12253.

Edelman, Marc, 2019. Hollowed out Heartland, USA: how capital sacrificed communities and paved the way for authoritarian populism. J. Rural Stud.

Gigerenzer, G., 2007. Gut Feelings: the Intelligence of the Unconscious. Viking, New York.

Gigerenzer, G., Todd, P.M., 1999. Fast and frugal heuristics: the adaptive toolbox. In: Gigerenzer, G., Todd, P.M., the ABC Research Group (Eds.), Simple Heuristics that Make Us Smart. Oxford University Press, New York, pp. 3–34.

Goetz, S.J., Debertin, D.L., 2001. Why farmers quit: a county-level analysis. Am. J. Agric. Econ. 83 (4), 1010–1023. https://doi.org/10.1111/0002-9092.00226.

Heffernan, J.B., Heffernan, W.D., 1985. The Effects of the Agricultural Crisis on the Health and Lives of Farm Families. Committee on Agriculture for the US House of Representatives, Washington, D.C.. No. 1718-2017-1104. 1985.

Missouri Hospital Association, 2020. Growing Stress on the Farm: the Expanding Mental Health and Economic Disparities in Rural Missouri. https://www.mhanet.com/mhaimages/BehavioralHealth/BehavioralHealth_GrowingStressOnTheFarm.pdf.

Irwin, D.A., 2017. The false promise of protectionism: why Trump's trade policy could backfire essays. Foreign Aff. 96 (3), 45–56. https://heinonline.org/HOL/P?h=hein.journals/fora96&i=493.

Jackson-Smith, D.B., 1999. Understanding the microdynamics of farm structural change: entry, exit, and restructuring among Wisconsin family farmers in the 1980s1. Rural Sociol. 64 (1), 66–91. https://doi.org/10.1111/j.1549-0831.1999.tb00005.x.

Jones, Chuck, 2019. Amidst Trump tariffs, farm bankruptcies and suicides rise. Forbes. https://www.forbes.com/sites/chuckjones/2019/08/30/amid-trump-tariffs-farm-bankruptcies-and-suicides-rise/#55440dbe2bc8.

Kahan, D.M., Jenkins-Smith, H., Braman, D., 2011. Cultural cognition of scientific consensus. J. Risk Res. 14 (2), 147–174. https://doi.org/10.1080/13669877.2010.511246.

Katchova, A.L., Ahearn, M.C., 2017. Farm entry and exit from US agriculture. Agric. Finance Rev. 77 (1), 50–63. https://doi.org/10.1108/AFR-03-2016-0021.

Kimhi, A., Bollman, R., 1999. Family farm dynamics in Canada and Israel: the case of farm exits. Agric. Econ. 21 (1), 69–79. https://doi.org/10.1111/j.1574-0862.1999.tb00584.x.

Klein-Davis, S., 2018. Dairy Farms Weather Long Stretch of Low Milk Prices. Dairy Herd Management. https://www.dairyherd.com/article/dairy-farms-weather-long-stretch-low-milk-prices.

Laca, A., 2018. Dozens More Farmers Lose Milk Contracts. Dairy Herd Management. https://www.dairyherd.com/article/dozens-more-farmers-lose-milk-contracts.

Lorenz, O.L., et al., 1997. After farming: emotional health trajectories of farm, nonfarm and displaced farm couples. Rural Sociol. 65 (1), 50–71.

McGuire, J., Morton, L.W., Cast, A.D., 2013. Reconstructing the good farmer identity: shifts in farmer identities and farm management practices to improve water quality. Agric. Hum. Val. 30 (1), 57–69. https://doi.org/10.1007/s10460-012-9381-y.

Mishra, A.K., Fannin, J.M., Joo, H., 2014. Off-farm work, intensity of government payments, and farm exits: evidence from a national survey in the United States. Can.

J. Agric. Econ./Revue canadienne d'agroeconomie 62 (2), 283–306. https://doi.org/10.1111/cjag.12027.

Moschini, G., Hennessy, D., 2001. Uncertainty, risk aversion and risk management for agricultural producers. In: Gardener, B., Rousser, G. (Eds.), Handbook of Agricultural Economics, 1A. North-Holland, Amsterdam, pp. 87–153.

Newman, J., 2021, March 10. For U.S. Farmers, China Is Back and Bigger than Ever. Wall Street Journal. https://www.wsj.com/articles/for-u-s-farmers-china-is-back-and-bigger-than-ever-11615372203.

Ortega, S.T., Johnson, D.R., Beeson, P.G., Craft, B.J., 1994. The farm crisis and mental health: a longitudinal study of the 1980s1. Rural Sociol. 59 (4), 598–619. https://doi.org/10.1111/j.1549-0831.1994.tb00550.x.

Parker, M., Levitt, H., 2019. Soaring Bankruptcies in the Farm Belt Force Banks to Boost Defenses. Bloomberg.Com. May 3. https://www.bloomberg.com/news/articles/2019-05-03/soaring-bankruptcies-in-farm-belt-force-banks-to-boost-defenses.

Peel, D., Berry, H.L., Schirmer, J., 2016. Farm exit intention and wellbeing: a study of Australian farmers. J. Rural Stud. 47, 41–51. https://doi.org/10.1016/j.jrurstud.2016.07.006.

Price, L., Evans, N., 2009. From stress to distress: conceptualizing the British family farming patriarchal way of life. J. Rural Stud. 25 (1), 1–11. https://doi.org/10.1016/j.jrurstud.2008.03.008.

Reuters staff, 2019. Factbox: Next Rounds of Trump's Tariffs on Chinese Goods to Hit Consumers. August, 31. https://www.reuters.com/article/us-usa-trade-tariffs-factbox/factbox-next-rounds-of-trumps-tariffs-on-chinese-goods-to-hit-consumers-idUSKCN1VL0EX.

Riley, 2016. Still being the 'good farmer': (non)-retirement and the preservation of farming identities in older age. Sociol. Rural. 56 (1), 96–115.

Ringgenberg, W., Peek-Asa, C., Donham, K., Ramirez, M., 2018. Trends and characteristics of occupational suicide and homicide in farmers and agriculture workers, 1992-2010: suicide and homicide in farmers and Ag workers. J. Rural Health 34 (3), 246–253. https://doi.org/10.1111/jrh.12245.

Roy, Philippe, et al., 2017. "Do it all by myself": a salutogenic approach of masculine health practice among farming men coping with stress. Am. J. Men's Health 11 (5), 1536–1546.

Rudel, T.K., 2018. Did growing rural poverty and a disruptive climate spur an expansion in rural sociology? A comparative historical analysis. Rural Sociol. 83 (3), 481–502.

Slovic, Paul, 1987. Perception of risk. Science 236, 280–285.

Swim, J.K., Stern, P.C., Doherty, T.J., Clayton, S., Reser, J.P., Weber, E.U., Gifford, R., Howard, G.S., 2011. Psychology's contributions to understanding and addressing global climate change. Am. Psychol. 66 (4), 241–250. https://doi.org/10.1037/a0023220.

Tversky, A., Kahneman, D., 1973. Availability: a heuristic for judging frequency and probability. Cognit. Psychol. 5 (2), 207–232. https://doi.org/10.1016/0010-0285(73)90033-9.

Tversky, A., Kahneman, D., 1974. Judgment under uncertainty: heuristics and biases. Science 185 (4157), 1124–1131. https://doi.org/10.1126/science.185.4157.1124.

United States Department of Agriculture, 2019. Price Received for Corn by Month. National Agricultural Statistics Service (NASS), Washington, DC. https://www.nass.usda.gov/Charts_and_Maps/Agricultural_Prices/pricecn.php.

United States Department of Agriculture, 2020a. February 2020 Farm Income Forecast. Economic Research Service, Washington, DC. https://www.ers.usda.gov/topics/farm-economy/farm-sector-income-finances/highlights-from-the-farm-income-forecast/.

United States Department of Agriculture, 2020b. Helping America's Farmers, Ranchers, and Producers when They Need it Most. Media blog, Washington, DC. https://www.usda.gov/media/blog/2020/01/28/helping-americas-farmers-ranchers-and-producers-when-they-need-it-most.

United States Department of Agriculture, 2021. Risk Management Agency, Summary of Business Data. Economic Research Service, Washington D.C. https://www.ers.usda.gov/data-products/chart-gallery/gallery/chart-detail/?chartId=100386.

van der Linden, S., Maibach, E., Leiserowitz, A., 2015. Improving public engagement with climate change: five "best practice" insights from psychological science. Perspect. Psychol. Sci. 10 (6), 758–763. https://doi.org/10.1177/1745691615598516.

Weingarten, D., 2018. Why Are America's Farmers Killing Themselves? the Guardian. December 11. https://www.theguardian.com/us-news/2017/dec/06/why-are-americas-farmers-killing-themselves-in-record-numbers.

Wheeler, S.A., Zuo, A., 2017. The impact of drought and water scarcity on irrigator farm exit intentions in the Murray–Darling Basin. Aust. J. Agric. Resour. Econ. 61 (3), 404–421. https://doi.org/10.1111/1467-8489.12218.

Wheeler, S.A., Zuo, A., Loch, A., 2018. Water torture: unravelling the psychological distress of irrigators in Australia. J. Rural Stud. 62, 183–194. https://doi.org/10.1016/j.jrurstud.2018.08.006.

Wheeler, S.A., Xu, Y., Zuo, A., 2020. Modelling the climate, water and socio-economic drivers of farmer exit in the Murray-Darling Basin. Climatic Change 158 (3), 551–574. https://doi.org/10.1007/s10584-019-02601-8.

Wu, Y., Turvey, C.G., 2020. The Impact of the China–USA Trade War on USA Chapter 12 Farm Bankruptcies. Agricultural Finance Review. https://doi.org/10.1108/AFR-05-2020-0076 (online only).

Yaffe-Bellany, D., 2019. A Milk Giant Goes Broke as Americans Reject Old Staples. The New York Times. https://www.nytimes.com/2019/11/13/business/dean-foods-bankruptcy.html.

Yazd, S.G., Wheeler, S.A., Zuo, A., 2019. Key risk factors affecting farmers' mental health: a systematic review. Int. J. Environ. Res. Publ. Health 16 (23). https://doi.org/10.3390/ijerph16234849.