

The Role of Social Norms in Producers' Motives to Adopt Sustainable
Practices

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Authorization to Submit Thesis

This thesis of Ranjita Bhandari, submitted for the degree of Master of Science with a Major in Applied Economics and titled “The Role of Social Norms in Producers’ Motives to Adopt Sustainable Practices,” has been reviewed in final form. Permission, as indicated by the signatures and dates below, is now granted to submit final copies to the College of Graduate Studies for approval.

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Abstract

Sustainable practices in the agricultural sector have become a prerequisite for operating in current markets as well as a source for building and sustaining a competitive advantage through better market positioning. Producers and processors in the agricultural sector have to make various decisions on the adoption of sustainable practices, whereby their choices and behaviour are affected by different types of norms: social and personal norms. This article examines the influence of social norms on the expected economic, social, and personal rewards, that may drive producers towards the adoption of sustainable practices. We have developed a framework in which we distinguish between two types of social norms: horizontal norms (reliant on peer influence) and vertical norms (imposed by transactional and hierarchical relationships). We focus on horizontal, vertical, and personal norms and analyze its impact on expected economic, social, and personal motives by using Seemingly Unrelated Regression (SUR) Model. Result from personal interviews with 164 hog producers show that horizontal social norms have a positive influence on both social and economic motives of farmers whereas vertical social norms have positive influence only on the farmer's social motives. In addition, personal norms have a significant positive relationship with personal motives.

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Dedication

This thesis is dedicated to my family, my husband, my friends and all my professors who directly and indirectly played important role in helping me finish my M.S.

Table of Contents

Authorization to Submit Thesis.....	ii
Abstract	iii
Acknowledgements	iv
Dedication.....	v
Table of Contents.....	vi
List of Tables	viii
List of Figures	ix
Chapter 1: Introduction	1
1.1 Motivation.....	1
1.2 Objective of the Study.....	2
Chapter 2: Literature Review.....	4
2.1 Some Concept of Behavioral Theories	4
2.2 Social Norms.....	5
2.3 Prior Behavioural Research on Social Norms.....	6
2.4 Social Norms and Motives.....	7
2.4.1 Social Motives.....	8
2.4.2 Economic Motives.....	9
2.4.3 Personal Motives	10
2.5 Influence of Social Approval (Disapproval) on Individual Behavior.....	11
Chapter 3: Research Methods	12
3.1 Data	12

3.2 Econometric method	13
3.3 Measures	16
Chapter 4: Results	19
4.1 Findings.....	19
Chapter 5: Discussion and Conclusions.....	21
5.1 Limitations of the Study.....	23
<i>References</i>	<i>24</i>
<i>Appendix</i>	<i>34</i>

List of Tables

Table 3.1.....	12
Table 3.2.....	17
Table 4.1.....	19
Table 4.2.....	20

List of Figures

Figure 2.1.....	11
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Chapter 1: Introduction

1.1 Motivation

Recently, the topic of sustainability has captured much attention from scholars and researchers and firms are increasingly adopting sustainable practices to conduct business, since it has become a necessary condition to achieve long-term value (Hult, 2011; Dooley, 2014). By definition, sustainability rests on three main pillars: "economic development, environmental conservation, and social justice". These must maintain a productive harmony between humans and nature, while fulfilling the requirements of present and future generations (Gibbes et al., 2018; de Gennaro & Forleo, 2019). In this modern era of farming ensuring sustainability is one of the major challenges of agricultural sector because it is a complex and dynamic concept which includes an environmental, social, economic and resource use issues that changes with the time, society and priorities. So, agricultural sectors require the integration of productive, competitive and efficient sustainable agricultural practices that protects and improves the environment, global ecosystem as well as socioeconomic conditions of local communities. (Mishra et al., 2018). Demand for sustainable practices is vital in the agricultural sector because of the increased awareness of the need to maximize farm output without harming the environment, public health, communities, or animal welfare (Salmivaara & Lankoski, 2019). The increasing pace of sustainability in modern farming is managed through innovations in production technologies, application systems solutions, farming standards, and agri-environmental schemes (Salmivaara & Lankoski, 2019). Farmers find it complicated to make decisions on whether to adopt or reject those innovations and understanding and predicting their behaviour towards innovations is still challenging (Nidumolu et al., 2013; Diederer et al., 2003). Many innovation adoptions studies, therefore, examine the behavioral characteristics that influence individual's decision to adopt innovation. (Wisdom et al., 2014; Diederer et al., 2003). These studies analyze the characteristics that influence farmer's choice and found out that innovators appear to be differ in behavioral characteristics: the valuation of external information, the source of innovative idea and the way they cooperate. This portrays that the farmers innovation behavior is still difficult to predict. Hence, knowledge of

producers' behavioural characteristics is crucial in designing strategies to promote sustainable practices in the agricultural sector (Dessart et al., 2019).

In this paper, we focus on how social norms affect producers' motives to adopt sustainable practices. Social norms are defined as "rules and standards that are understood by members of a group, and that guide or constrain social behaviour without the force of law" (Cialdini and Trost et al., 1998). The literature on the adoption of innovations shows that social norms greatly influence the behaviour and decision making of individuals and those farmers are affected by what their peers think of a particular behaviour and whether they exhibit this behaviour (Sanagorski & Monaghan, 2014; Kormos et al., 2015; Salmivaara & Lankoski, 2019). Dessart et al., (2019) and Trujillo-Barrera, Pennings and Hofenk, (2016) argue that economic/perceived cost and benefits (cognitive), social, and personal (dispositional) motives are among the main factors driving the choice of an individual to adopt sustainable practices. Harsanyi (1969) also argued that the behavior of the people is largely explained by economic gain, social acceptance and self -esteem and elaborates how the social norms interact with various motives of an individual. However, relatively little attention has been paid to understanding how existing social norms affect these motives (whether or not) to adopt sustainable farming practices.

1.2 Objective of the Study

This study therefore aims to examine the influence of social norms on the expected economic, social, and personal rewards that may lead producers towards the adoption of sustainable practices, and it seeks to extend previous findings on the adoption of innovations to this context. It shows the influence of horizontal and vertical norms on the economic and social motives, as well as the impact of personal norms on the personal motives.

Horizontal social norms refer to the influence of peers, such as family, colleagues, friends, and neighbours. When people observe a particular social norm, they often do so as part of a specific reference group (consisting of, for example, family, friends, co-workers, neighbours) that engages in and approves of the behaviour dictated by that norm. Vertical norms, on the

other hand, refer to conventions set with people and institutions with whom our relationships are more transactional and hierarchical, for example clients, channel members, and governments (Paluck & Shepherd, 2012). As social norms are psychological variables/constructs, and thus challenging to measure directly, this study uses, amongst others, primary data, collected in personal interviews with producers.

This study focuses on the hog industry in the Netherlands. More than half of the meat consumed in the Netherlands is pork (Rougoor & Van, 2015). The annual production of pig meat in the Netherlands amounts to around 1.3 million tons, greatly exceeding domestic consumption (Rougoor & Van, 2015). For our analysis, we identified 2830 hog producers with at least 1000 hogs or 200 sows in the five main Dutch farming provinces.

We have developed a conceptual model and tested it using data from personal guided interviews with 164 hog farmers, all within a seemingly unrelated regression framework. We adopted existing psychometric scales or used multiple indicators (on seven-point Likert-type scales) to measure our variables of interest. The data includes measures of indicators, variables, and corresponding latent constructs of horizontal and vertical social norms (SR), expected economic rewards (ER), expected social rewards (SR), and expected personal rewards (PR). Results indicate that horizontal social norms positively influence farmers' economic and social motives, whereas vertical social norms only influence farmers' social motives. Similarly, personal norms have a positive impact on the personal motives of hog producers.

This study provides insights that help policymakers and practitioners to design new social-psychology-based initiatives or readjust the current strategies to promote the adoption of sustainable behaviour. The paper contributes to our understanding of social norms and their relationships with the motives that impact the adoption of sustainable practices. In addition, it adds to the scarce literature on the adoption of sustainable practices that accounts for the socio-psychological aspects of behaviour.

Chapter 2: Literature Review

The question why social norms influence people's desired behaviour has been a recurring topic in various strains of literature, including economics, political science, sociology, and psychology (Salmivaara & Lankoski, 2019; Axelrod, 1986; Festré, 2010). To examine the influence of social norms on farmers' motives, we must first explore the concept and definitions of social norms and how they influence human behaviour.

2.1 Some Concept of Behavioural Theories

The ability of social norms to affect behavior has been considered within several behavior change theories. Theory of reasoned action explains the human behavior and adoption decisions. It assumes that human behavior is under full volitional control and based on pre-existing attitudes and behavioral intentions (Ajzen & Fishbein, 1977). This behavioral intention is important because these intentions "are determined by attitudes to behaviors (one's evaluation of behavior) and subjective norms (one's evaluation of what important others think one should do)". This theory suggests that stronger intentions lead to increased effort to perform the behavior, which also increases the likelihood for the behavior to be performed. (Ajzen & Madden, 1986), (Vlaev & Dolan, 2015).

However, Ajzen (1991) later criticized that not all human behavior is completely under volitional control, since some behavior relies on external factors. Therefore, Ajzen proposed the theory of planned behavior, which added perceived control to the existing components of behavioral

explained intention. This theory shows the link between one's beliefs and behavior. It describes that individual's attitude, perceptions and subject norms, together, manages and influences the individual's behavioral intentions. There is high correlation between attitudes, subjective norms and behavioral intention. If an individual evaluates that particular behavior as positive (attitude), if they perceive the social pressure to perform that behavior (subjective norm), this results a higher motivation (they are more likely to do so).(Ajzen, 1991).

Furthermore, Theory of normative social behavior explains about the distinctions between descriptive norms (beliefs concerning what other people actually do, others practices that

people tend to follow when they unknown with particular situations) and injunctive norms (beliefs concerning what one feels they ought to do based on others expectation or social approval) (Rimal & Real, 2005).

2.2 Social Norms

Social norms are reflected by what a person believes their peers do and think (Sanagorski & Monaghan, 2014). There are different types of social norms: injunctive norms, descriptive norms, subjective norms, and personal norms (Cialdini and Trost et al., 1998). Descriptive norms concern other people's concrete behaviour or actions in any given situation, while injunctive norms describe what people ought to do – i.e., society's 'collective' expectations – to gain social approval. Subjective norms relate to peer expectations of, for instance, family, friends, or co-workers (Ham & Frajman, 2015). Finally, personal norms are feelings of personal obligation associated with one's self-expectations (Schwartz, 1977). Overall, all of these norms relate to specific group or individual expectations and to what one believes one ought to do in a given situation (Hechter and Opp 2001; Kallgren et al. 2000).

We categorized social norms into horizontal and vertical norms. This is related to subjective norms and this norm is a construct within the Theory of Planned Behavior and the theory of reasoned action, which describes an individual's perceptions of whether valued others think one should perform a behavior, combined with one's motivation to comply with other beliefs. (Ajzen & Thomas, 1986). Both theories model an individual's perception of whether valued others believe that one should perform a certain behaviour, combined with the individual's motivation to comply with other people's beliefs. If the individual evaluates this suggested behaviour as positive (attitude) and if they perceive social pressure to perform this behaviour (subjective norm), they will be more motivated to do so (Ajzen, 1991). Likewise, in this study, the term 'horizontal' refers to the influence of peers like family, colleagues, friends, and society, and thus corresponds with the above-mentioned subjective norms.

Vertical norms, on the other hand, refer to conventions set with other people and institutions, with whom our relationships are more transactional and hierarchical (e.g., customers, channel members and governments). As such, vertical norms correspond with the above-mentioned

injunctive norms. Research focused on how different reference groups are used to interpret social norms (Paluck & Shepherd, 2012), the networks that organize them (Hunter et al., 2015), and our sense of identity with them (Terry et al., 2000).

Social norms affect behavior because individuals need social approval (Talcott, 1951). It is determined by beliefs about the extent to which significant others want them to perform a behavior (Rivis and Sheeran, 2003). Horizontal and vertical social norms also relate to the individual's perception of social pressure from others who are important to them (e.g., family, friends, colleagues, customers, channel members and societies) to behave (or not) in a certain manner and their motivation to comply with those people's views (Ham et al., 2015). The effectiveness of horizontal and vertical social norms is based on serving an individual's need to belong to a group and to be socially approved (Cialdini & Trost, 1998). If people feel more connected to the group, they more likely agree and tend to follow the norms (Rimal & Real, 2005). So, horizontal and vertical norms have an impact on long-term behavior, since they capture what is approved or disapproved within a culture (Reno et al., 1993).

Various previous studies also explain about the importance horizontal and vertical social norms in agricultural sectors. Farmers who participate in agri-environmental schemes are more likely consider about the society opinion as one of the important aspects (Defrancesco *et al.*, 2008). The producers of organic meat tend to follow the opinion or advice of relatives and advisors to a greater extent (Lapple and Kelley, 2013). Farmers who are involved in sustainable hedge management also feel greater social pressure than those who are not (Beedell and Rehman, 1999). Retailers also put pressure on farmers to adopt more sustainable practices, in case of un-processed food (for example pesticides in fruit and vegetables, antibiotics in meat production) (Dessart et al., 2019). Spouses, relatives and co-workers may also have greater impact towards sustainable practices (Gardebreek, 2006).

2.3 Prior Behavioural Research on Social Norms

Behavioural economics has focused on measuring social norms to explain and influence individual behaviour (Sanagorski & Monaghan, 2014; Kormos et al., 2015; Salmivaara &

Lankoski, 2019; Yamin et al., 2019; Dessart et al., 2019) It is not evident, however, how these previous findings would apply to an individual's economic, social and personal motives. This leaves open questions regarding the influence of social norms on the economic, social, and personal motives that may drive the adoption of sustainable practices.

Several studies have considered the role of social norms in influencing individual behaviour in various domains. There are several agriculture-related examples where social norms influenced farmers' behaviour and their decisions to adopt sustainable practices, including agri- environmental schemes (Kuhfuss et al., 2016) and management practices (Defrancesco et al., 2008, Van Dijk et al. 2016); sustainable hedge management (Beedell & Rehman, 1999). Also, many examples outside of agriculture have shown the behavioural effects of interventions based on social norms on, for instance, pro-environmental behaviours (Kollmuss & Agyeman, 2002); energy and water consumption (Schultz et al., 2016); sustainable transport use (Kormos et al., 2015); food choices; social sustainability: alcohol consumption (Miller & Prentice, 2016); harassment; and violence. These findings portray the power of social norms in achieving behavioural change and show that decision makers are primarily motivated to know and observe the norms of groups of which they are part. Moreover, these studies suggest that understanding the influence of social norms is essential for changing individual behaviour.

2.4 Social Norms and Motives

The studies discussed above concentrate on the role of social norms in shaping human behaviour; other studies (Harsanyi (1969), p.524; Bopp et al., 2019) also focused on how different motives influence individual behaviours, beliefs, and perceptions. The following discussion provides the theoretical justification for our hypotheses (i.e., the interrelationships between the various social norms and motives). Figure 1 depicts the conceptual model and our hypotheses.

One of the key drivers of motivation is reward (Hendijani et al., 2016). Rewards are positive incentives that benefit people and motivate as well as influence their actions and behaviours.

The expected reward drives both extrinsic and intrinsic motives. Extrinsic motives primarily take the form of (the search for) an external reward, such as a financial incentive, or the avoidance of external punishment, e.g., fines (Ryan & Deci, 2000). Intrinsic motives, on the other hand, emanate from the individual's inner life, for instance as a sense of 'doing the right thing' or in the form of personal enjoyment. These different motives also influence a farmer's behaviours, beliefs, and perceptions (Bopp et al., 2019).

2.4.1 Social Motives

Social rewards are defined as socially relevant or directed towards social outcomes such as affiliation, aggression, achievement, approval, and power (Kornadt, 2015). They are associated with how society views the firm. Firms must be seen as legitimate by the community to induce a licence to control or operate (Coevellec, 2007; Howard et al., 2008). Establishing and maintaining organizational legitimacy could be a core motive for long-term survival (Metzler, 2001, p.321).

According to Azar (2004), individual behaviour is highly motivated by social motives such as prestige or status (i.e. popularity, esteem, or respect). Thus, people incorporate certain social factors into their individual preferences. Bénabou & Tirole (2006) developed a theory of prosocial behaviour, which posits that individuals are highly concerned about "image rewards" such as publicity, praise, and shame. These two studies show that, in the long term, people become more concerned about social recognition, status, reputation, and self-respect, while the human desire to fit in with the community encourages them to observe the relevant group norms.

In his seminal paper on behavioural change, Lewin (1926) (p. 273), addressed a similar concept, pointing out that humans are afraid to stand out from the crowd: "the individual unwillingness to go too far from group standards is a strong aspect which influences behaviour" (Gold, 1999). This means that the power of social norms in achieving behavioural change does not come solely from one's natural inclination to imitate others, nor from the

need to know what is appropriate action in a given condition, but is also rooted in the human desire to belong to one's community (Yamin et al., 2019).

It is therefore reasonable to assume that, so as to gain the above social rewards, a person's behaviour is highly influenced by what they think others (e.g., friends, family, co-workers) expect from them (Dessart et al., 2019, p.433-436). Sanagorski & Monaghan (2014) discussed a similar concept and found that people tend to be encouraged by what their peers think of a certain behaviour and to what extent they exhibit this behaviour. Moreover, Falck et al. (2012) argued that peer influence impacts entrepreneurial intentions.

In addition, social pressure influences a person's behaviour; farmers who engage in sustainable hedge management, for example, feel greater social pressure than those who do not participate in this type of collaborative project (Beedell and Rehman, 1999). Hence, we hypothesize that

H1: Horizontal social norms are positively related to social motives.

H2: Vertical social norms are positively related to social motives.

2.4.2 Economic Motives

People tend to observe various social norms, not only to receive social rewards, but also to obtain the desired economic outcomes. Economic motives are related to the satisfaction of reaping tangible external benefits, such as profits and market or policy incentives (Rode et al., 2015). Individual behaviour is influenced by the desire to maximize rewards and minimize the cost of obtaining highly profitable outcomes (Harsanyi, 1969, p. 524; Homans, 1958, p. 597-606). This notion was explained in a micro-economic framework which shows that people consider social norms with basic principles in economics, such as 1) people are driven by their own- self-interest and 2) people are driven by rational choice (Elster, 1989, p.101-102). Dessart, Barreiro- Hurle, and Bavel (2019) show that social comparison also affects farmers' inclination to compare their financial situation with that of fellow farmers

participating in mutual funds. Since these studies demonstrate that people's behaviours can also be explained in terms of economic gain, we hypothesize that:

H3: Horizontal social norms are positively related to economic motives.

H4: Vertical social norms are positively related to economic motives.

2.4.3 Personal Motives

Alongside economic and social behaviours, personal norms also influence motives and behaviour. Personal norms are related to self-concept and are experienced as a moral obligation to perform a certain behaviour (Schwartz, 1973). For instance, people who feel a moral responsibility to protect the environment are more likely to purchase organic foods (Thøgersen & Olander, 2006) or reduce personal car use (Nordlund & Garvill, 2003). It has been shown that compliance with personal norms is associated with feelings of pride, while non-compliance with personal norms is linked with feelings of guilt (Onwezen et al., 2013). Kallgren et al. (2000) also mention that behavioural regulation is driven by internal rather than external processes. Osterhus (1997) argued that any person's decision to act according to the norms depends on variables such as responsibility attribution towards taking specific actions (e.g., "I must obey the traffic regulations") and awareness of the consequences of their behaviour. Similarly, Elster (1989) argues that social norms are sustained by the feelings of anxiety, guilt, embarrassment, and shame that follow violation of these norms.

Moral concerns also refer to a person's conscience, ethical principles, and respect for other people's welfare. This affects farmers' behaviours, such as adopting practices that enhance animal welfare (Kielland et al., 2010) and conservation tillage (Sheeder and Lynne, 2011). Mzoughi (2011) proved this point by comparing organic and conventional farming and discovering that organic farmers are significantly more concerned with doing the right thing. Based on this, we hypothesize that:

H5: Personal norms are positively related to personal motives.

2.5 Influence of Social Approval (Disapproval) on Individual Behavior

The notion that individuals are concerned about social approval or disapproval when interacting is essential for understanding the interplay between social norms and economic, social, and personal motives. Many economists, therefore, pay attention to social approval (or disapproval) or the self-reputational motives of individual behaviour (e.g., Benabou and Tirole, 2006). Adam Smith was one of the first economists to focus on the importance of social approval for individual behaviour (Smith, 1822; Smith & Stewart, 1853). He emphasized the social approbation and disapprobation dimensions of individual behaviour in the Theory of Moral Sentiments (Smith, 1822). According to this theory, social norms are self-enforcing standards at group level: when the group expects someone to comply, that someone will seek to do so. Several processes that uphold social norms include willingness to organize, fear of being disciplined, signalling community membership, or simply following other people's leadership (Young, 2014). Coleman (1988, 1990) noted that the more people believe in the norm, the more they will observe it. The conceptual model proposed in this study is displayed in Figure 1.

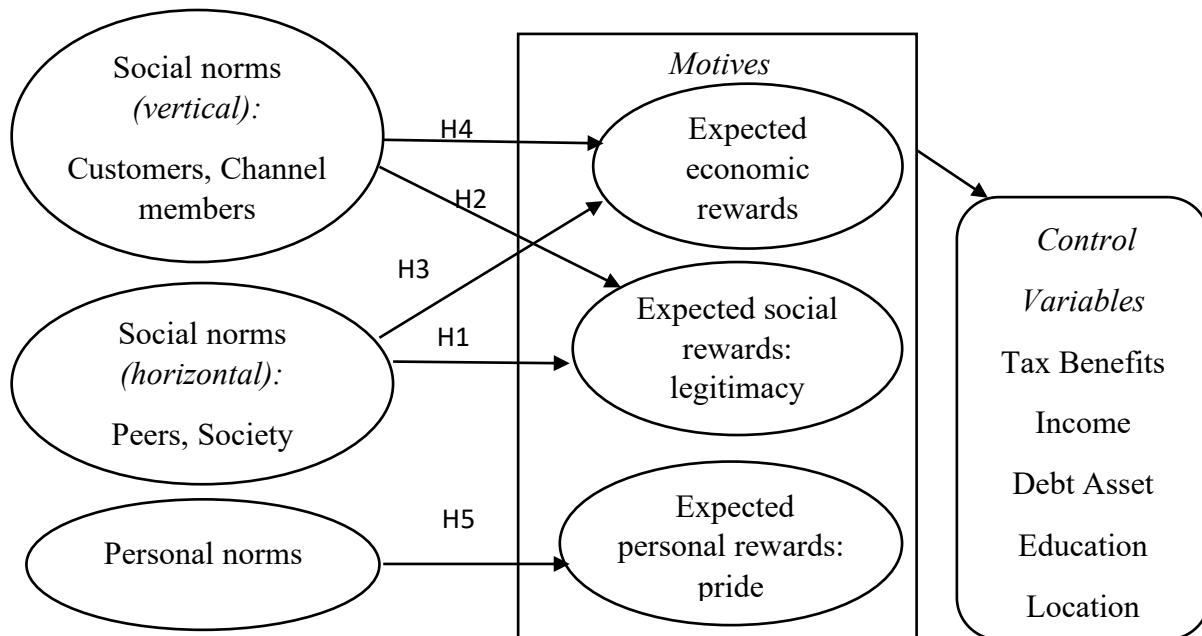


Figure 2.1 Conceptual model; Relating social and personal norms to farmers' expected economic, social, and personal rewards.

Chapter 3: Research Methods

3.1 Data

To test and validate the proposed conceptual model in the farming context, this study collected primary data from a sample of 164 hog producers running a business with at least 1000 hogs or 200 breeding sows in one of the five main farming provinces in the Netherlands. To obtain the desired sample size, we randomly identified a target sample of 400 (out of 2830) hog producers, all of whom received a letter by mail informing them about the study. A structured telephone survey was carried out in October and November 2013, yielding an effective response rate of 41 %. A telephone interviewer asked the farmers whether they were willing to participate in the study.

Table 1 summarizes the participants' demographic profiles, including gender, income, level of education, age, and descriptive statistics. As shown in Table 1, 54% of the participating hog farms achieved an average annual turnover of over EUR 1,000,000, while 93% had a turnover of more than EUR 250,000, reflecting the relatively large size of the Dutch hog-farming industry. Most hog farmers in the sample were middle-aged males (of over 40) with lower or intermediate vocational education. This demographic profile appears to be rather homogeneous and representative of Dutch hog farmers in general (Trujillo-Barrera, Pennings, and Hofenk, 2016).

Table 3.1 Demographic Profile and Descriptive Statistics of surveyors (N=164)

Items	<i>Frequency</i>	<i>Percentage</i>
<i>Gender:</i>		
<i>Male</i>	157	95.73
<i>Female</i>	7	4.27
<i>Income: (in thousands of Euros)</i>		
<i>Less than 100</i>	6	3.66
<i>100-250</i>	6	3.66

<i>250-500</i>	11	6.71
<i>500-1000</i>	35	21.34
<i>1000 or more</i>	88	53.66
<i>Missing</i>	18	10.98
<i>Education (Scale 1-6):</i>		
<i>Primary School</i>	14	8.54
<i>Secondary School</i>	13	7.93
<i>Lower vocational</i>	100	60.98
<i>Intermediate vocational</i>	25	15.24
<i>Higher vocational / UAS</i>	2	1.22
<i>University or higher</i>	10	6.1
<i>Age(years):</i>		
<i>(20,30)</i>	6	3.66
<i>(30,40)</i>	18	10.98
<i>(40,50)</i>	81	49.39
<i>(50,60)</i>	57	28.66
<i>(60,80)</i>	12	7.31

3.2 Econometric method

This study uses a Seemingly Unrelated Regression (SUR) to test the relationships as depicted in Figure 1.¹ In brief, a seemingly unrelated regression (SUR) model explains the variation of a set of dependent variables. It collects two or more regression that can be analyzed using the

¹In brief, a seemingly unrelated regression (SUR) model explains the variation of a set of dependent variables. It collects two or more regression models using the data on both dependent and independent variables. It estimates the parameter of all equations simultaneously and accounts for the correlations among the error terms (Zellner,1962).

We also performed Structural Equation Modeling (SEM) and Ordinary Least Squares (OLS) to check the robustness of the results. We found that these results were very similar to those of the SUR estimation, both quantitatively and qualitatively. Seemingly Unrelated Regression may offer more flexibility to account for the association among the variables used in this study and the potential correlation of the error terms. Given that the results of SEM and SUR are very close, we do not expect a negative effect from measurement error.

data on both dependent and independent variables. It estimates the parameter of all equations simultaneously and accounts for the correlations among the error terms (Zellner,1962).

In this study, the contribution of potentially related factors of different dimensions of social norms and motives was explored by both SUR and Ordinary Least Squares (OLS) estimation methods, and the efficiency of these two estimators was compared. Here, the SUR method is considered a set of independent OLS because it takes the correlation between the error terms into account. As different dimensions of motives are usually correlated and affected by different social- norms variables, the SUR method leads to a more efficient estimation (Heidari et al., 2017).

Also, SUR method provides more flexibility to show the relationship among the variables used in this study and potential correlation of the error terms. The social norms and motives considering in this study are psychological constructs and motives can be affected by various social norms variables. This means there may be interactions between individual equations if the random error associated with at least some of the different equations are correlated with each other. This kind of behavior is possible to reflected in SURE model in which individual equations are in fact related to one another, although they may not seem to be related on the surface (Srivastava & Giles, 1987). The SUR estimator provides accurate estimates in comparison to the OLS estimator, as lower standard errors describe the SUR parameters. OLS model contains multiple equations and ignores any correlated errors across equations. However, SUR models allow correlation among the errors between equations. Therefore, instead of estimating equation individually using the OLS method, SUR models are worth considering (Sun et al., 2014).

Zellner (1962) developed the Seemingly Unrelated Regression (SUR) which jointly estimates multiple models. In order to simplify notation, all equations are arranged into a single equation and can be specifies as:

$$Y = X\beta + \epsilon$$

$$\begin{bmatrix} Y_1 \\ Y_2 \\ \vdots \\ Y_K \end{bmatrix} = \begin{bmatrix} X_1 & 0 & 0 & 0 \\ 0 & X_2 & 0 & 0 \\ \vdots & \vdots & \ddots & \vdots \\ 0 & 0 & 0 & X_K \end{bmatrix} \begin{bmatrix} \beta_1 \\ \beta_2 \\ \vdots \\ \beta_K \end{bmatrix} + \begin{bmatrix} \epsilon_1 \\ \epsilon_2 \\ \vdots \\ \epsilon_K \end{bmatrix}$$

Where, (Y_1, Y_2, \dots, Y_K) denotes the stacked dependent variables, X denotes the diagonal matrix with i^{th} design matrix X_i on the ii^{th} block, $(\beta_1, \beta_2, \dots, \beta_K)$ denotes the vector of stacked coefficient vectors of all equations and $(\epsilon_1, \epsilon_2, \dots, \epsilon_K)$ denotes the vector of the stacked error vectors of all equations.

The OLS estimation of β is then can be obtained by an OLS estimation of the entire system of equations as:

$$\beta^{OLS} = (X'X)^{-1} X' Y .$$

Also, SUR estimator can be obtained by:

$$(X' \Omega^{-1} X)^{-1} (X' \Omega^{-1} Y)$$

Where, Ω^{-1} denotes a weighting matrix based on covariance matrix of the error terms Σ and the inverse of the weighting matrix can be calculated by $\Omega = \Sigma \otimes I_N$, where, I_N is an $N \times N$ identity matrix and \otimes denotes the Kronecker product. However, as the true error terms ϵ are unknown, they are often replaced by observed residuals e.g., obtained from OLS estimates, i.e., $\hat{\epsilon} = Y_i - X_i \beta_i^{OLS}$ (Cadavez & Henningsen, 2012)

Since different dimensions of economic, social, and personal motives can be correlated and affected by various social-norm variables, the SUR method yields a closer estimate than a set of ordinary least squares (OLS) would (Heidari et al., 2017). We have designed the model so that it explains the impact of social norms on producers' motives. These social norms and motives are psychological constructs, and thus latent variables. According to Pennings and Smidts (2000), a latent variable is a hypothesized and unobserved concept, which can only be approximated by measured or observable variables known as indicators. The model is expressed as follows:

$$\begin{aligned} \text{Economical Rewards} = & \beta_0 + \beta_1 \text{ Social Norms Vertical} + \\ & \beta_2 \text{ Social Norms Horizontal} + \beta_3 \text{ Tax Benefits} + \beta_4 \text{ Debt to Asset Ratio} + \\ & \beta_5 \text{ Education} + \beta_6 \text{ Location} + \varepsilon_1 \quad (\text{eq.1}) \end{aligned}$$

$$\begin{aligned} \text{Social Rewards} = & \gamma_0 + \gamma_1 \text{ Social Norms Vertical} + \gamma_2 \text{ Social Norms Horizontal} + \\ & \gamma_3 \text{ Tax Benefits} + \gamma_4 \text{ Debt to Asset Ratio} + \gamma_5 \text{ Education} + \gamma_6 \text{ Location} + \varepsilon_2 \end{aligned}$$

(eq.2)

$$\begin{aligned} \text{Personal Rewards} = & \eta_0 + \eta_1 \text{ Personal Norms} + \eta_3 \text{ Tax Benefits} + \\ & \eta_4 \text{ Debt to Asset Ratio} + \eta_5 \text{ Education} + \eta_6 \text{ Location} + \varepsilon_3 \end{aligned}$$

(eq.3)

3.3 Measures

This study analyses the relationship between horizontal social norms, vertical social norms, personal norms and expected economic, social, and personal motives (i.e. rewards), the relevant variables of which are all latent constructs that need to be captured from observable indicators. We use six indicators to measure horizontal and vertical social norms and three indicators for personal norms. The interviews with the hog farmers yielded nine relevant indicators of expected economic rewards; we identified five indicators of expected social rewards based on a definition of legitimacy by Suchman (1995) and three indicators of expected personal rewards based on the scales of Verbeke et al., (2004) and Goudarzi et al., (2011). To measure our variables of interest, we adapted existing psychometric scales using multiple indicators on seven-point scales and taking the average of the indicators to build our constructs.

We used Confirmatory Factor Analysis to test the reliability of the latent constructs. Reliability is high for all constructs, above the recommended 0.70 (Kline 2011). Table 2 shows the constructs and indicators used in this study, including their reliability (Cronbach's α). Cronbach alpha (or coefficient alpha) measures reliability or internal consistency and tells how closely the latent variables are correlated. This helps to see if multiple question Likert scale surveys are reliable. The general rule of thumb for interpreting alpha is that a Cronbach's

alpha of 0.90 and above is best, 0.80 and above is better and 0.70 and above is good. A high level of alpha means that the variables used in the study are highly correlated (Cronbach, 1951).

The chi-square, Root Mean Square Error of Approximation (RMSEA), Comparative Fit Index (CFI), and standardized root mean square residual (SRMR) were examined to check the goodness-of-fit of the model (Hooper et al., 2008). We use the standards recommended by Bagozzi and Yi (2012) and Bentler and Bonett (1980) of a root mean square error of approximation (RMSEA) ≤ 0.08 , comparative fit index (CFI) ≥ 0.90 , standardised root mean square residual (SRMR) ≤ 0.08 and Tucker Lewis Index (TLI) ≥ 0.90 .

Table 3.2 Descriptions of constructs

<i>Constructs and Indicators</i>	<i>Mean</i>	<i>SE</i>	<i>Std. dev</i>	<i>Median</i>
<i>Social Norms Vertical:(Cronbach's α (alpha) = 0.823)</i>				
<i>By building an MDV-certified stable I am meeting the expectations that:</i>				
<i>1) Suppliers had (of me) (SN1)</i>	3.87	0.14	1.72	4
<i>2) Buyers had (SN2)</i>	4.11	0.14	1.83	4
<i>3) Consumers had (SN3)</i>	4.12	0.14	1.80	4
<i>Social Norms Horizontal:(Cronbach's α (alpha) = 0.818)</i>				
<i>By building an MDV-certified stable I am meeting the expectations that:</i>				
<i>1) Peer entrepreneur(s) had (SN5)</i>	3.91	0.13	1.61	4
<i>2) Society had (SN6)</i>	4.47	0.13	1.65	5
<i>3) My farmer's association had</i>	4.54	0.12	1.49	5
<i>Personal Norms:(Cronbach's α (alpha) = 0.907)</i>				
<i>To which extent do you agree or disagree with the statements below?</i>				
<i>1) My conscience called on me to build a certified stable</i>	2.86	0.14	1.77	2
<i>2) Building a certified stable was fully in</i>	3.39	0.15	1.85	3

line with my moral convictions

3) I felt morally obliged to build a certified stable	3.00	0.14	1.84	3
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Economic Rewards:(Cronbach's α (alpha) = 0.929)

I expected that building a certified stable would bring my firm:

1) Enhanced technical performance	3.88	0.14	1.82	4
2) Enhanced financial performance	3.69	0.13	1.70	4
3) Increased efficiency	3.65	0.13	1.66	4
4) Labour savings	3.42	0.13	1.66	4
5) Increased productivity	3.88	0.13	1.71	4
6) Increased returns	3.68	0.13	1.67	4
7) Increased profits	3.27	0.13	1.68	3

Social Rewards: Legitimacy (Cronbach's α (alpha) = 0.920)

I expected that building a certified stable would help my firm to be:

1) More appreciated by society	4.52	0.15	1.89	5
2) Perceived as more desirable by society	4.87	0.14	1.79	5
3) Perceived as more proper by society	4.52	0.14	1.83	5
4) Perceived as more appropriate by society	4.61	0.14	1.78	5
5) Better at meeting the standards that	4.70	0.14	1.74	5

people expect of agricultural entrepreneurs

Personal Rewards: Pride (Cronbach's α (alpha) = 0.889)

I expected that building a certified stable would give me a sense of:

1) Pride	4.36	0.13	1.67	4
2) Exhilaration	4.04	0.13	1.63	4
3) Meaningfulness	4.09	0.13	1.65	4

Note: Scale of items: from 1= strongly disagree to 7= strongly agree

Chapter 4: Results

4.1 Findings

Table 3 shows that both horizontal norms ($b = 0.33, p = 0.01$) and vertical norms ($b = 0.28, p = 0.01$) exhibit a positive and significant relationship with the social motives of farmers to build a certified sustainable stable, supporting hypotheses 1 and 2. Economic motives are related to horizontal social norms, showing a positive and significant effect ($b = 0.28, p = 0.04$), thus supporting hypothesis 3. Hypotheses 4 is not supported, in that the vertical social norms are not significantly associated with economic motives. Farmers' personal norms, on the other hand, significantly influence their personal motives ($b = 0.40, p = 0.00$), thereby confirming hypothesis 5.

With respect to the observed control variables, tax benefits are positively and significantly related to the economic motives of the farmers ($b = 0.16, p = 0.06$), whereas income, debt-to-asset ratio, location and education do not appear to play a role in farmers' motives. This may not come as a surprise since the sample of Dutch hog farmers seems relatively homogeneous (as per Table 1).

Table 4.1 Parameters Estimates Explaining the Motives for Adopting Sustainable Practices

Variables	<i>Economical Rewards</i>		<i>Social Rewards</i>		<i>Personal Rewards</i>	
	<i>Estimate</i> (<i>S.E.</i>)	<i>p-value</i>	<i>Estimate</i> (<i>S.E.</i>)	<i>p-value</i>	<i>Estimate</i> (<i>S.E.</i>)	<i>p-value</i>
<i>Constant</i>	0.75 (1.03)	0.47	0.71 (1.01)	0.49	3.49*** (0.97)	0.00
<i>Social Norms Vertical</i>	0.16 (0.12)	0.18	0.28** (0.11)	0.01	-	-
<i>Social Norms Horizontal</i>	0.28** (0.13)	0.04	0.33** (0.13)	0.01	-	-
<i>Personal Norm</i>	-	-	-	-	0.40*** (0.06)	0.00

<i>Tax Benefits</i>	0.16*	0.06	0.09	0.24	0.05	0.56
	(0.08)		(0.08)		(0.08)	
<i>Income</i>	0.05	0.68	0.04	0.70	-0.04	0.77
	(0.11)		(0.11)		(0.12)	
<i>Debt to asset ratio</i>	0.03	0.81	0.02	0.90	-0.19	0.17
	(0.14)		(0.14)		(0.14)	
<i>Education</i>	-0.05	0.58	0.05	0.59	-0.02	0.86
	(0.10)		(0.09)		(0.09)	
<i>Location</i>	0.02	0.85	0.06	0.48	-0.01	0.88
	(0.08)		(0.08)		(0.08)	
<i>Adjusted R2</i>	0.20		0.35		0.25	

Note: Significant at: *** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$

Breusch-Pagan test of independence: $Chi2(3) = 15.145, p=0.01$

Table 4.2 provides a summary of the hypotheses, expected relationships, and findings.

Table 4.2 Summary of the findings

<i>Hypotheses</i>	<i>Expected Relationship</i>	<i>Finding</i>
<i>H1 Horizontal social norm - Social motives</i>	Positive	Supported
<i>H2 Vertical social norm - Social motives</i>	Positive	Supported
<i>H3 Horizontal social norm – Economic motives</i>	Positive	Supported
<i>H4 Vertical social norm – Economic motives</i>	Positive	Supported
<i>H5 Personal norm – Personal motives</i>		Not Supported

Chapter 5: Discussion and Conclusions

Sustainable practices in the agricultural sector have become a prerequisite for operating in current markets as well as a source for building and sustaining a competitive advantage through better market positioning. Producers and processors in the agricultural sector have to make various decisions on the adoption of sustainable practices, whereby their choices and behaviour are affected by different types of norms: social and personal norms.

We have developed a framework in which we distinguish between two types of social norms: horizontal norms (reliant on peer influence) and vertical norms (imposed by transactional and hierarchical relationships). We show how these norms impact farmers' economic and social motives to embrace sustainable practices. We also find that farmers' personal norms are related to personal motives (i.e., expected personal rewards).

This study offers policymakers and practitioners insights for designing social-psychology-based strategies to stimulate sustainable behaviour. It suggests that understanding how social norms impact the drivers of adoption of sustainable practices can further strengthen traditional economic analyses of farmers' decision-making. Knowing, *a priori*, how these social norms impact farmers' behaviour and decision-making can lead to more effective agri-sustainable policies.

The literature suggests that horizontal norms play a major role in receiving economic and social rewards (Sanagorski & Monaghan, 2014; Dessart et al., 2019; Kielland et al., 2010; Mzoughi, 2011). In line with the literature, this study finds that peers, families, and society are relevant influencers in the Dutch hog industry. There may be several reasons for this, including an interest in comparing one's own financial situation with that of fellow farmers, external pressure, the desire to fit in with one's community, and a concern with doing the right thing. This means that any strategies seeking to influence the adoption of sustainable practices should take these relationships into account. For instance, marketing campaigns to promote sustainable practices among farmers could include information addressing their desire to be

part of a community or their eagerness to match the performance and production standards of their peers.

While vertical social norms play an important role in influencing the social drivers of adoption, they show no relationship with economic motives. Thus, farmers appear more concerned about their social status and reputation; they carefully watch their customers, buyers, and suppliers to obtain social benefits, even if this comes at the cost of economic benefits. This suggests that the adoption of sustainable practices has indeed become a “prerequisite to operate”, thus producing a relevant (social and economic) motive to adopt such practices. Note, however, that this outcome might be country specific, as the Netherlands is an egalitarian society with relatively low levels of hierarchy (Dai 2008, Van Bavel and Frankema 2017). Another, more worrying, explanation may be that farmers lack the trust that they will be reaping the economic rewards promised or projected by the parties with whom they engage in transactional and hierarchical relationships (i.e., their customers, buyers, and suppliers). While the construct of trust is complex and beyond the scope of this study, this certainly calls for further research as there may be grave policy implications: only if farmers believe in the economic rewards promised or projected by the parties that set the vertical social norms, will they be willing to change their behaviour accordingly when the ‘economic rewards’ argument is brought forward (Lu et al., 2012; Wagner et al., 2011; Newman et al., 2016; Dlamini et al., 2019).

Tax benefits show a positive association with economic motives for adoption. This suggests that policy makers who seek to design strategies to encourage the adoption of sustainable practices might consider including tax incentives alongside the other obvious drivers. Personal norms are strongly associated with personal motives; hog farmers in the Netherlands appear concerned with their conscience and moral convictions in the pursuit of personal rewards.

This study also helps policy makers for designing short-term and long-term policy strategies, designed to address the behavioral factors that influence farmers’ adoption of more sustainable practices. Regarding short-term approaches to addressing social norms, policy makers could segment policies according to farmer’s personality, socio- economic characteristics, and their

economic objectives. Educational campaigns could also be beneficial for educating farmers about importance of social norms in terms of economic benefits and tax benefits may also increase the adoption of sustainable practices.

This study provides insights to governments seeking to support farmers in transitioning towards sustainable practices. Also, by proposing a viable revenue model, it capitalizes on the relationship between social horizontal norms and expected economic rewards. In addition, it shows that governments can reinforce the relationship between farmers' personal norms and expected personal rewards by communicating to society at large what farmers actually do, what their role is in feeding the world and taking care of our environment, so that farmers feel widely appreciated. This may be a pathway to supporting sustainable farmers on the long term and furthering sustainable practices.

5.1 Limitations of the Study

This study comes with limitations, to be addressed in future research. Although this study is based on high-quality personal interviews, our research has been limited to one industry in one country. It is unclear whether farmers in other countries and different industries would make similar decisions, as social norms may differ across national – and industry – cultures. Therefore, caution is due when generalizing the outcomes of this study to include different decision contexts. Future research could explore the relationship between the variables by including several other sectors and countries. In addition, different contexts could be explored, including a comparison between motives on the one hand and risk perception and risk attitudes on the other, as well as research into the role of farmers' trust in the other parties involved in shaping the relationship between social norms and social motives. Finally, longitudinal studies that increase our understanding of other existing social norms and their impact over time might be exciting avenues for future research.

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APPENDIX

Table 1

Title	
Estimator	ML
Optimization method	NLMINB
Number of model parameters	63
	Used Total
Number of observations	143 164

Table 2

Model Test Baseline Model:

Test statistic	2885.989
Degrees of freedom	276
P-value	0.000

Table 3

Model Test User Model:

Test statistic	411.186
Degrees of freedom	237
P-value (Chi-SQUARE)	0.000

Table 4

Loglikelihood and Information Criteria:

Loglikelihood user model (H0)	-5486.178
Loglikelihood unrestricted model (H1)	-5280.585
Akaike (AIC)	11098.355
Bayesian (BIC)	11285.014
Sample-size adjusted Bayesian (BIC)	11085.672

Table 5

Root Mean Square Error of Approximation:

RMSEA	0.072
90 Percent confidence interval - lower	0.060
90 Percent confidence interval - upper	0.083
P-value RMSEA \leq 0.05	0.002

Standardized Root Mean Square Residual:

SRMR	0.052
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Parameter Estimates:

Standard errors	Standard
Information	Expected
Information saturated (h1) model	Structured

Table 6

Latent Variables:

	Estimate	Std.Err	zvalue	P(> z)	Std.lv	Std.all
Economic =~						
ER1	1.000			1.450	0.820	
ER2	0.852	0.086	9.946	0.000	1.235	0.736
ER3	0.959	0.079	12.154	0.000	1.391	0.846
ER4	0.909	0.081	11.204	0.000	1.318	0.801
ER7	1.011	0.082	12.337	0.000	1.466	0.855
ER9	0.993	0.079	12.634	0.000	1.440	0.868
ER11	0.827	0.086	9.632	0.000	1.199	0.719
Social =~						
SR1	1.000			1.612	0.851	
SR2	0.995	0.071	14.103	0.000	1.605	0.894
SR3	0.953	0.076	12.537	0.000	1.537	0.834
SR4	0.956	0.072	13.273	0.000	1.542	0.863
SR5	0.782	0.077	10.106	0.000	1.262	0.726
Personal =~						
PR1	1.000			1.564	0.933	
PR2	0.848	0.066	12.803	0.000	1.327	0.809
PR3	0.886	0.066	13.379	0.000	1.386	0.830
SNVertical =~						
SN1	1.000			1.378	0.825	
SN2	1.089	0.098	11.062	0.000	1.501	0.822
SN3	0.961	0.101	9.532	0.000	1.324	0.734
SNHorizontal =~						
SN5	1.000			1.304	0.835	
SN6	0.981	0.095	10.297	0.000	1.278	0.765
SN7	0.828	0.085	9.736	0.000	1.080	0.734
PersonalNorms =~						

PN1	1.000			1.614	0.922	
PN2	1.026	0.064	15.905	0.000	1.655	0.901
PN3	0.924	0.071	13.050	0.000	1.491	0.808

Table 7

Covariances:

	Estimate	Std.Err	z-value	P(> z)	Std.lv	Std.all
Economic ~~~						
Social	1.093	0.243	4.496	0.000	0.467	0.467
Personal	1.183	0.239	4.953	0.000	0.522	0.522
SN Vertical	0.975	0.218	4.477	0.000	0.488	0.488
SN Horizontal	1.019	0.212	4.816	0.000	0.539	0.539
Personal Norms	1.040	0.237	4.380	0.000	0.444	0.444
Social ~~~						
Personal	1.392	0.268	5.204	0.000	0.552	0.552
SN Vertical	1.463	0.263	5.555	0.000	0.658	0.658
SN Horizontal	1.464	0.253	5.775	0.000	0.696	0.696
Personal Norms	1.091	0.260	4.200	0.000	0.419	0.419
Personal ~~~						
SN Vertical	1.034	0.230	4.505	0.000	0.480	0.480
SN Horizontal	1.219	0.229	5.331	0.000	0.598	0.598
Personal Norms	1.462	0.266	5.497	0.000	0.579	0.579
SN Vertical ~~~						
SN Horizontal	1.670	0.252	6.614	0.000	0.930	0.930
Personal Norms	1.237	0.245	5.042	0.000	0.556	0.556
SN Horizontal ~~~						
Personal Norms	1.226	0.235	5.225	0.000	0.583	0.583

Table 8

Variances:

	Estimate	Std.Err	z-value	P(> z)	Std.lv	Std.all	R-Square
.ER1	1.025	0.141	7.278	0.000	1.025	0.328	0.672
.ER2	1.292	0.166	7.781	0.000	1.292	0.458	0.542
.ER3	0.767	0.109	7.003	0.000	0.767	0.284	0.716
.ER4	0.969	0.130	7.429	0.000	0.969	0.358	0.642
.ER7	0.792	0.115	6.895	0.000	0.792	0.269	0.731
.ER9	0.677	0.101	6.693	0.000	0.677	0.246	0.754
.ER11	1.345	0.171	7.847	0.000	1.345	0.483	0.517
.SR1	0.991	0.146	6.812	0.000	0.991	0.276	0.724
.SR2	0.649	0.109	5.961	0.000	0.649	0.201	0.799
.SR3	1.034	0.147	7.027	0.000	1.034	0.304	0.696
.SR4	0.817	0.123	6.627	0.000	0.817	0.256	0.744
.SR5	1.429	0.184	7.769	0.000	1.429	0.473	0.527
.PR1	0.361	0.110	3.298	0.001	0.361	0.129	0.871
.PR2	0.931	0.136	6.858	0.000	0.931	0.346	0.654
.PR3	0.869	0.133	6.534	0.000	0.869	0.312	0.688
.SN1	0.888	0.144	6.183	0.000	0.888	0.319	0.681
.SN2	1.078	0.173	6.236	0.000	1.078	0.324	0.676
.SN3	1.503	0.207	7.252	0.000	1.503	0.461	0.539
.SN5	0.735	0.122	6.047	0.000	0.735	0.302	0.698
.SN6	1.161	0.164	7.070	0.000	1.161	0.415	0.585
.SN7	0.999	0.136	7.322	0.000	0.999	0.461	0.539
.PN1	0.458	0.110	4.161	0.000	0.458	0.150	0.850
.PN2	0.638	0.127	5.033	0.000	0.638	0.189	0.811
.PN3	1.179	0.166	7.109	0.000	1.179	0.347	0.653
