NEW ZEALAND
WORK RESEARCH INSTITUTE

Juliane Hennecke

New Zealand Work Research Institute
Auckland University of Technology

AUT

The Independent Woman - Locus of Control and Female Labor Force Participation

Australian Gender Economics Workshop
Queensland University of Technology, Brisbane
February 5, 2020

The Puzzle of Female Labor Supply

- Extensive literature on long-term trends in female labor supply as well as the gender participation gap
  - Gender wage gap & wage elasticities, Gender roles and social working norms, (Returns to) education, Partner-wage elasticities, Taxes and transfers, Fertility, Childcare provision and costs, discrimination
- Remaining unexplained differences between women with identical observable (monetary) opportunities and constraints

The Puzzle of Female Labor Supply

- Extensive literature on long-term trends in female labor supply as well as the gender participation gap
  - Gender wage gap & wage elasticities, Gender roles and social working norms, (Returns to) education, Partner-wage elasticities, Taxes and transfers, Fertility, Childcare provision and costs, discrimination
- Remaining unexplained differences between women with identical observable (monetary) opportunities and constraints

Unexplained Gaps

- **Theoretical Approach** - Individual Optimization Errors and Idiosyncratic Shocks
- **Empirical Approach** - Unobserved Heterogeneity
  - Incomplete Information $\rightarrow$ Unobserved beliefs and expectations
  - Unobserved inherent preferences

Unexplained Gaps

- **Theoretical Approach** - Individual Optimization Errors and Idiosyncratic Shocks
- **Empirical Approach** - Unobserved Heterogeneity
  - Incomplete Information → Unobserved beliefs and expectations
  - Unobserved inherent preferences

Unexplained Gaps

- **Theoretical Approach** - Individual Optimization Errors and Idiosyncratic Shocks
- **Empirical Approach** - Unobserved Heterogeneity
  - Incomplete Information $\rightarrow$ Unobserved beliefs and expectations
  - Unobserved inherent preferences

The Role of Psychology in Economic Models

- **Traditional Approach:** Personality traits as "non-cognitive skills"
  $\Rightarrow$ Determinants of monetary constraints and opportunities
- **Modern Approach:** Behavioral implications of personality traits
  $\Rightarrow$ Determinants of preferences and beliefs
  - Relationship between personality traits and economic preference parameters (Borghans et al. 2008, Becker et al. 2012)

The Role of Psychology in Economic Models

- **Traditional Approach:** Personality traits as "non-cognitive skills"
  $\Rightarrow$ Determinants of monetary constraints and opportunities
- **Modern Approach:** Behavioral implications of personality traits
  $\Rightarrow$ Determinants of preferences and beliefs
  - Relationship between personality traits and economic preference parameters (BORGHANS ET AL. 2008, BECKER ET AL. 2012)

This Paper

Research Question

Can the personality trait **locus of control (LOC)** contribute to the explanation of heterogeneity in female participation decisions?

- Contribution to the literature
  - Detailed and ample theoretical discussion of the role of LOC as determinant of female decision making on the labor market
  - Extensive empirical analysis of the effect of LOC on participation decisions as well as employment probabilities also with a life-time perspective
  - Identification of an important interplay between inherent traits and preferences and traditional constraints (e.g. marital status and children, strength of social norms)

This Paper

Research Question

Can the personality trait **locus of control (LOC)** contribute to the explanation of heterogeneity in female participation decisions?

- Contribution to the literature
  - Detailed and ample theoretical discussion of the role of LOC as determinant of female decision making on the labor market
  - Extensive empirical analysis of the effect of LOC on participation decisions as well as employment probabilities also with a life-time perspective
  - Identification of an important interplay between inherent traits and preferences and traditional constraints (e.g. marital status and children, strength of social norms)

This Paper

Research Question

Can the personality trait **locus of control (LOC)** contribute to the explanation of heterogeneity in female participation decisions?

- Contribution to the literature
  - Detailed and ample theoretical discussion of the role of LOC as determinant of female decision making on the labor market
  - Extensive empirical analysis of the effect of LOC on participation decisions as well as employment probabilities also with a life-time perspective
  - Identification of an important interplay between inherent traits and preferences and traditional constraints (e.g. marital status and children, strength of social norms)

This Paper

Research Question

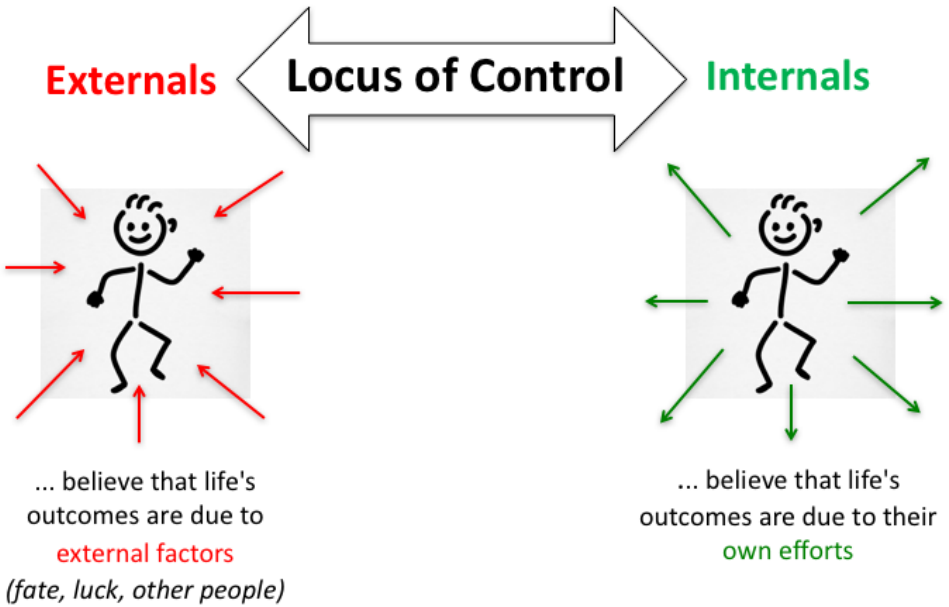
Can the personality trait **locus of control (LOC)** contribute to the explanation of heterogeneity in female participation decisions?

- Contribution to the literature
  - Detailed and ample theoretical discussion of the role of LOC as determinant of female decision making on the labor market
  - Extensive empirical analysis of the effect of LOC on participation decisions as well as employment probabilities also with a life-time perspective
  - Identification of an important interplay between inherent traits and preferences and traditional constraints (e.g. marital status and children, strength of social norms)

Locus of Control (LOC)- What is it?

Definition - Rotter (1966)

"A generalized [...] belief [...] regarding the nature of the causal relationship between one's own behavior and its consequences."

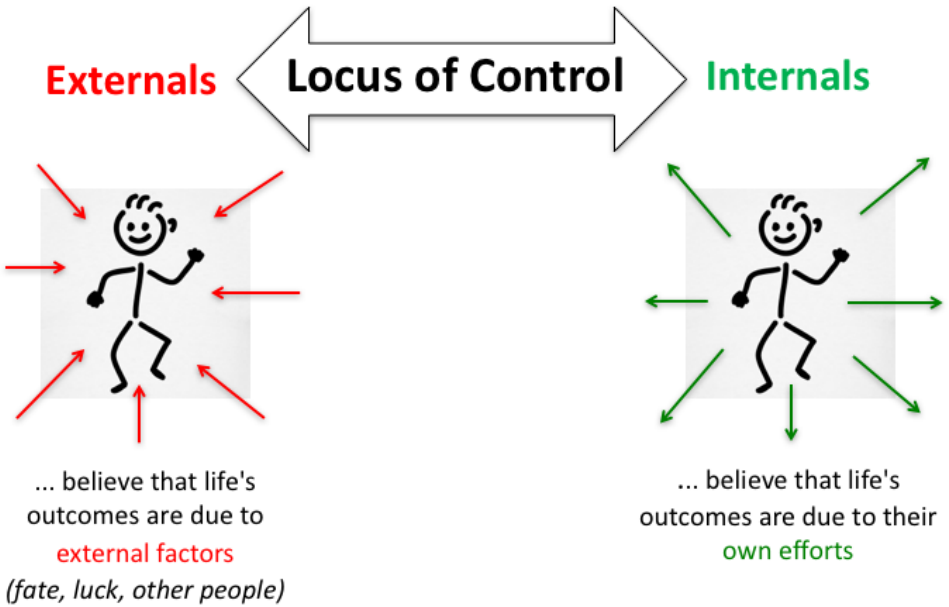


- High explanatory power for economic decision making *(e.g. regional mobility, job search, investment decisions, entrepreneurship)*

Locus of Control (LOC)- What is it?

Definition - Rotter (1966)

"A generalized [...] belief [...] regarding the nature of the causal relationship between one's own behavior and its consequences."



- High explanatory power for economic decision making *(e.g. regional mobility, job search, investment decisions, entrepreneurship)*

Theoretical Considerations

- LOC implemented into one-period model of discrete labor supply decisions as non-stochastic personal attribute ▸ Model ▸ Optimization
- Channels and Mechanisms:
  1. Preferences - marginal gains from arguments of utility function
     - ... for economic and financial independence - Internals value consumption which is generated based on self-earned income higher than consumption based on external income ▸
     - ... for own childcare - Internal mother expect higher returns to own efforts in child-rearing ▸
  2. Budget Constraints
     - Beliefs - Subjective expectations about monetary returns to participation (i.e. job-offer arrival rates, expected wages and future career returns) ▸
     - Opportunities and Constraints - e.g. assortative mating, objective wage returns, occupational selection

Theoretical Considerations

- LOC implemented into one-period model of discrete labor supply decisions as non-stochastic personal attribute ▸ Model ▸ Optimization
- Channels and Mechanisms:
  1. Preferences - marginal gains from arguments of utility function
     - ... for economic and financial independence - Internals value consumption which is generated based on self-earned income higher than consumption based on external income ▸
     - ... for own childcare - Internal mother expect higher returns to own efforts in child-rearing ▸
  2. Budget Constraints
     - Beliefs - Subjective expectations about monetary returns to participation (i.e. job-offer arrival rates, expected wages and future career returns) ▸
     - Opportunities and Constraints - e.g. assortative mating, objective wage returns, occupational selection

Theoretical Considerations

- LOC implemented into one-period model of discrete labor supply decisions as non-stochastic personal attribute ▸ Model ▸ Optimization
- Channels and Mechanisms:
  1. Preferences - marginal gains from arguments of utility function
     - ... for economic and financial independence - Internals value consumption which is generated based on self-earned income higher than consumption based on external income ▸
     - ... for own childcare - Internal mother expect higher returns to own efforts in child-rearing ▸
  2. Budget Constraints
     - Beliefs - Subjective expectations about monetary returns to participation (i.e. job-offer arrival rates, expected wages and future career returns) ▸
     - Opportunities and Constraints - e.g. assortative mating, objective wage returns, occupational selection

Theoretical Considerations

- LOC implemented into one-period model of discrete labor supply decisions as non-stochastic personal attribute ▸ Model ▸ Optimization
- Channels and Mechanisms:
  1. Preferences - marginal gains from arguments of utility function
     - ... for economic and financial independence - Internals value consumption which is generated based on self-earned income higher than consumption based on external income ▸
     - ... for own childcare - Internal mother expect higher returns to own efforts in child-rearing ▸
  2. Budget Constraints
     - Beliefs - Subjective expectations about monetary returns to participation (i.e. job-offer arrival rates, expected wages and future career returns) ▸
     - Opportunities and Constraints - e.g. assortative mating, objective wage returns, occupational selection

Theoretical Considerations

- LOC implemented into one-period model of discrete labor supply decisions as non-stochastic personal attribute ▸ Model ▸ Optimization
- Channels and Mechanisms:
  1. Preferences - marginal gains from arguments of utility function
     - ... for economic and financial independence - Internals value consumption which is generated based on self-earned income higher than consumption based on external income ▸
     - ... for own childcare - Internal mother expect higher returns to own efforts in child-rearing ▸
  2. Budget Constraints
     - Beliefs - Subjective expectations about monetary returns to participation (i.e. job-offer arrival rates, expected wages and future career returns) ▸
     - Opportunities and Constraints - e.g. assortative mating, objective wage returns, occupational selection

Theoretical Considerations

- LOC implemented into one-period model of discrete labor supply decisions as non-stochastic personal attribute ▸ Model ▸ Optimization
- Channels and Mechanisms:
  1. Preferences - marginal gains from arguments of utility function
     - ... for economic and financial independence - Internals value consumption which is generated based on self-earned income higher than consumption based on external income ▸
     - ... for own childcare - Internal mother expect higher returns to own efforts in child-rearing ▸
  2. Budget Constraints
     - Beliefs - Subjective expectations about monetary returns to participation (i.e. job-offer arrival rates, expected wages and future career returns) ▸
     - Opportunities and Constraints - e.g. assortative mating, objective wage returns, occupational selection

Data and Outcome Variables

- Data - German Socio-Economic Panel (SOEP) 2000 - 2015

- Labor Force Participation - Binary indicator for availability to the labor force (ILO Definition)
  - employed,
  - self-employed,
  - registered unemployed and actively searching for a job
  - not-working (unregistered), actively searching, intention to work and ready to start

Data and Outcome Variables

- Data - German Socio-Economic Panel (SOEP) 2000 - 2015

- Labor Force Participation - Binary indicator for availability to the labor force (ILO Definition)
  - employed,
  - self-employed,
  - registered unemployed and actively searching for a job
  - not-working (unregistered), actively searching, intention to work and ready to start

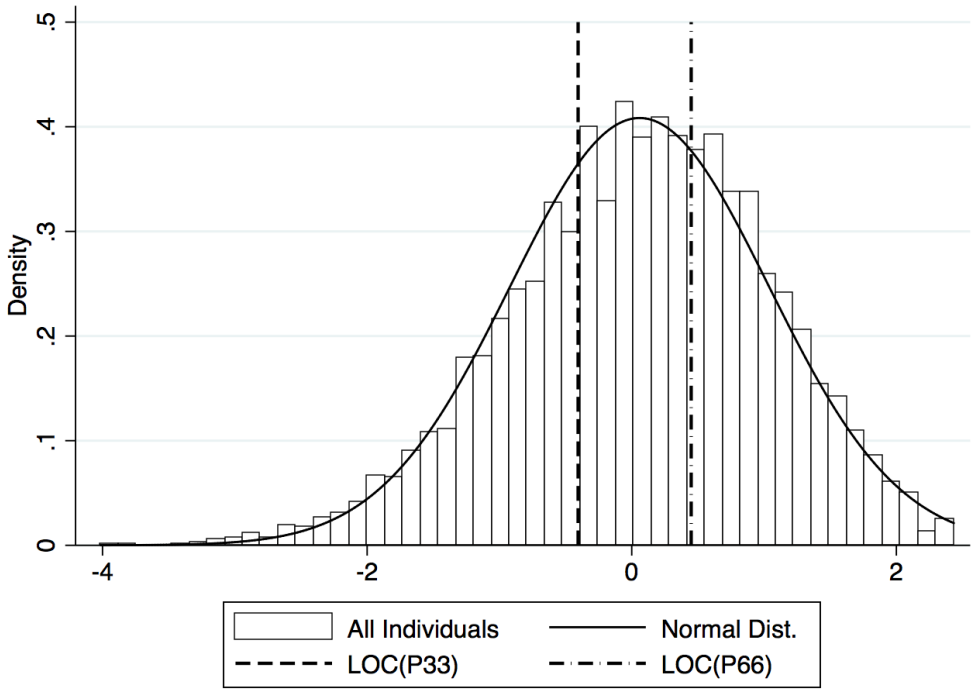
Data and Outcome Variables

- Data - German Socio-Economic Panel (SOEP) 2000 - 2015

- Labor Force Participation - Binary indicator for availability to the labor force (ILO Definition)
  - employed,
  - self-employed,
  - registered unemployed and actively searching for a job
  - not-working (unregistered), actively searching, intention to work and ready to start

Data - Locus of Control

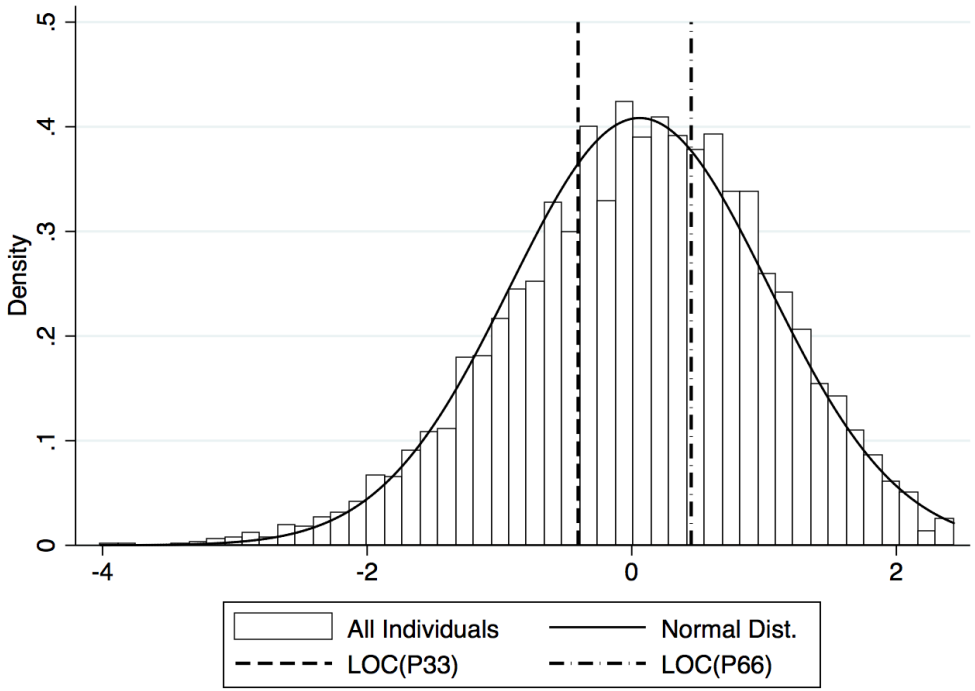
- Surveyed in 1999, 2005, 2010 and 2015
- List of 10 items rate on a Likert-scale ▸ Full List of Items
- Construction of a unidimensional factor LOC_{it} based on 8/10 items ▸ Factor Analysis



- Impute forwards lagged by 1 year

Data - Locus of Control

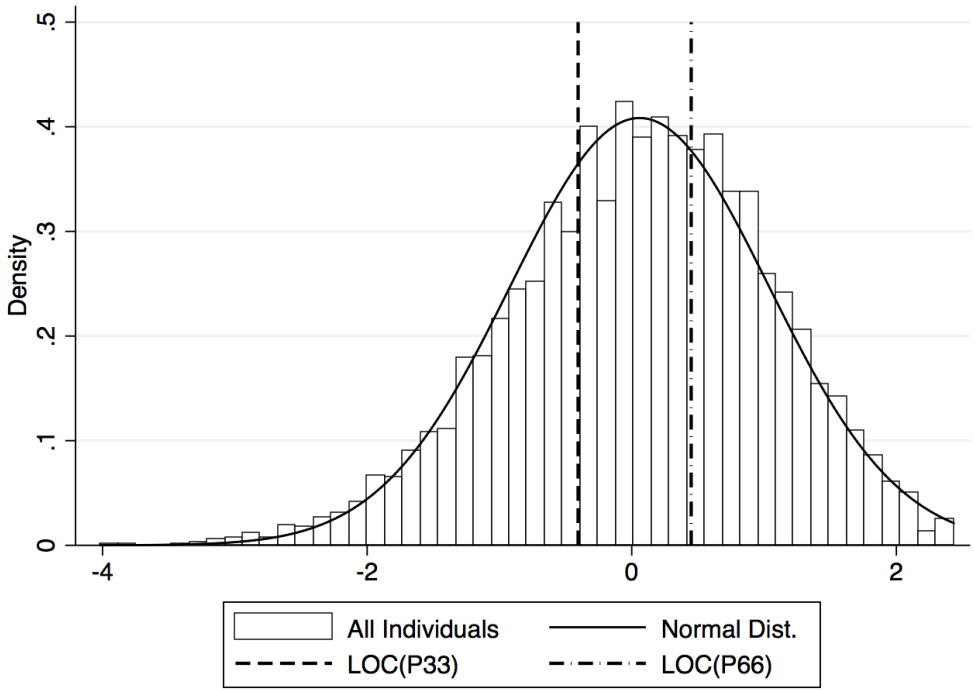
- Surveyed in 1999, 2005, 2010 and 2015
- List of 10 items rate on a Likert-scale ▸ Full List of Items
- Construction of a unidimensional factor LOC_{it} based on 8/10 items ▸ Factor Analysis



- Impute forwards lagged by 1 year

Data - Locus of Control

- Surveyed in 1999, 2005, 2010 and 2015
- List of 10 items rate on a Likert-scale ▸ Full List of Items
- Construction of a unidimensional factor LOC_{it} based on 8/10 items ▸ Factor Analysis



- Impute forwards lagged by 1 year

Data - Sample Restriction

- Sample: All women observed in years 2000 - 2015 (panel)
  - Working age - between 25 and 65 years
  - no women in education, early retirement or military service

	All	Children under 16		Cohabiting	
		No	Yes	No	Yes
	(1)	(2)	(3)	(4)	(5)
Labor Force Status					
Employed	0.70	0.75	0.62	0.77	0.69
Unemployed	0.07	0.07	0.07	0.12	0.05
... and searching	0.05	0.05	0.05	0.09	0.04
Self-Employed	0.06	0.06	0.06	0.07	0.06
Not-Working	0.13	0.12	0.15	0.03	0.16
... and searching	0.00	0.00	0.01	0.00	0.01
Maternity Leave	0.04	0.00	0.10	0.01	0.04
Outcome: Labor Force Participation (LF_{it})	0.82	0.87	0.74	0.93	0.79
Observations	56,940	34,836	22,104	11,117	45,823
Individuals	7,662	5,890	3,589	2,266	6,499

Source: SOEP, waves 2000 - 2016, version 33, own calculations.

Further Descriptives

Data - Sample Restriction

- Sample: All women observed in years 2000 - 2015 (panel)
  - Working age - between 25 and 65 years
  - no women in education, early retirement or military service

	All	Children under 16		Cohabiting	
		No	Yes	No	Yes
	(1)	(2)	(3)	(4)	(5)
Labor Force Status					
Employed	0.70	0.75	0.62	0.77	0.69
Unemployed	0.07	0.07	0.07	0.12	0.05
... and searching	0.05	0.05	0.05	0.09	0.04
Self-Employed	0.06	0.06	0.06	0.07	0.06
Not-Working	0.13	0.12	0.15	0.03	0.16
... and searching	0.00	0.00	0.01	0.00	0.01
Maternity Leave	0.04	0.00	0.10	0.01	0.04
Outcome: Labor Force Participation (LF_{it})	0.82	0.87	0.74	0.93	0.79
Observations	56,940	34,836	22,104	11,117	45,823
Individuals	7,662	5,890	3,589	2,266	6,499

Source: SOEP, waves 2000 - 2016, version 33, own calculations.

▸ Further Descriptives

Estimation Strategy

- Binary Logit Model

$$P(LFP_{it} = 1) = P(\beta_1 + \beta_2 loc_{it-1} + \beta_3 X_{it} + \beta_4 P_i + \beta_5 R_{it} + \beta_6 T + \epsilon_{it} > 0)$$

  - Socio-economic control variables (X_{it})
    - Demographic information *(age, religion, region of residence, school and vocational degree, subjective health)*
    - Family characteristics *(partner status, number of children, indicators for children in certain age ranges, family income)*
  - Personality and preferences (P_i) *(Big Five and risk aversion)*
  - Indicators for relative regional characteristics (R_{it})
    - economic conditions *(unemployment rate, GVA, population density, median full-time income of women)*
    - Childcare *(share of children in public childcare, share of full-time childcare, median costs for full-time childcare per child)*
  - Period-fixed effects (T)

Estimation Strategy

- Binary Logit Model

$$P(LFP_{it} = 1) = P(\beta_1 + \beta_2 loc_{it-1} + \beta_3 X_{it} + \beta_4 P_i + \beta_5 R_{it} + \beta_6 T + \epsilon_{it} > 0)$$

  - Socio-economic control variables (X_{it})
    - Demographic information *(age, religion, region of residence, school and vocational degree, subjective health)*
    - Family characteristics *(partner status, number of children, indicators for children in certain age ranges, family income)*
  - Personality and preferences (P_i) *(Big Five and risk aversion)*
  - Indicators for relative regional characteristics (R_{it})
    - economic conditions *(unemployment rate, GVA, population density, median full-time income of women)*
    - Childcare *(share of children in public childcare, share of full-time childcare, median costs for full-time childcare per child)*
  - Period-fixed effects (T)

Estimation Strategy

- Binary Logit Model

$$P(LFP_{it} = 1) = P(\beta_1 + \beta_2 loc_{it-1} + \beta_3 X_{it} + \beta_4 P_i + \beta_5 R_{it} + \beta_6 T + \epsilon_{it} > 0)$$

  - Socio-economic control variables (X_{it})
    - Demographic information *(age, religion, region of residence, school and vocational degree, subjective health)*
    - Family characteristics *(partner status, number of children, indicators for children in certain age ranges, family income)*
  - Personality and preferences (P_i) *(Big Five and risk aversion)*
  - Indicators for relative regional characteristics (R_{it})
    - economic conditions *(unemployment rate, GVA, population density, median full-time income of women)*
    - Childcare *(share of children in public childcare, share of full-time childcare, median costs for full-time childcare per child)*
  - Period-fixed effects (T)

Estimation Strategy

- Binary Logit Model

$$P(LFP_{it} = 1) = P(\beta_1 + \beta_2 loc_{it-1} + \beta_3 X_{it} + \beta_4 P_i + \beta_5 R_{it} + \beta_6 T + \epsilon_{it} > 0)$$

  - Socio-economic control variables (X_{it})
    - Demographic information *(age, religion, region of residence, school and vocational degree, subjective health)*
    - Family characteristics *(partner status, number of children, indicators for children in certain age ranges, family income)*
  - Personality and preferences (P_i) *(Big Five and risk aversion)*
  - Indicators for relative regional characteristics (R_{it})
    - economic conditions *(unemployment rate, GVA, population density, median full-time income of women)*
    - Childcare *(share of children in public childcare, share of full-time childcare, median costs for full-time childcare per child)*
  - Period-fixed effects (T)

Estimation Strategy

- Binary Logit Model

$$P(LFP_{it} = 1) = P(\beta_1 + \beta_2 loc_{it-1} + \beta_3 X_{it} + \beta_4 P_i + \beta_5 R_{it} + \beta_6 T + \epsilon_{it} > 0)$$

  - Socio-economic control variables (X_{it})
    - Demographic information *(age, religion, region of residence, school and vocational degree, subjective health)*
    - Family characteristics *(partner status, number of children, indicators for children in certain age ranges, family income)*
  - Personality and preferences (P_i) *(Big Five and risk aversion)*
  - Indicators for relative regional characteristics (R_{it})
    - economic conditions *(unemployment rate, GVA, population density, median full-time income of women)*
    - Childcare *(share of children in public childcare, share of full-time childcare, median costs for full-time childcare per child)*
  - Period-fixed effects (T)

Main Estimation Results

Figure: Main Estimation Results: Family Status and Children

	All		Non-Cohabiting		Cohabiting	
	Children under 16		Children under 16		Children under 16	
	No	Yes	No	Yes	No	Yes
	(1)	(2)	(3)	(4)	(5)	(6)
Locus of Control Terciles (Ref.: $[LOC_{min}, LOC_{P33}]$)						
$(LOC_{P33}, LOC_{P66}]$	0.021**	0.025*	-0.007	0.038*	0.028**	0.022†
	(0.007)	(0.011)	(0.008)	(0.017)	(0.009)	(0.012)
$(LOC_{P66}, LOC_{max}]$	0.017*	0.028*	-0.004	0.017	0.023*	0.028*
	(0.008)	(0.011)	(0.008)	(0.020)	(0.011)	(0.012)
Observations	34,836	22,104	8,295	2,822	26,541	19,282
LF = 0	4,661	5,804	375	438	4,286	5,366
LF = 1	30,175	16,300	7,920	2,384	22,255	13,916
	(86.62%)	(73.74%)	(95.48%)	(84.48%)	(83.85%)	(72.17%)
All Controls	✓	✓	✓	✓	✓	✓

Source: SOEP, waves 2000 - 2016, version 33, doi:10.5684/soep.v33, own calculations.
Notes: Standard Errors in parentheses. † $p < 0.1$ * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

▸ Stepwise Controls ▸ Age of Children

Additional Results I - Social Norms

Figure: Heterogeneity Analysis: Social Norms for Working

	Region		Cohort[1]		
	West	East	Early $<$'58	Middle '58-'66	Late $>$'66
	(1)	(2)	(3)	(4)	(5)
Locus of Control Terciles (Ref.: $[LOC_{min}, LOC_{P33}]$)					
$(LOC_{P33}, LOC_{P66}]$	0.022**	0.011	0.038**	0.010	0.011
	(0.008)	(0.008)	(0.013)	(0.011)	(0.009)
$(LOC_{P66}, LOC_{max}]$	0.023**	0.011	0.026†	0.018	0.018*
	(0.009)	(0.009)	(0.015)	(0.012)	(0.009)
Observations	41,448	15,485	18,435	17,649	20,851
LF = 0	8,812	1,653	3,936	2,313	4,216
LF = 1	32,636 (79%)	13,839 (89%)	14,504 (79 %)	15,336 (87%)	16,635 (80%)
All Controls	✓	✓	✓	✓	✓

Source: SOEP, waves 2000 - 2016, version 33, doi:10.5684/soep.v33, own calculations.
Notes: Standard Errors in parentheses. † $p < 0.1$ * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$
[1] Cohort Cutoffs: Early - born before 1958, Middle - born 1958-1966, Late - born after 1966.

Additional Results II - Activity, Working Hours and Lifetime Participation

- Effect translates into higher actual employment probabilities
- No effects at the intensive margin (working hours conditional on participation)
- Lifetime participation - Considerable effect on aggregated years in employment between 25 and 55 years

Additional Results II - Activity, Working Hours and Lifetime Participation

- Effect translates into higher actual employment probabilities
- No effects at the intensive margin (working hours conditional on participation)
- Lifetime participation - Considerable effect on aggregated years in employment between 25 and 55 years

Additional Results II - Activity, Working Hours and Lifetime Participation

- Effect translates into higher actual employment probabilities
- No effects at the intensive margin (working hours conditional on participation)
- Lifetime participation - Considerable effect on aggregated years in employment between 25 and 55 years

Sensitivity Checks

- Controlling for potential confounders
  - Occupational characteristics
  - Expected wages
  - Partners earnings and locus of control (assortative mating)
- LOC construction *(factor analysis vs. simple averaging)*
- Endogeneity and reverse causality - Alternative methods of LOC imputation
  - LOC during closest employment phase
  - Average LOC over all available observations
- Method Choice
- Sample Definition

Sensitivity Checks

- Controlling for potential confounders
  - Occupational characteristics
  - Expected wages
  - Partners earnings and locus of control (assortative mating)
- LOC construction *(factor analysis vs. simple averaging)*
- Endogeneity and reverse causality - Alternative methods of LOC imputation
  - LOC during closest employment phase
  - Average LOC over all available observations
- Method Choice
- Sample Definition

Sensitivity Checks

- Controlling for potential confounders
  - Occupational characteristics
  - Expected wages
  - Partners earnings and locus of control (assortative mating)
- LOC construction *(factor analysis vs. simple averaging)*
- Endogeneity and reverse causality - Alternative methods of LOC imputation
  - LOC during closest employment phase
  - Average LOC over all available observations
- Method Choice
- Sample Definition

Sensitivity Checks

- Controlling for potential confounders
  - Occupational characteristics
  - Expected wages
  - Partners earnings and locus of control (assortative mating)
- LOC construction *(factor analysis vs. simple averaging)*
- Endogeneity and reverse causality - Alternative methods of LOC imputation
  - LOC during closest employment phase
  - Average LOC over all available observations
- Method Choice
- Sample Definition

Main Findings

Importance of Inherent Preferences

Internal locus of control is an important positive factor in the labor supply decision of women and the effect translates into higher observed employment probabilities also from a lifetime perspective.

Boundaries of Inherent Preferences

Role of inherent traits strongly restricted by underlying monetary and non-monetary constraints (e.g. available family income and social acceptance).

Main Findings

Importance of Inherent Preferences

Internal locus of control is an important positive factor in the labor supply decision of women and the effect translates into higher observed employment probabilities also from a lifetime perspective.

Boundaries of Inherent Preferences

Role of inherent traits strongly restricted by underlying monetary and non-monetary constraints (e.g. available family income and social acceptance).

Conclusion

- This paper...
  - ...significantly adds to the economic literature on female labor force participation by empirically investigating the psychological black box behind participation decisions.
  - ... broadens the knowledge on the economic importance of locus of control.
- ... delivers important implications for the widespread political discourse about low labor force participation rates of women.
  - Boundaries of monetary incentives set by latent psychological characteristics and inherent preferences.
  - Boundaries of intrinsic decision making based on inherent traits set by monetary constraints and opportunities as well as social norms.

Conclusion

- This paper...
  - ...significantly adds to the economic literature on female labor force participation by empirically investigating the psychological black box behind participation decisions.
  - ... broadens the knowledge on the economic importance of locus of control.
- ... delivers important implications for the widespread political discourse about low labor force participation rates of women.
  - Boundaries of monetary incentives set by latent psychological characteristics and inherent preferences.
  - Boundaries of intrinsic decision making based on inherent traits set by monetary constraints and opportunities as well as social norms.

THANK YOU FOR YOUR ATTENTION!

NEW ZEALAND WORK RESEARCH INSTITUTE

Comments and Feedback are highly welcome.

e-mail: juliane.hennecke@aut.ac.nz

Go back to Theory

- One-period model of discrete labor supply decisions
- Woman i maximizes neoclassical utility function:

$$U_i = U_i(C_i, L_i, H_i, P_i; \theta_i)$$

  - Convex utility function with arguments consumption (C_i), leisure (L_i), home production (H_i) and participation (P_i)
  - Marginal gains from all arguments depend on a vector of individual attributes θ_i
- Budget Constraint

$$y_i + \tilde{w}_i(T - L_i - H_i) \geq C_i + p_h(T - H_i)$$

  - ... with y_i - family income, T - endowment of time, p_h - hourly childcare price
  - $\tilde{w}_i(\theta_i)$ - subjective expectation about hourly wage depending on individual attributes θ_i

Go back to Theory

- Optimization - Woman i chooses the labor force status, which maximizes her utility and fulfills her budget constraint

$$LF_i^* = \underset{LF_i \in B_i}{\text{argmax}}\{U_i\} \quad \text{with} \quad B_i = \{0, 1\}$$

  - Extensive Margin - Choice set B_i: participating ($LF_i = 1$) if $T - L_i - H_i > 0$ or not participating ($LF_i = 0$) if $T - L_i - H_i = 0$

Go back to Theory

- θ_i increases with internality, i.e. $\theta_I > \theta_E$

1a Internals derive more additional direct utility from participation than do externals

$$\frac{\partial^2 U_i}{\partial P_i \partial \theta_i} > 0. \tag{1}$$

1b Internal mothers gain higher utility from every unit of H_i

$$\frac{\partial^2 U_i}{\partial H_i \partial \theta_i} > 0. \tag{2}$$

2a Internals expect higher earnings from participation $\partial \tilde{w}_i / \partial \theta > 0$,

- ...and thus gain higher utility from availability for market production as their budget constraints allows for higher returns to participation in expected consumption levels $\tilde{C}_i$

$$\frac{\partial U_i}{\partial \theta_i} = \frac{\partial U_i}{\partial \tilde{C}_i} \times \frac{\partial \tilde{C}_i}{\partial \theta_i} > 0. \tag{3}$$

Go back to Data

Figure: Components of Locus of Control (not imputed)

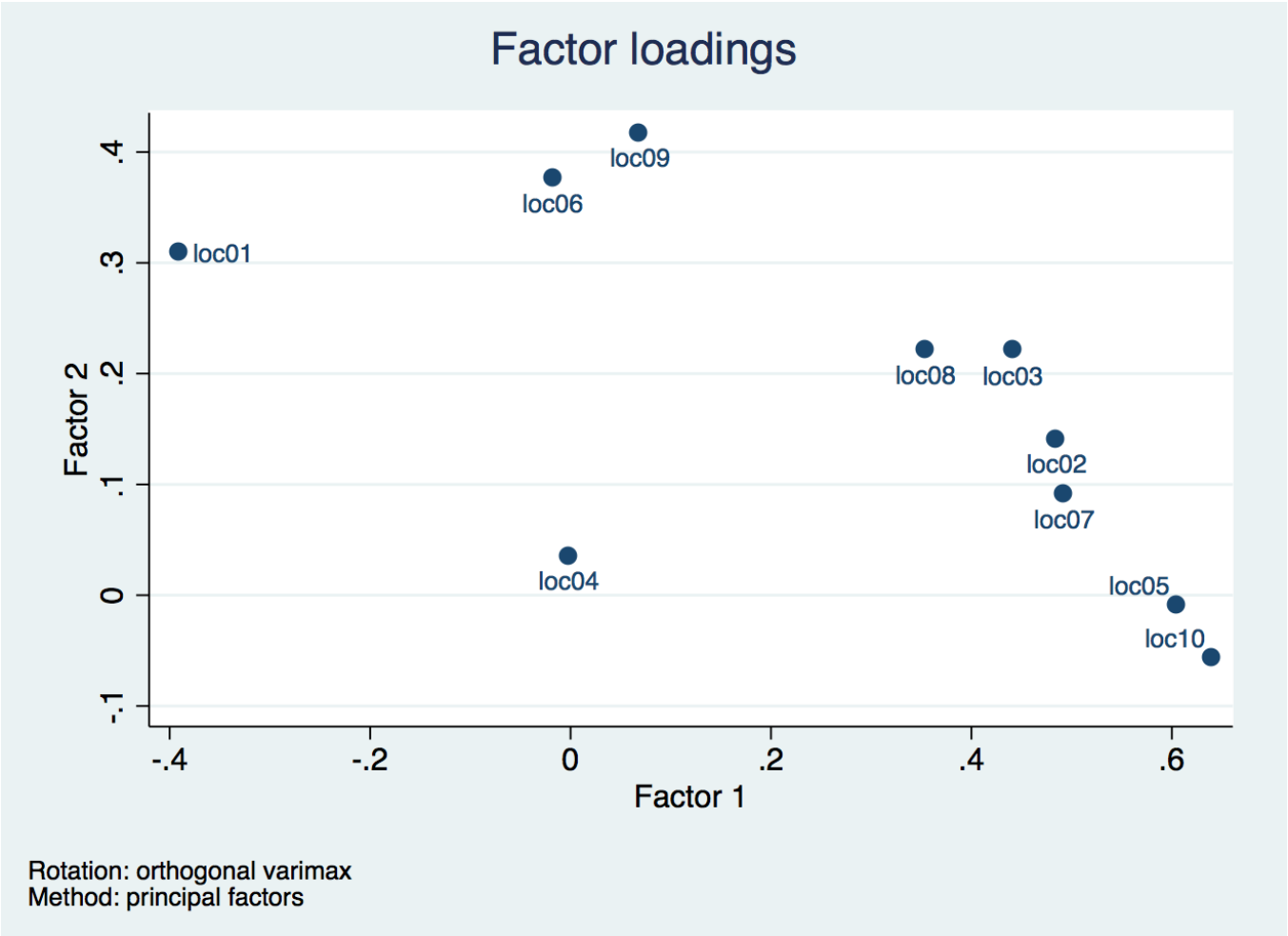
Table 2: Components of Locus of Control (not imputed)

No	Item	*mean*	*SD*
Q:	The following statements apply to different attitudes towards life and the future. To what degree do you personally agree with the following statements? *Scale: 1 (Disagree completely) - 7 (Agree completely)*		
I1:	How my life goes depends on me	5.46	(1.39)
I2:	Compared to other people, I have not achieved what I deserve (-)	3.15	(1.76)
I3:	What a person achieves in life is above all a question of fate or luck (-)	3.53	(1.63)
I4:	If a person is socially [...] active, she can have an effect on social conditions	3.71	(1.58)
I5:	I have the experience that others have a controlling influence over my life (-)	3.11	(1.66)
I6:	One has to work hard in order to succeed	5.91	(1.14)
I7:	If I run up against difficulties in life, I often doubt my own abilities (-)	3.49	(1.66)
I8:	The opportunities that I have in life are determined by the social conditions (-)	4.54	(1.43)
I9:	Inborn abilities are more important than any efforts one can make	4.78	(1.31)
I10:	I have little control over the things that happen in my life (-)	2.63	(1.47)
	Observations	14,214[a]	

Source: SOEP, waves 1999, 2005, 2010 and 2015, version 33, doi:10.5684/soep.v33.
Notes: Items marked with a (-) are reversed prior to factor analysis.
[a] In this table, the item means and SD are computed for the observation waves 1999,2005, 2010 and 2015 only. Imputed values are not included.

Go back to Data

Figure: Factor Loadings of the LOC Variable



Source: SOEP, waves 1999, 2005, 2010 and 2015, version 33, own illustration.

Go back to Data

Figure: Descriptive Statistics I

	All	Children under 16		Cohabiting	
		No	Yes	No	Yes
	(1)	(2)	(3)	(4)	(5)
Family Characteristics					
Family Status					
Single	0.13	0.16	0.08	0.68	
Partner not in HH	0.06	0.07	0.04	0.32	
Partner in HH	0.10	0.11	0.09		0.13
Married	0.70	0.65	0.78		0.87
Number of Children	1.62	1.35	2.03	1.19	1.72
Has Child under 1	0.03		0.07	0.01	0.03
Has Child 1 - 3 Years	0.06		0.15	0.02	0.07
Has Child 3 - 7 Years	0.13		0.33	0.07	0.14
Has Child between 7 and 16 years	0.28		0.72	0.20	0.30
Family Income					
Low	0.33	0.40	0.22	0.86	0.20
Medium	0.34	0.31	0.38	0.09	0.40
High	0.33	0.29	0.41	0.05	0.40
Observations	56,940	34,836	22,104	11,117	45,823
Individuals	7,662	5,890	3,589	2,266	6,499

Source: SOEP, waves 2000 - 2016, version 33, doi:10.5684/soep.v33, own calculations.

Go back to Data

Descriptive Statistics II

	All	Children under 16		Cohabiting	
		No	Yes	No	Yes
	(1)	(2)	(3)	(4)	(5)
Socio-Demographic Controls					
Age Categories					
25 - 34 Years	0.21	0.14	0.31	0.28	0.19
35 - 44 Years	0.30	0.16	0.52	0.27	0.31
45 - 54 Years	0.31	0.40	0.16	0.28	0.31
55 - 65 Years	0.18	0.30	0.00	0.17	0.19
Religious Affiliation					
Non	0.32	0.35	0.27	0.37	0.31
Christian	0.64	0.62	0.67	0.60	0.65
Muslim	0.02	0.01	0.03	0.01	0.02
Other	0.02	0.01	0.03	0.01	0.02
Highest School Degree					
No School Degree	0.02	0.02	0.02	0.01	0.02
Lower Secondary School	0.24	0.26	0.21	0.24	0.24
Middle School	0.40	0.39	0.42	0.37	0.41
Highschool	0.27	0.27	0.28	0.33	0.26
Other School	0.06	0.06	0.07	0.05	0.07
Highest Vocational Degree					
No Vocational Diploma	0.15	0.15	0.16	0.16	0.15
Apprenticeship	0.43	0.43	0.41	0.41	0.43
Higher Technical College	0.28	0.27	0.31	0.28	0.29
College or University Degree	0.24	0.26	0.21	0.26	0.23
In Bad Health	0.14	0.17	0.09	0.16	0.13

Go back to Results

Main Results - Stepwise Inclusion of Controls (All Women)

	Outcome Variable: Labor Force Participation							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
LOC Factor (cont.)	0.026***		0.010**		0.017***		0.011***	
	(0.003)		(0.003)		(0.003)		(0.003)	
Locus of Control Terciles (Ref.: $[LOC_{min}, LOC_{P33}]$)								
$(LOC_{P33}, LOC_{P66}]$		0.041***		0.015*		0.025***		0.020**
		(0.008)		(0.007)		(0.006)		(0.006)
$(LOC_{P66}, LOC_{max}]$		0.056***		0.017*		0.033***		0.020**
		(0.008)		(0.008)		(0.007)		(0.007)
Observations	56,940	56,940	56,940	56,940	56,940	56,940	56,940	56,940
Year Fixed-Effects	✓	✓	✓	✓	✓	✓	✓	✓
Regional Controls	✓	✓	✓	✓	✓	✓	✓	✓
Socio-Demographic Controls			✓	✓	✓	✓	✓	✓
Family Controls					✓	✓	✓	✓
Personality Controls							✓	✓

Source: SOEP, waves 2000 - 2016, version 33, doi:10.5684/soep.v33, own calculations.
Notes: Standard Errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Go back to Main Results

Figure: Heterogeneity Analysis: Age of Children

	Children under 16[1]				Adult Child
	Baby *0-1*	Toddler *1-3*	Pre-School *3-7*	School Age *7-16*	*over 16*
	(1)	(2)	(3)	(4)	(5)
Locus of Control Terciles (Ref.: $[LOC_{min}, LOC_{P33}]$)					
$(LOC_{P33}, LOC_{P66}]$	0.020	0.028	0.019	0.011	0.023*
	(0.024)	(0.024)	(0.017)	(0.013)	(0.010)
$(LOC_{P66}, LOC_{max}]$	0.003	0.031	0.033†	0.022†	0.028*
	(0.024)	(0.024)	(0.018)	(0.014)	(0.011)
Observations	1,554	3,372	7,275	11,998	23,763
LF = 0	1,310	1,738	2,388	1,811	4,141
LF = 1	244 (16%)	1,634 (48%)	4,887 (67%)	10,187 (85%)	19,622 (83%)
All Controls	✓	✓	✓	✓	✓

Source: SOEP, waves 2000 - 2016, version 33, own calculations.
Notes: Standard Errors in parentheses. † $p < 0.1$ * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$
[1] The groups are not mutually exclusive. Women are included if they have at least one child in the respective age-group.

Go back to Additional Results

Figure: Labor Force Activity

	Sample: All Employed								
	Employment			No Marginal			Full-Time		
	All	Kids <16	Cohab.	All	Kids <16	Cohab.	All	Kids <16	Cohab.
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Locus of Control Terciles (Ref.: $[LOC_{min}, LOC_{P33}]$)									
$(LOC_{P33}, LOC_{P66}]$	0.038***	0.041***	0.038***	0.003	-0.001	0.005	-0.016	-0.014	-0.009
	(0.008)	(0.012)	(0.009)	(0.003)	(0.008)	(0.004)	(0.010)	(0.016)	(0.011)
$(LOC_{P66}, LOC_{max}]$	0.039***	0.040**	0.036***	0.003	0.002	0.005	-0.000	0.003	-0.002
	(0.008)	(0.013)	(0.010)	(0.004)	(0.007)	(0.004)	(0.011)	(0.017)	(0.012)
Observations[1]	53,560	20,826	43,166	39,959	13,808	31,397	39,959	13,808	31,397
LF = 0	13,601	7,018	11,769	1,415	812	1,241	14,194	7,265	12,327
LF = 1	39,959	13,808	31,397	38,544	12,996	30,156	25,765	6,543	19,070
	(75%)	(66%)	(73%)	(96%)	(94%)	(96%)	(64%)	(47%)	(61%)
All Controls	✓	✓	✓	✓	✓	✓	✓	✓	✓

Source: SOEP, waves 2000 - 2016, version 33, doi:10.5684/soep.v33, own calculations.
Notes: Standard Errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$
[1] Self-employed are dropped from the sample as working hours cannot be determined for them.

Go back to Additional Results

Figure: Aggregated Participation (Sample: 55+)

	Sample: Cross-Section - Women 55+					
	Years in Labor Force 25-55y			Years Employed 25-55y		
	All	Kids[2]	Cohab.	All	Kids[2]	Cohab.
	(1)	(2)	(3)	(4)	(5)	(6)
Locus of Control Terciles (Ref.: $[LOC_{min}, LOC_{P33}]$)[1]						
$(LOC_{P33}, LOC_{P66}]$	0.241	0.279	0.329	0.840*	0.862*	0.708†
	(0.352)	(0.376)	(0.403)	(0.360)	(0.384)	(0.407)
$(LOC_{P66}, LOC_{max}]$	0.854*	0.683†	0.750†	1.549***	1.373***	1.185**
	(0.372)	(0.396)	(0.423)	(0.381)	(0.404)	(0.428)
Observations	3,232	2,887	2,624	3,232	2,887	2,624
All Controls	✓	✓	✓	✓	✓	✓

Source: SOEP, waves 2000 - 2016, version 33, doi:10.5684/soep.v33, own calculations.
Notes: Standard Errors in parentheses. † $p < 0.1$ * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$
[1] Locus of Control is calculated based on the average over all available LOC observations.
[2] The sub-group consists of all women with any biological children at time t independent from their age.

Go back to Sensitivity

Table: Additional Results (Marginal Effects): Confounders (Sample: All)

	Sample: Ever Employed			Sample: With Partner		
	(1)	(2)	(3)	(4)	(5)	(6)
Locus of Control Terciles (Ref.: $[LOC_{min}, LOC_{P33}]$)						
$[LOC_{P33}, LOC_{P66}]$	0.015**	0.014*	0.012*	0.024**	0.024**	0.025**
	(0.006)	(0.005)	(0.005)	(0.008)	(0.008)	(0.008)
$(LOC_{P66}, LOC_{max}]$	0.019**	0.019**	0.012*	0.028**	0.027**	0.029**
	(0.006)	(0.006)	(0.006)	(0.009)	(0.009)	(0.009)
Observations	53,403	53,403	53,403	39,780	39,780	39,780
All Controls	✓	✓	✓	✓	✓	✓
Occup. Type		✓	✓			
Industry		✓	✓			
Expected Wage			✓			
Partners Wage					✓	✓
Partners LOC						✓

Source: SOEP, waves 2000 - 2016, version 33, own calculations.

Notes: Standard Errors in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Go back to Sensitivity

Figure: Sensitivity Analysis: Locus of Control Measurement

	Full Sample						Filled Employment Sample			
	Baseline		Simple Index[1]		Average[2]		Baseline		Closest Employment[3]	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
LOC Factor (cont.)	0.011***		0.010***		0.012***		0.004***		0.007**	
	(0.003)		(0.003)		(0.004)		(0.002)		(0.002)	
Locus of Control Terciles (Ref.: $[LOC_{min}, LOC_{P33}]$)										
$(LOC_{P33}, LOC_{P66}]$		0.020**		0.022***		0.016*		0.009*		0.015**
		(0.006)		(0.006)		(0.008)		(0.005)		(0.005)
$(LOC_{P66}, LOC_{max}]$		0.020**		0.020**		0.017*		0.011**		0.016**
		(0.007)		(0.007)		0.009)		(0.005)		(0.006)
Observations	56,940	56,940	56,940	56,940	56,940	56,940	49,801	49,801	49,801	49,801
All Controls	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Source: SOEP, waves 2000 - 2016, version 33, doi:10.5684/soep.v33, own calculations.
Notes: Standard Errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$
[1] LOC Factor for each year is calculated using a simple average of all 8 items. The Index is then imputed using the same rule as in the baseline.
[2] LOC Factor is calculated for each year as in the baseline but is imputed as an average over all available LOC observations.
[3] LOC Factor is calculated for each year as in the baseline but is imputed from the closest LOC observation in which the individual was employed or self-employed and not from the last LOC observations.

Go back to Sensitivity

Figure: Sensitivity Analysis: Estimation Method

	Random Effects Logit		Linear Random Effects		Linear Probability Clustered SE	
	(1)	(2)	(3)	(4)	(5)	(6)
LOC Factor (cont.)	0.008***		0.007***		0.010**	
	(0.002)		(0.002)		(0.003)	
Locus of Control Terciles (Ref.: $[LOC_{min}, LOC_{P33}]$)						
$(LOC_{P33}, LOC_{P66}]$		0.013***		0.011**		0.019**
		(0.003)		(0.004)		(0.007)
$(LOC_{P66}, LOC_{max}]$		0.015***		0.015***		0.018*
		(0.004)		(0.004)		(0.007)
Observations	56,940	56,940	56,940	56,940	56,940	56,940
All Controls	✓	✓	✓	✓	✓	✓

Source: SOEP, waves 2000 - 2016, version 33, own calculations.
Notes: Standard Errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Go back to Sensitivity

Figure: Sensitivity Analysis: Sample 25 - 55

	All		Non-Cohabiting		Cohabiting	
	Children under 16		Children under 16		Children under 16	
	No	Yes	No	Yes	No	Yes
Locus of Control Terciles (Ref.: $[LOC_{min}, LOC_{P33}]$)						
$(LOC_{P33}, LOC_{P66}]$	0.010	0.025*	-0.008	0.038*	0.018*	0.023
	(0.007)	(0.011)	(0.007)	(0.017)	(0.009)	(0.011)
$(LOC_{P66}, LOC_{max}]$	0.007	0.028*	-0.008	0.018	0.012	0.028*
	(0.007)	(0.011)	(0.007)	(0.020)	(0.010)	(0.012)
Observations	25,967	22,051	6,715	2,816	19,252	19,235
All Controls	✓	✓	✓	✓	✓	✓

Source: SOEP, waves 2000 - 2016, version 33, doi:10.5684/soep.v33, own calculations.
Notes: Standard Errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$