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THE INDEPENDENT WOMAN - LOCUS OF CONTROL AND FEMALE LABOR FORCE PARTICIPATION

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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 → Unobserved beliefs and expectations
 - Unobserved inherent preferences

The Role of Psychology in Economic Models

- **Traditional Approach:** Personality traits as “non-cognitive skills”
⇒ Determinants of monetary constraints and opportunities
- **Modern Approach:** Behavioral implications of personality traits
⇒ 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

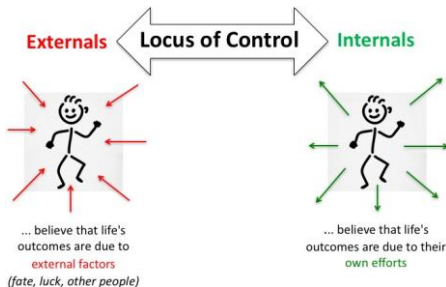
Can the personality trait **locus of control (LOC)** contribute to the explanation of heterogeneity in female participation decisions?

- 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)

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

Data and Outcome Variables

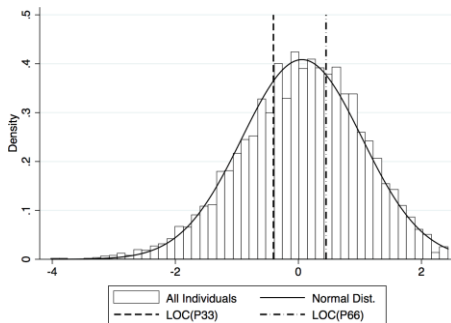
- Data - German Socio-Economic Panel (SOEP) 2000 - 2015



- 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 - 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.

Estimation Strategy

- Binary Logit Model

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

- 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)

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** (0.008) | 0.011 (0.008) | 0.038** (0.013) | 0.010 (0.011) | 0.011 (0.009) |
| $(LOC_{P66}, LOC_{max}]$ | 0.023** (0.009) | 0.011 (0.009) | 0.026 [†] (0.015) | 0.018 (0.012) | 0.018* (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 

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).

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.

► 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

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

- 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

$$\frac{\partial^2 U_i}{\partial P_i \partial \theta_i} > 0. \quad (1)$$

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

$$\frac{\partial^2 U_i}{\partial H_i \partial \theta_i} > 0. \quad (2)$$

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

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

► Go back to Data

Figure: Components of Locus of Control (not imputed)

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

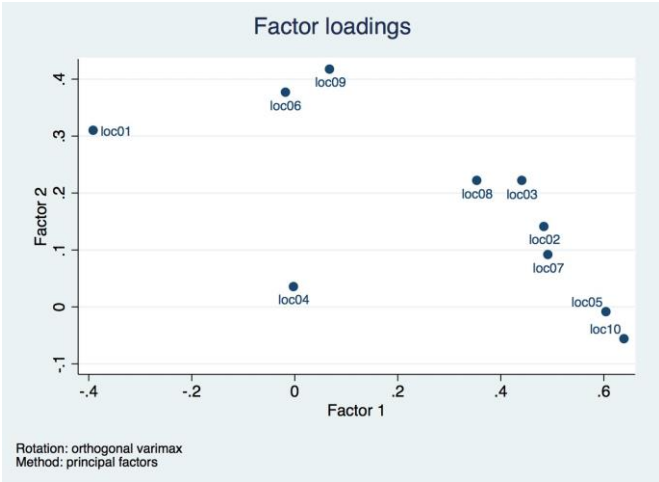
| No | Item | mean | SD |
|--------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|--------|
| Q: | The following 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.

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 | |
|----------------------------------|--------|-------------------|------------|------------|------------|
| | (1) | No (2) | Yes (3) | No (4) | Yes (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.

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Descriptive Statistics II

| | All | Children under 16 | | Cohabiting | |
|-----------------------------------|------|-------------------|------------|------------|------------|
| | (1) | No (2) | Yes (3) | No (4) | Yes (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 |

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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*** (0.003) | | 0.010** (0.003) | | 0.017*** (0.003) | | 0.011*** (0.003) | |
| Locus of Control Terciles (Ref.: [LOC_{min} , LOC_{P33}]) | | | | | | | | |
| (LOC_{P33} , LOC_{P66}] | | 0.041*** (0.008) | | 0.015* (0.007) | | 0.025*** (0.006) | | 0.020** (0.006) |
| (LOC_{P66} , LOC_{max}] | | 0.056*** (0.008) | | 0.017* (0.008) | | 0.033*** (0.007) | | 0.020** (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. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

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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 (0.024) | 0.028 (0.024) | 0.019 (0.017) | 0.011 (0.013) | 0.023* (0.010) |
| (LOC_{P66} , LOC_{max}] | 0.003 (0.024) | 0.031 (0.024) | 0.033 [†] (0.018) | 0.022 [†] (0.014) | 0.028* (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*** (0.008) | 0.041*** (0.012) | 0.038*** (0.009) | 0.003 (0.003) | -0.001 (0.008) | 0.005 (0.004) | -0.016 (0.010) | -0.014 (0.016) | -0.009 (0.011) |
| (LOC_{P66} , LOC_{max}) | 0.039*** (0.008) | 0.040** (0.013) | 0.036*** (0.010) | 0.003 (0.004) | 0.002 (0.007) | 0.005 (0.004) | -0.000 (0.011) | 0.003 (0.017) | -0.002 (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 (75%) | 13,808 (66%) | 31,397 (73%) | 38,544 (96%) | 12,996 (94%) | 30,156 (96%) | 25,765 (64%) | 6,543 (47%) | 19,070 (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.

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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** (0.006) | 0.014* (0.005) | 0.012* (0.005) | 0.024** (0.008) | 0.024** (0.008) | 0.025** (0.008) |
| (LOC_{P66} , LOC_{max}] | 0.019** (0.006) | 0.019** (0.006) | 0.012* (0.006) | 0.028** (0.009) | 0.027** (0.009) | 0.029** (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. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

