Bargaining over Babies

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The Question

- To make a baby, two people have to participate.
- Suggests that for a birth to take place, agreement is essential: both mother and father have to prefer the baby over the status quo.
- Question: Is the need for agreement important for understanding fertility choice in the data?

The Plan

- Document importance of agreement in data on fertility preferences and outcomes.
- Build a bargaining model of fertility that incorporates a need for agreement.
- Match the model to the data.
- Compare the effects of alternative policies designed to increase fertility.

Data from the Gender and Generations Programme (GGP)

- Longitudinal Survey of 18-79 year olds in 19 countries.
- Wave I (2003-2009) contains questions on fertility preferences:
  - *Do You Yourself Want Another Baby Now?*
  - *Does Your Partner Want Another Baby Now?*
- Wave II (2007-ongoing) contains information on subsequent fertility outcomes.

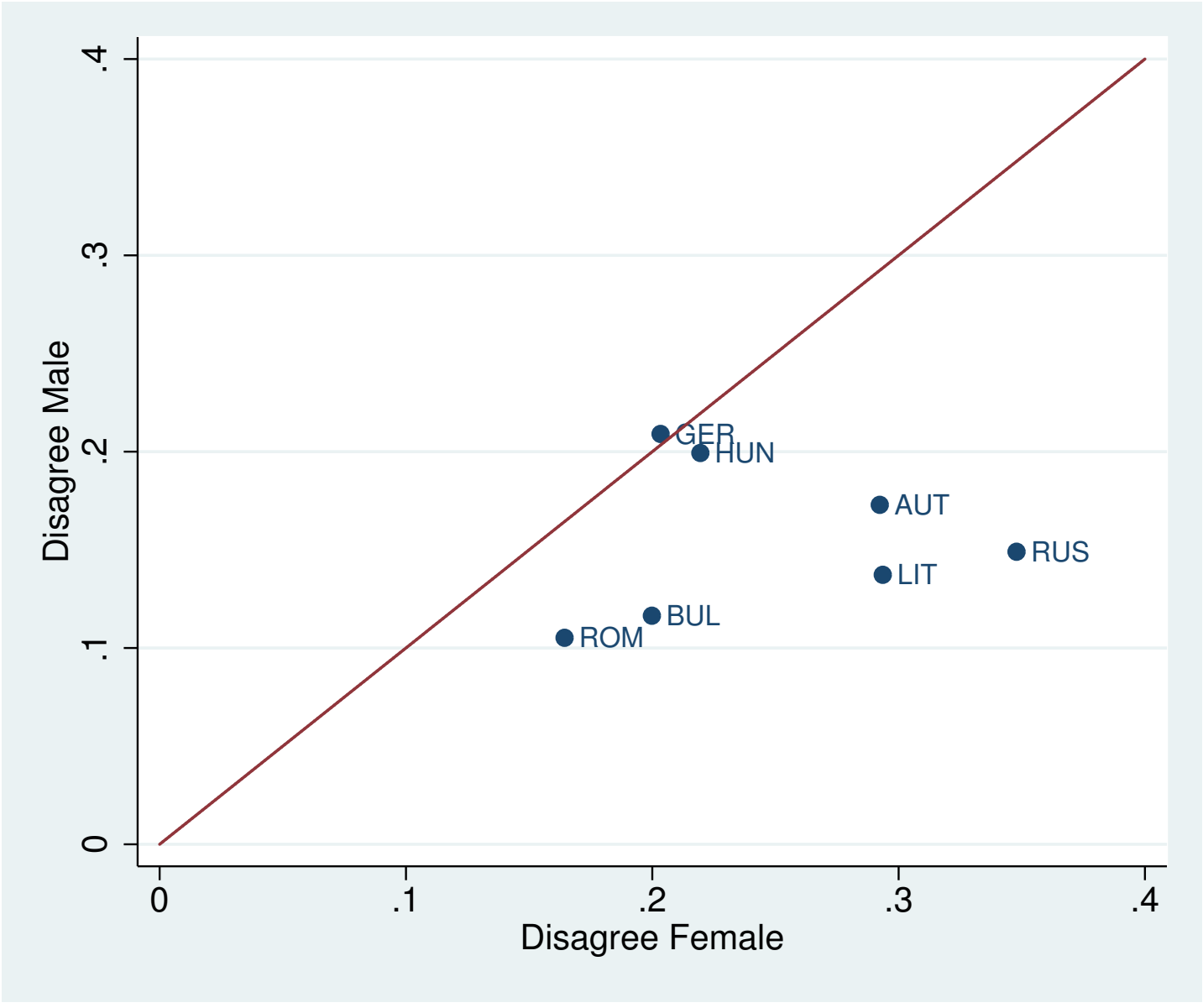
GGP Data on Fertility Intentions

- Four possible states for a couple:
  - Neither wants a baby.
  - Both want a baby (AGREE).
  - She wants a baby, he does not (HE NO).
  - He wants a baby, she does not (SHE NO).
- Measure disagreement as a fraction of all couples where at least one spouse wants a baby:

$$\text{DISAGREE MALE} = \frac{\text{HE NO}}{\text{AGREE} + \text{HE NO} + \text{SHE NO}},$$

$$\text{DISAGREE FEMALE} = \frac{\text{SHE NO}}{\text{AGREE} + \text{HE NO} + \text{SHE NO}}.$$

GGP Data on Fertility Intentions



GGP Data on Fertility Intentions and Outcomes

- Fertility outcomes available for Germany and Bulgaria.
- Regress birth outcome on her intent, his intent, and an interaction term:

	Coefficient	Standard Error
fintent	0.091***	(0.028)
mintent	0.058**	(0.023)
fintent$\times$mintent	0.113***	(0.037)

GGP Data on Fertility Intentions and Outcomes

- Compute fertility rates for each combination of female and male intent.
- Bulgaria:

	mintent	
fintent	0	1
0	0.05	0.10
1	0.12	0.27

- Germany:

	mintent	
fintent	0	1
0	0.09	0.18
1	0.20	0.52

Data from the German Socioeconomic Panel (SOEP)

- Large panel with information on fertility, eduction, and economic variables.
- Fertility preference question:
  - *How important are the following things to you today: [. . .] Have children?*
- Both spouses observed individually.

SOEP Data on Fertility Intentions and Outcomes

- Frequency of intentions:

	mintent	
fintent	0	1
0	0.184	0.084
1	0.116	0.616

- Regression of fertility on intent:

	Coefficient	Standard Error
fintent	0.041**	(0.017)
mintent	0.014	(0.015)
fintent×mintent	0.086***	(0.023)

SOEP Data on Fertility Intentions and Outcomes

- Fertility rate for each combination of female and male intent:

	mintent	
fintent	0	1
0	0.02	0.03
1	0.06	0.16

- Average female income for each combination of female and male intent (in EUR/month):

	mintent	
fintent	0	1
0	1,494	1,580
1	1,300	1,388

A Simple Bargaining Model of Fertility Choice

- Couple consisting of wife and husband.
- Market wages w_f and w_m with $w_f \leq w_m$.
- Decide on consumption allocation and on whether to have a child, $n \in \{0, 1\}$.
- Returns to scale in joint consumption: Effective resources increase by factor $\alpha > 0$ if couple cooperates.
- Child requires time cost ϕ.
- Preferences of spouse $g \in \{f, m\}$ are:

$$u_g(c_g, n) = c_g + nv_g,$$

Where v_g is utility derived from child.

A Simple Bargaining Model of Fertility Choice

- Decisions made through Nash bargaining. Outside option is non-cooperation within marriage (Lundberg and Pollak 1993).
- Under commitment, (future) consumption and fertility are chosen simultaneously. Outside options:

$$\bar{u}_f = w_f, \quad \bar{u}_m = w_m.$$

- Without commitment, ex-post bargaining over consumption given sunk fertility choice. Outside options as a function of n:

$$\bar{u}_f(0) = w_f, \quad \bar{u}_m(0) = w_m,$$

$$\bar{u}_f(1) = (1-\phi)w_f + v_f, \quad \bar{u}_m(1) = w_m + v_m.$$

Outcome Under Commitment

- The couple solves:

$$\max_{n,c_f,c_m} \left\{ \left(u_f(c_f,n) - \bar{u}_f\right)^{\frac{1}{2}} \left(u_m(c_m,n) - \bar{u}_m\right)^{\frac{1}{2}} \right\}$$

subject to:

$$c_f + c_m = (1+\alpha)\left((1-\phi n)w_f + w_m\right).$$

Outcome Under Commitment

- Couple will have a child if:

$$v_f + v_m \geq (1+\alpha)\phi w_f .$$

- Couple agrees on fertility and choice is efficient.
- The bargaining solution is:

$$c_f + n v_f = w_f + \frac{\alpha}{2}\left((1-\phi n) w_f + w_m\right) + \frac{n}{2}\left(v_f + v_m - \phi w_f\right),$$

$$c_m + n v_m = w_m + \underbrace{\frac{\alpha}{2}\left((1-\phi n) w_f + w_m\right)}_{\text{Surplus from Consumption}} + \underbrace{\frac{n}{2}\left(v_f + v_m - \phi w_f\right)}_{\text{Surplus from Fertility}}.$$

Outcome Without Commitment

- Two-stage decision:
  1. Decide on fertility.
  2. Ex-post bargaining given fertility choice.
- Solve backwards.
- Let $U_g(n)$ denote ex-post utility of spouse g given fertility choice n.
- Ex-post utilities for $n = 0$, given outside options $\bar{u}_f(0) = w_f$, $\bar{u}_m(0) = w_m$:

$$U_f(0) = w_f + \frac{\alpha}{2}(w_f + w_m),$$

$$U_m(0) = w_m + \frac{\alpha}{2}(w_f + w_m).$$

Outcome Without Commitment

- Ex-post utilities for $n = 1$, given outside options $\bar{u}_f(1) = (1-\phi)w_f + v_f$, $\bar{u}_m(1) = w_m + v_m$:

$$U_f(1) = (1-\phi)w_f + v_f \quad + \frac{\alpha}{2}\left((1-\phi)w_f + w_m\right),$$
$$U_m(1) = w_m + v_m \quad + \frac{\alpha}{2}\left((1-\phi)w_f + w_m\right).$$

- Spouses still share consumption surplus equally, but wife is not compensated for reduction in her outside option.

Fertility Choice Without Commitment

- Spouses have to agree for child to be born:

$$n = \begin{cases} 1 & \text{if} \quad U_f(1) \geq U_f(0) \text{ and } U_m(1) \geq U_m(0), \\ 0 & \text{else.} \end{cases}$$

- Wife agrees to birth if:

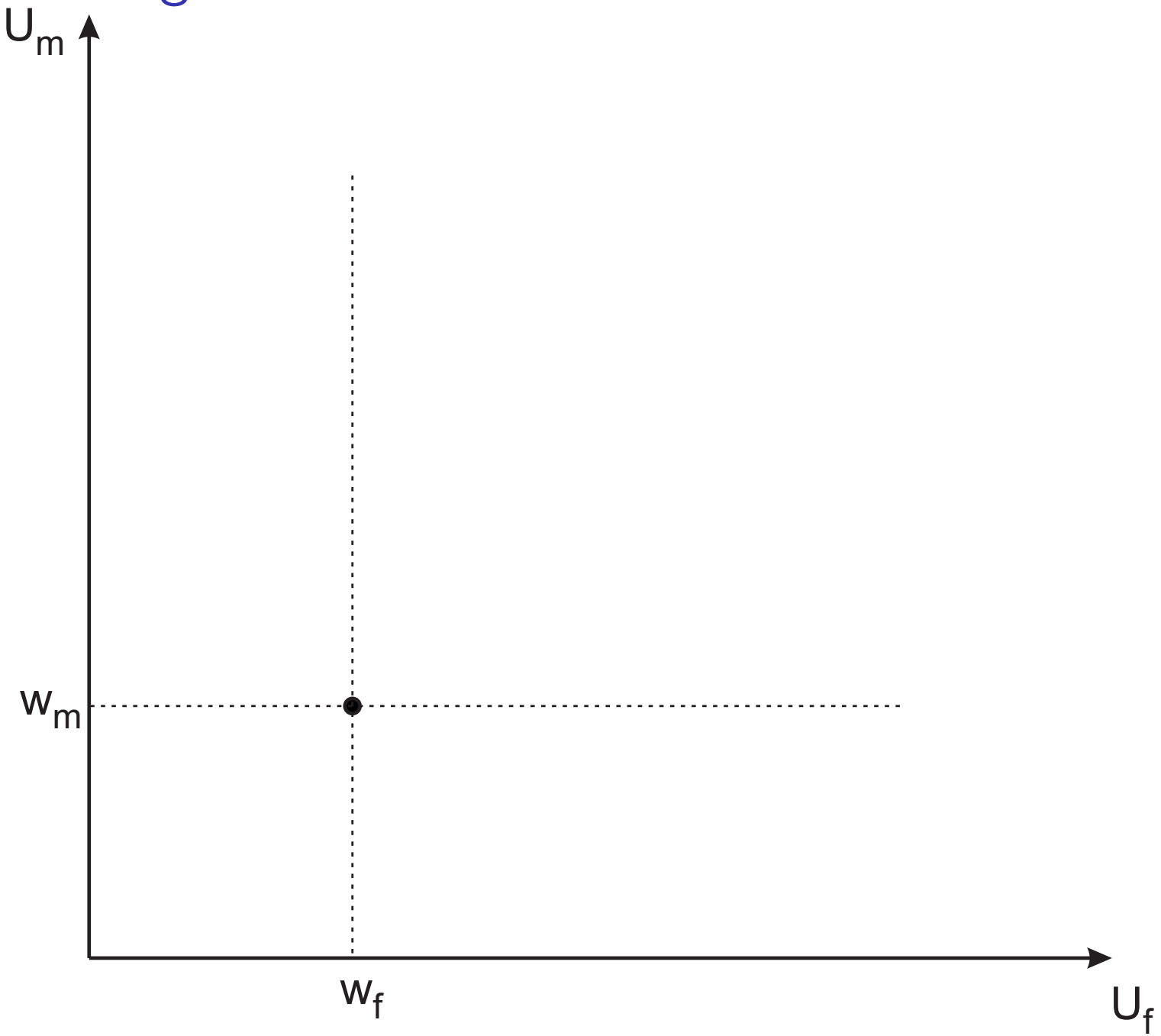
$$v_f \geq \left(1 + \frac{\alpha}{2}\right) \phi w_f .$$

- Husband agrees to birth if:

$$v_m \geq \frac{\alpha}{2} \phi w_f .$$

- Disagreement is possible and outcome may be inefficient.

Child Bearing Decisions With and Without Commitment



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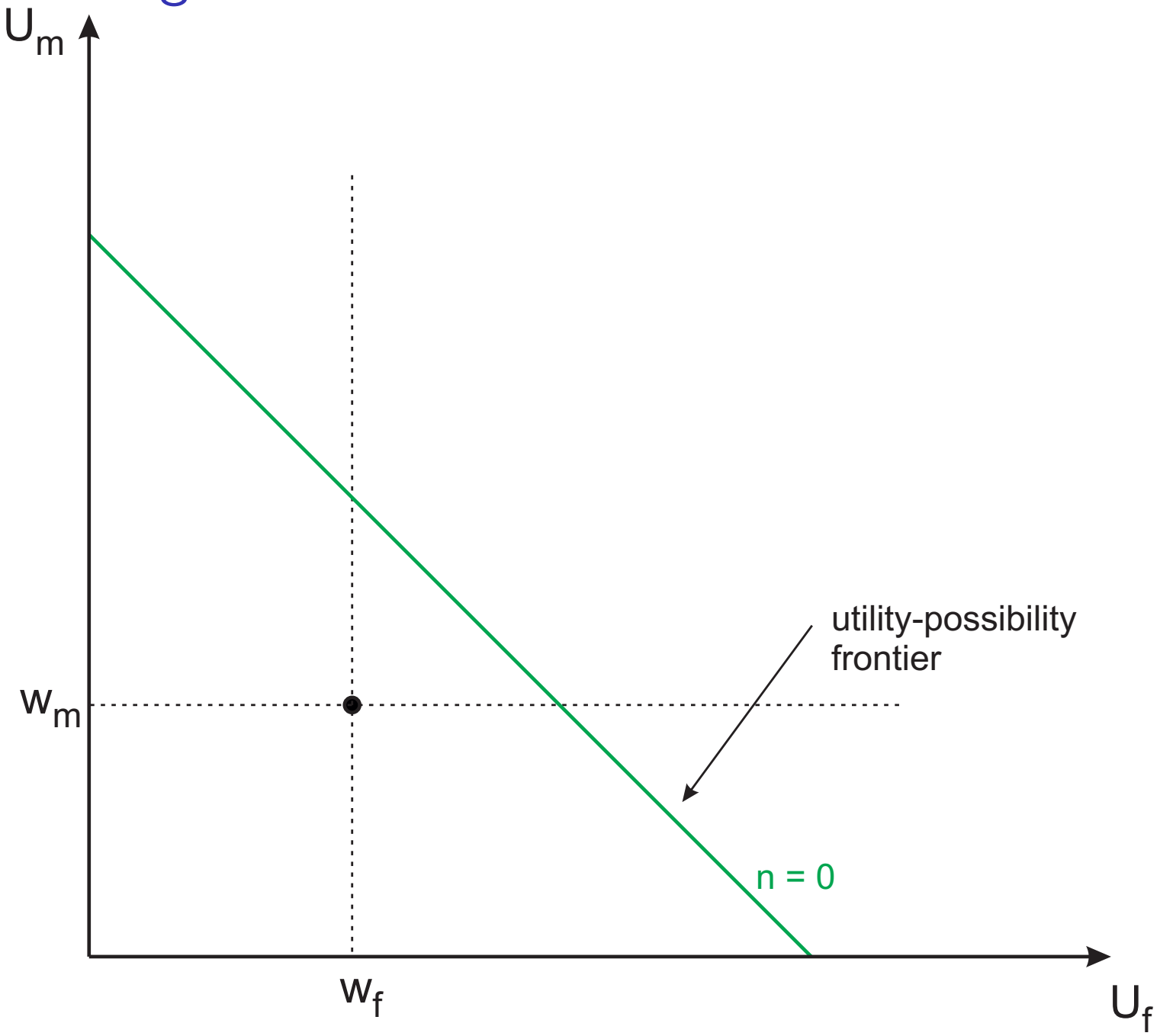

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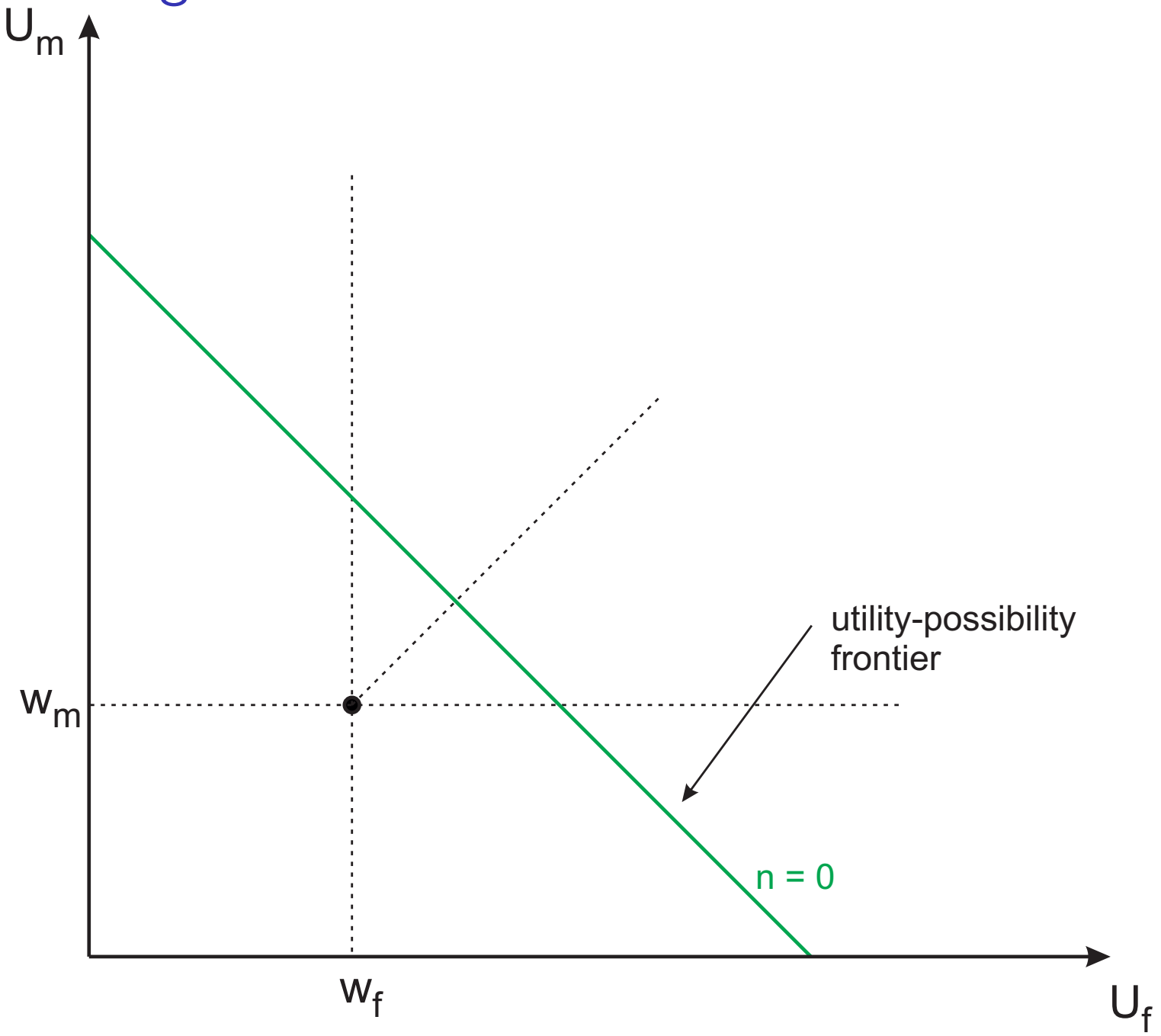

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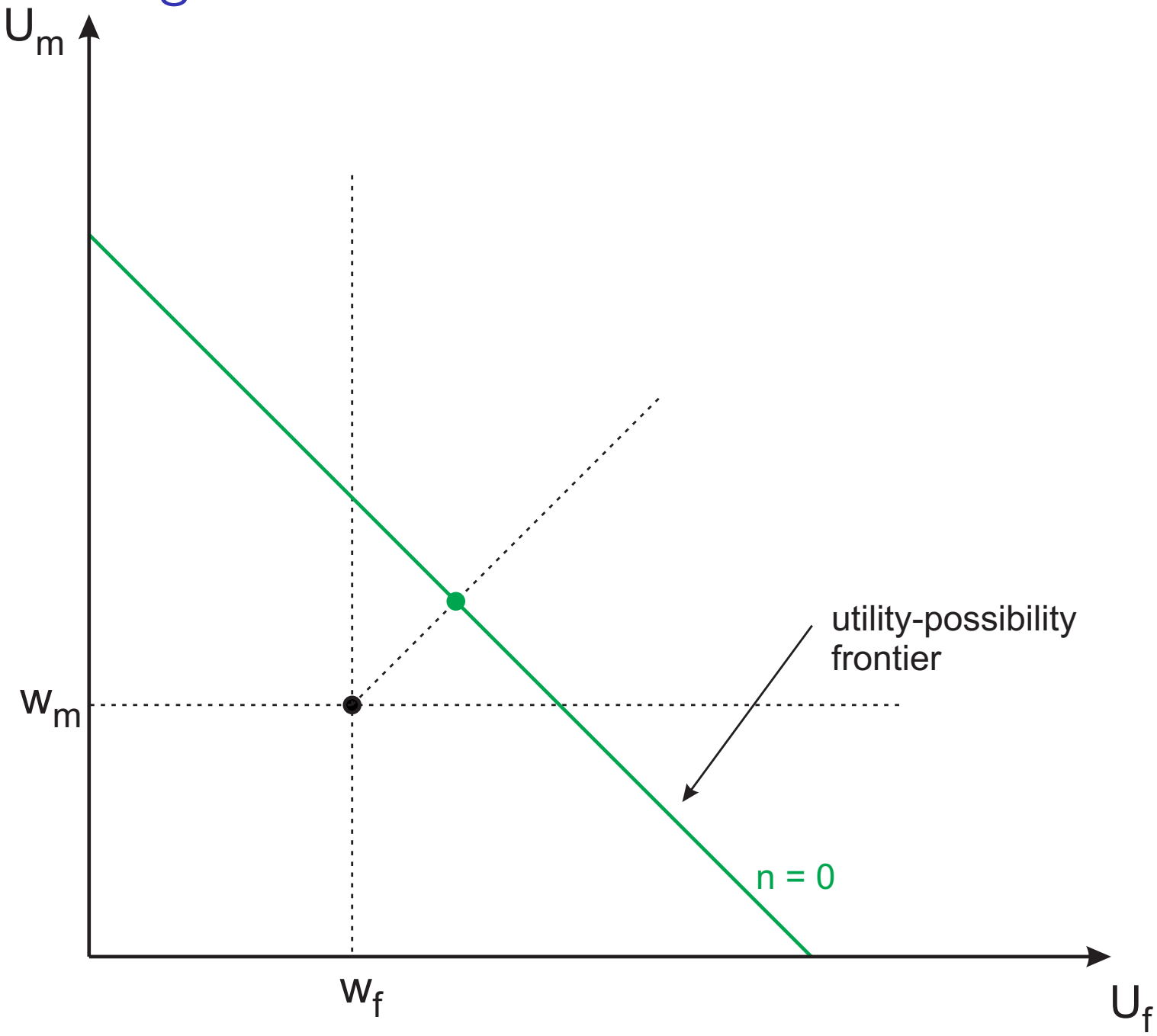

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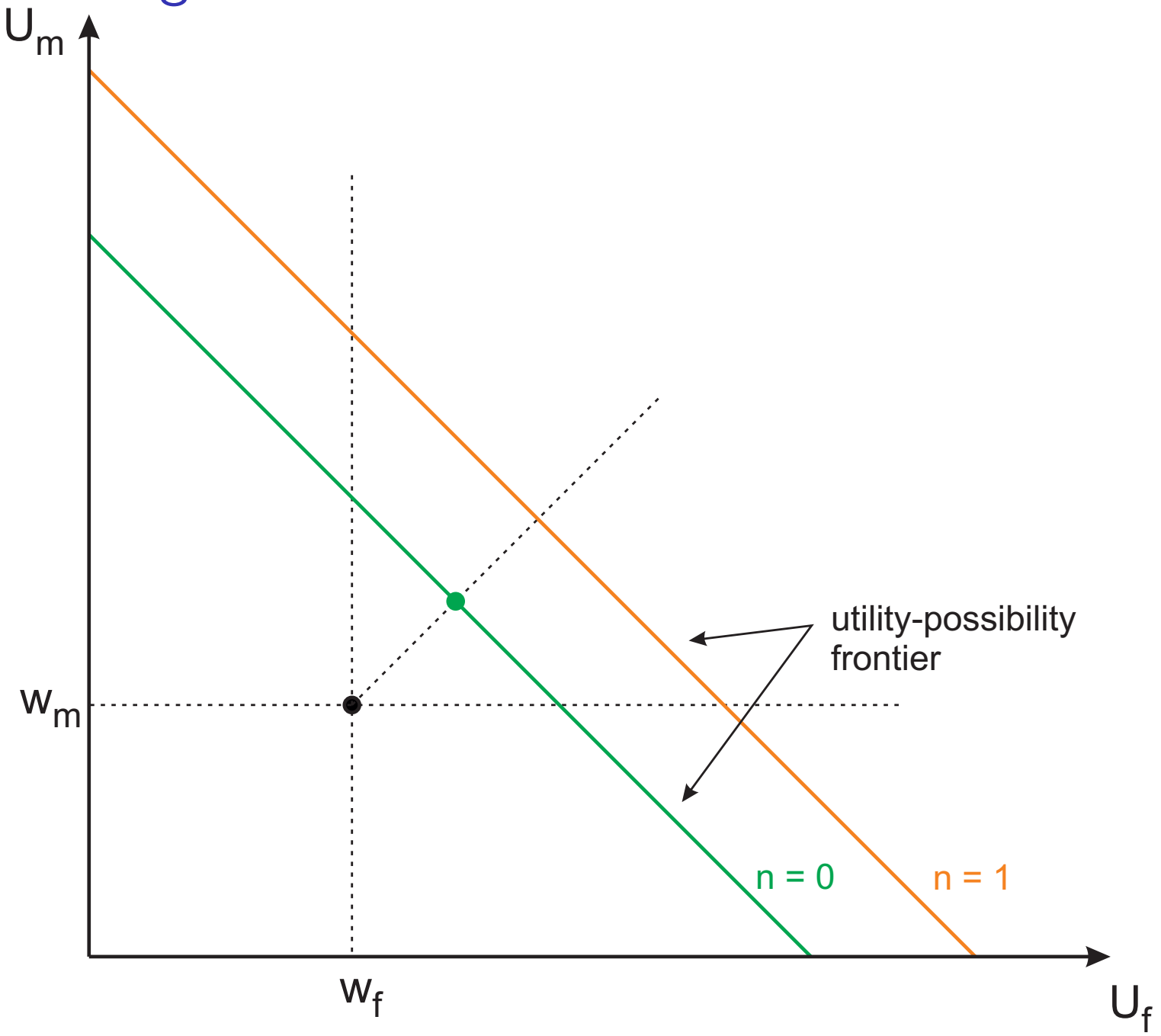

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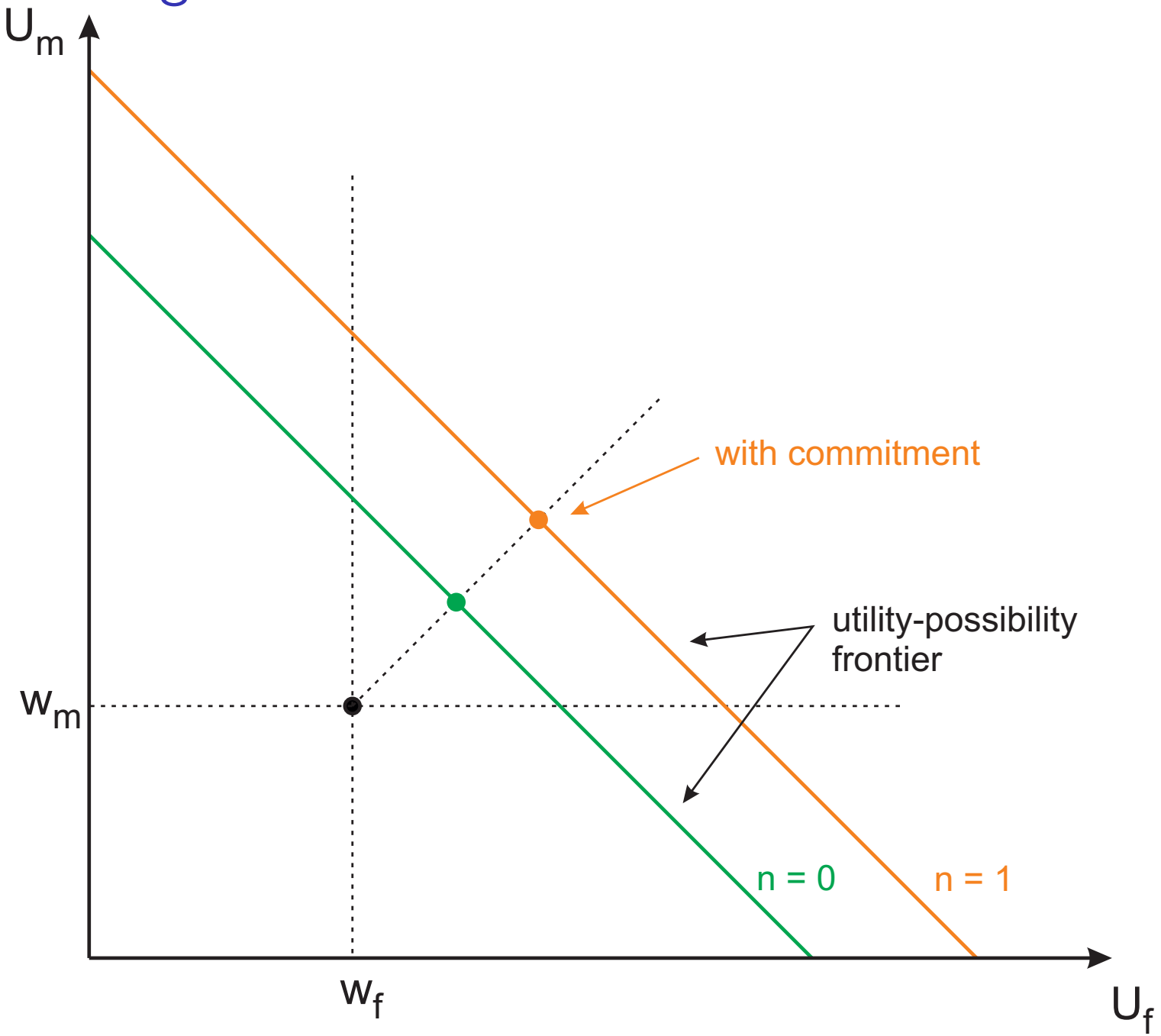

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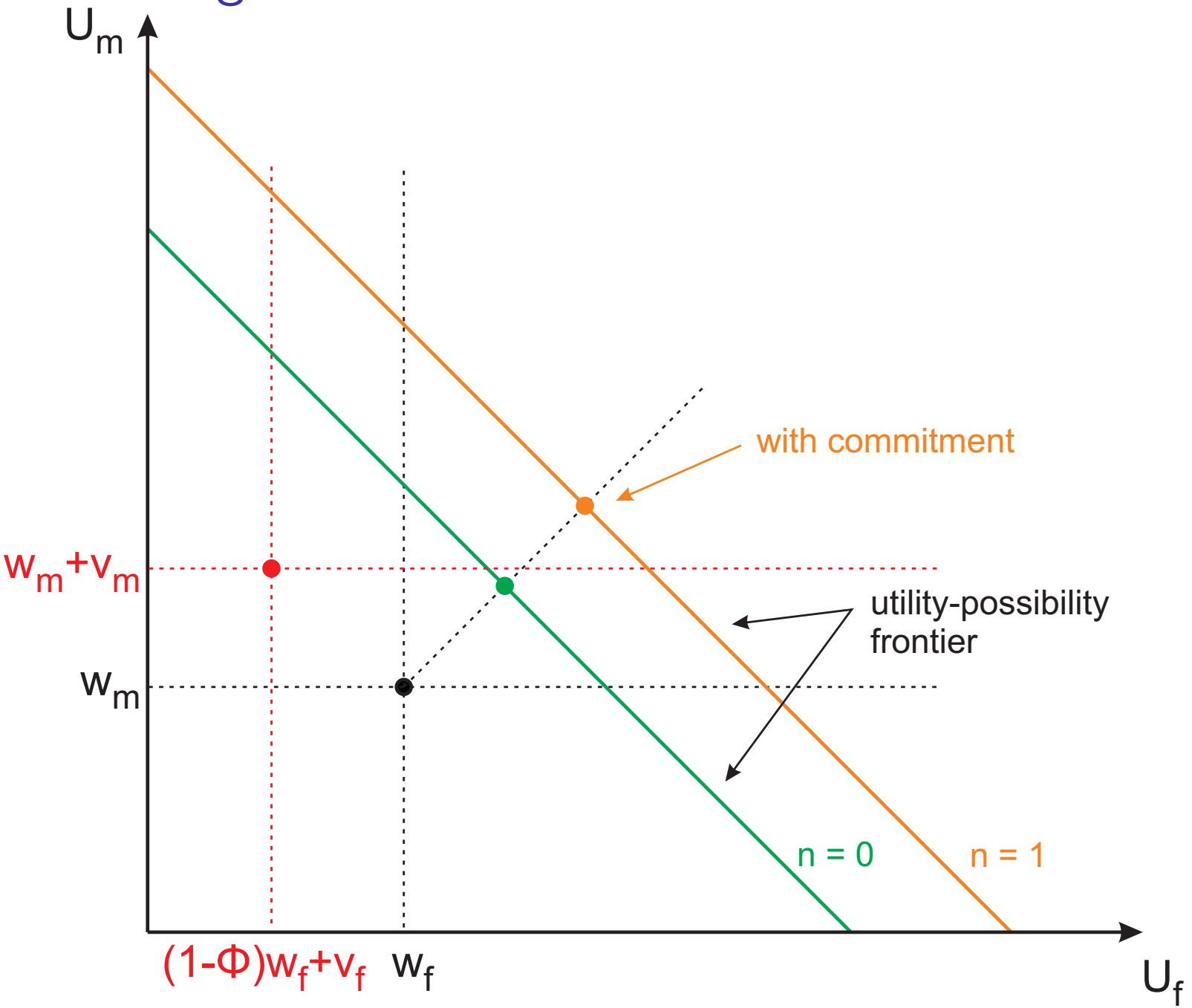

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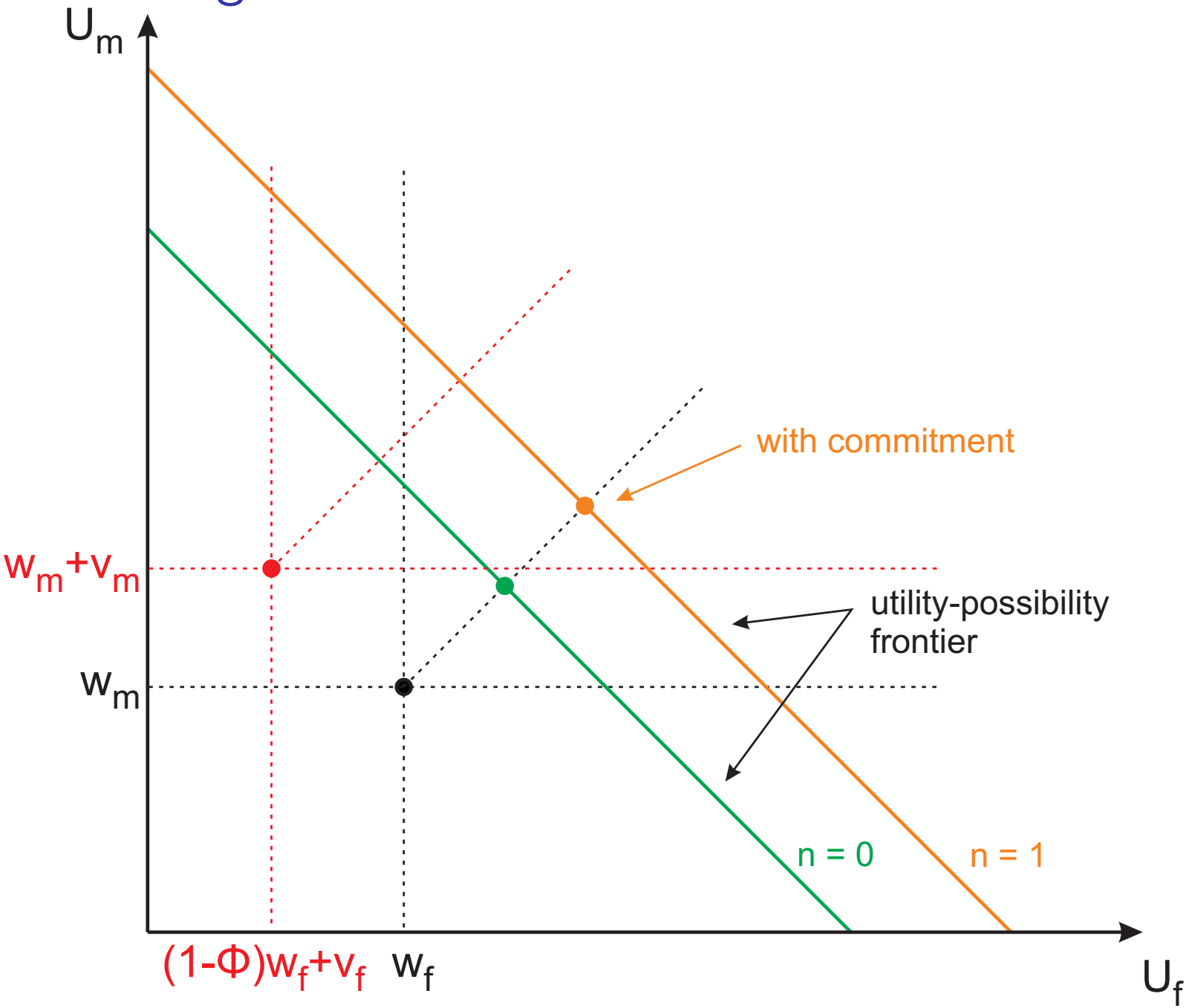

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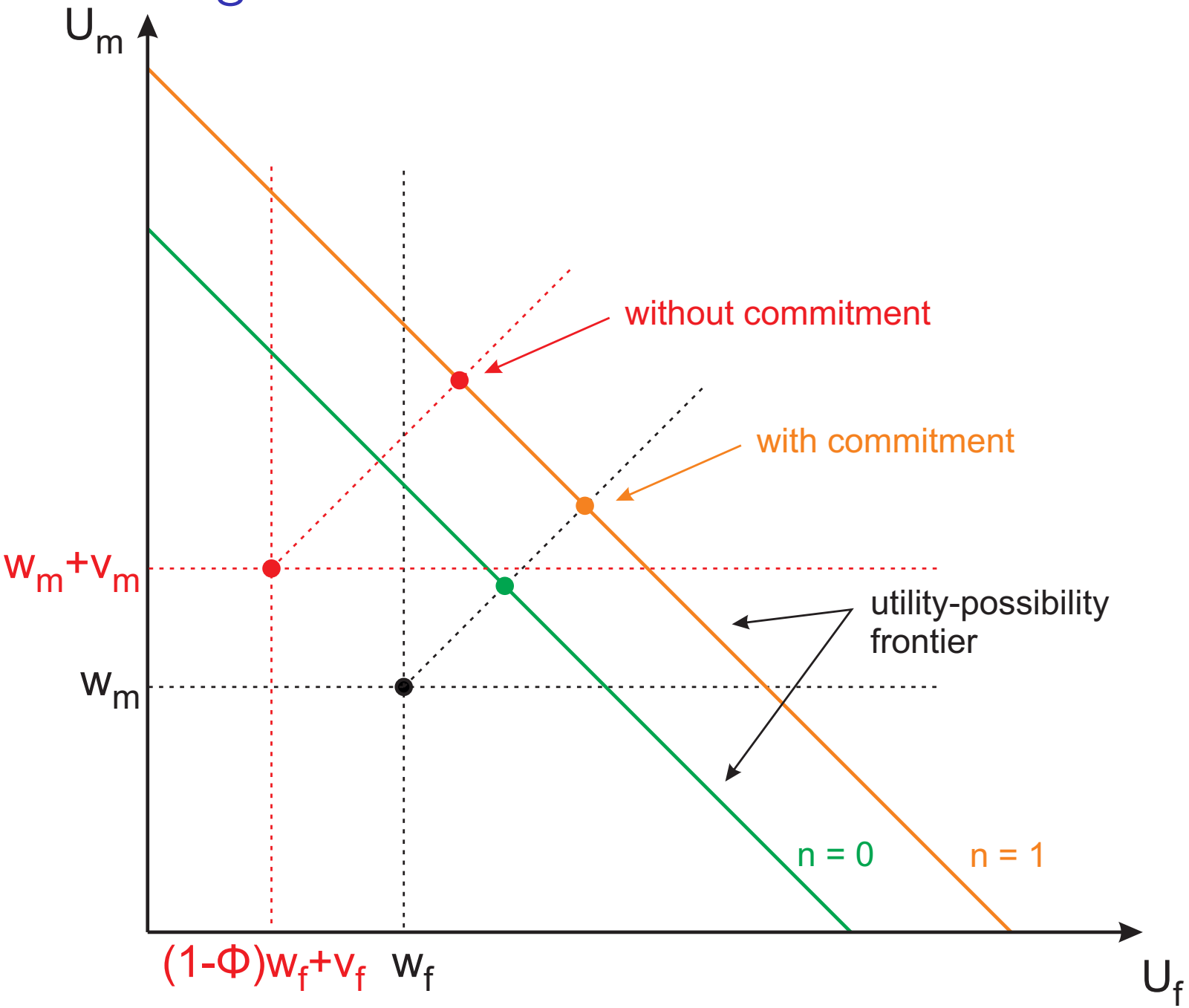


Allowing for Altruism to Match Choice Data

- In data, at least some couples have babies even though they disagree. Match this through altruism ("love").
- Altruism weight is λ. Value function given n:

$$V_f(n) = U_f(n) + \lambda U_m(n),$$
$$V_m(n) = U_m(n) + \lambda U_f(n).$$

- Spouses have to agree for child to be born:

$$n = \begin{cases} 1 & \text{if} \quad V_f(1) \geq V_f(0) \text{ and } V_m(1) \geq V_m(0), \\ 0 & \text{else.} \end{cases}$$

- However, spouse g reports desire to have a child if:

$$U_g(1) \geq U_g(0).$$

- Can choose λ to match probability of having a child conditional on disagreement.

Desire and Child Bearing Conditions with Altruism

- Wife desires to have a child

$$v_f \geq \left(1 + \frac{\alpha}{2}\right) \phi w_f .$$

- Husband desires to have a child

$$v_m \geq \frac{\alpha}{2} \phi w_f .$$

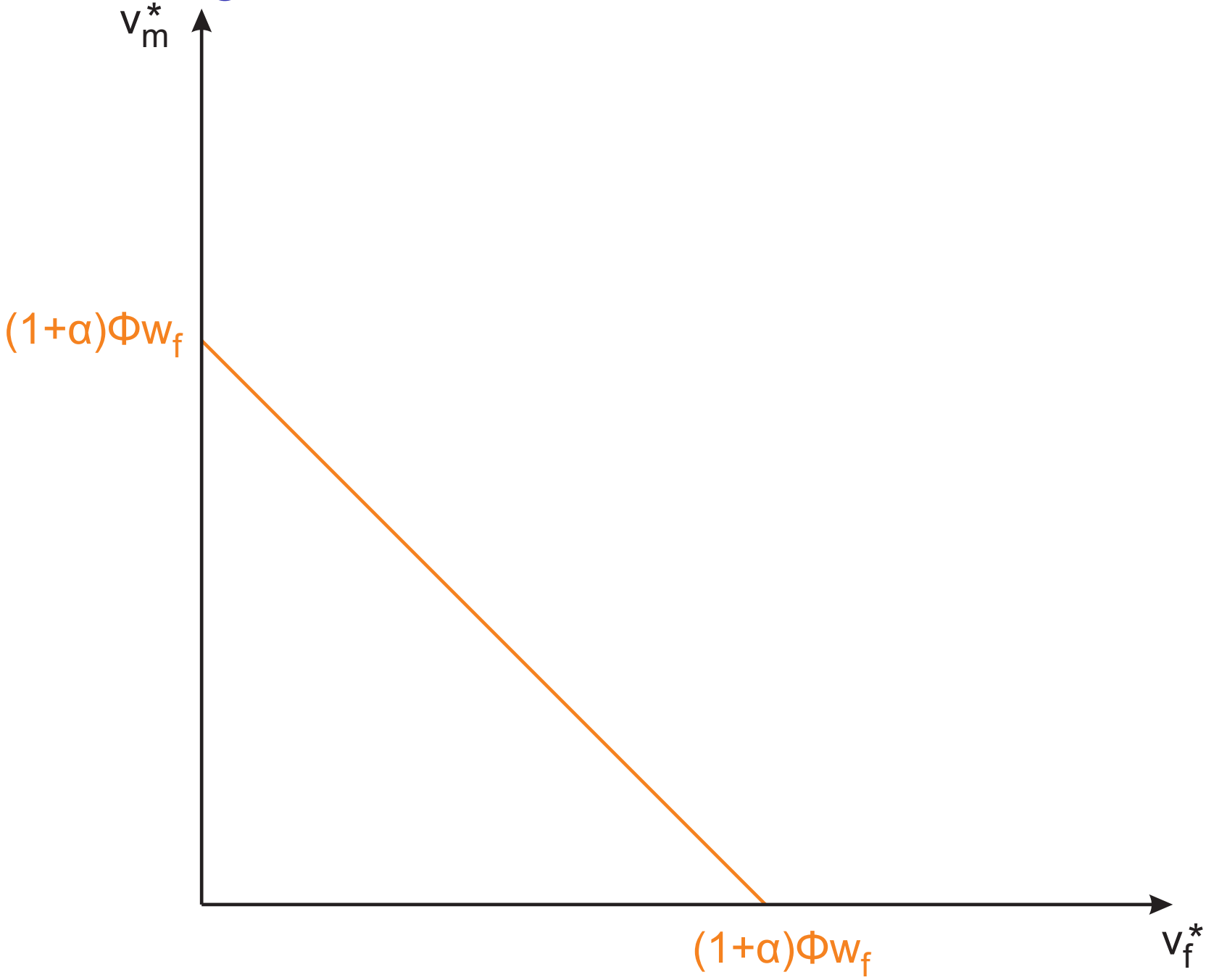
- Wife agrees to have a child

$$v_f + \lambda v_m \geq \left(1 + \frac{\alpha}{2}\right) \phi w_f + \lambda \frac{\alpha}{2} \phi w_f .$$

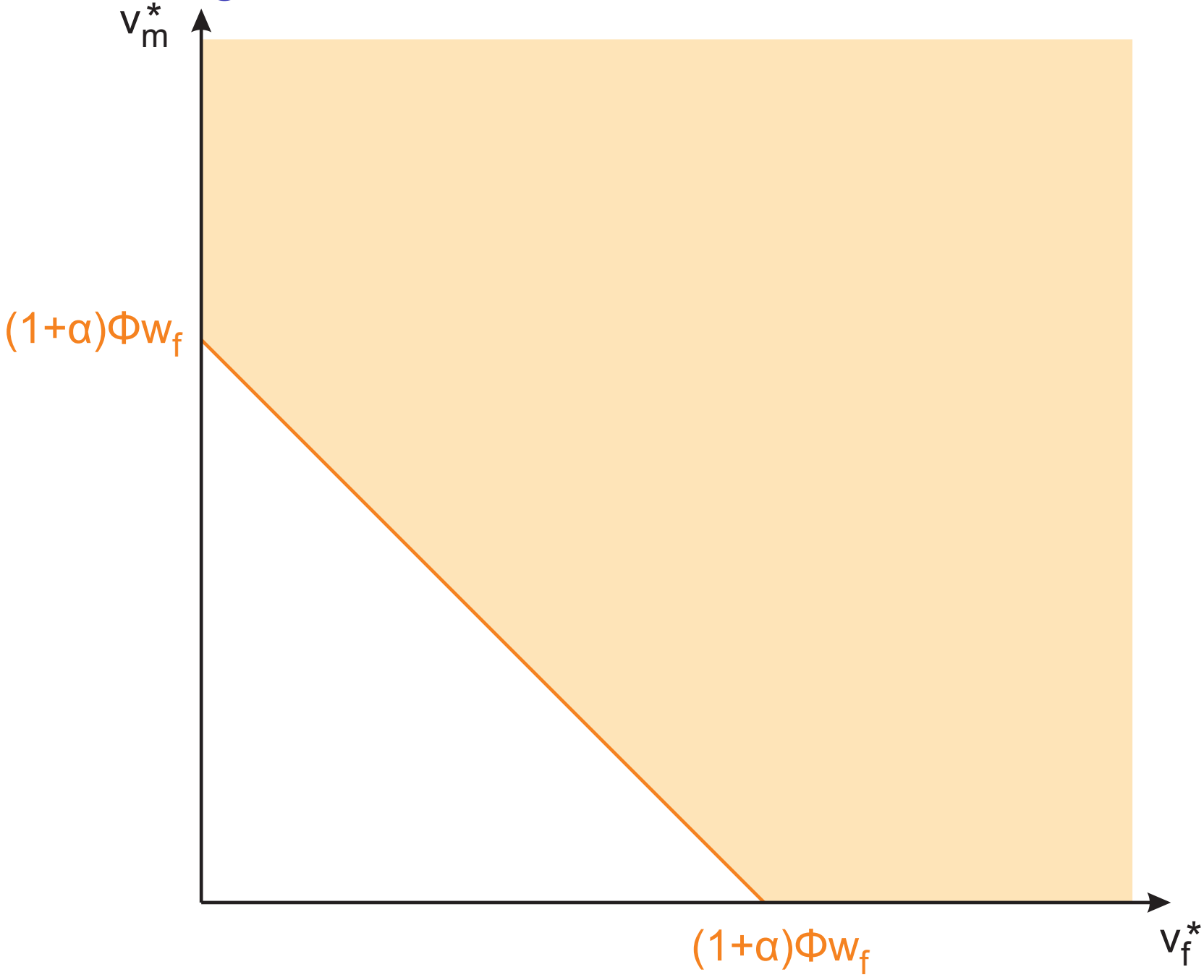
- Husband agrees to have a child

$$v_m + \lambda v_f \geq \frac{\alpha}{2} \phi w_f + \lambda \left(1 + \frac{\alpha}{2}\right) \phi w_f .$$

Child Bearing vs. Desire



Child Bearing vs. Desire



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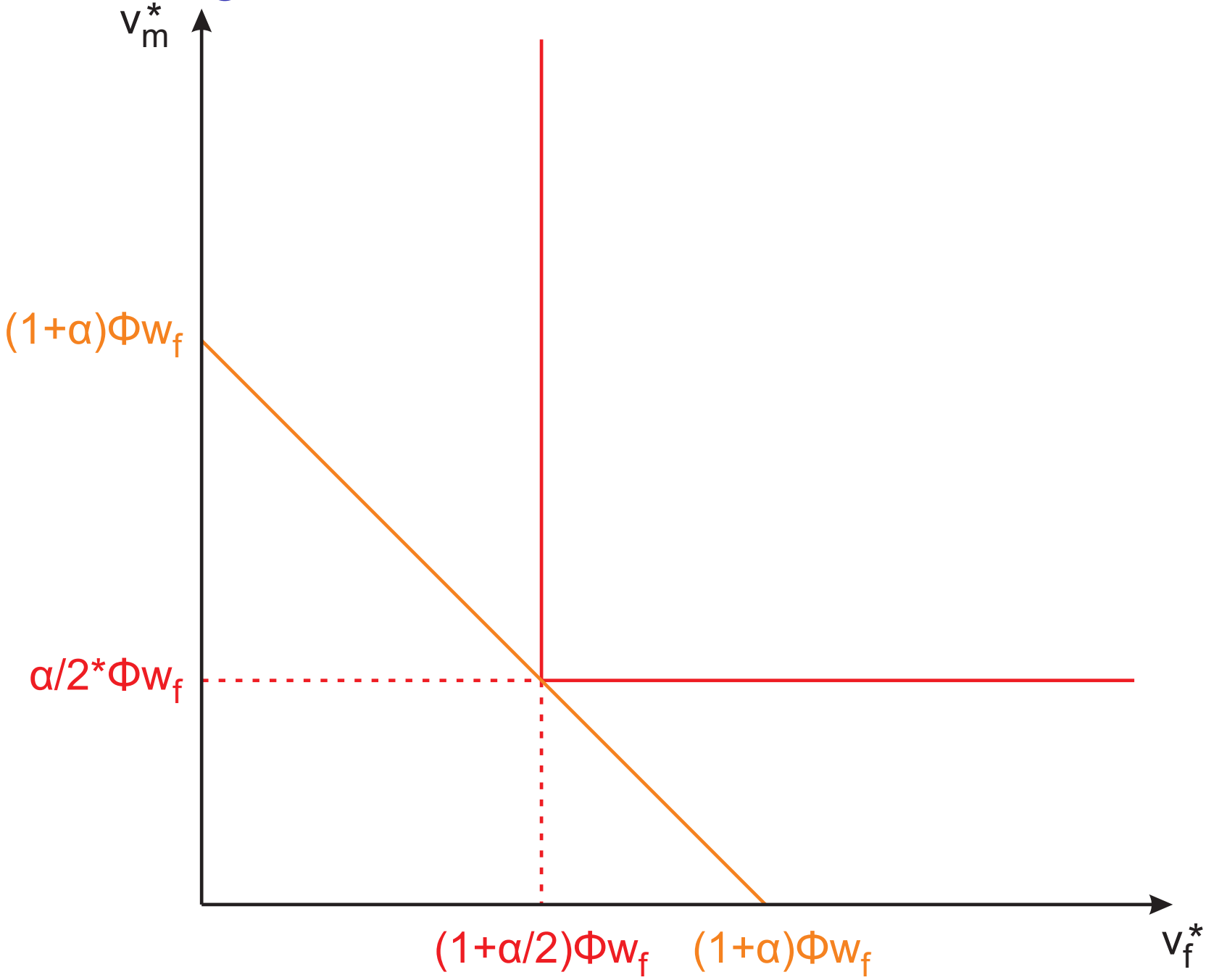

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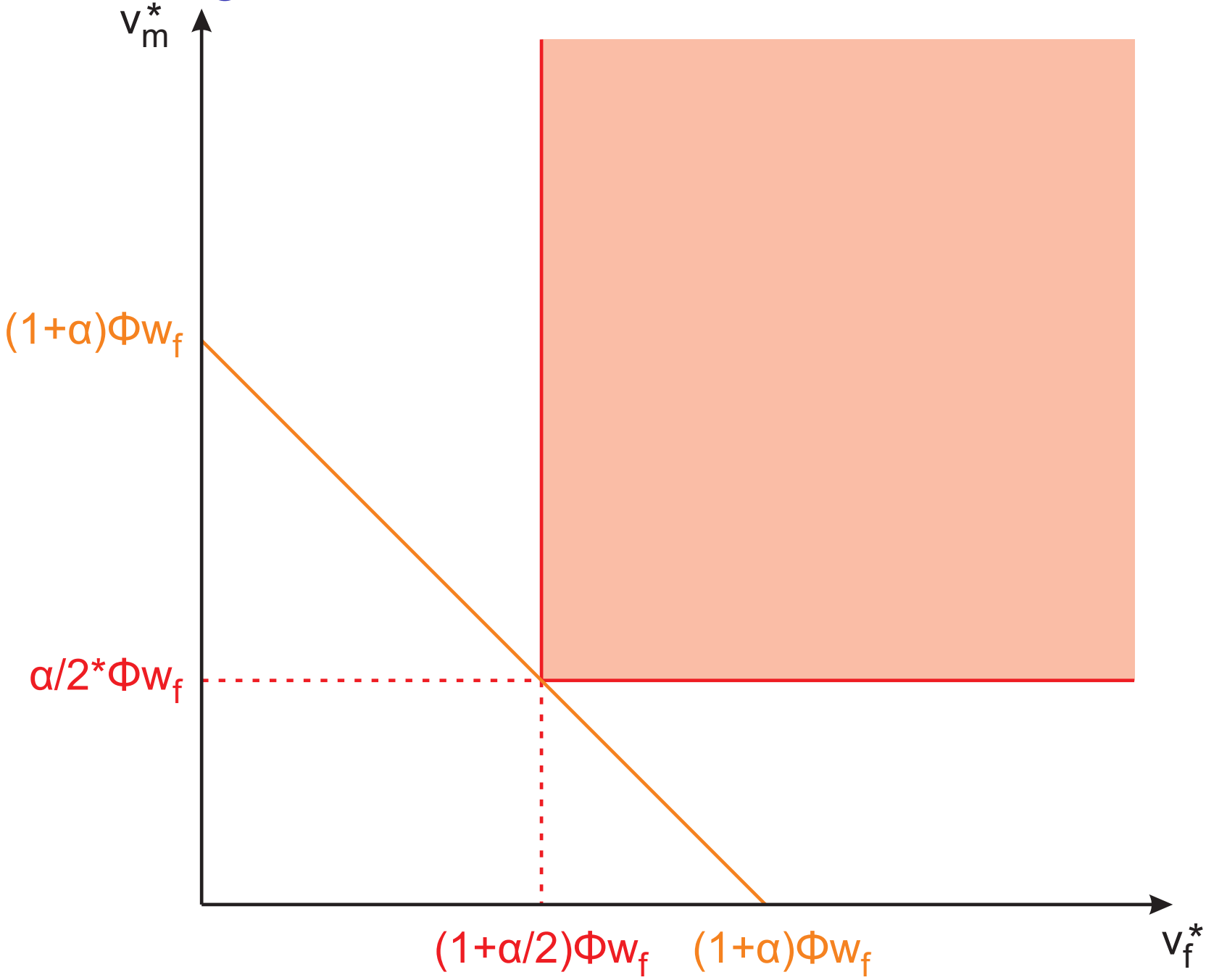

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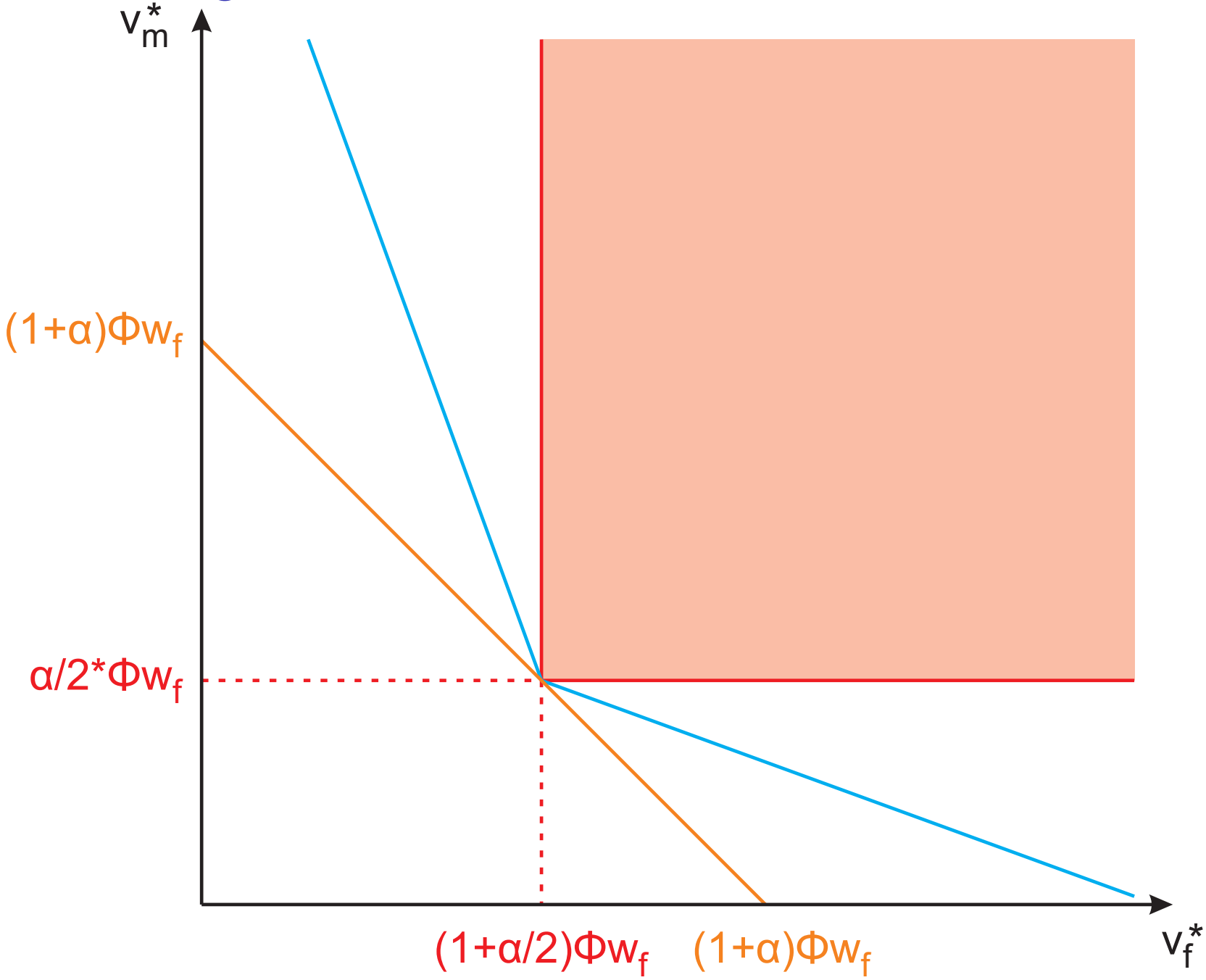

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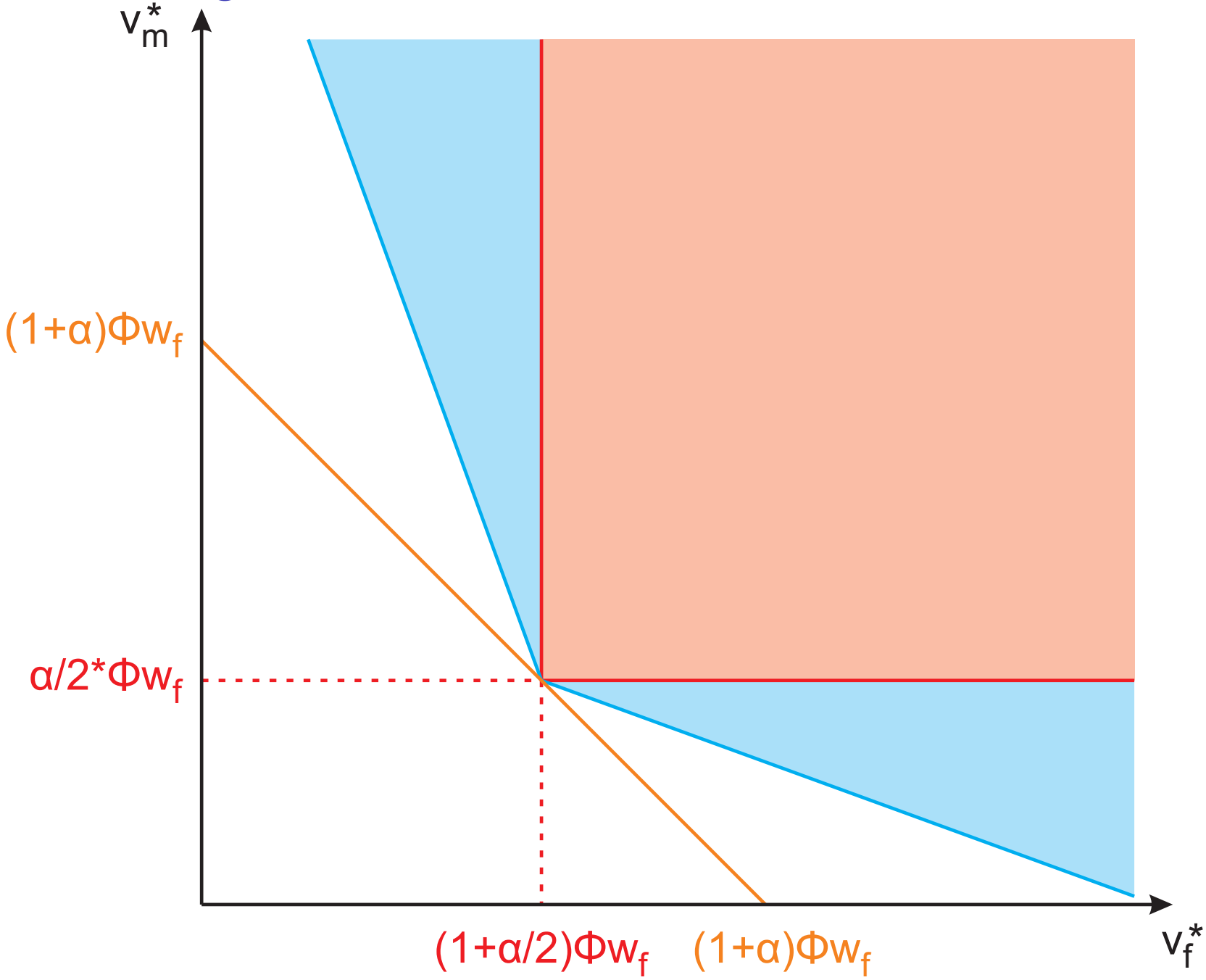


Calibration

- Normalize by female wage $v_f^* = \frac{v_f}{w_f}$ and $v_m^* = \frac{v_m}{w_f}$
- Specification of preferences

$$\begin{pmatrix} v_f^* \\ v_m^* \end{pmatrix} \sim N\left[\begin{pmatrix} \mu_f \\ \mu_m \end{pmatrix}, \begin{pmatrix} \sigma_f^2 & \rho\sigma_f\sigma_m \\ \rho\sigma_f\sigma_m & \sigma_m^2 \end{pmatrix}\right]$$

- Exogenously chosen parameters

Parameter		Value
Efficiency scales	α	0.400
Time costs f	ϕ	0.500
Variance v_m^*	σ_m^2	0.175

Calibration

- Calibrated parameters

Parameter		Value
Probability of child birth	π	0.1405
Expected value of v_f^*	μ_f	1.0875
Expected value of v_m^*	μ_m	0.3193
Variance v_f^*	σ_f^2	0.6189
Correlation coefficient	ρ	0.7389
Degree of altruism	λ	0.1709

Results

- Comparison model data

Shares (data)

	mintent	
fintent	0	1
0	18.40	8.37
1	11.61	61.62

Shares (model)

	mintent	
fintent	0	1
0	18.40	8.37
1	11.61	61.62

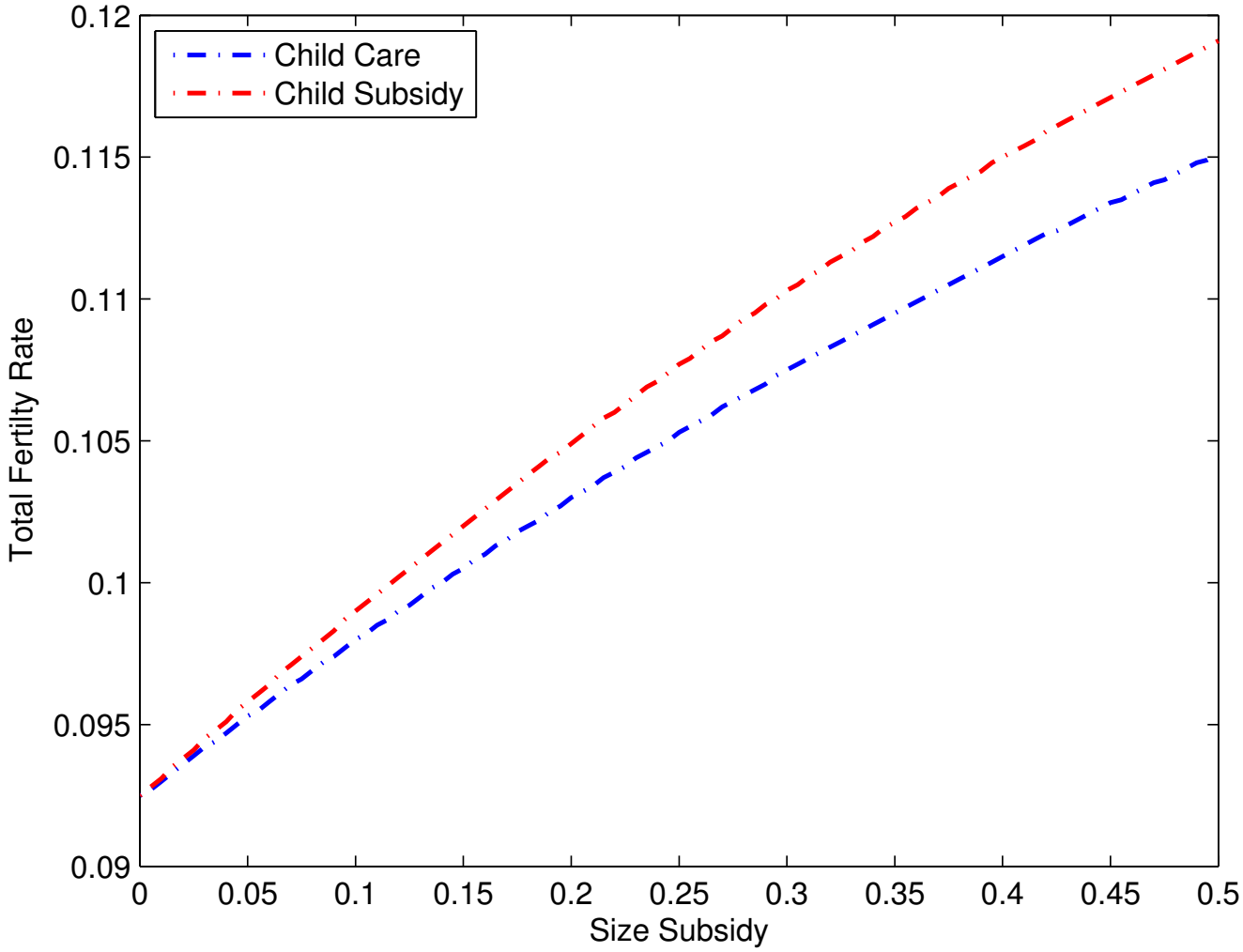
Fertility rates (data)

	mintent	
fintent	0	1
0	0.00000	0.01398
1	0.04067	0.14050

Fertility rates (model)

	mintent	
fintent	0	1
0	0.00000	0.01397
1	0.04067	0.14050

Policy Analysis: Child care vs. Child subsidy



Policy Analysis: Child care vs. Child subsidy

- Pure child subsidy

Shares (data)

	mintent	
fintent	0	1
0	5.60	8.76
1	3.09	82.55

Fertility rates (data)

	mintent	
fintent	0	1
0	0.00000	0.01902
1	0.04792	0.14050

- Pure child care

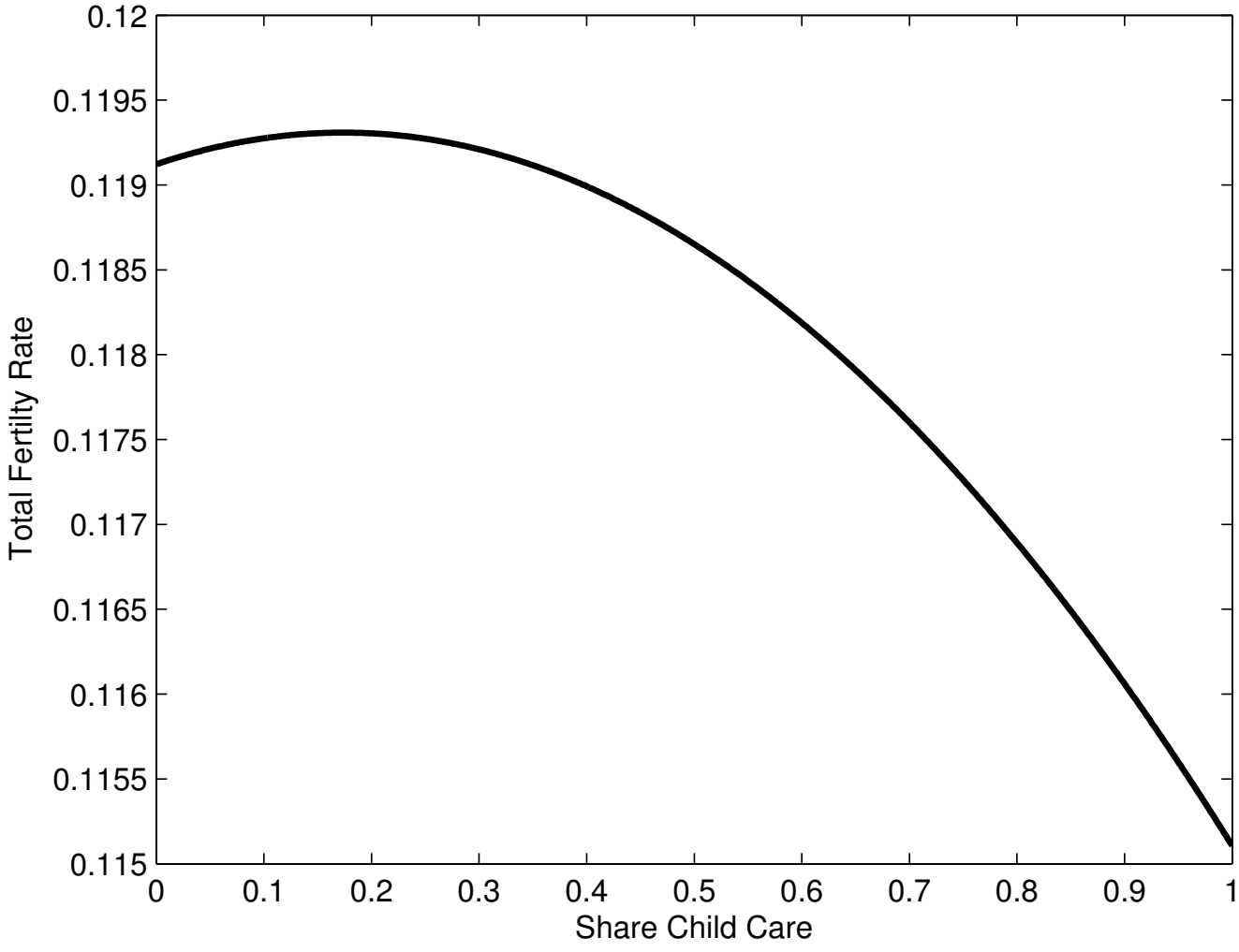
Shares (data)

	mintent	
fintent	0	1
0	6.60	1.75
1	15.67	75.98

Fertility rates (data)

	mintent	
fintent	0	1
0	0.00000	0.01608
1	0.05146	0.14050

Policy Analysis: Optimal mix



Conclusions

- Agreement seems to be an important determinant of a couple's fertility outcome
- A limited commitment bargaining model with altruism can replicate the data on fertility decisions
- Policies to promote child bearing should be designed to maximize agreement of partners

Next Steps

- Refine empirical work by identifying marginal births and allowing for heterogeneity.
- Allow for multiple births in model.
- Life-cycle perspective.
- Extend policy analysis.