Income Differentials Between Farm and Non-Farm Households Among Selected OECD Member Countries

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Outline

1. Motivation
2. Research Questions
3. Household Data
4. Model Specification
5. Decomposition Effects
6. Preliminary Conclusions

1. Motivation

- In the EU, low farm income is still used to justify generous farm direct payments
  - But using a questionable income ratio indicator
- In the U.S., low farm income does not prevail anymore on average since the mid-1960s
  - Evidence: Gardner (1992, 2000), Mishra *et al.* (2002), Katchova (2008), Peake & Marshall (2009)
- In OECD member countries, not as low as pretended but greater inequality among farm hh
  - Evidence: Henry de Frahan *et al*. (2017)

2. Research Questions

- To what extent income gaps still prevail between farm and non-farm households?
- What can explain these income gaps?
  - Composition effects of some characteristics of the households?
  - Return effects to some characteristics of the households?

3. Household Data

1. National household-based budget surveys
   - available since the 1970s for about 50 countries
   - harmonized by Luxembourg Income Study (LIS) to enable cross-national comparisons
2. Farm household definition (OECD, 2001):
   - "narrow" definition: farm self-employment income > 50% factor incomes of the hh
   - "broad" definition: farm self-employment income $\neq 0$
   - where:
     - farm self-employment income: return to family labour and some own-capital, net of operational expenses, including payments from government farm programmes
     - factor incomes = gross salaries + farm & non-farm self-employment income + cash property income

Caveats with the "narrow" definition of farm household

- Possible underestimation of farm hh incomes b/c:
  - incomes in-kind are specifically not accounted for in the U.S. and Canada
  - incomes from self-employment, including from farming, may be under-reported
- Hh with accidently low or negative farm self-employment income may not be considered anymore as farm hh:
  - Except when their negative farm self-employment income is smaller than half their negative factor income

⇒ Need a sensitive analysis on the 50% threshold of factor income

Country	Survey waves
Australia	1981, 89, 95, 2001, 03
Austria	1994, 97, 2004, 07, 10, 13
Canada	**1971, 75, 81, 87, 91, 94, 97, 98, 2000, 04, 07, 10, 15**
Finland	1987, 91, 95, 2000, 04, 07, 10, 13
France	**1978, 84, 89, 94, 2005**
Germany	**1973, 78, 81, 83, 84, 87, 89, 91, 94, 98, 2000, 01, 04, 06, 07, 10, 11, 13, 15**
Hungary	1991, 94, 99, 2005, 07, 09, 12
Ireland	**1987, 94, 95, 96, 2004, 07, 10**
Italy	1987, 89, 91, 93
Luxembourg	1985, 91, 94, 97, 2000, 04, 07, 10, 13
Norway	1979, 86, 91, 95, 2000, 04, 07, 10
Poland	**1995, 99, 2004, 07, 10, 13, 16**
Switzerland	1982, 92, 2000, 02, 04
United Kingdom	1979, 86, 91, 95
United States	**1974, 79, 86, 91, 94, 97, 2000, 04, 07, 10, 13, 16**
15 countries	**119 waves => 2,352,658 households!**

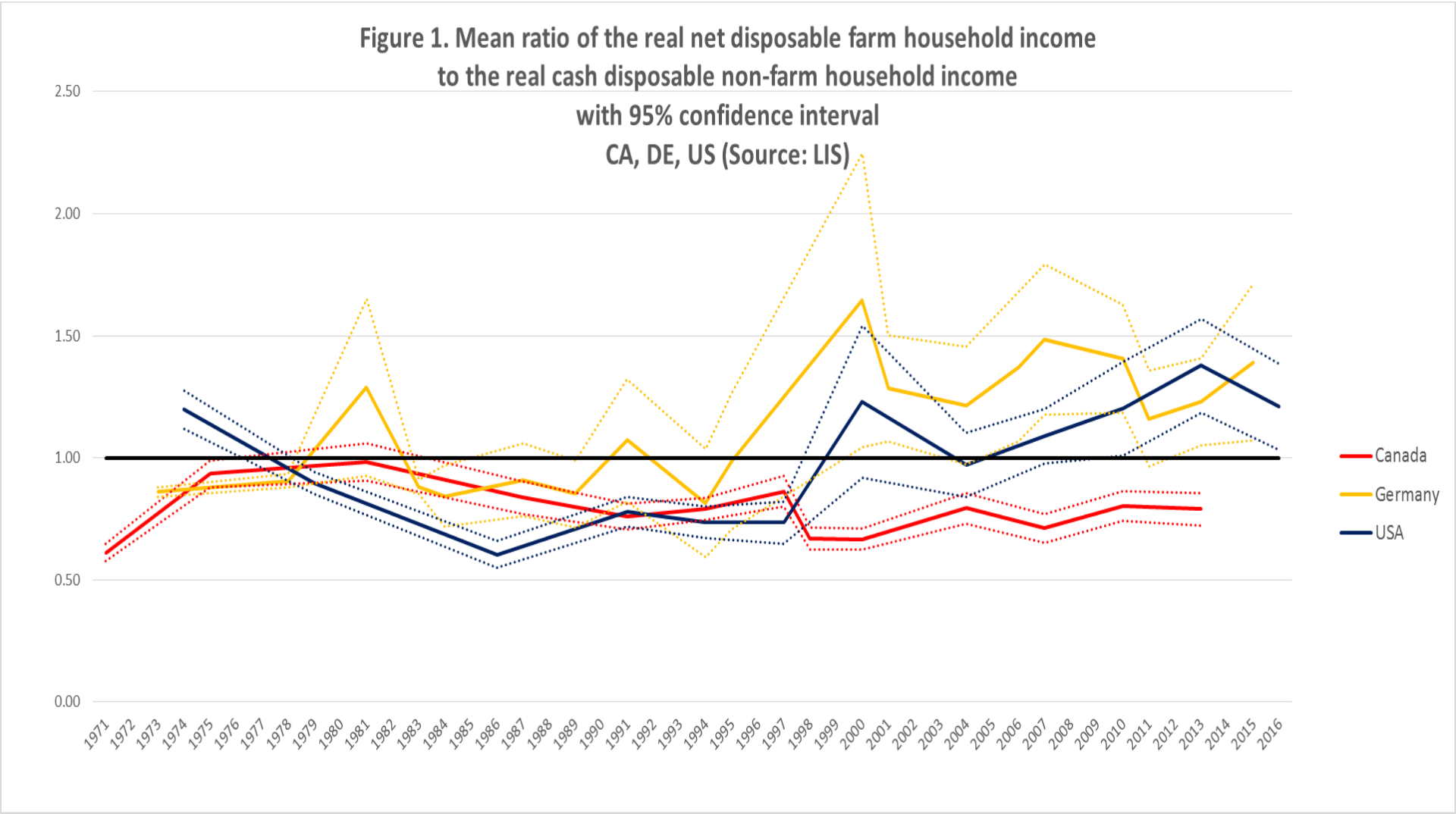
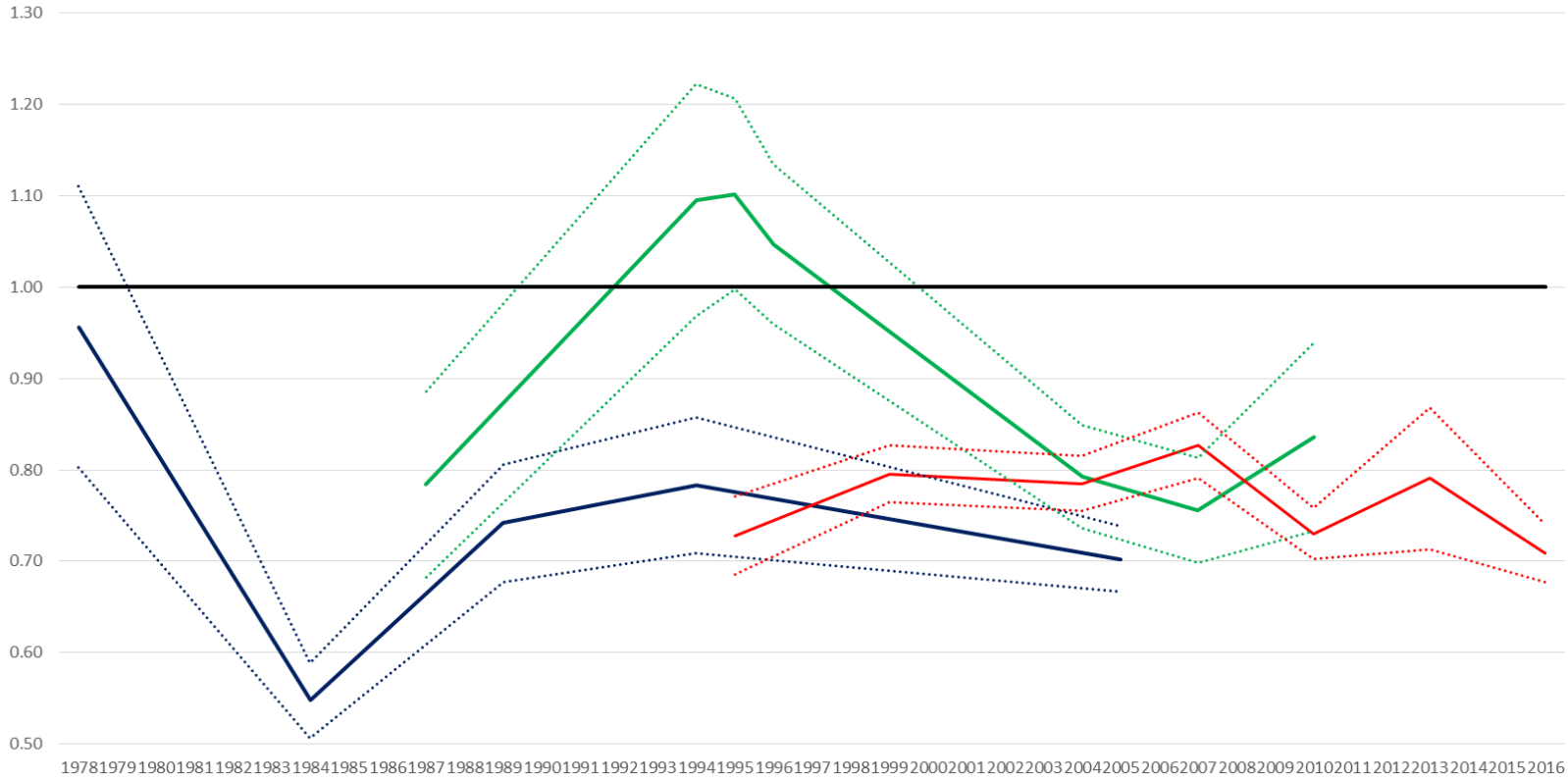


Figure 1. Mean ratio of the real net disposable farm household income
to the real cash disposable non-farm household income
with 95% confidence interval
CA, DE, US (Source: LIS)
2.50
2.00
1.50
1.00
0.50
0.00
1971 1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Canada
Germany
USA

Figure 2. Mean ratio of the real net disposable farm household income to the real net disposable non-farm household income with 95% confidence interval FR, IE, PL (Source: LIS)



4. Model Specification: Heckman 2-step procedure

$$y_{ht} = (x_{ht} \cdot F_{ht})'\alpha_{xF} + (x_{ht} \cdot NF_{ht})'\alpha_{xNF} + (x_{ht} \cdot \lambda_{ht})'\alpha_{x\lambda} + v_{ht}$$

where:

y_{ht} is the hh cash disposal income adjusted for hh size in 2010 US$;

x_{ht} is a vector of J control variables, including one;

F_{ht} and NF_{ht} are binary variables for farm hh and non-farm hh;

λ_{ht} controls for the possible endogeneity of the binary variables;

v_{ht} is a heteroskedastic error term;

h and t are household and time indices.

$\lambda_{ht}(x_{ht}, w_{ht}; \beta)$ is the likelihood of being a farm hh genereated by Probit, where w_{ht} are possible instrumental variables.

4. Model Specification: additional details on 'Heckit'

$$y_{ht} = (x_{ht} \cdot F_{ht})'\alpha_{xF} + (x_{ht} \cdot NF_{ht})'\alpha_{xNF} + (x_{ht} \cdot \lambda_{ht})'\alpha_{x\lambda} + v_{ht}$$

is an extension of the outcome equation:

$$y_{ht} = (x_{ht} \cdot F_{ht})'\alpha_{xF} + (x_{ht} \cdot NF_{ht})'\alpha_{xNF} + (\varepsilon_{ht} + x_{ht} \cdot \varepsilon_{ht})$$

where $(\varepsilon_{ht} + x_{ht} \cdot \varepsilon_{ht})$ is a heteroskedastic error term,

to the possibly endogenous farm household dummy F_{ht} which is modelled by the reduced from:

$$F_{ht} = I(F_{ht}^{*} > 0)$$

$$F_{ht}^{*} = x_{ht}'\beta_x + w_{ht}'\beta_w + u_{ht}$$

We assume that the potential endogeneity of the farm household dummy F_{ht} only stems from:

$$E\left[u_{ht}\varepsilon_{ht}\right] \neq 0$$

under the assumption that $(u_{ht}, \varepsilon_{ht})$ is normally distributed, with variance matrix:

$$\begin{pmatrix} 1 & \rho\sigma_{\varepsilon} \\ \rho\sigma_{\varepsilon} & \sigma_{\varepsilon}^{2} \end{pmatrix}$$

Control variables: x_{ht}

- Motivated by the farm household income-earning capacity model (Gardner 1992, 2000)
- Skills:
  - education level dummies (high = 1, if not = 0; medium = 1, if not = 0) for both the household head & spouse
  - age of the household head (linear & in square)
- Adjustment costs in labour movement:
  - area dummy (urban = 1, if not = 0)
  - age of the household head (linear & in square)
- Others:
  - gender dummy of the household head (male = 1, if not = 0)
  - potential earners b/w 18-65 years old
  - region for DE (east = 1, if not = 0)
  - ethnicity for the U.S. (non white = 1, if not = 0)
  - time period dummies except for the starting year

5. Decomposition Effects: the Oaxaca Decomposition

- The expected average outcome difference between farm and non-farm households $(\bar{y}_F - \bar{y}_{NF})$ can be decomposed into:
  - compositional effects C
  - return effects R
- These C and R effects can be recovered for each independent variable x_j:

$$\hat{C}_j = 1/2\,(\hat{\alpha}_{x_j F} + \hat{\alpha}_{x_j NF})(\bar{x}_{jF} - \bar{x}_{jNF})$$

$$\hat{R}_j = 1/2\,(\bar{x}_{jF} + \bar{x}_{jNF})(\hat{\alpha}_{x_j F} - \hat{\alpha}_{x_j NF})$$

Inference of the Composition and Return Effects: by Simulation

- Confidence intervals of every composition and return effect are obtained by simulation under the model assumptions that vectors:

$$\hat{\alpha}(\hat{\alpha}_F', \hat{\alpha}_{NF}') \text{ and } \overline{x}(\overline{x}_F', \overline{x}_{NF}')$$

are uncorrelated and normally distributed:

$$\begin{pmatrix} \hat{\alpha} \\ \overline{x} \end{pmatrix} \square\ \mathrm{N}\left(\begin{pmatrix} \alpha \\ \mu_x \end{pmatrix}; \begin{pmatrix} \Sigma_{\hat{\alpha}} & 0 \\ 0 & \Sigma_{\overline{x}} \end{pmatrix} \right)$$

- For each draw k of N_R draws, the desired statistic $\widehat{\tau}_k$ is calculated and the resulting sample $(\widehat{\tau}_1, \ldots, \widehat{\tau}_{N_R})$ allows to estimate the CI of the desired statistic $\widehat{\tau}$

Preliminary results: some observations for CA, US and DE

- Countries tend to have their own pattern of composition and return effects
- Difficulties to generalise explanations for income gaps across countries
- Age of the farm hh head:
  - Concave return effects in the U.S. & DE, but convex in CA
- Education of the farm hh head:
  - Large neg. return effects in CA and the U.S., but small pos. composition effects
  - Small pos. return effects in DE, but small neg. composition effects
- Education of the spouse:
  - Large neg. return effects in the U.S. and DE, but small pos. composition effects in the U.S. and neg. in DE
  - Small pos. return effects in CA

Preliminary results: some observations for CA, US and DE

- Urban location:
  - Large pos. return effect in the U.S., but large neg. composition effect
  - Large neg. return effects in CA and DE, but large pos. composition effects
- East location in DE:
  - Large neg. return effect, but large pos. composition effect
- Non-white in the U.S:
  - Large neg. return effect, but large pos. composition effect
- Time: the good news!
  - Increasing pos. return effects in DE and until 97 in CA
  - Decreasing neg. return effects in the U.S.

6. Preliminary Conclusions

- Not much policy implication for the moment
- But helps demystify income gaps b/w farm and non-farm household through:
  - performing descriptive analysis on several developed countries
  - underlining composition and return effects to some key variables motivated by the income-earning capacity model

Next Steps

- Add some instrumental variables
- Possibly add some sectoral & policy variables
- Perform more rigorously the statistical inference
- Perform sensitivity analysis on the farm household definition
- Compare with incomes of non-farm self-employed households
- Examine more countries: FR, IE, PL, etc.

Thank you!

The Classic Perception in the U.S.

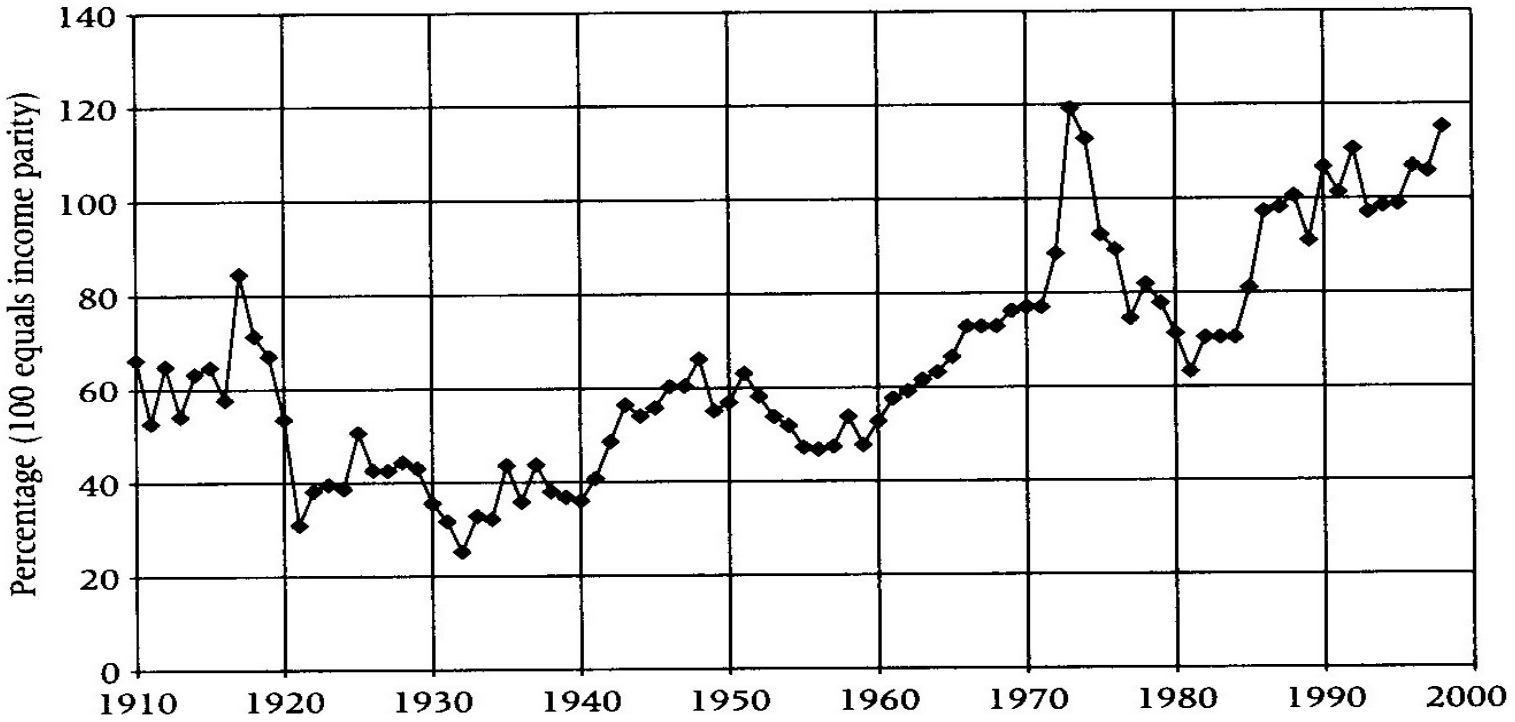
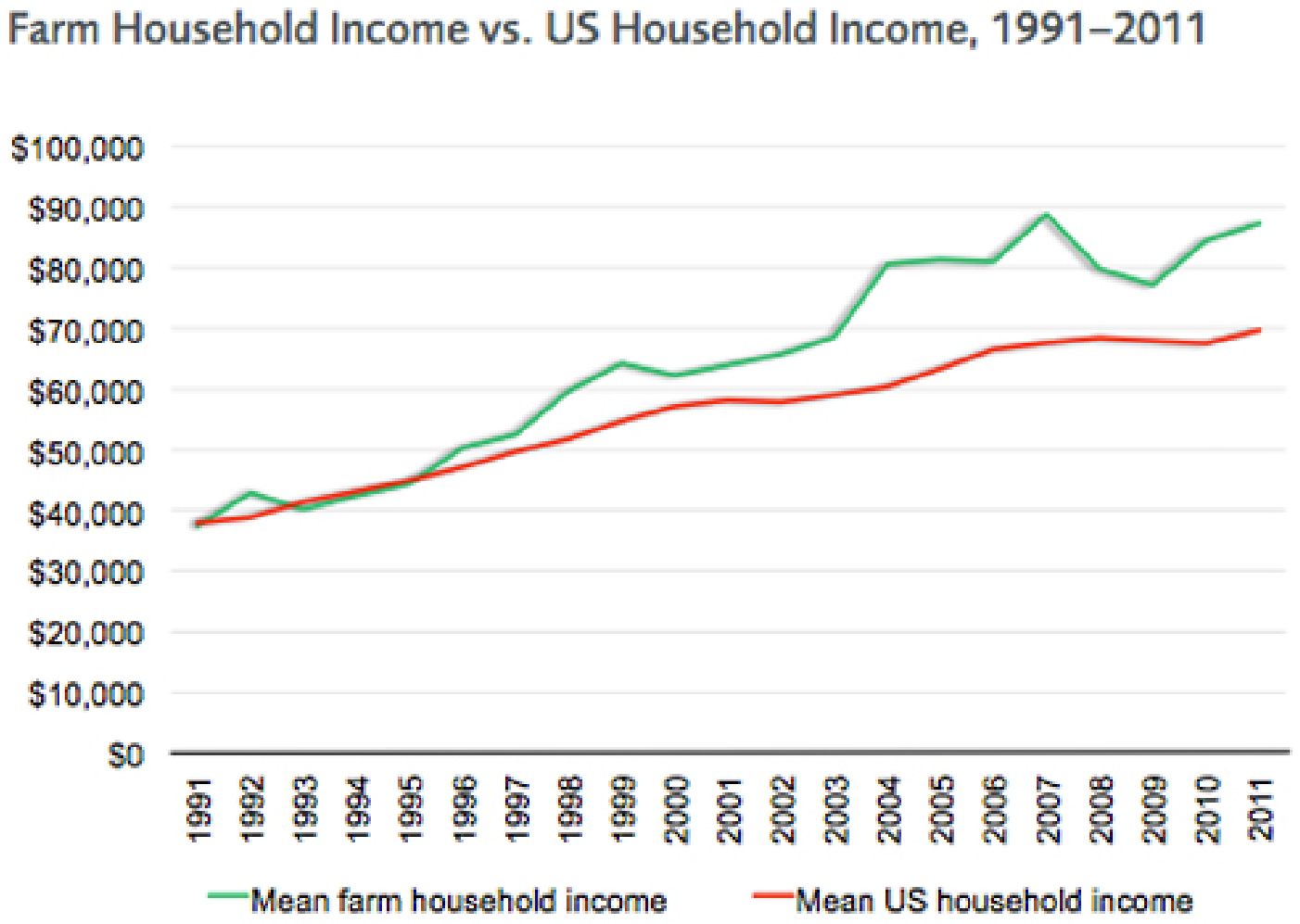
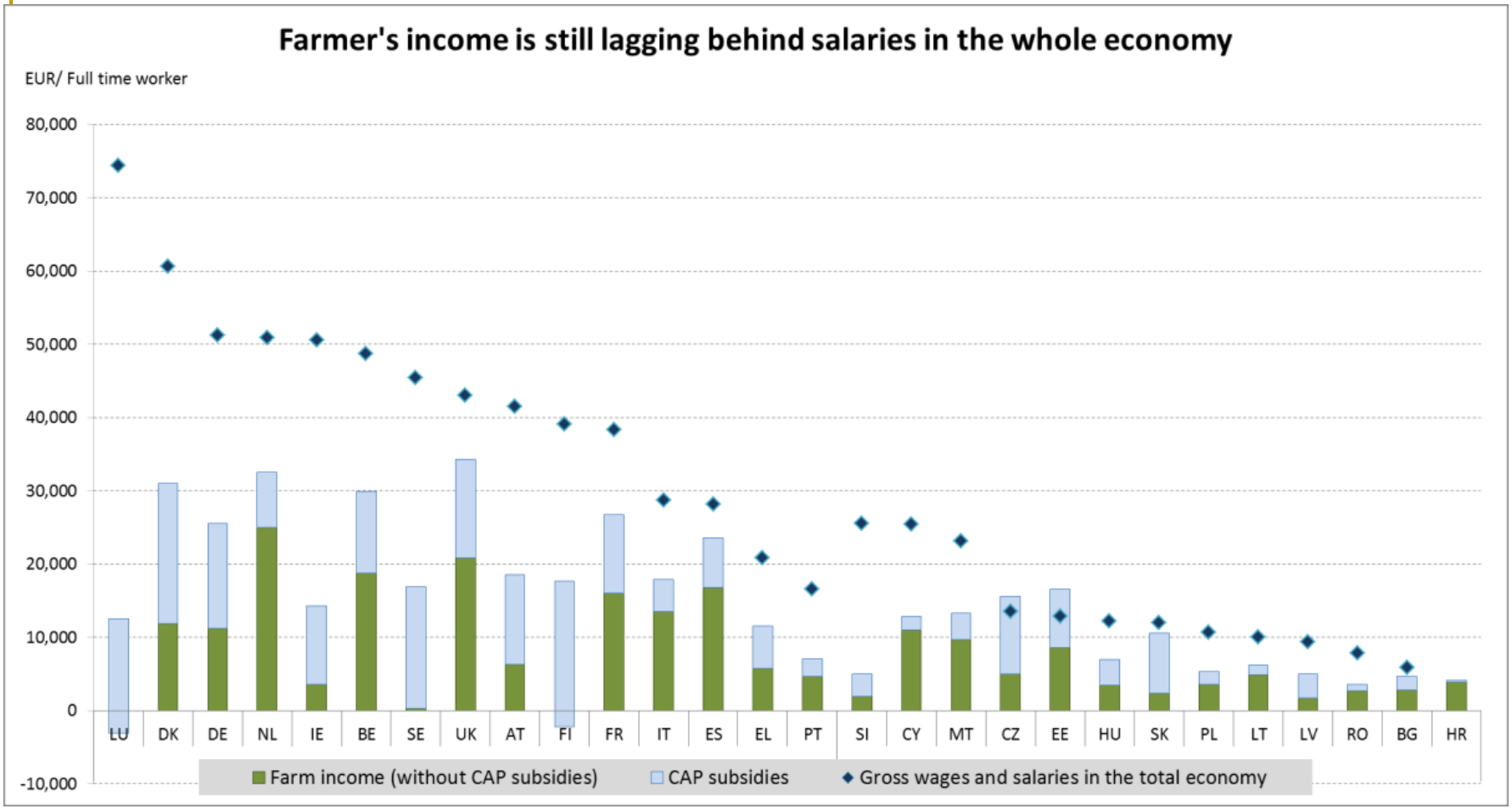


Figure 3.12 Farm as percentage of nonfarm household income. Data from U.S. Department of Agriculture, *Agricultural Outlook,* December 1999; U.S. Department of Commerce (1975).

The USDA Perception in the U.S.



Source: USDA, Economic Research Service, "Median Farm Household Income Forcast Up in 2012 and 2013," accessed May 15, 2013, http://www.ers.usda.gov/topics/farm-economy/farm-household-well-being/farm-household-income.aspx.



Source: DG AGRI based on DG AGRI and Eurostat data, 2011-2013
Average CAP support = operating subsidies per worker incl. support covering possible negative market income
Average farmer income (without CAP support) = entrepreneurial income per worker - operating subsidies
Nota:
CAP support does not include investment support; average farmer income without CAP support in LU and FI was negative over the period considered - the negative income compensated by CAP support is hatched on graph