Introduction to Economic History : Capital, Inequality, Growth

(Master APE & PPD)

(EHESS & Paris School of Economics)

Thomas Piketty

Academic year 2026-2027

Lecture 2: Growth, Degrowth & Well-Being: Labour Hours, Domestic vs Economic Work, Population & the Gender Gap

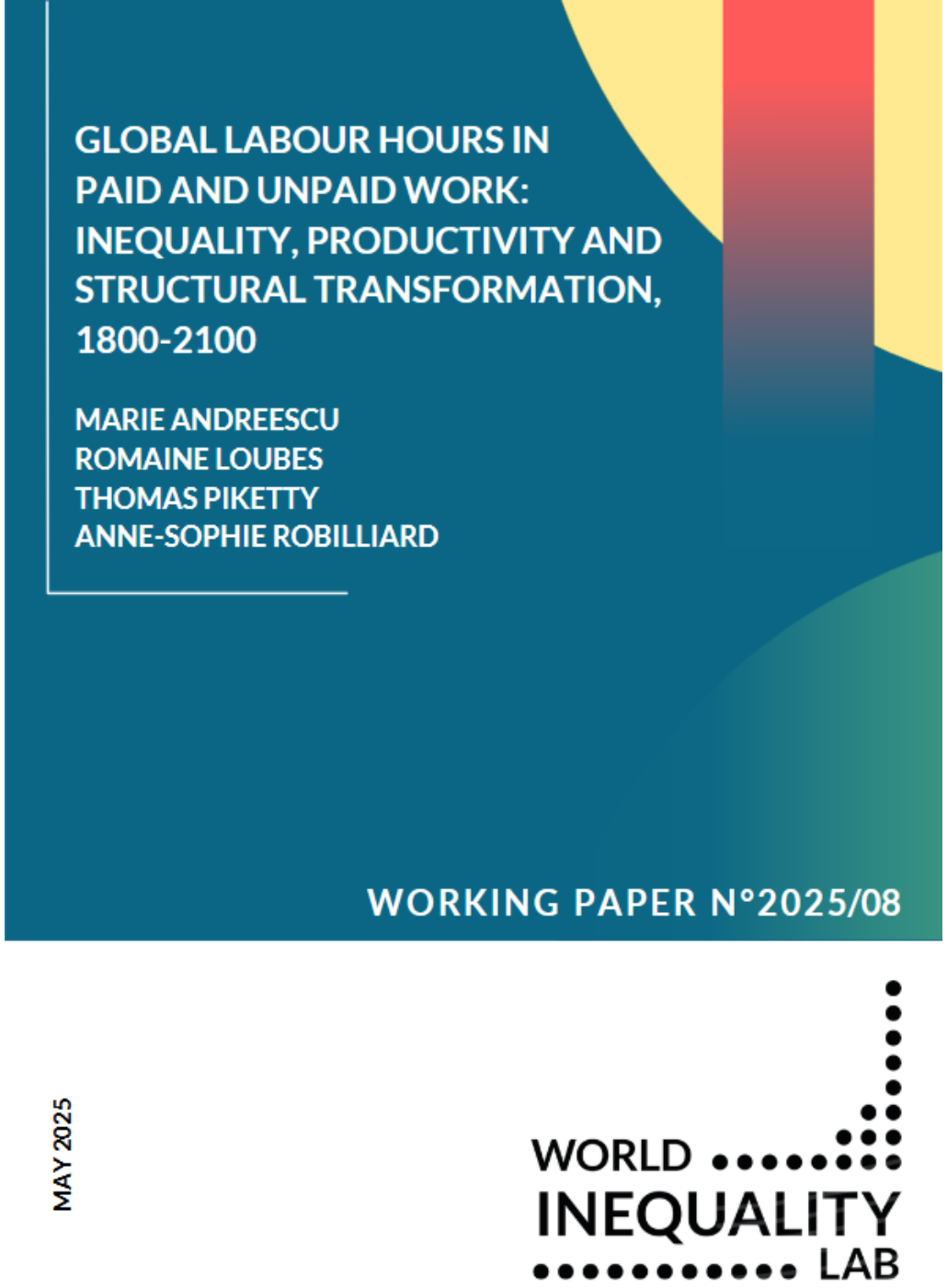
Roadmap of the lecture

- The Measurement of Working Time: Economic Labour vs Domestic Labour & Gender Inequality
- Unpaid Labour & the Measurement of Gender Gaps
- The Negative Elasticity between Labour Hours & Productivity: the Rise of Free Time (Keynes 1930)
- Using Productivity Growth to Reduce Labour Time & Material Footprint in the Future: from 1800-2025 to 2025-2100
- Was Work Time Exceptionnally High around 1780-1860 & Why?
- Historical Demography: Understanding Fertility Decline & Changing Family Structures

Short Bibliography

- C. Goldin "The U-Shaped Female Labor Force Function in Economic Development and Economic History", in T.P. Schultz, Investment in Women's Human Capital and Economic Development, UCP, 1995
- Huberman, M., C. Minns, "Days and Hours of Work in Old and New Worlds, 1870–2000", Explorations in Economic History, 2007
- O. Gilmore, "The Working Week in Manufacturing since 1820", in How Was Life? Vol.2: New Perspectives on Global Inequality and Well-Being since 1820, OECD, 2021
- C. Goldin, "Nobel Lecture: An Evolving Economic Force", American Economic Review 2024
- ***M. Andreescu et al, "Global Labour Hours in Paid and Unpaid Work: Productivity and Structural Transformation 1800-2100", WIL WP 2025**
- T. Guinnane, "The Historical Fertility Transition", JEL 2011
- A. Gethin, E. Saez, "Global Working Hours", NBER WP 2026

Measuring Labour Time: Andreescu et al 2025



Measuring Labour Time: Andreescu et al 2025

(1) Quantify the **global decline in labor hours 1800-2025, together with multiple transformations of gender patterns**

(2) Estimate a **large negative long-run elasticity between labour hours and productivity** (income effects > substitution effects) (Keynes 1930 "*Economic possibilities for our grand-children*"), but with substantial variations across countries & periods. At world level, hourly productivity (NDP per work hour) rose from 0.5€ in 1800 to 15€ in 2025 (PPP 2025 €). In 2025, it ranges from 4€ in Subsaharan Africa to 55-60€ in USA, Germany or France.

(i) Large literature on the **determinants of global labour hours** (Bick et al 2018, 2022, Fuchs-Schundeln 2024, Gottlieb et al 2024). **Mostly focuses on recent decades.**
(ii) Large literature on **history of labour hours since 1800** (Huberman 2004, 2007, Gilmore 2021, Goldin 1995, 2024). **Mostly focuses on Western countries**.

Main novelty: **global historical database covering the entire planet over 1800-2025 & use it for prospective analysis**

(1) Main long-run results: **global decline in labor hours 1800-2025, together with multiple transformations of gender patterns of work**

Main historical series 1800-2025 focus on economic labour, but also include domestic labour over 1960-2025 using time-use surveys

Long-run series combine micro data (employment & time-use surveys) 1960-2025 with historical series 1800-1960 coming from industrial surveys (mostly manufacturing sector, but manufacturing and non-manufacturing work hours show consistent trends over time & across regions 1960-2025)

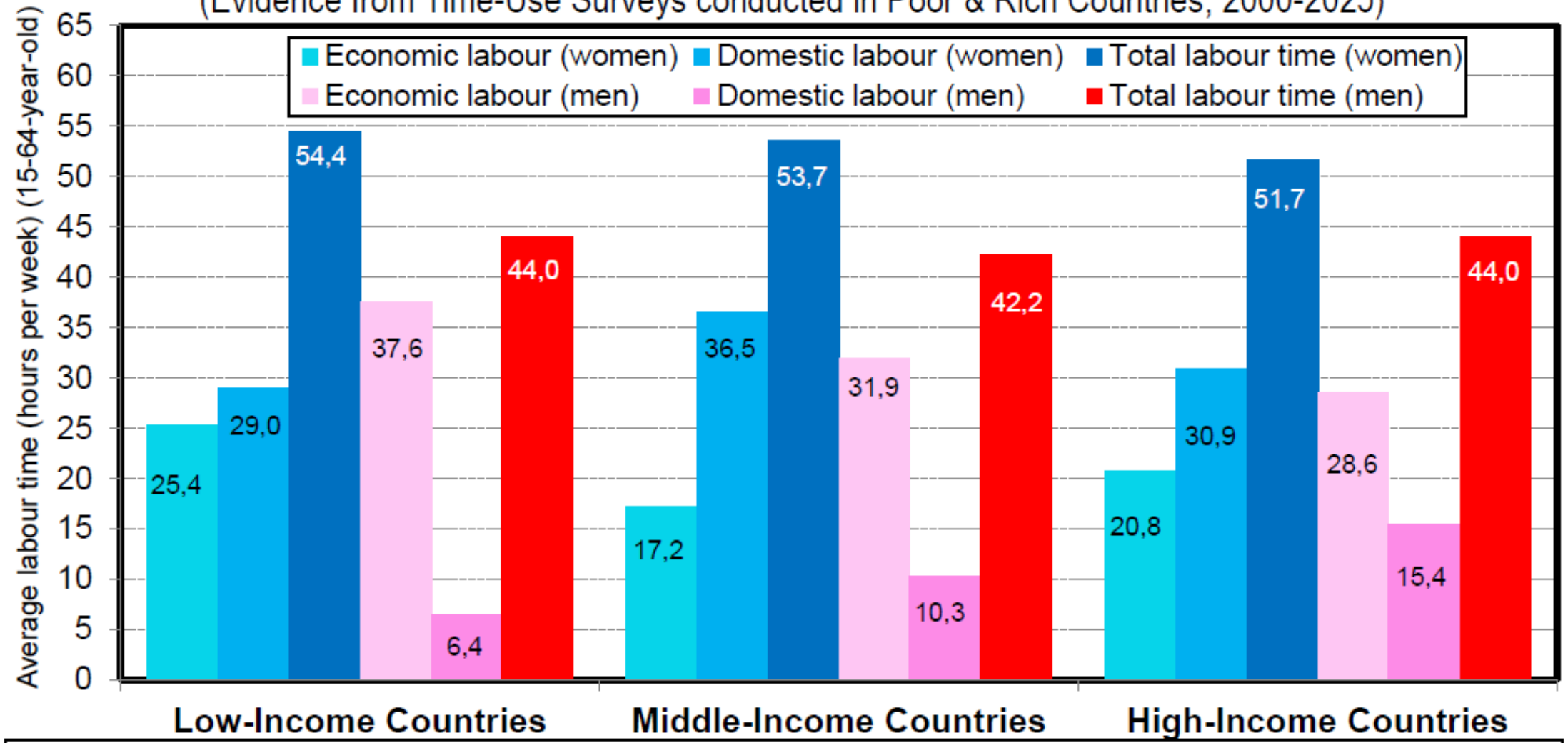
Table 1. Economic Labour vs Domestic Labour: Concepts Used in this Research

Economic Labour	Domestic Labour
Labour that is used as an input to produce **goods and services** that are **included in national accounts**	Labour that is used as an input to produce **goods and services** that are **not included in national accounts**
Economic labour includes many forms of **market & non-market** labour, **formal & informal** labour, **paid & unpaid** labour, etc. Examples: **public school teachers or nurses/doctors** (valued at production costs); **unpaid family work in agriculture** (valued at output prices); etc.	**Domestic labour** also includes many different forms of labour, and in particular **housekeeping tasks** (cleaning, cooking, child-caring, etc), **unpaid volunteering and community work**, etc. This excludes self-care, education and leisure time.

Note. Due to data limitations, the global historical labour hours database constructed in this paper focuses for the most part on economic labour. In effect, this is the only form of labour for which we can construct long-run series on labour hours and labour productivity covering two centuries (1800-2025) and a large set of countries. For recent decades (1960-2025), we also provide series on domestic labour for an incomplete set of countries based on time-use surveys.

Fig. 1. Women Work More Than Men

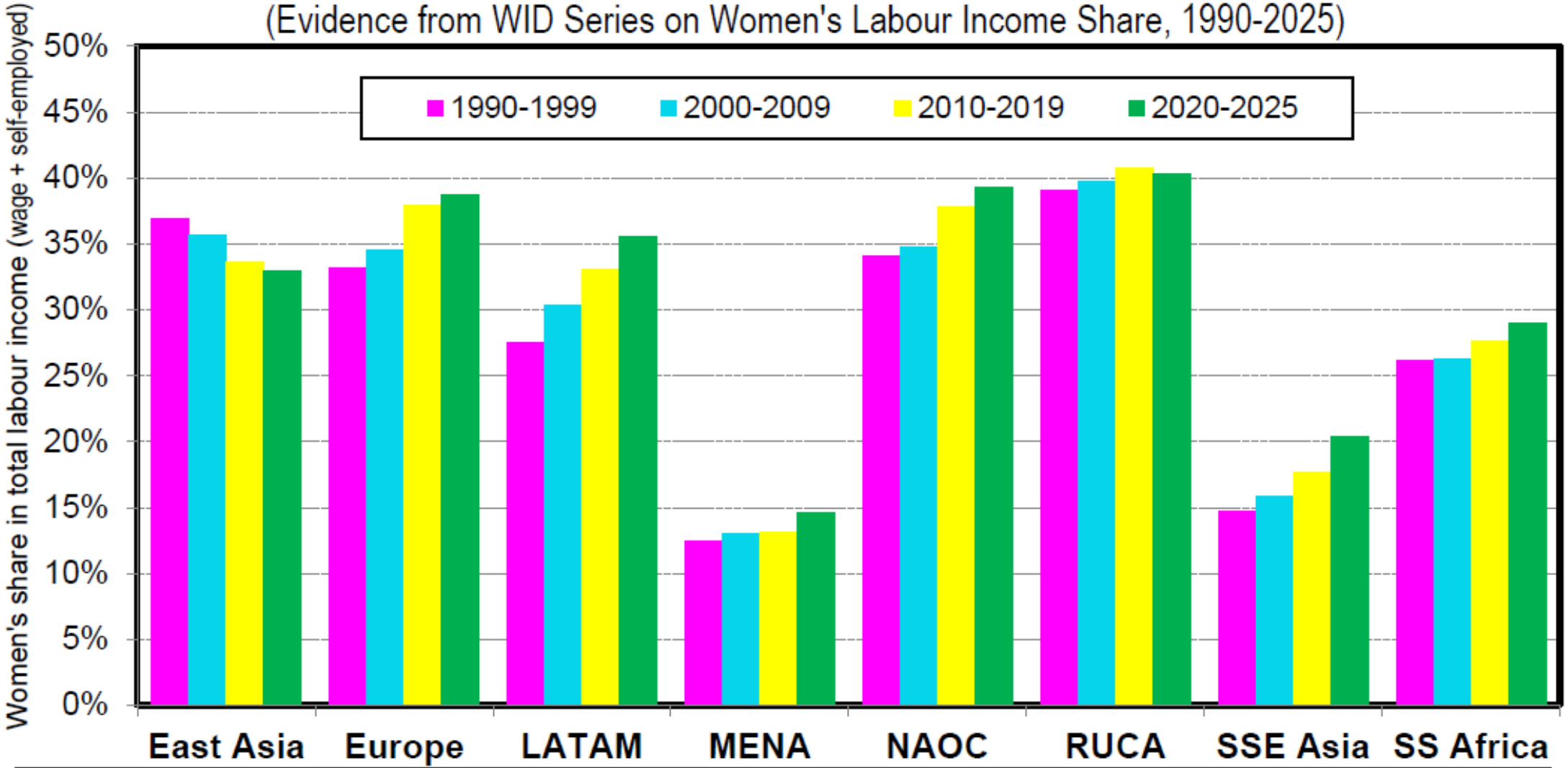
(Evidence from Time-Use Surveys conducted in Poor & Rich Countries, 2000-2025)



Interpretation. If we look at total labour time (economic + domestic), women work more men in all categories of countries, particularly in low-income countries (per capita NNI<10k€ PPP 2023) & middle-income countries (btw 10k & 30k). **Note.** Economic labour includes labour used to produce goods & services included in national accounts. Domestic labour includes all other forms of labour: household cleaning, cooking, child-care, etc. Authors' computations using time-use surveys run in 35 countries over 2000-2025 period. **Averages are computed over all individuals aged 15-to-64** (employed or not). **Sources & series**: wid.world

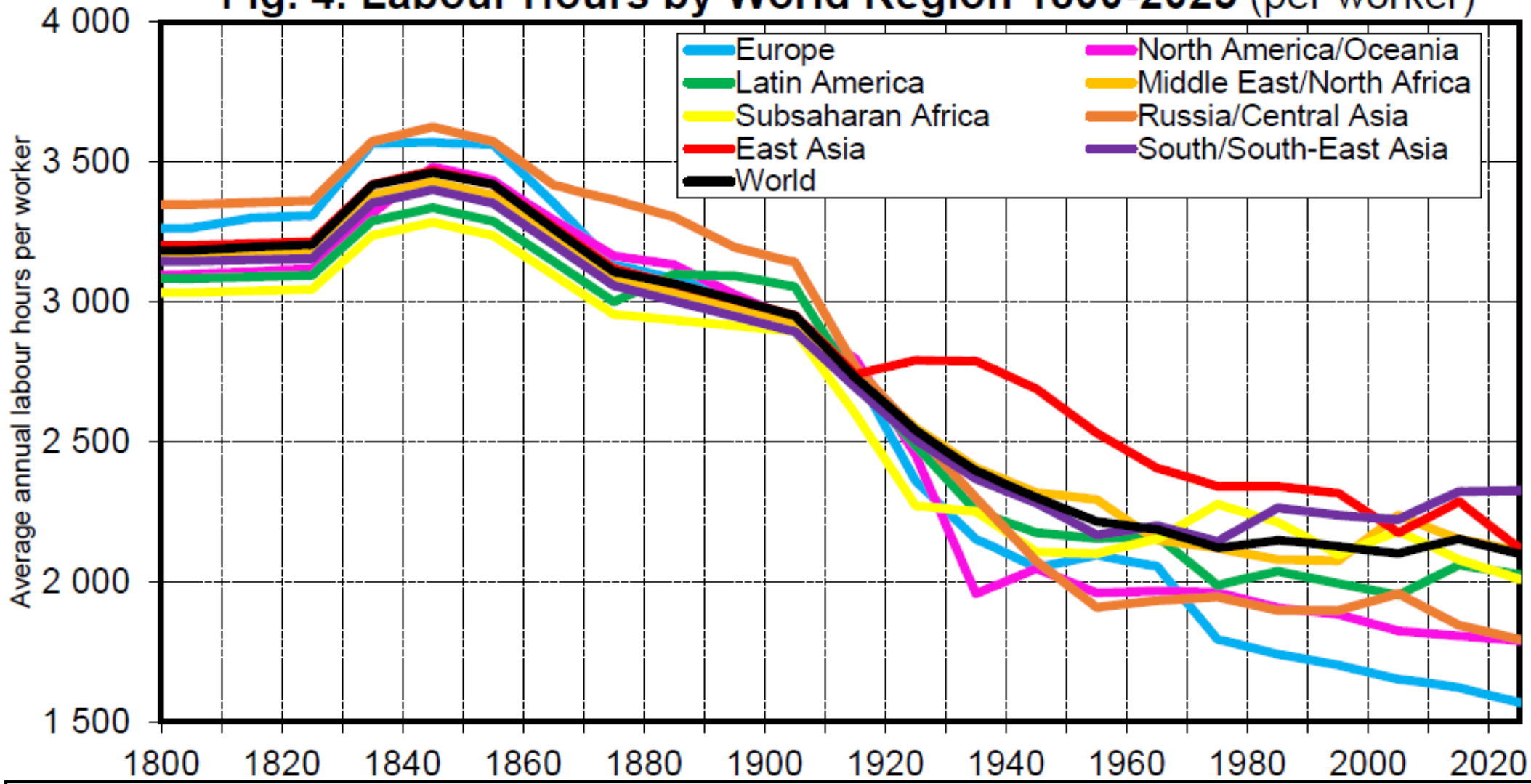
Fig. 2. Women Earn (A Lot) Less Than Men

(Evidence from WID Series on Women's Labour Income Share, 1990-2025)



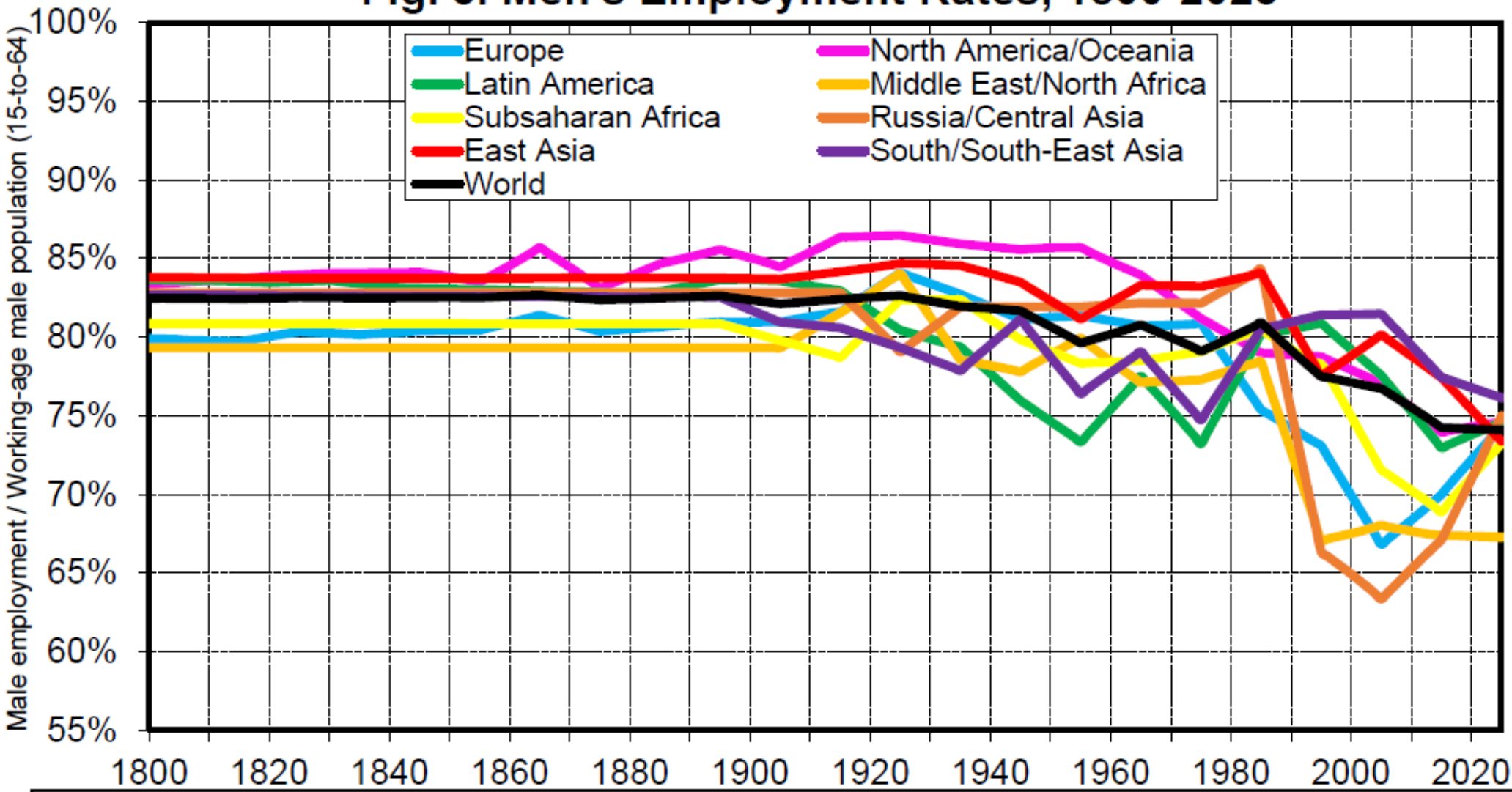
Interpretation. In 2020-2025, the share of women in total labour income (wage work+ self-employment) is a lot less than 50% in all world regions, from about 15-20% in Middle East/North Africa and South & South-East Asia to about 25-30% in Subsaharan Africa, 30-35% in East Asia and Latin America and 35-40% in Europe, North America/Oceania and Russia/Central Asia. **Sources & series**: wid.world

Fig. 4. Labour Hours by World Region 1800-2025 (per worker)



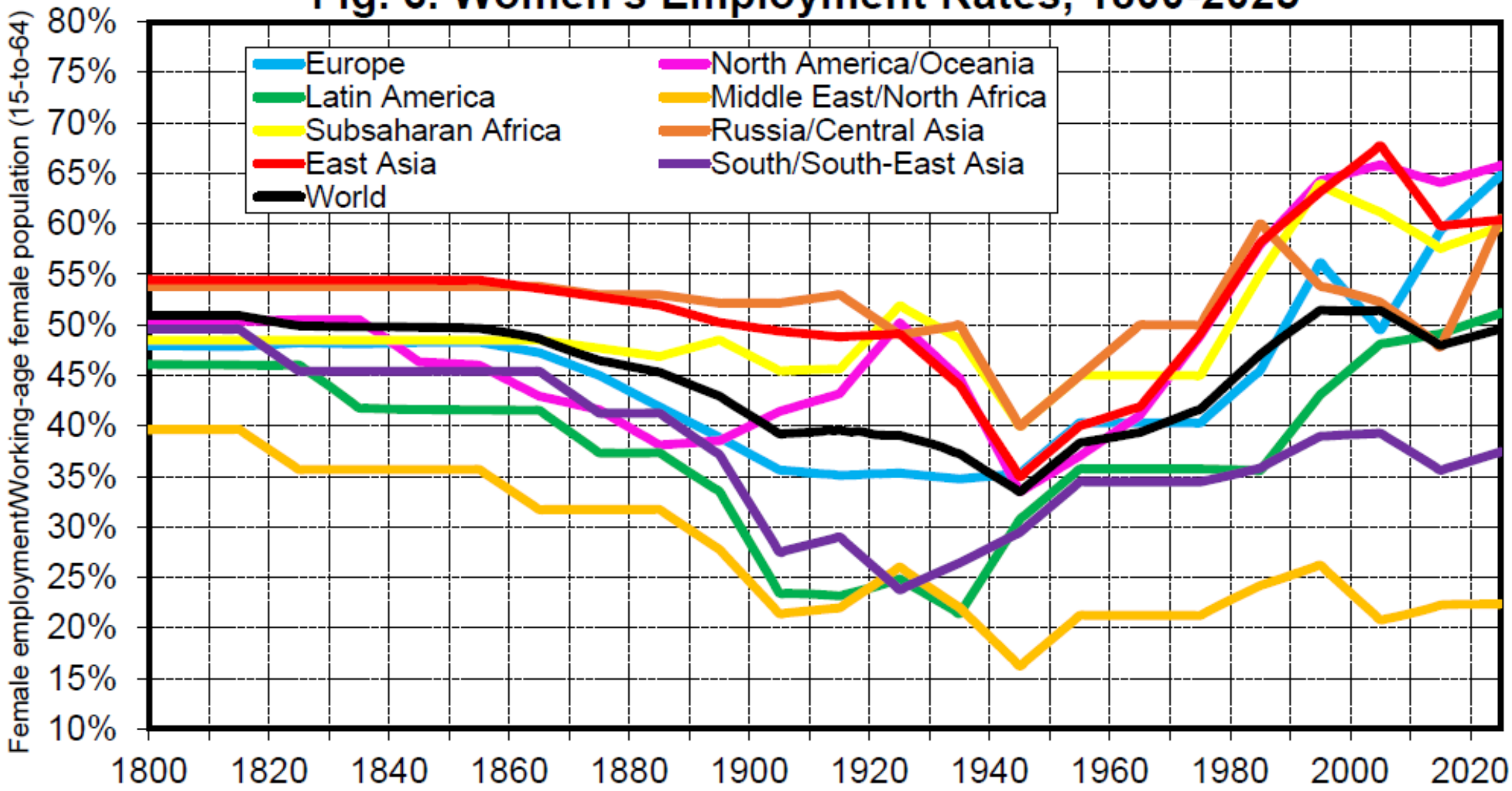
Interpretation. We observe a large long-run decline in average economic labour hours per worker (all employed persons aged 15-to-64 combined, irrespective of gender, employment status or sector). Annual labour hours around 3000-3500 hours correspond to about 60-65 hours per week all year long. Annual hours around 2000 hours correspond to 40 hours per week during 50 weeks (2 weeks in paid vacation) and annual hours around 1600 hours correspond to 35 hours per week during 47 weeks (5 weeks in paid vacation). **Sources and series**: see wid.world

Fig. 5. Men's Employment Rates, 1800-2025



Interpretation. Men's employment rate, defined as the ratio between total male employment (irrespective of status or sector) and working-age male population (15-to-64-year-old), has been relatively stable around 80-85% at the global level in the long-run, with a gradual decline in recent decades due to a variety of factors (late entry of younger generations into labor market due to educational advances, early retirement of older generations, low employment opportunities, etc.). **Sources and series**: see wid.world

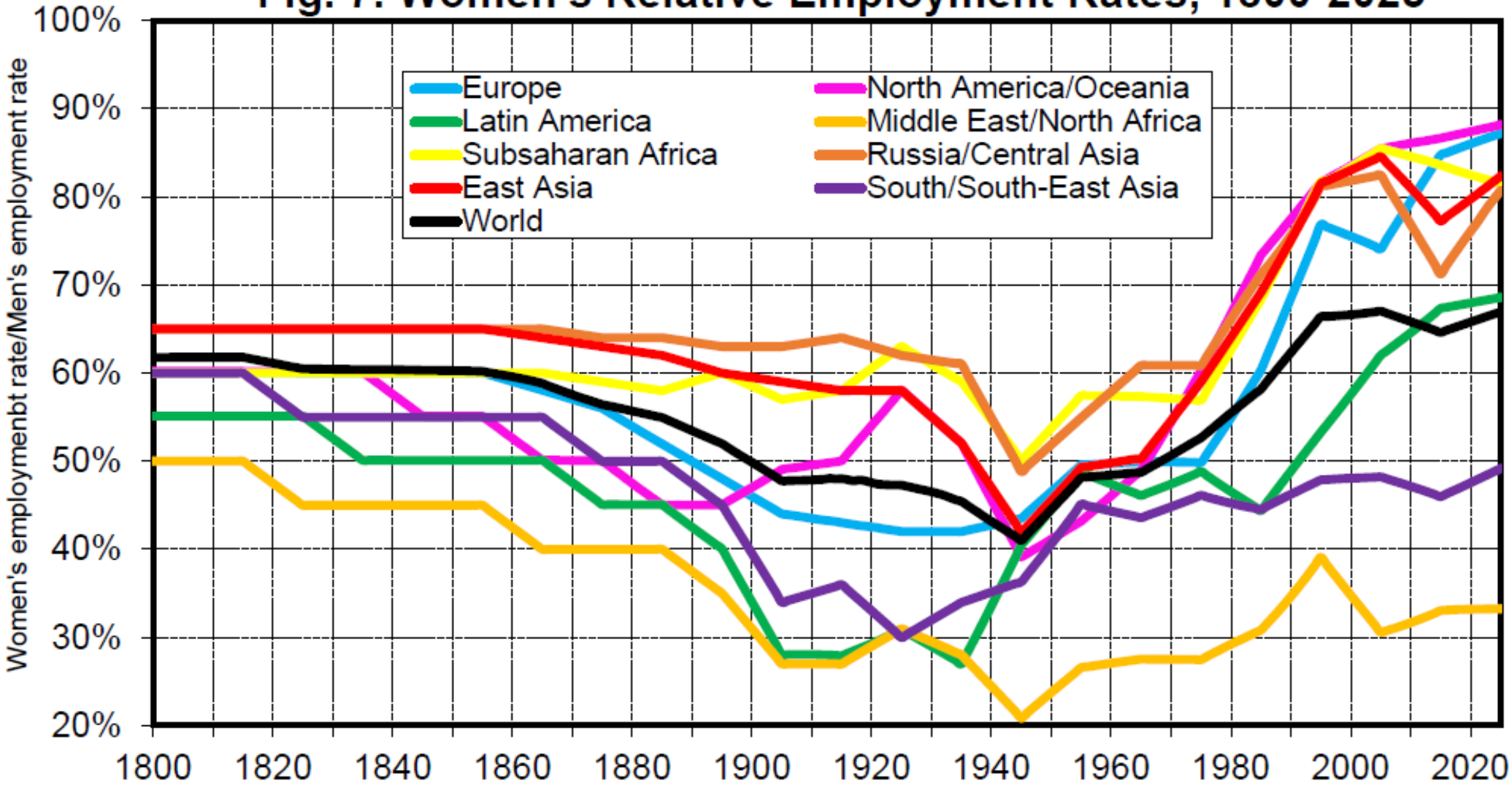
Fig. 6. Women's Employment Rates, 1800-2025



Interpretation. Women's employment rate, defined as the ratio between total female employment (irrespective of employment status or sector) and working-age female population (15-to-64-year-old), has followed a U-shaped curve at the global level over the 1800-2025 period, with important time and regional variations.

Sources and series: see wid.world

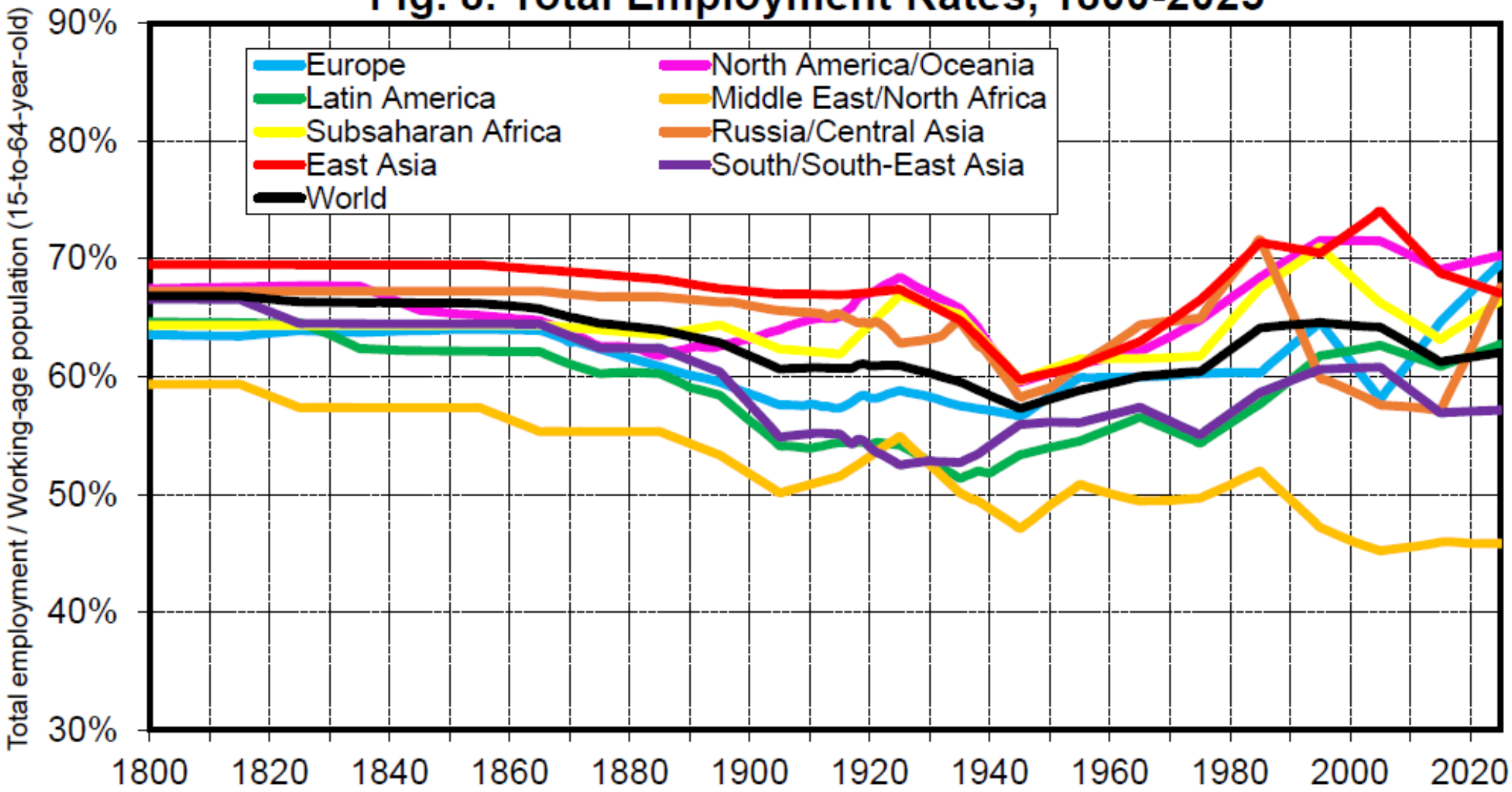
Fig. 7. Women's Relative Employment Rates, 1800-2025



Interpretation. Women's relative employment rate, defined as the ratio between total women's and men's employment rates among the working-age female population (15-to-64-year-old), has followed a U-shaped curve at the global level over the 1800-2025 period, with important time and regional variations.

Sources and series: see wid.world

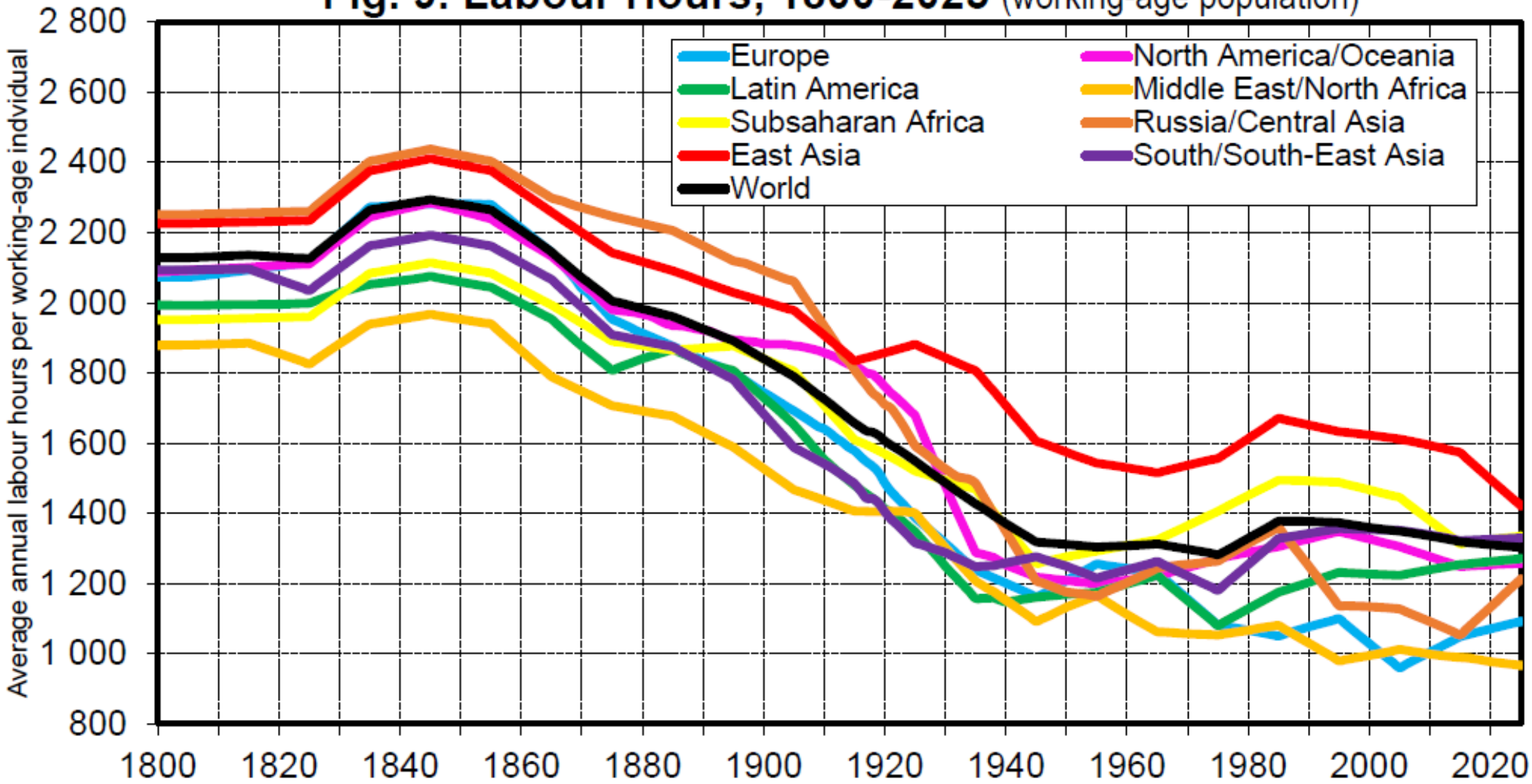
Fig. 8. Total Employment Rates, 1800-2025



Interpretation. The employment rate, defined as the ratio between total employment (irrespective of gender, employment status or sector) and working-age population (15-to-64-year-old), has been relatively stable around 60-65% at the global level over the 1800-2025 period, with interesting variations across regions and over time, reflecting in particular important variations in female employment.

Sources and series: see wid.world

Fig. 9. Labour Hours, 1800-2025 (working-age population)



Interpretation. We observe a long-run decline in average economic labour hours per working-age individual (15-to-64-year-old) at the global level over the 1800-2025 period, with a stabilisation in recent decades due to rising female employment. **Sources and series**: see wid.world

Summing up: **large decline in labor hours 1800-2025**
(per worker: from 3300h to 2100h, -37%)
(per working-age individual: from 2200h to 1300h, -40%)

But with large variations across periods/countries: main period of work time reduction = **1860-1980 rise of labor movement**

And with major changes in gender patterns: **U-shaped women employment rates** (key role of unpaid family work in agriculture), + **very slow rise of men domestic labor** (large regional variations)

→ History of labor time is socio-political, not just economic

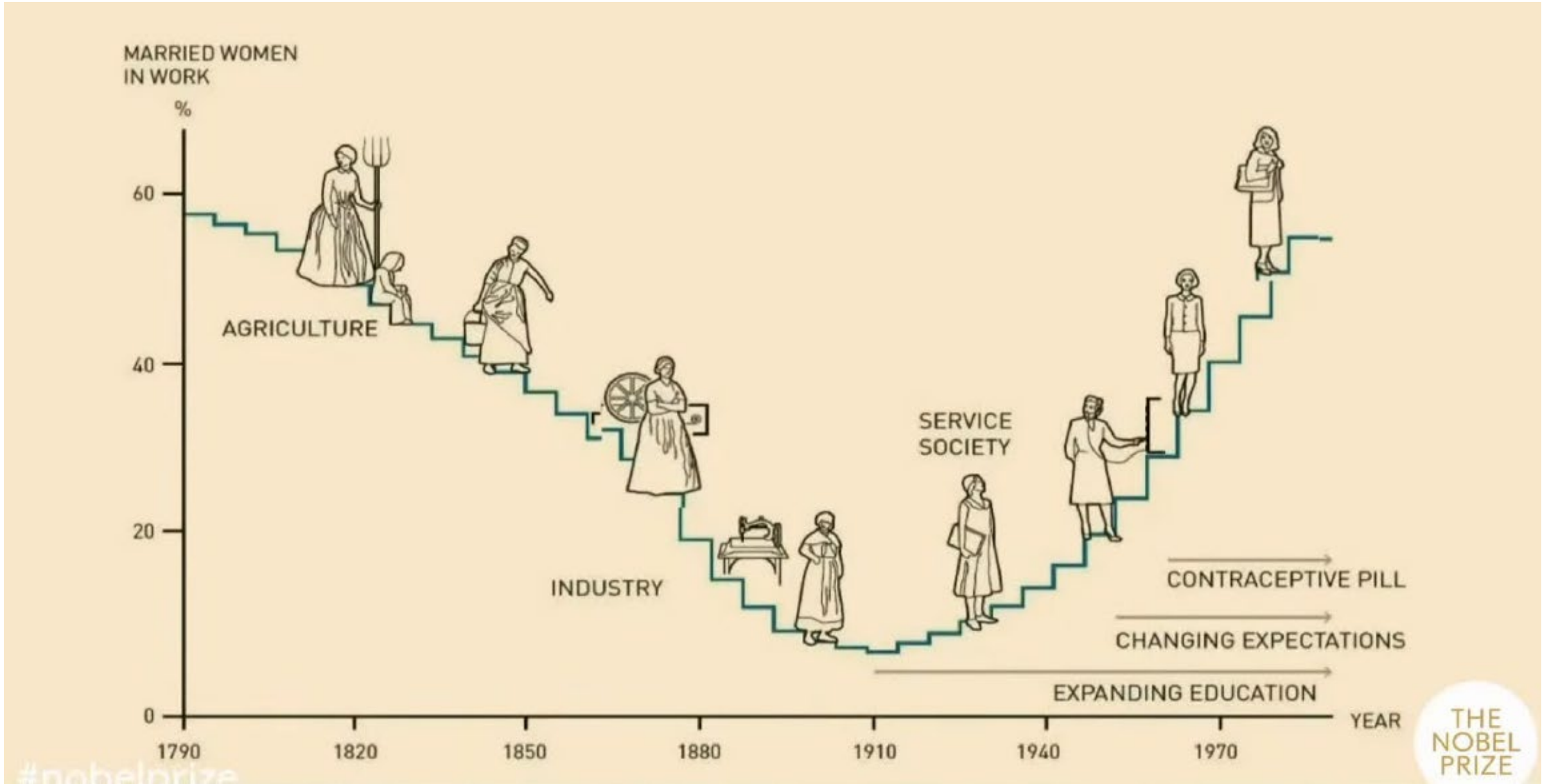
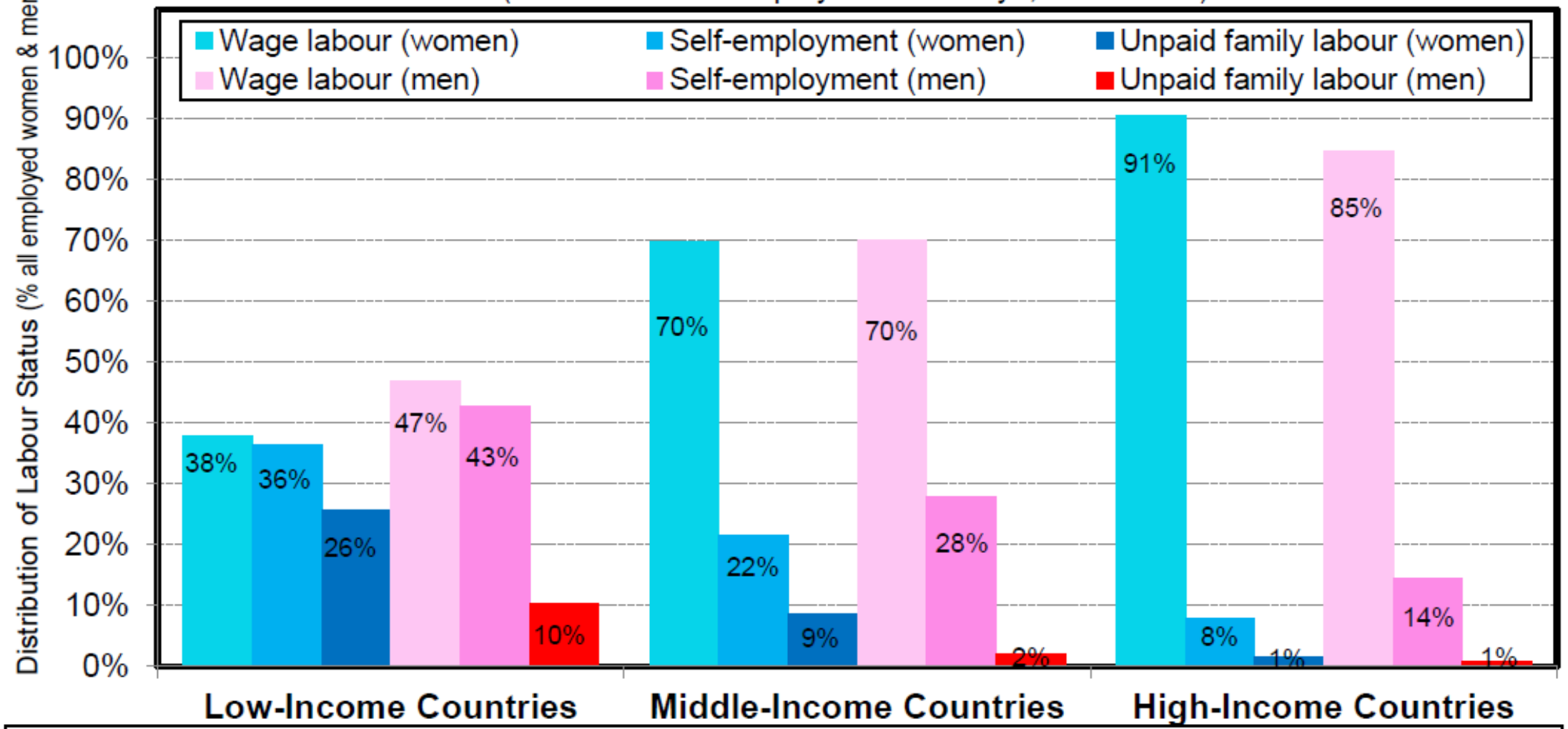

MARRIED WOMEN
IN WORK
%
60
40
20
0
AGRICULTURE
INDUSTRY
SERVICE
SOCIETY
CONTRACEPTIVE PILL
CHANGING EXPECTATIONS
EXPANDING EDUCATION
YEAR
1790
1820
1850
1880
1910
1940
1970
THE
NOBEL
PRIZE
#nobelprize

Fig. 10. Labour Status & Gender in Poor & Rich Countries

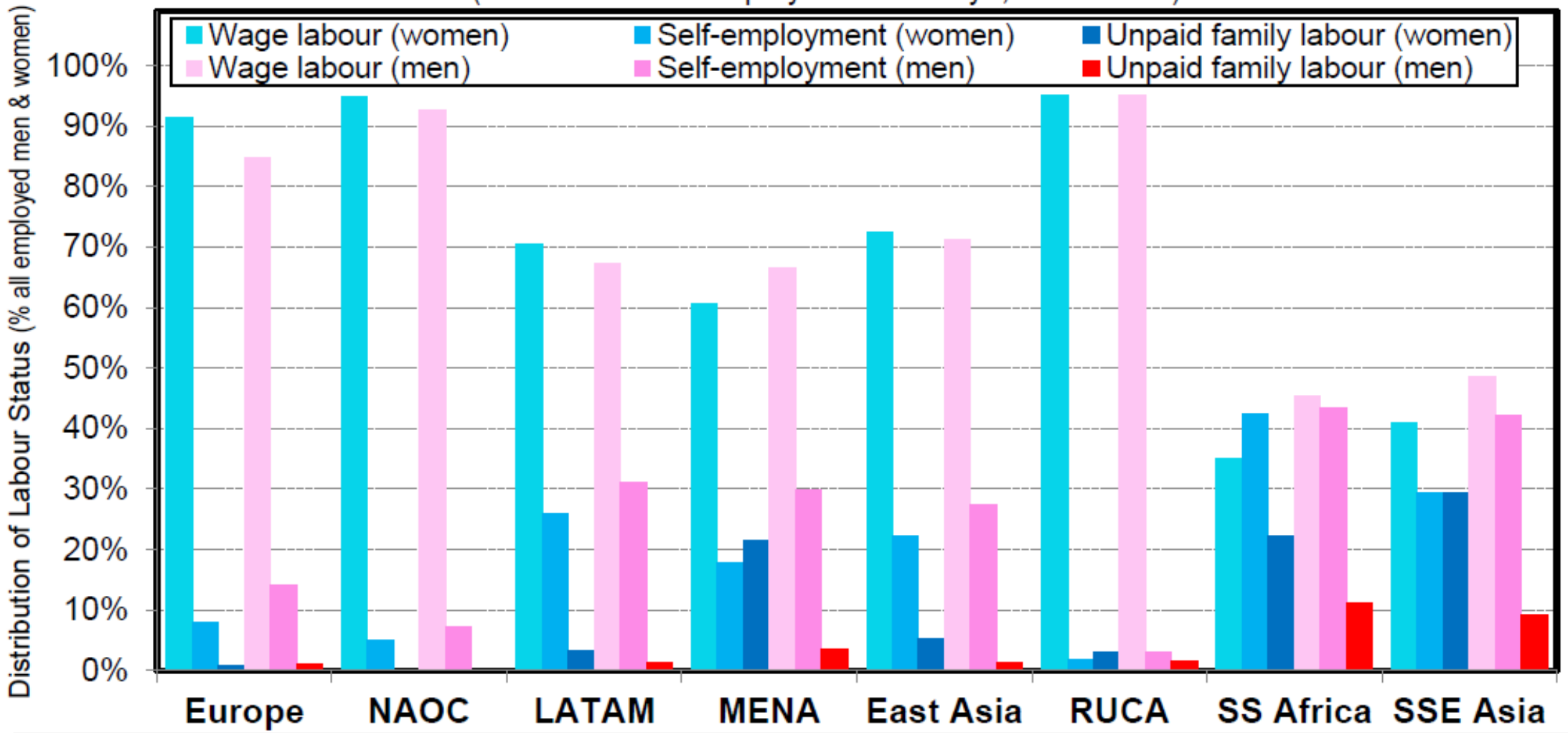
(Evidence from Employment Surveys, 2010-2025)



Interpretation. In poor countries (per capita NNI<10k € PPP 2023), 38% of all employed women are wage-earners, 36% are self-employed and 26% are unpaid family workers (in agriculture and other sectors); 47% of employed men are wage-earners, 43% are self-employed and 10% are unpaid family workers. Wage labour gradually becomes predominant in middle-income countries (btw 10k & 30k) and rich countries (over 30k), both for women and men. **Note.** Authors' computations using employment surveys from 35 countries. **Sources & series**: wid.world

Fig. 11. Labour Status & Gender Across Regions

(Evidence from Employment Surveys, 2010-2025)

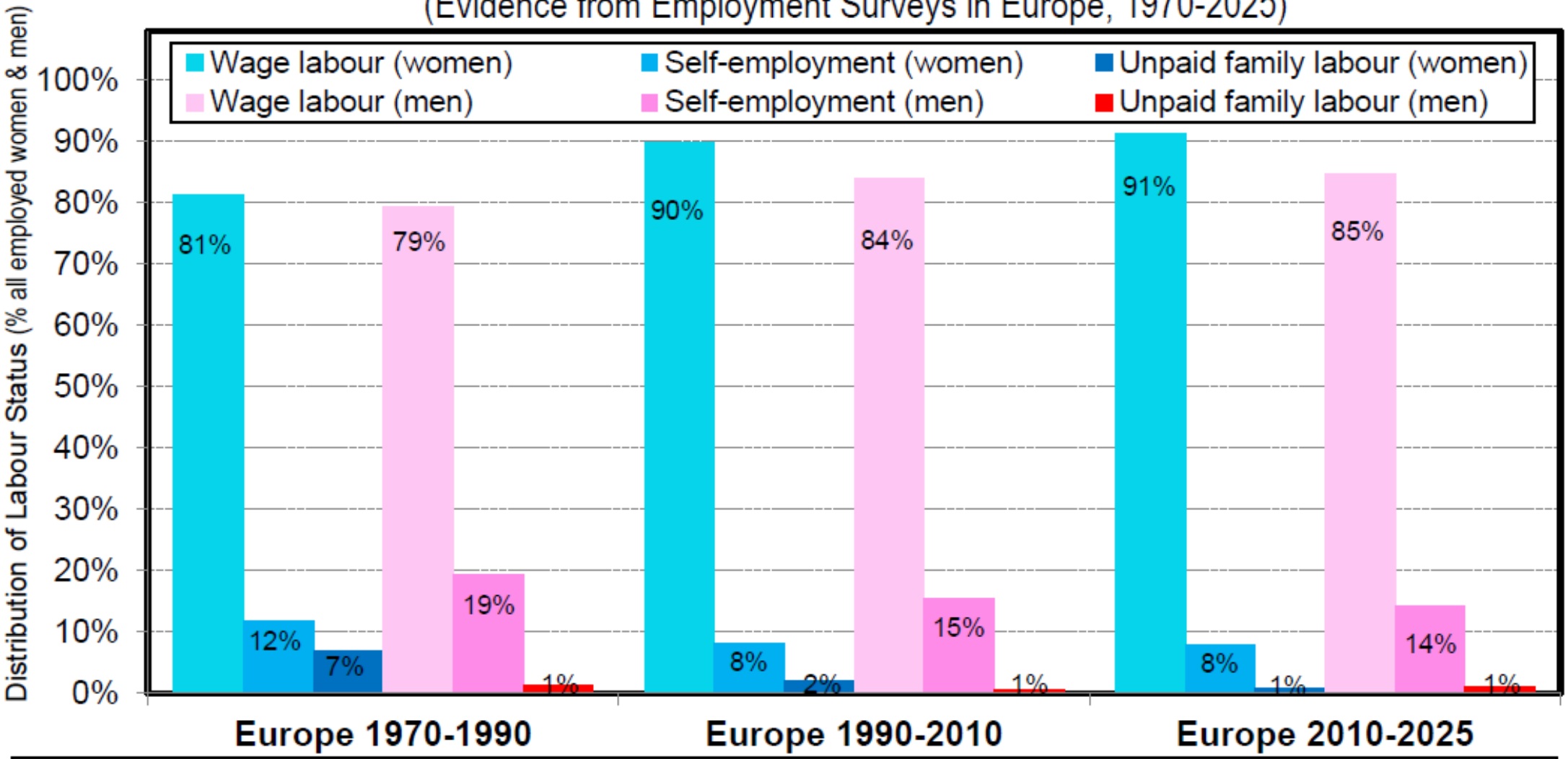


Interpretation. In 2010-2025, the proportion of unpaid family labour within employed women is particularly large in Middle East/North Africa (22%) Subsaharan Africa (22%) and South/South-East Asia (30%).

Note. Authors' computations using employment surveys from 35 countries. **Sources & series**: wid.world

Fig. 12. Labour Status & Gender over Time in Europe

(Evidence from Employment Surveys in Europe, 1970-2025)

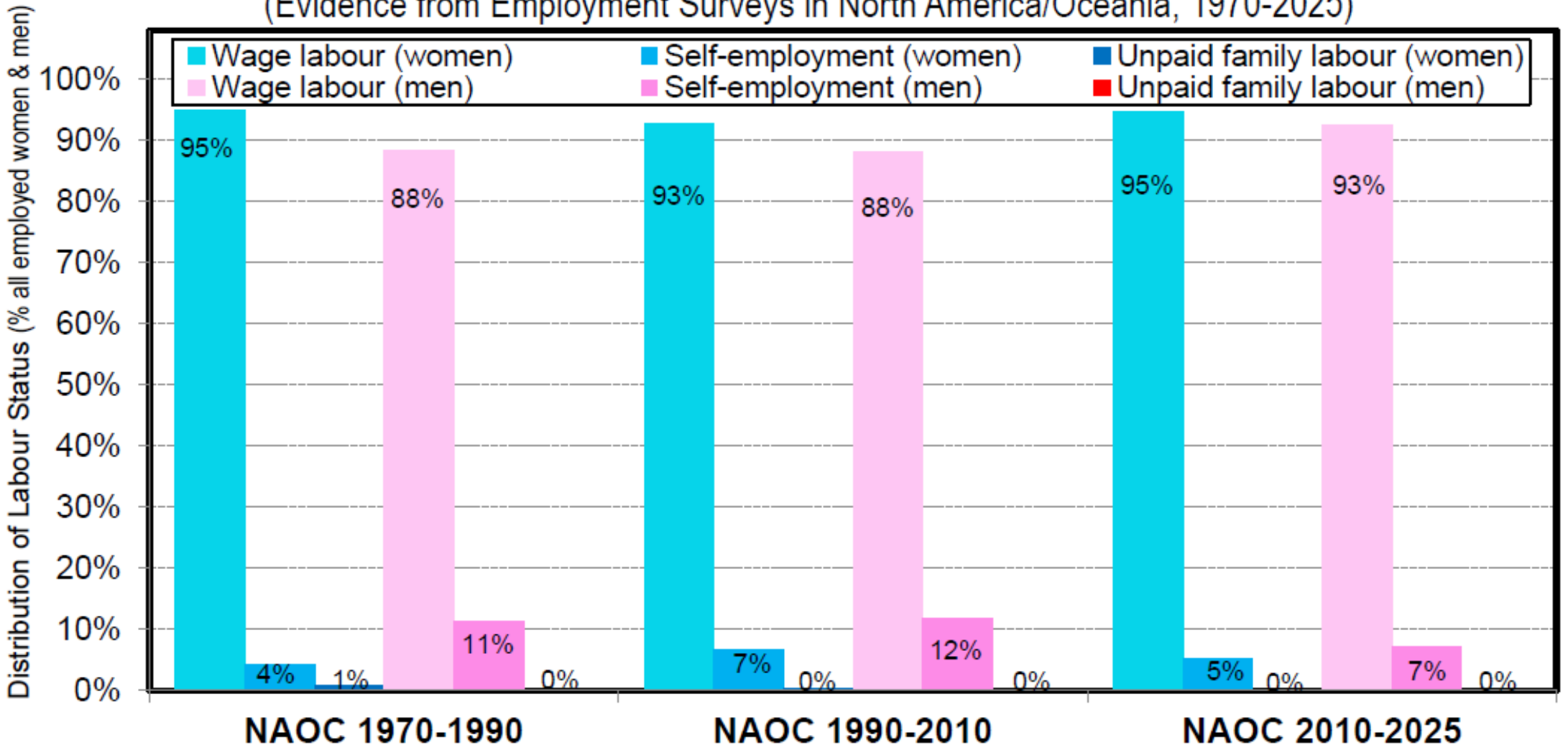


Interpretation. In 1970-1990, the proportion of unpaid family labour within employed women (7%) was comparable to middle-income countries in 2010-2025 (9%).

Note. Authors' computations using employmentsurveys run in Britain, Denmark, Italy, France, Germany and Spain over 1970-2025 period. **Sources & series**: wid.world

Fig. 13. Labour Status & Gender over Time in NAOC

(Evidence from Employment Surveys in North America/Oceania, 1970-2025)

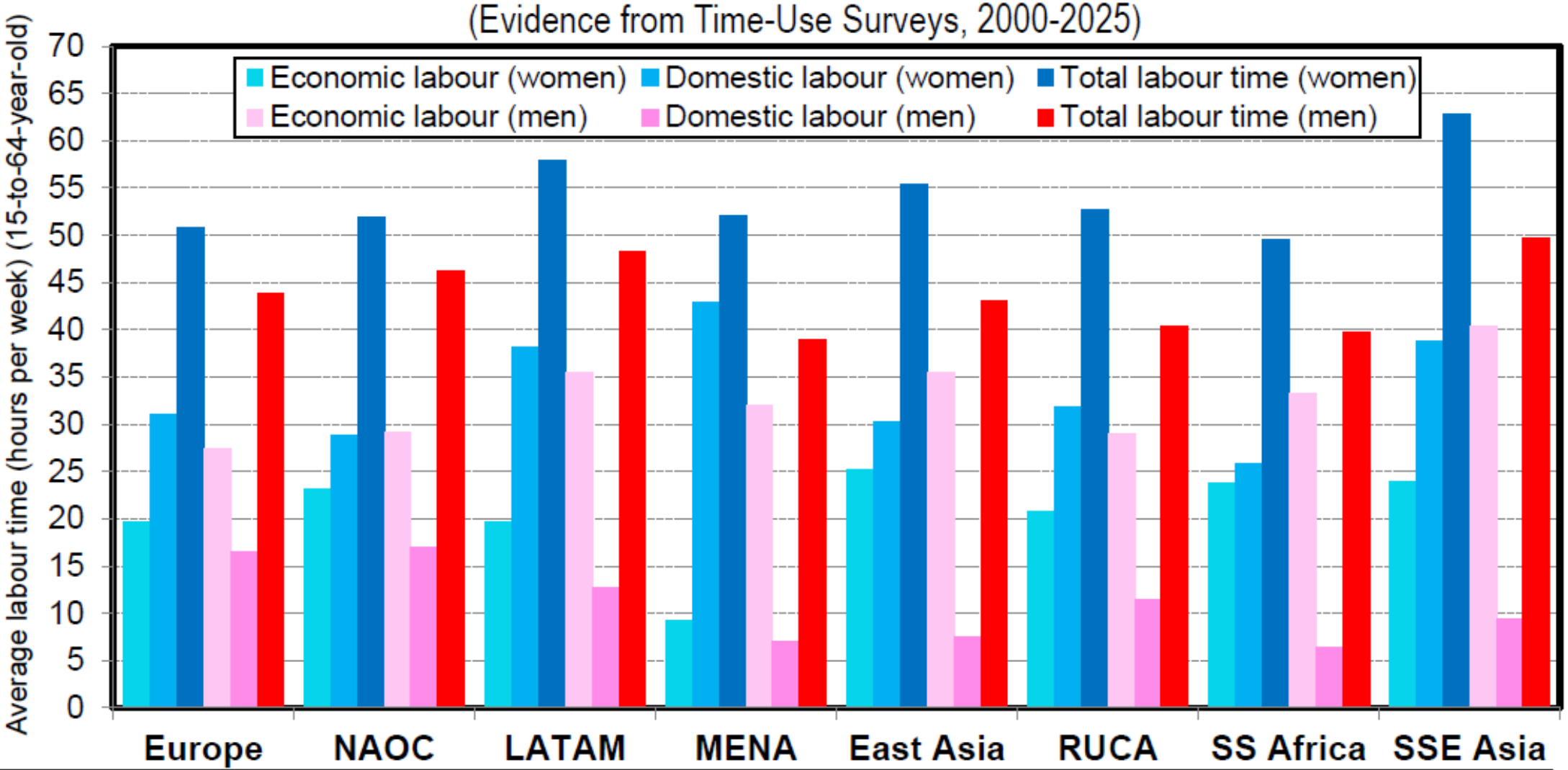


Interpretation. In 1970-1990, the proportion of unpaid family labour within employed women (1%) was already negligible in North America/Oceania, reflecting an early decline of the agricultural sector and other traditionnal familly self-employment activities.

Note. Authors' computations using employmentsurveys run in USA, Canada, Austrlalia and New Zealand over 1970-2025 period. **Sources & series**: wid.world

Fig. 14. Women Work More Than Men in All Regions

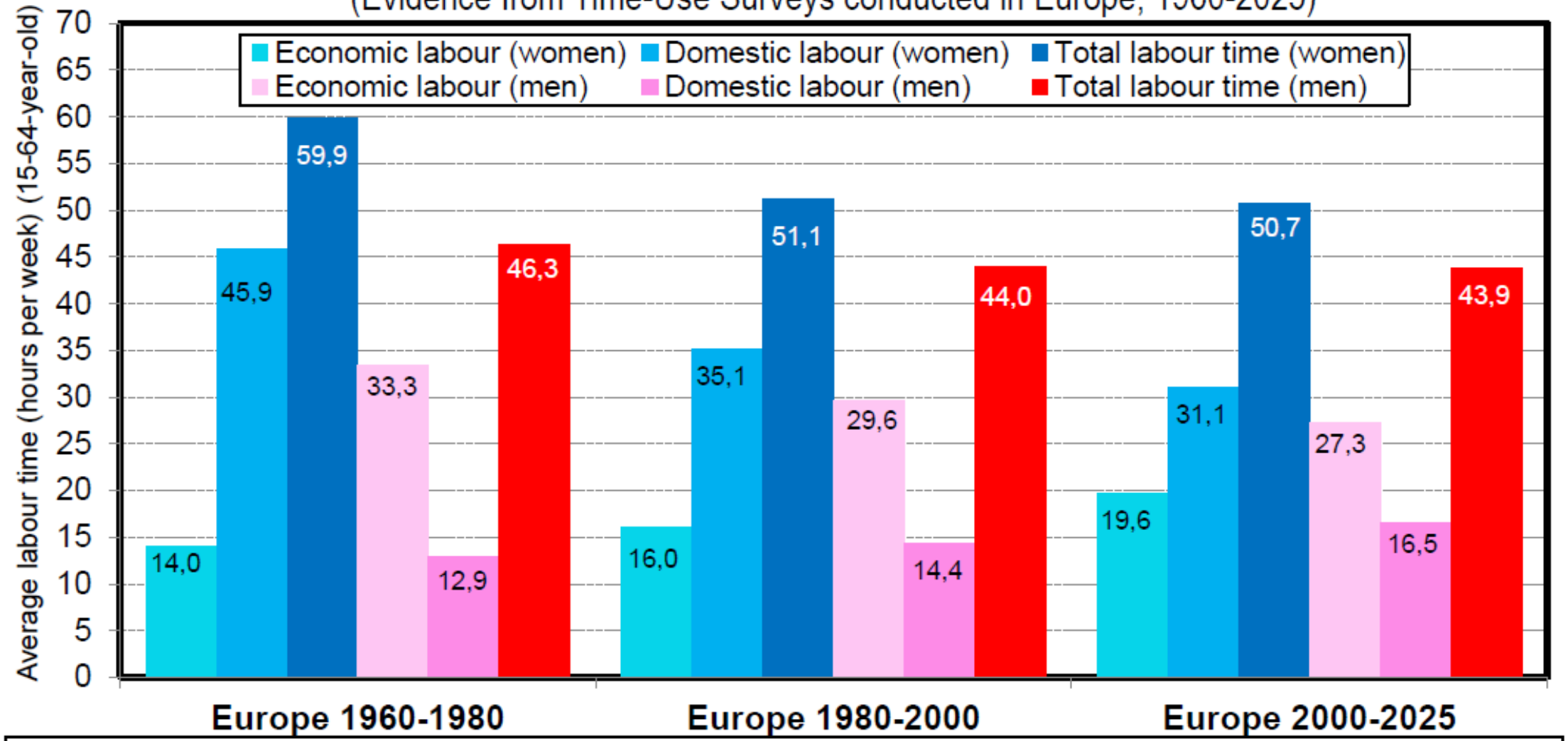
(Evidence from Time-Use Surveys, 2000-2025)



Interpretation. If we look at total labour time (economic + domestic), women work more men in all regions, with gaps ranging from 6-7 hours (Europe, North America/Oceania) to 12-13 hours (MENA, East Asia, South & South-East Asia). **Note.** Economic labour includes labour used to produce goods & services included in national accounts. Domestic labour includes all other forms of labour: household cleaning, cooking, child-care, etc. Authors' computations using time-use surveys run in 35 countries over 2000-2025 period. **Averages are computed over all individuals aged 15-to-64** (employed or not). **Sources & series**: wid.world

Fig. 15. Women Have Always Worked More Than Men: Europe

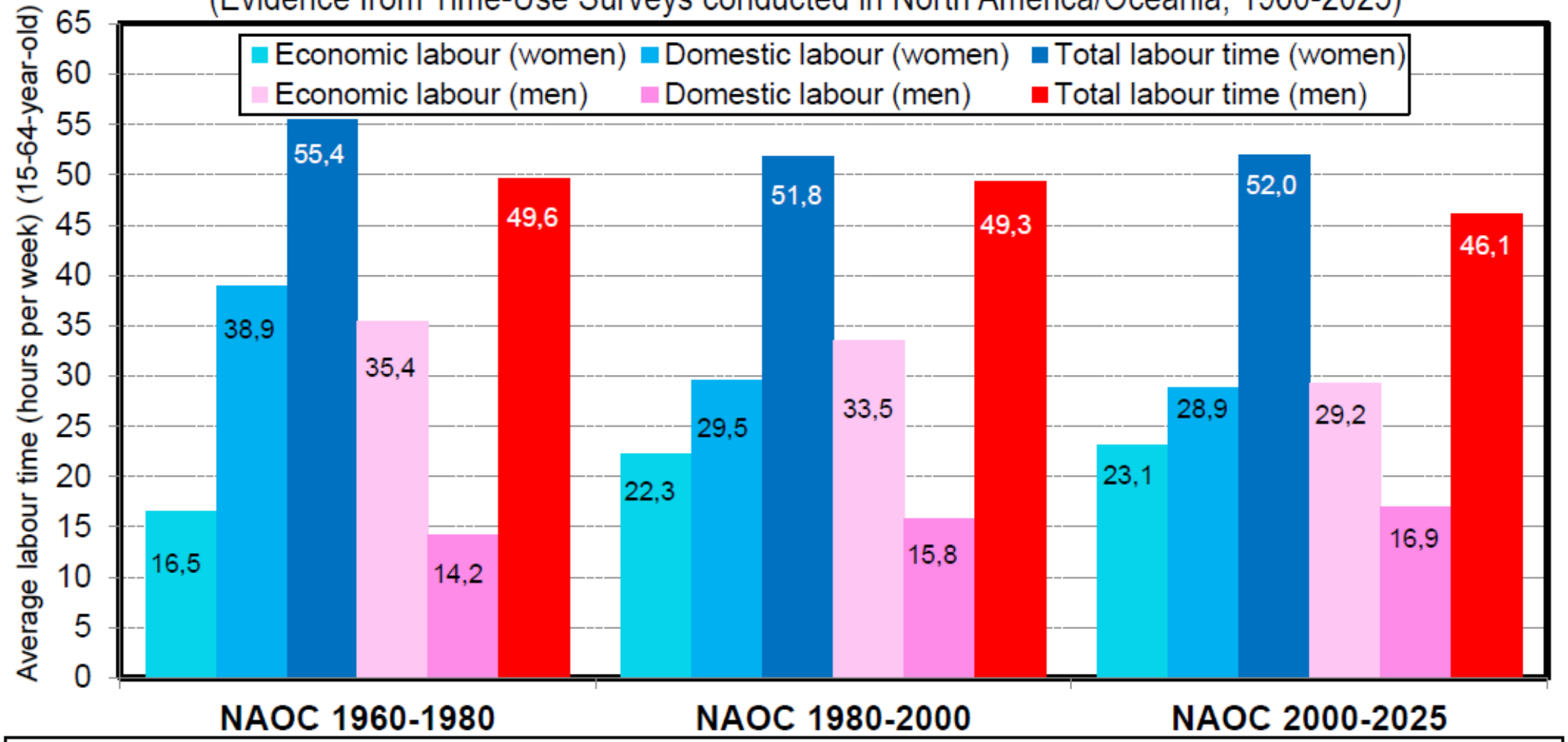
(Evidence from Time-Use Surveys conducted in Europe, 1960-2025)



Interpretation. If we look at total labour time (economic + domestic), we find that women have always worked more men in Europe. The reduction of gap observed in recent decades is relatively small. **Note.** Economic labour includes labour used to produce goods & services included in national accounts. Domestic labour includes all other forms of labour: household cleaning, cooking, child-care, etc. Authors' computations using time-use surveys run in Britain, Denmark, Italy, France, Germany and Spain over 1960-2025 period. **Averages are computed over all individuals aged 15-to-64** (employed or not). **Sources & series**: wid.world

Fig. 16. Women Have Always Worked More Than Men: NAOC

(Evidence from Time-Use Surveys conducted in North America/Oceania, 1960-2025)



Interpretation. If we look at total labour time (economic + domestic), we find that women have always worked more men in North America and Oceania, with no reduction of the gap in recent decades. **Note.** Economic labour includes labour used to produce goods & services included in national accounts. Domestic labour includes all other forms of labour: household cleaning, cooking, child-care, etc. Authors' computations using time-use surveys run in USA, Canada, Australia and New Zealand over 1960-2025 period. **Averages are computed over all individuals aged 15-to-64** (employed or not). **Sources & series**: wid.world

Table 3. Women Work Than Men: Summary Statistics

Average labour time (hours per week) among all working-age individuals (15-to-64-year-old) (working or not)	Women			Men			Gender gap in total labour time		Women share in labour time		
	Economic Labour	Domestic Labour	Total Labour Time	Economic Labour	Domestic Labour	Total Labour Time	Absolute (W-M)	Relative (W-M)/M	Economic Labour	Domestic Labour	Total Labour Time
Low-Income Countries	25.4	29.0	**54.4**	37.6	6.4	**44.0**	**10.4**	24%	40%	82%	**55%**
Middle-Income Countries	17.2	36.5	**53.7**	31.9	10.3	**42.2**	**11.4**	27%	35%	78%	**56%**
High-Income Countries	20.8	30.9	**51.7**	28.6	15.4	**44.0**	**7.7**	17%	42%	67%	**54%**
All Countries 2000-2025	21.1	32.1	**53.2**	32.7	10.7	**43.4**	**9.8**	23%	39%	75%	**55%**
Europe	19.6	31.1	**50.7**	27.3	16.5	**43.9**	**6.9**	16%	42%	65%	**54%**
North America/Oceania	23.1	28.9	**52.0**	29.2	16.9	**46.1**	**5.9**	13%	44%	63%	**53%**
Latin America	19.7	38.2	**57.9**	35.5	12.8	**48.3**	**9.6**	20%	36%	75%	**55%**
Middle East/North Africa	9.2	42.9	**52.1**	32.0	7.0	**39.0**	**13.0**	33%	22%	86%	**57%**
East Asia	25.2	30.3	**55.5**	35.5	7.5	**43.1**	**12.4**	29%	41%	80%	**56%**
Russia/Central Asia	20.8	31.9	**52.7**	28.9	11.5	**40.4**	**12.3**	30%	42%	74%	**57%**
Subsaharan Africa	23.8	25.9	**49.6**	33.3	6.3	**39.7**	**9.9**	25%	42%	80%	**56%**
South & Sout-East Asia	24.0	38.8	**62.8**	40.4	9.3	**49.7**	**13.1**	26%	37%	81%	**56%**
Europe 1960-1980	14.0	45.9	**59.9**	33.3	12.9	**46.3**	**13.7**	30%	30%	78%	**56%**
Europe 1980-2000	16.0	35.1	**51.1**	29.6	14.4	**44.0**	**7.2**	16%	35%	71%	**54%**
Europe 2000-2025	19.6	31.1	**50.7**	27.3	16.5	**43.9**	**6.9**	16%	42%	65%	**54%**
NAOC 1960-1980	16.5	38.9	**55.4**	35.4	14.2	**49.6**	**5.8**	12%	32%	73%	**53%**
NAOC 1980-2000	22.3	29.5	**51.8**	33.5	15.8	**49.3**	**2.5**	5%	40%	65%	**51%**
NAOC 2000-2025	23.1	28.9	**52.0**	29.2	16.9	**46.1**	**5.9**	13%	44%	63%	**53%**

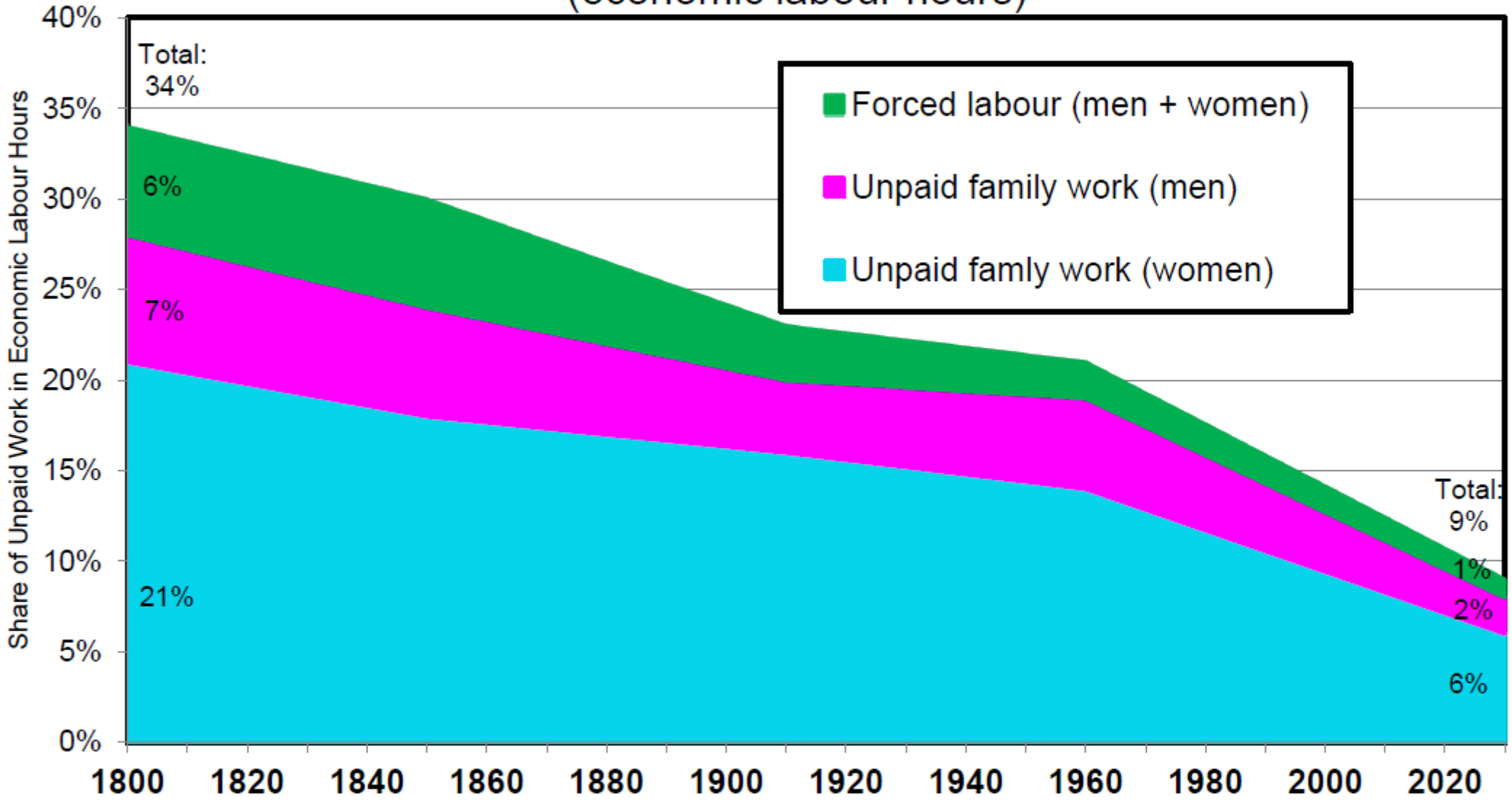
Interpretation. If we look at total labour time (economic + domestic), women work more men in all categories of countries, particularly in low-income countries (per capita NNI<10k€ PPP 2023) & middle-income countries (btw 10k & 30k). **Note.** Economic labour includes labour used to produce goods & services included in national accounts. Domestic labour includes all other forms of labour: household cleaning, cooking, child-care, etc. Authors' computations using time-use surveys run in 35 countries over 2000-2025 period. **Sources & series**: wid.world

Historical series show the large historical importance of unpaid labour

Unpaid labour plays a critical role for the proper measurement of gender inequality
(and also for the study of industrial revolution and colonial inequality: see next lecture)

Fig. 17. Unpaid Work: A Global Assessment 1800-2025

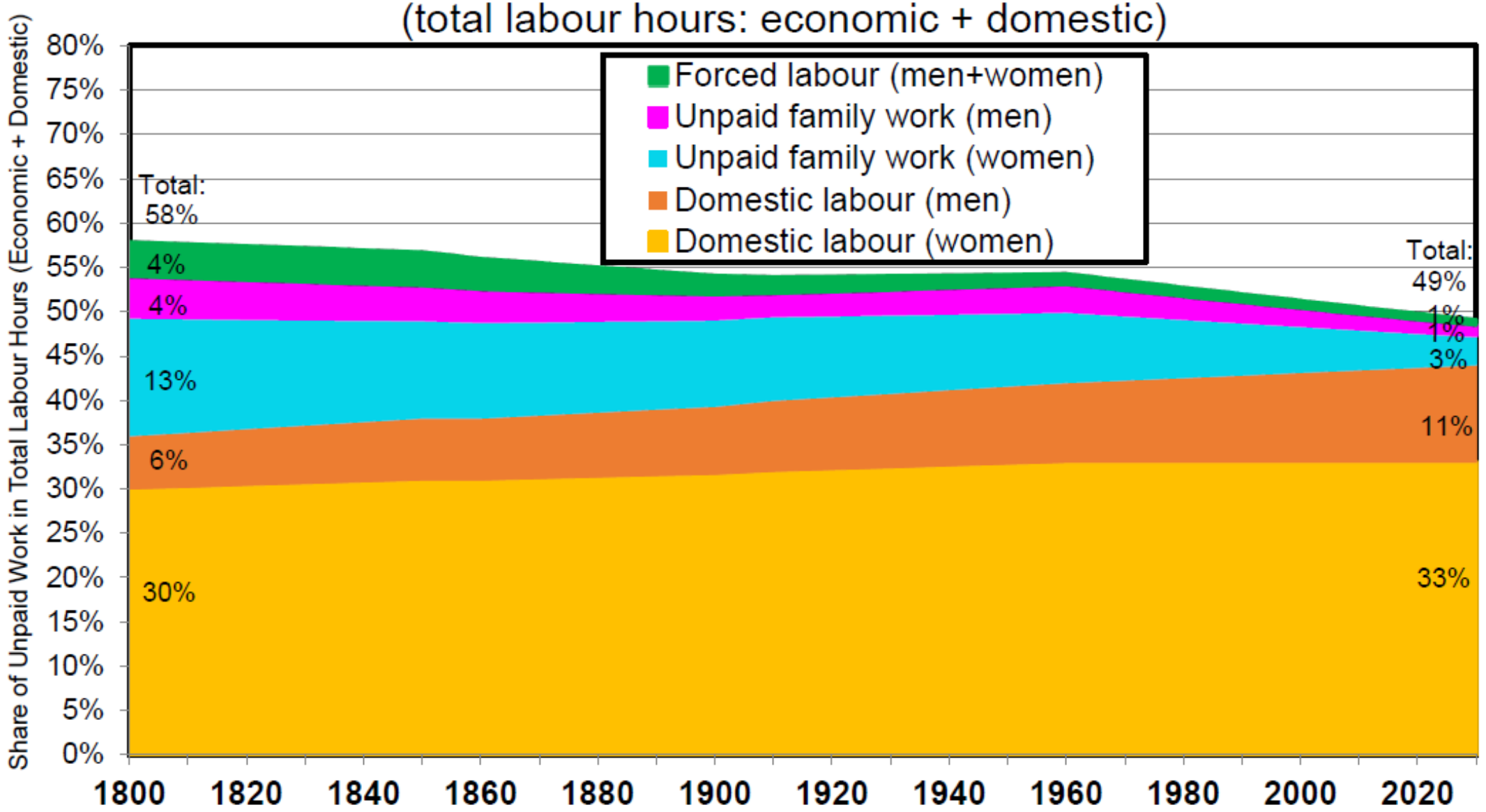
(economic labour hours)



Interpretation. In 1800, the share of unpaid work in economic labour hours can be estimated to be around 34%, including about 21% for women's unpaid family work, 7% of men's unpaid family work and 6% for forced labour (including slave labour, serfdom and corvée labour). In 2025, the share of unpaid work makes about 9% of total economic labour hours. **Sources and series**: wid.world

Fig. 18. Unpaid Work: A Global Assessment 1800-2025

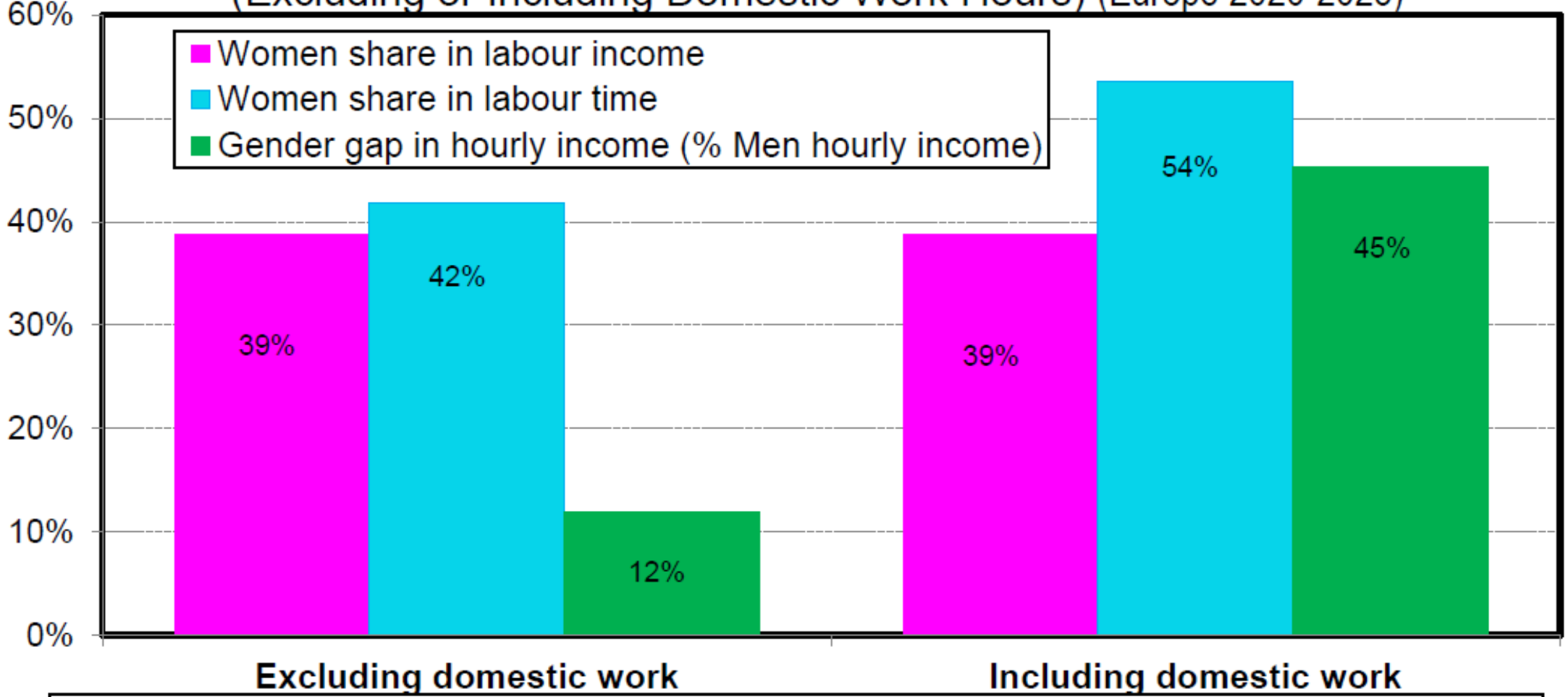
(total labour hours: economic + domestic)



Interpretation. In 1800, the share of unpaid work in total labour hours (economic + domestic) can be estimated to be around 58%, as compared to 49% in 2025. In the long run, the decline in unpaid family work and forced labour has been partly compensated by the rise of the share of domestic labour in total labour hours. **Sources and series**: wid.world

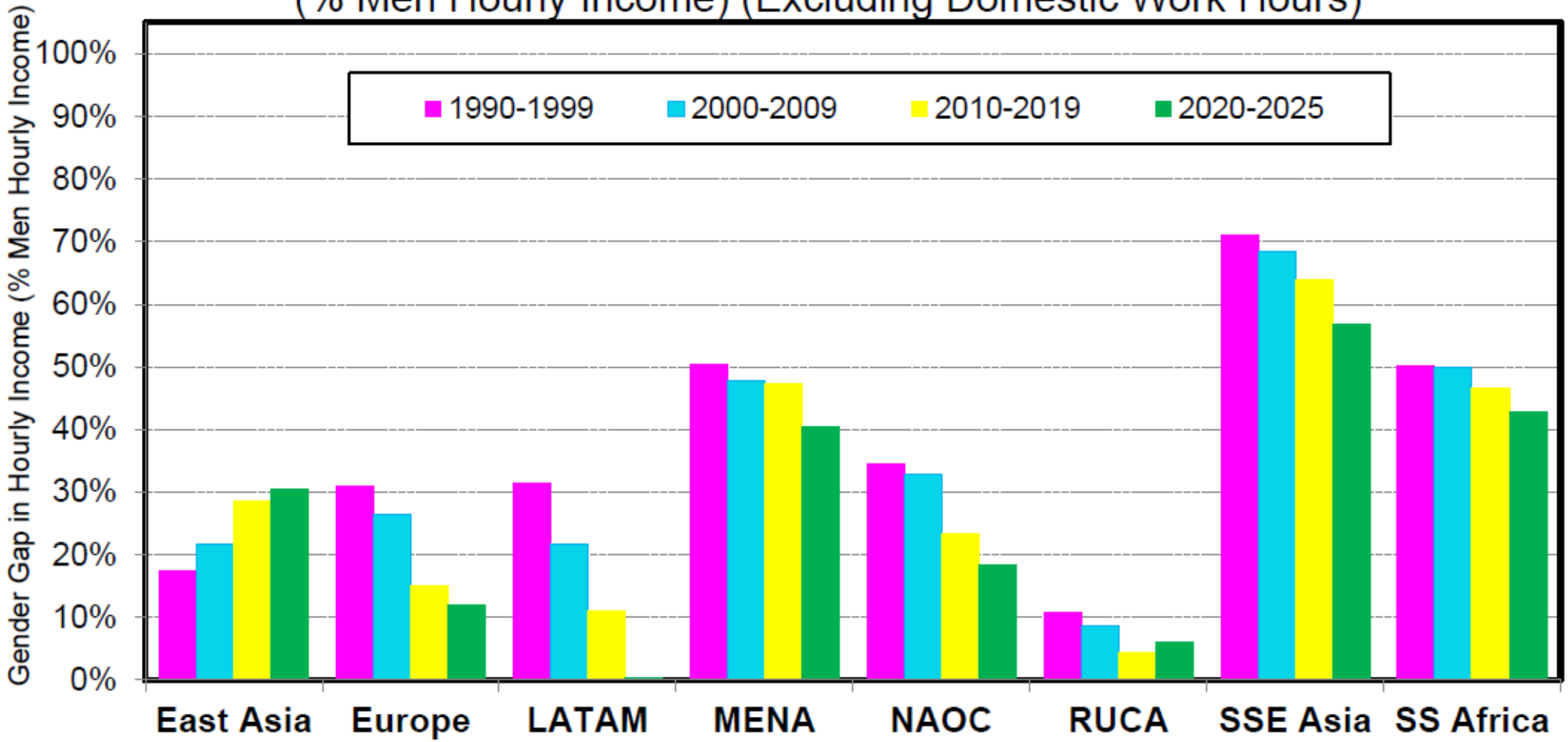
Fig. 19. Alternative Measures of the Gender Gap

(Excluding or Including Domestic Work Hours) (Europe 2020-2025)



Interpretation. The share of women in total labour income is equal to 39% in Europe in 2020-2025, while heir share in economic work hours is equal to 42%. This implies that their average income per work hour (excluding domestic work hours) is 12% smaller than that of men. However their share in total work hours (including domestic work) is equal to 54%. This implies that their average labour income per work hour (including both economic and domestic work hours) is 45% smaller than that of men. The bottom line is that the inclusion of domestic labour has a major impact on the measured gender gap. **Note.** If women shares in labour income and labour time are equal to i and t, then the gender gap in hourly income (as a % of average men hourly income) is given by the following formula: g=(t-i)/(t(1-i)). **Sources & series**: wid.world

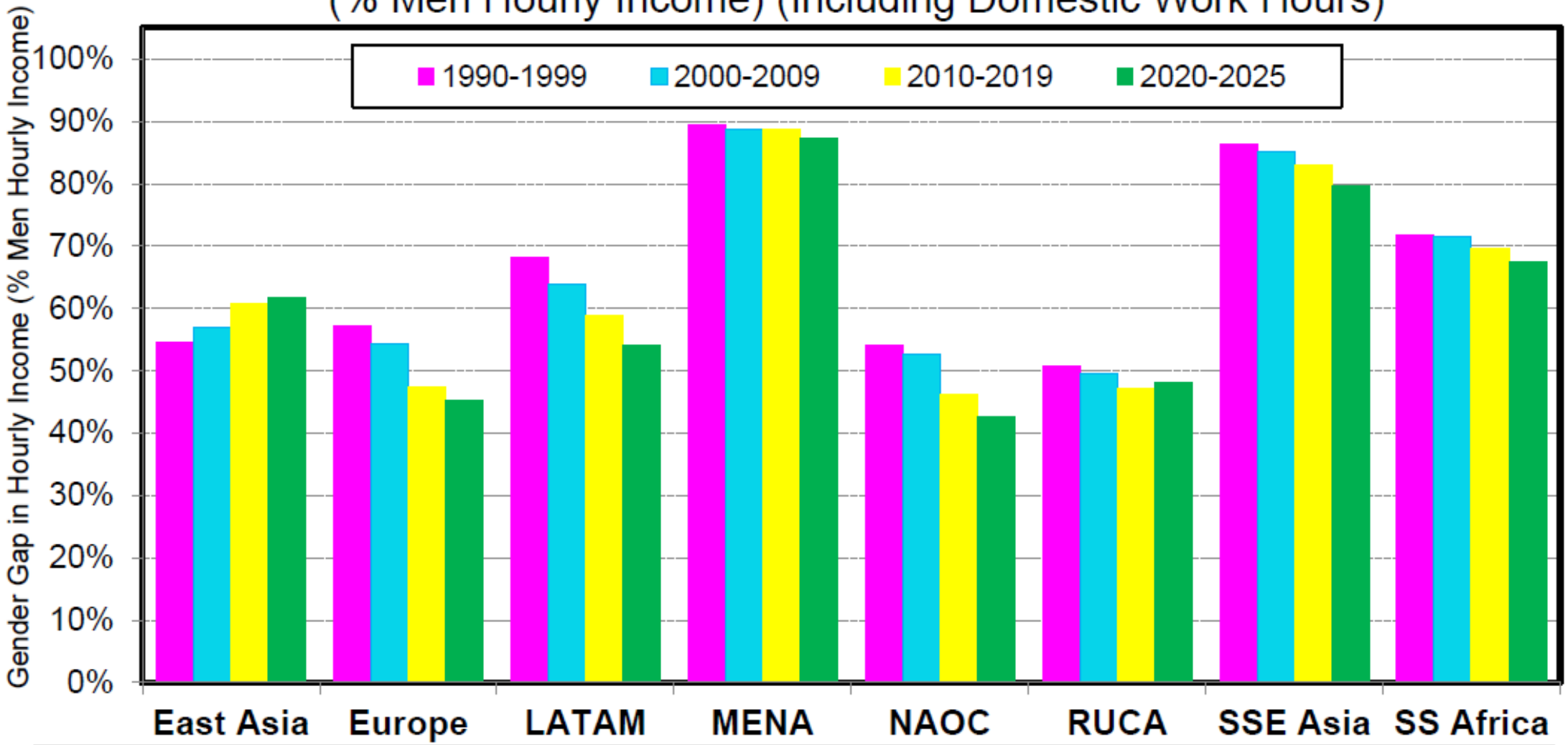
Fig. 20. The Conventional Gender Gap in Hourly Income
(% Men Hourly Income) (Excluding Domestic Work Hours)



Interpretation. Average women labour income per work hour (excluding domestic work hours) was 31% smaller than that average men labour income per work hour in Europe in 1990-1999, and it is 12% smaller in 2020-2025. Generally speaking, the gender gap looks relatively moderate (10-20% or less) in a number of world regions when we exclude domestic work hours. **Sources & series**: wid.world

Fig. 21. The Real Gender Gap in Hourly Income

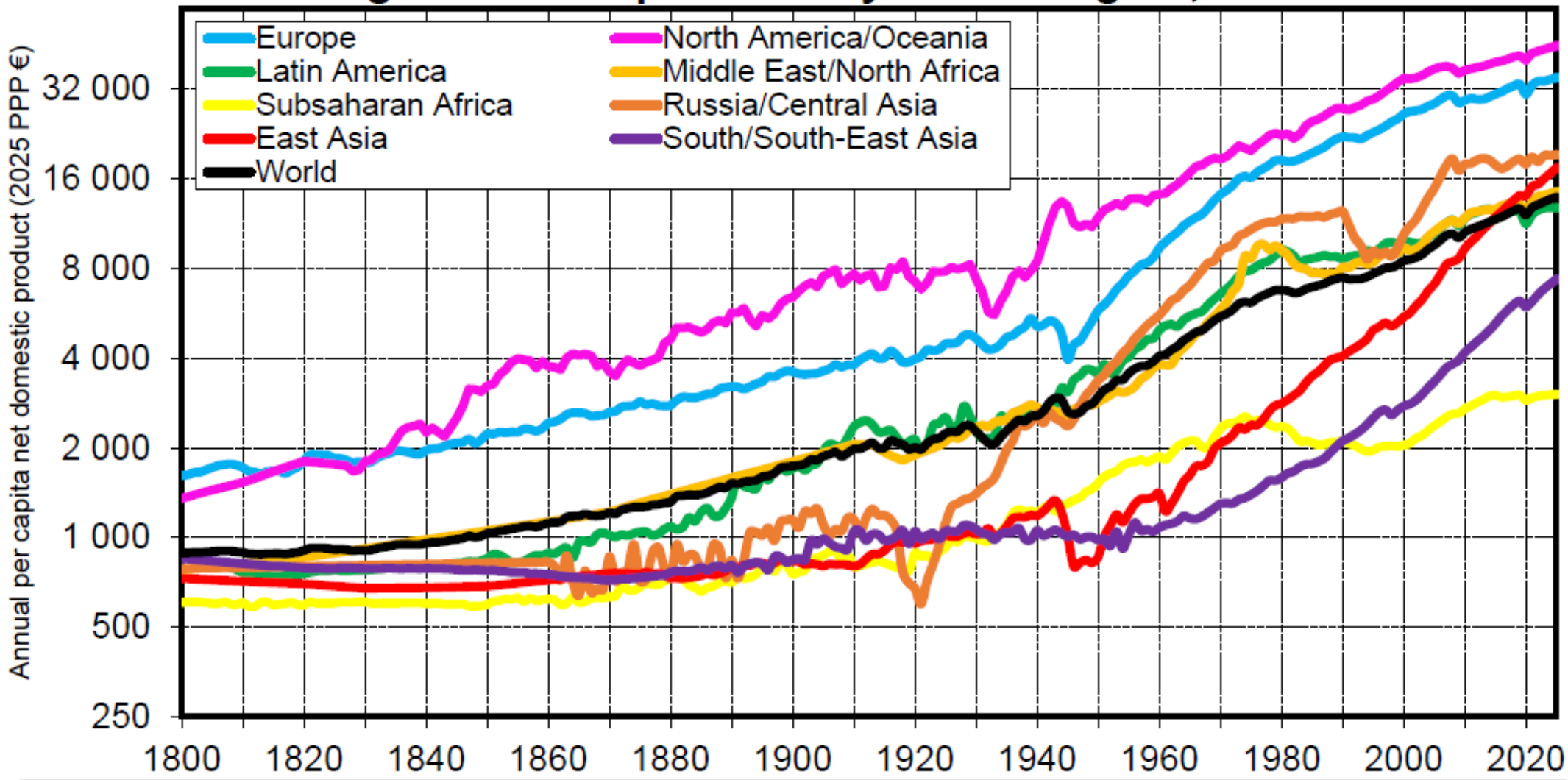
(% Men Hourly Income) (Including Domestic Work Hours)



Interpretation. Average women labour income per work hour (including both economic and domestic work hours) was 57% smaller than average men labour income per work hour in Europe in 1990-1999, and it is 45% smaller in 2020-2025. The bottom line is that when we include domestic work then the gender gap looks very large in all world regions: generally around 40-50% in the most gender-equal regions and up to 80-90% in the most gender-unequal regions. **Sources & series**: wid.world

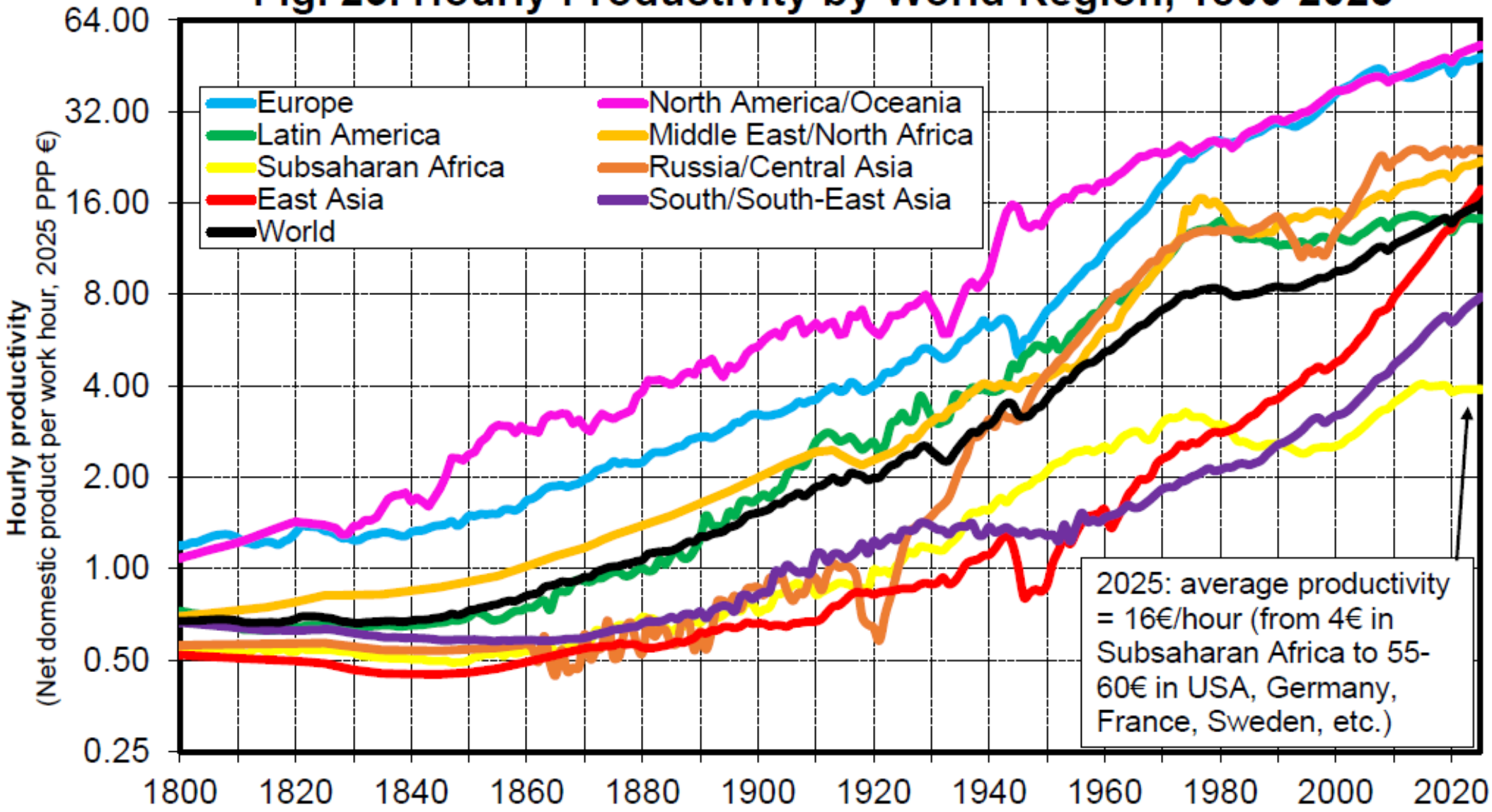
Historical series show a **large negative long-run elasticity between labour hours and productivity** (income effects > substitution effects), but with substantial variations across countries & periods

Fig. 22. Per Capita NDP by World Region, 1800-2025



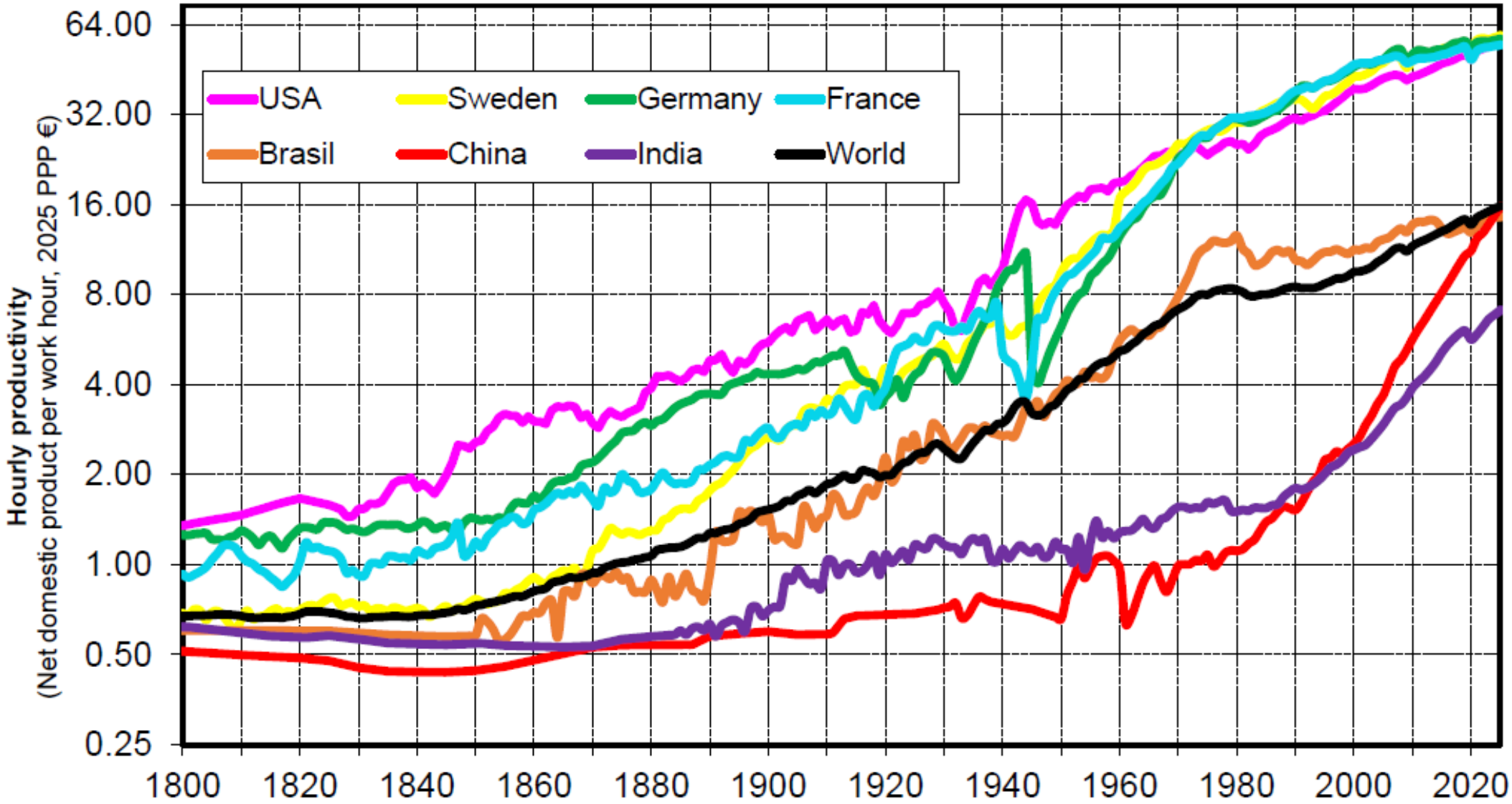
Interpretation. Expressed in 2025 PPP €, annual per capita net domestic product (NDP) rose from about 900€ in 1800 to 14 000€ in 2025 at the global level. I.e. it was multiplied by about 16, which corresponds to average annual real growth rate of 1,2% per year, with large variations over time and across regions. **Sources and series**: see wid.world

Fig. 23. Hourly Productivity by World Region, 1800-2025



Interpretation. Expressed in 2025 PPP €, hourly productivity (as defined by net domestic product by economic labour hour) rose from about 0.7€ in 1800 to 16€ in 2025 at the global level. I.e. it was multiplied by about 24, which corresponds to average annual real growth rate of 1,4% per year, with large variations over time and across regions. **Sources and series**: see wid.world

Fig. 24. Hourly Productivity by Country, 1800-2025



Interpretation. Expressed in 2025 PPP €, hourly productivity (as defined by net domestic product by economic labour hour) rose from about 0.7€ in 1800 to 16€ in 2025 at the global level. I.e. it was multiplied by about 24, which corresponds to average annual real growth rate of 1,4% per year, with large variations over time and across regions. **Sources and series**: see wid.world

Table 4. Productivity Growth by World Regions (1800-2025)					
Annual real growth rate of productivity (hourly NDP)	1800-2025	1800-1910	1910-1950	1950-1990	1990-2025
East Asia	1.6%	0.2%	0.7%	3.6%	**4.6%**
Europe	1.7%	1.0%	1.7%	3.6%	**1.4%**
Latin America	1.3%	1.2%	1.8%	2.0%	**0.6%**
Middle East/ North Africa	1.5%	1.1%	1.4%	2.9%	**1.4%**
North America/ Oceania	1.7%	1.6%	2.1%	1.8%	**1.6%**
Russia/ Central Asia	1.7%	0.5%	4.0%	3.0%	**1.5%**
South/South-East Asia	1.1%	0.5%	0.4%	1.7%	**3.2%**
Sub Saharan Africa	0.9%	0.4%	2.4%	0.5%	**1.2%**
World	**1.4%**	**0.9%**	**1.7%**	**2.2%**	**1.8%**

Interpretation. Productivity (as defined by net domestic product per hour of economic labour) has been multiplied by about 24 at the global level between 1800 and 2025 (from about 0.7€/h in 1800 to about 16€/h in 2025) (PPP 2025 €). This corresponds to an average annual real growth rate of 1.4%. Productivity growth has increased from 0.9% over the 1800-1910 period to 1.7% over 1910-1950 and 2.2% and 1.8% over 1950-1990 and 1990-2025. **Sources and series**: wid.world

Table 5. The Elasticity of Labor Hours With Respect to Productivity						
	Average Annual Labour Hours per Employed Individual (log)			Average Annual Labour Hours per Working-Age Individual (15-64) (log)		
Hourly Productivity (log)	-0.128***	-0.176***	-0.082***	-0.145***	-0.192***	-0.116***
(s.e.)	(0.001)	(0.001)	(0.003)	(0.001)	(0.001)	(0.005)
Country Fixed Effects	NO	YES	YES	NO	YES	YES
Period Covered	1800-2025	1800-2025	1980-2025	1800-2025	1800-2025	1980-2025
R2	0.59	0.80	0.76	0.55	0.75	0.73
N.obs	12882	12882	2622	12882	12882	2622

Interpretation. When hourly productivity increases by 1%, labour hours decline by 0.13% (specification without country fixed effects) or by 0.18% (specification with country fixed effects). The estimated coefficients are smaller if we restrict to the post-1980 and do not use the full historical variations.

Baseline historical elasticity ≈ -0,15 (between -0,12 & -0,18)

I.e. when productivity ↑ by 1%, labour hours ↓ by 0,15%

Quite substantial: if productivity is multiplied by 30 (≈ 1800-2025), then labor hours decline by about 40% ($30^{-0.15} = 0,60$)

I.e. about 40% of the 30-fold rise in productivity was used to reduce labour hours and obtain extra leisure (rather than extra consumption), so that per capita NDP was multiplied by 19 (rather than 30) → **40%-60% historical split between leisure & production**

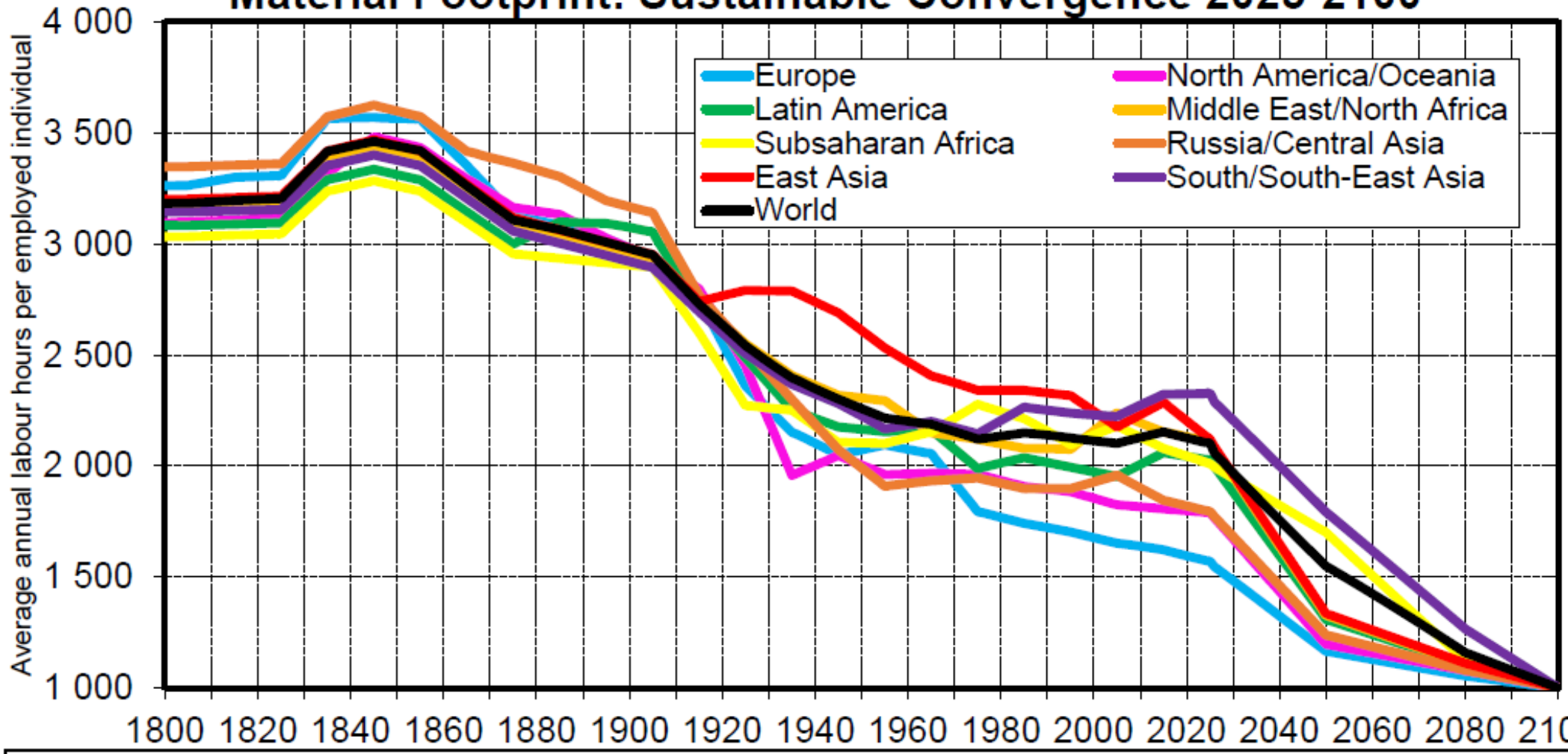
Pursuing the historical decline in labour hours over 2026-2100 (close to 1800-2025 trends) in order to raise well-being and reduce material footprint

See Chancel et al, Prosperity Within Limits? Planetary Habitability, Global Convergence and Structural Transformation, 2026; Global Justice Report, 2026

Probably also the best way to reduce gender gaps and raise men's domestic labour

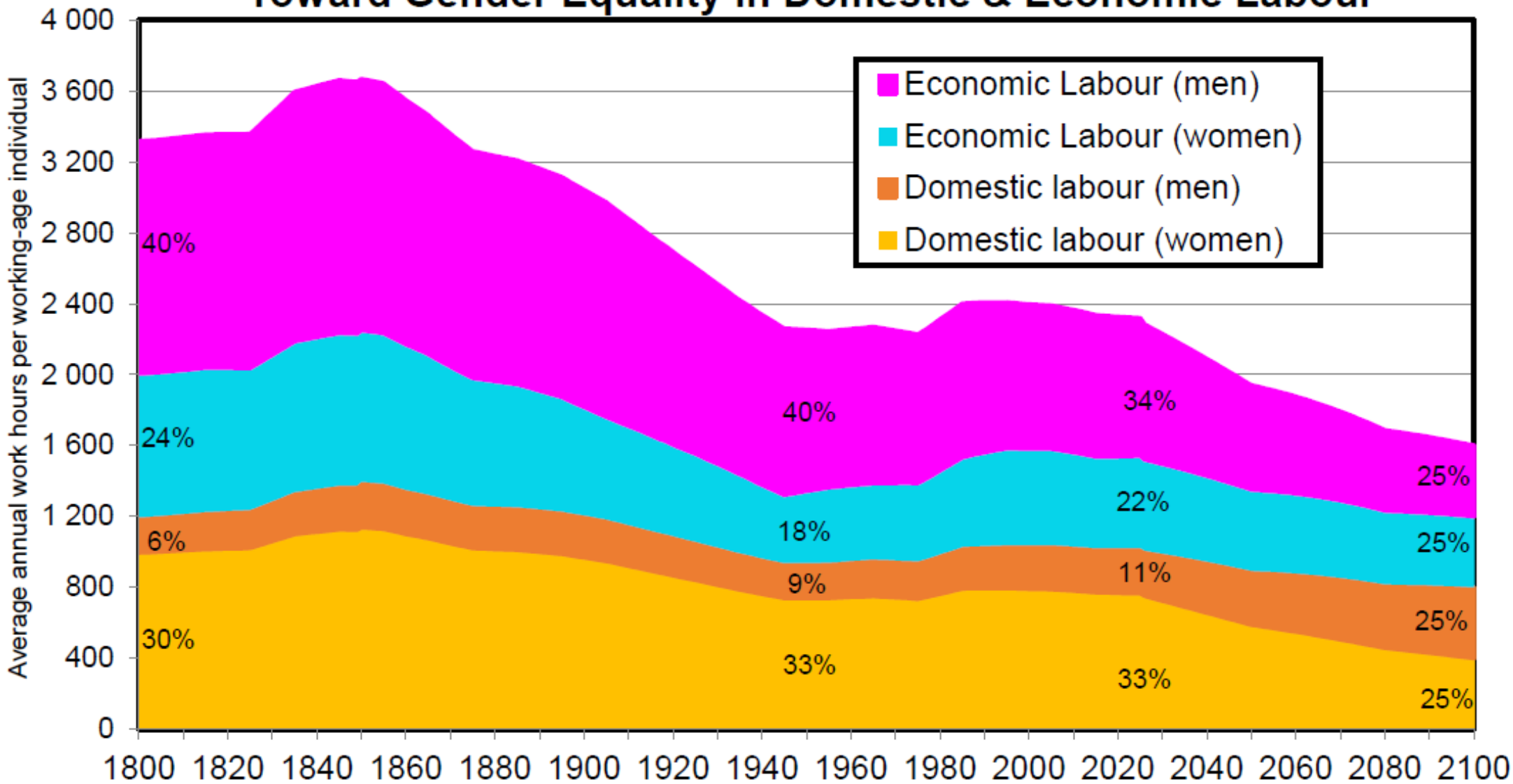
(Together with fiscal equalization - or at least very sharp compression – within households? See S. Aura, "Does the balance of power within a family matter? The case of the Retirement Equity Act", 2005)

Fig. 5. Using Productivity Gains to Reduce Work Hours & Material Footprint: Sustainable Convergence 2025-2100



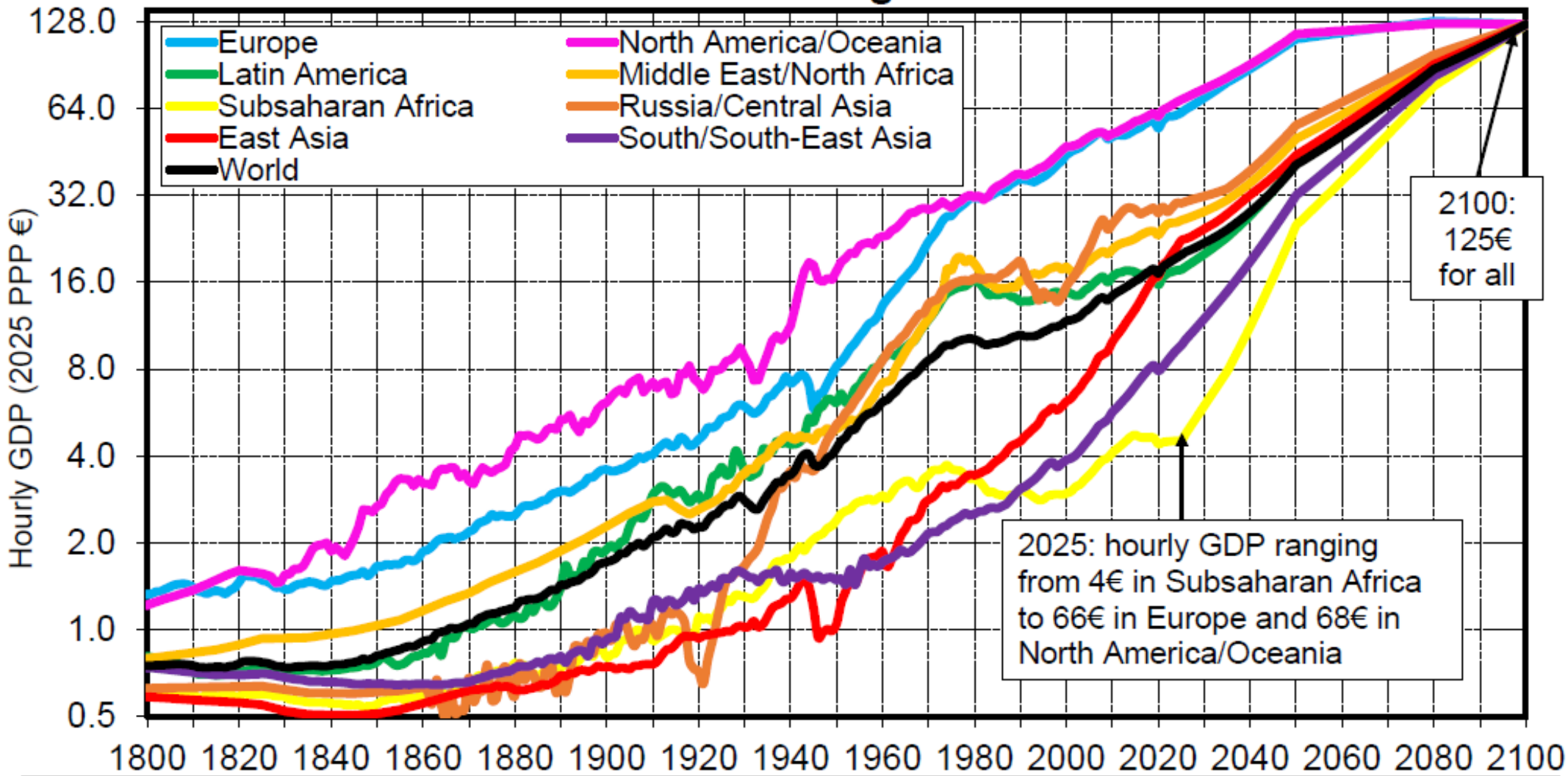
Interpretation. Under the Sustainable Convergence scenario, average annual labour hours decline from about 2100 to 1000 hours globally between 2025 and 2100. Note. Annual labour hours around 3000-3500 hours correspond to about 60-65 hours per week all year long. Annual hours around 2000 hours correspond to 40 hours per week during 50 weeks (2 weeks in paid vacation); annual hours around 1600 hours correspond to 35 hours per week during 47 weeks (5 weeks in paid vacation); annual hours around 1000 hours correspond to 25 hours per week during 40 weeks (12 weeks in paid vacation). **Sources and series**: wseed.world (E1a)

Fig. 6. The Structual Transformation of Work 1800-2100: Toward Gender Equality in Domestic & Economic Labour



Interpretation. In the Sustainable Convergence scenario, working-age men and women are projected to supply the same quantity of economic labour and domestic labour and to receive equal average pay. This would represent a continuation of the trend toward gender equality observed between 1950 and 2025, albeit with a major acceleration. **Sources and series**: wseed.world (E1b)

Fig. 4. World Productivity Trends 2025-2100: Sustainable Convergence Scenario



Interpretation. Under the Sustainable Convergence scenario, all countries converge toward high productivity by 2100, namely 125€ in hourly GDP (gross domestic product per economic labour hour). **Sources and series**: see wseed.world (F1a)

Table 10. Using Productivity Gains to Reduce Labour Hours: Lessons from the Past and Scenarios for the Future

	Share of Productivity Gains Devoted to Extra Leisure (vs Extra Production)
1800-2025	**32%**
incl. 1800-1860	-4%
incl. 1860-1980	40%
incl. 1980-2025	-9%
2025-2100 (Sustainable Convergence Scenario)	**44%**

Interpretation. According to the "sustainable convergence" scenario, 44% of productivity gains will be devoted to extra leisure (as opposed to extra production) at the global level over the 2025-2100 period. This is roughly in line with the historical record observed during the 1860-1980 period (slightly more ambitious). **Source:** wseed.world (F2a)

Was Work Time Exceptionnally High around 1780-1860 & Why?

- As compared to modern levels, living standards were very low & work time was very high in pretty much every society before 20c, both in preindustrial societies and in industrializing societies
- **But available evidence also suggests that work time & child labor** (1841: ban on child labor below 8 in manufactures (FR); 1842: ban below 10 in mining (UK)) **were particularly high around 1780-1860, apparently in order to compensate for declining hourly wages, population pressures during late 18^{c}-early 19^{c} in Britain & and other industrializing countries**
- See J. Voth, «Time and Work in Eighteenth-Century London», JEH 1998 (use of witness judicial accounts to measure effective working time)
- See J. De Vries, "The Industrial Revolution and the Industrious Revolution", JEH 1994; *The Industrious Revolution. Consumer Behavior and the Household Economy, 1650 to the Present*, Cambridge UP, 2008

- **Rising taste for consumption leading to high labour supply, and/or rising urban misery leading to long labour hours?**
- Both mechanisms could operate at the same time & for different social classes and locations
- **Available evidence suggests that average living standards did not rise much until late 19^{c}, so misery story seems more relevant**
- See e.g. Feinstein, "Pessimism Perpetuated: Real Wages and the Standard of Living During and After the Industrial Revolution", *JEH* 1998; Allen, « Engel's Pause: Technical Change, Capital Accumulation and Inequality During the British Industrial Revolution », EEH 2009

(no significant rise in real wages in UK and other industrializing countries until at least 1860-1870, rising profit share)

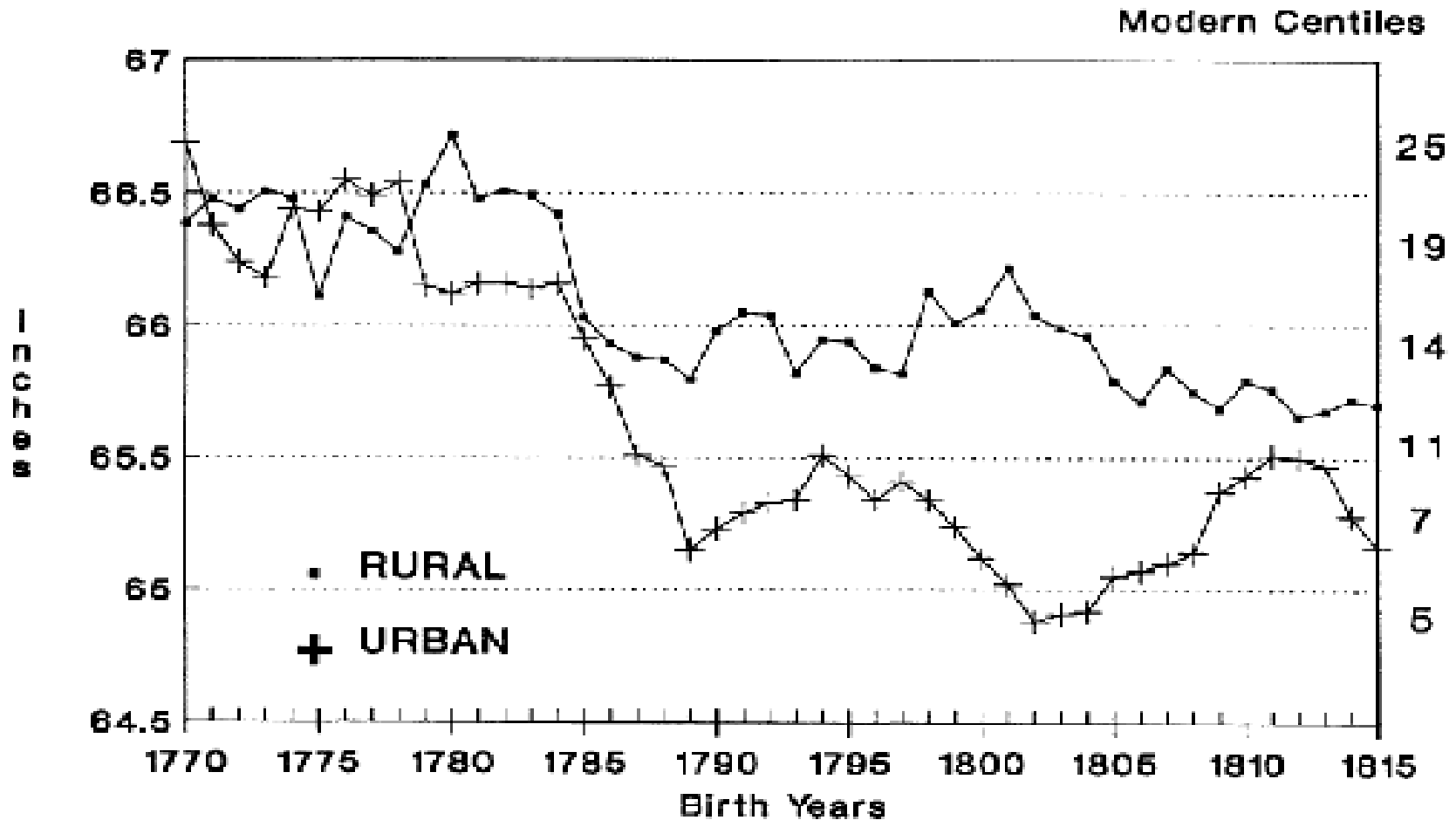
- **Wage and price series are imperfect, but they are confirmed by other sources, e.g. evolution of height or labor time**
- See Nicholas-Steckel, "Heights and Living Standards of English Workers during the Early Years of Industrialization, 1770–1815," *JEH 1991*: **decline in average height of British urban men from 66.5inches (1.69m) to 65inches (1.65m) in late 18^{c}-early 19^{c}**

- For very long run series on the evolution of height using osteological data, see Boix-Rosentbluth, « Bones of Contention: The Political Economy of Height Inequality », APSR 2014

(two main facts in the very long-run: following neolithic revolution & invention of agriculture, we seem to observe decline average height (uncertain) and rising inequality of height (better established))

FIGURE 3

HEIGHT PROFILE OF ENGLISH WORKERS 23 TO 49: 5-YEAR MOVING AVERAGE



From: Nicholas and Steckel, "Heights and Living Standards"

Was There a « Middle-Age » Industrious Revolution?

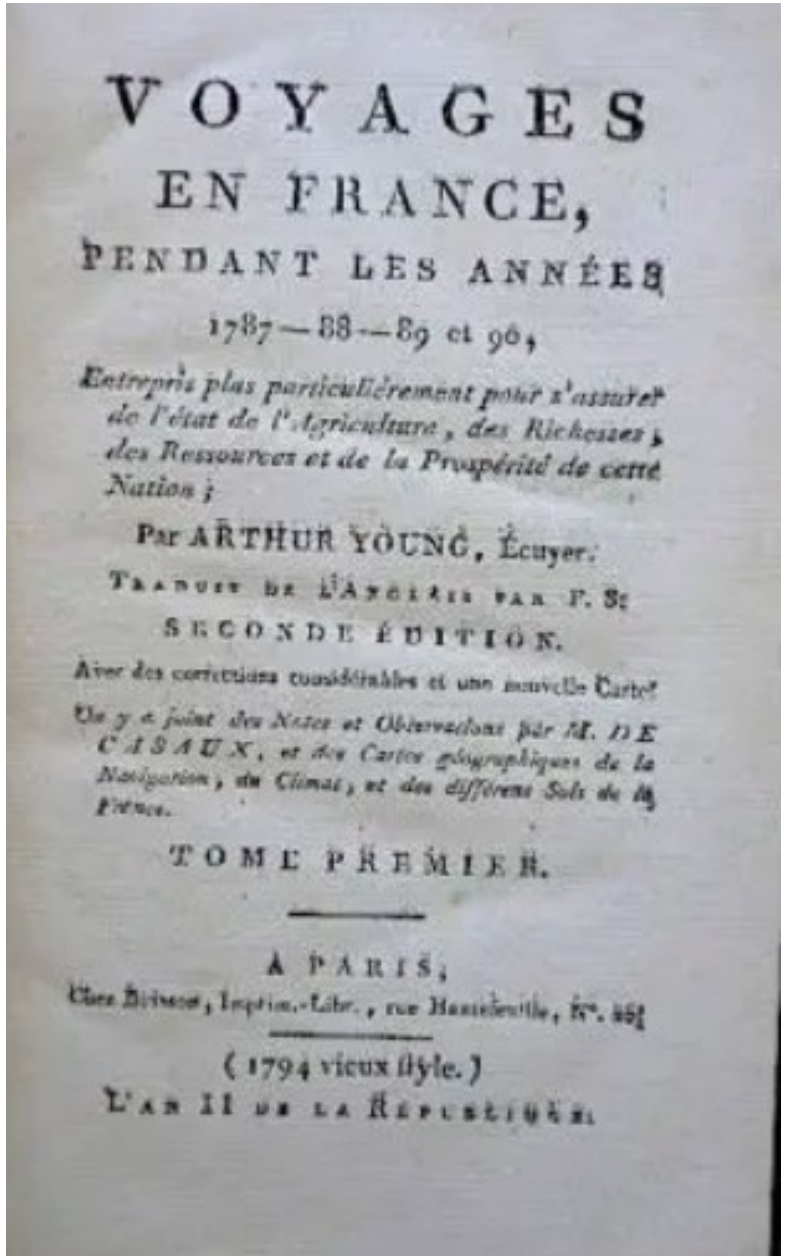
- M. Arnoux, *Le temps des laboureurs. Travail, ordre social et croissance en Europe (11^{e}-14^{e} siècle)*, 2012: the rise of three-class social structure in medieval Western Europe around 1000-1400 comes together with the end of slavery/forced labour and the unification and rising dignity of labour and labourers; this also led to more intense labor supply and territorial expansion
- **I.e. the trifunctional society (or ternary society: clergy-nobility-labourers) is hierarchical, but at least it unifies the class of labour (≠ slave or caste societies), and it is an important part of the rise of modern societies**
- One should not exagerate the extent of labor unification: there is always a continuum of situations between paying « corvée » (still important in France 1789, as we will later see) and paying a rent, i.e. between « archaïc » serfdom relations and « modern » property relations.

- In practice, one observes very different processes of labour unification across ternary societies: the third class (commoners, workers) is sometime permanently divided into two or three (peasants/rurals vs traders/craftsmen, or peasants/rurals vs traders/craftsmen vs untouchables), so that there are four or five basic classes
- **E.g. India's caste system: three upper castes (brahmins, kshatryas, vaishyas: free men) vs shudras (common laborers, serfs) vs dalits (untouchables)**
- In the European context, it has been often claimed that serfom disappeared following the Black Death 1347-1350 (labor shortage → rising bargaining power of workers). True in Western Europe (to some extent), but the opposite evolution happenned in Eastern Europe & the Baltics: reinforcement of serfdom partly due to rising grain exports to the West (see Raster "Serfs and the Market" 2019)
- **Depending on the politico-ideological context and the balance of power, modernity can come with increased labor coercion (serfdom, slavery)**

Historical Demography: Understanding Fertility Decline & Changing Family Structures

- Basic economic model used to explain historical fertility decline: « **quantity-quality trade-offs** » (see Guo et al 2022 for a survey) (Becker)
- « **When people are poor, they choose to have large quantities of children, often at the expense of quality. As the value of their time and the returns to human capital increase, they go for smaller quantities and higher qualities** »
- Not very different from **Young 1792/Malthus 1798** (« the fertility of the poor needs to be reduced, otherwise they will remain poor forever »: Mathusian poverty trap), except that Malthus could not foresee the improvement in living standards & large decline in fertility (& large rise in population) which was going to happen in 19c-21c
- **Pb: too mechanical** (+ too paternalistic (anti-poor))

Young 1792



VOYAGES

EN FRANCE,

PENDANT LES ANNÉES

1787—88—89 et 90,

Entrepris plus particulièrement pour s'assurer de l'état de l'Agriculture, des Richesses, des Ressources et de la Prospérité de cette Nation;

Par ARTHUR YOUNG, Écuyer.

TRADUIT DE L'ANGLOIS PAR F. SOULÈS

SECONDE ÉDITION.

Avec des corrections considérables et une nouvelle Carte.

On y a joint des Notes et Observations par M. DE CASAUX, et des Cartes géographiques de la Navigation, du Climat, et des différens Sols de la France.

TOME PREMIER.

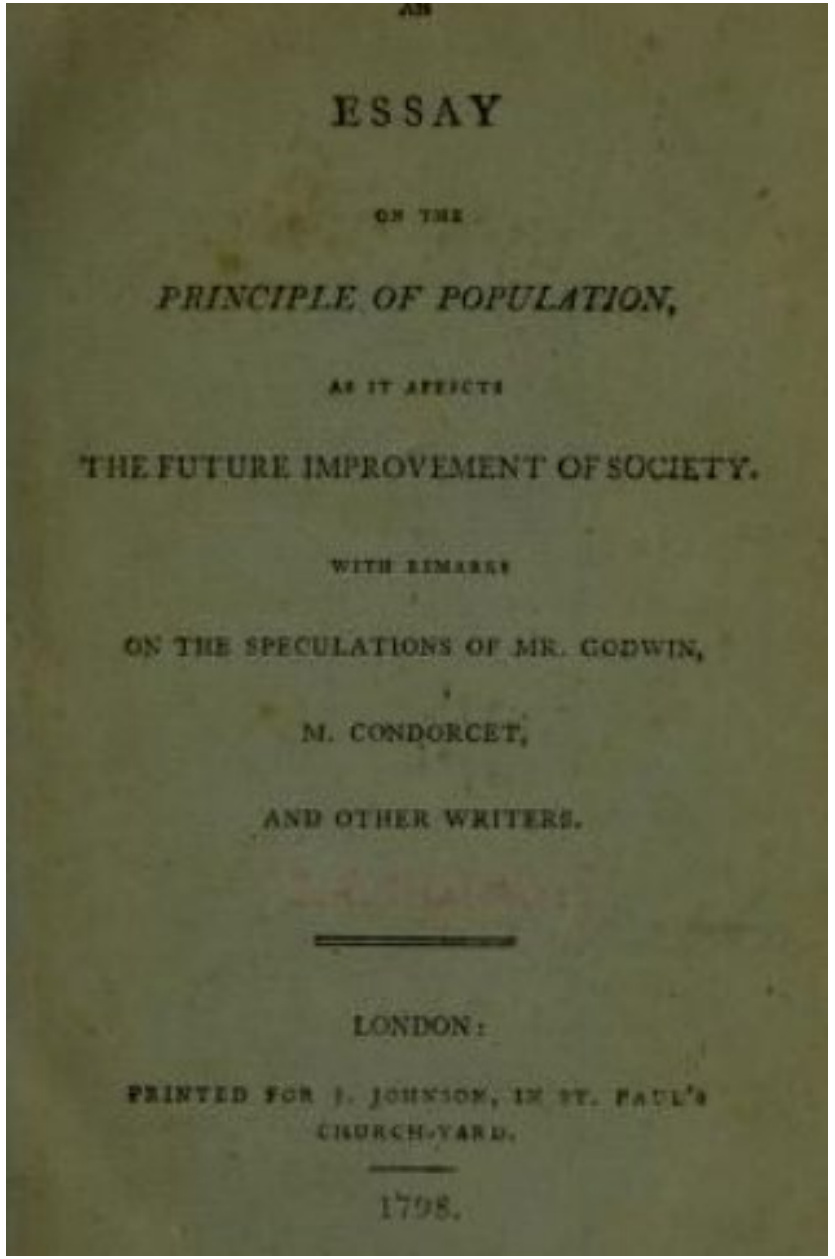
A PARIS,

Chez Buisson, Imprim.-Libr., rue Hautefeuille, N°. 20.

(1794 vieux style.)

L'AN II DE LA RÉPUBLIQUE.

Malthus 1798



AN

ESSAY

ON THE

PRINCIPLE OF POPULATION,

AS IT AFFECTS

THE FUTURE IMPROVEMENT OF SOCIETY.

WITH REMARKS

ON THE SPECULATIONS OF MR. GODWIN,

M. CONDORCET,

AND OTHER WRITERS.

LONDON:

PRINTED FOR J. JOHNSON, IN ST. PAUL'S CHURCH-YARD.

1798.

- **Main pb with « quantity-quality trade-offs »: too mechanical**
- **Demographic behavior is not determined by economic factors alone**
- **Many variations of fertility patterns over time and across countries are difficult to explain without stressing other factors**: political, cultural, religious, ideological, institutional, etc.

- Role of **religion**: early French fertility decline, beginning as early as 1750-1780, with a very advanced demographic transition and population stabilisation in 1800-1900, at a time when the rest of Europe was still having very high fertility rates. See Guinnane, "The Historical Fertility Transition", JEL 2011
- One possible explanation: France also seems to be the first country to experience a sharp decline of religious beliefs

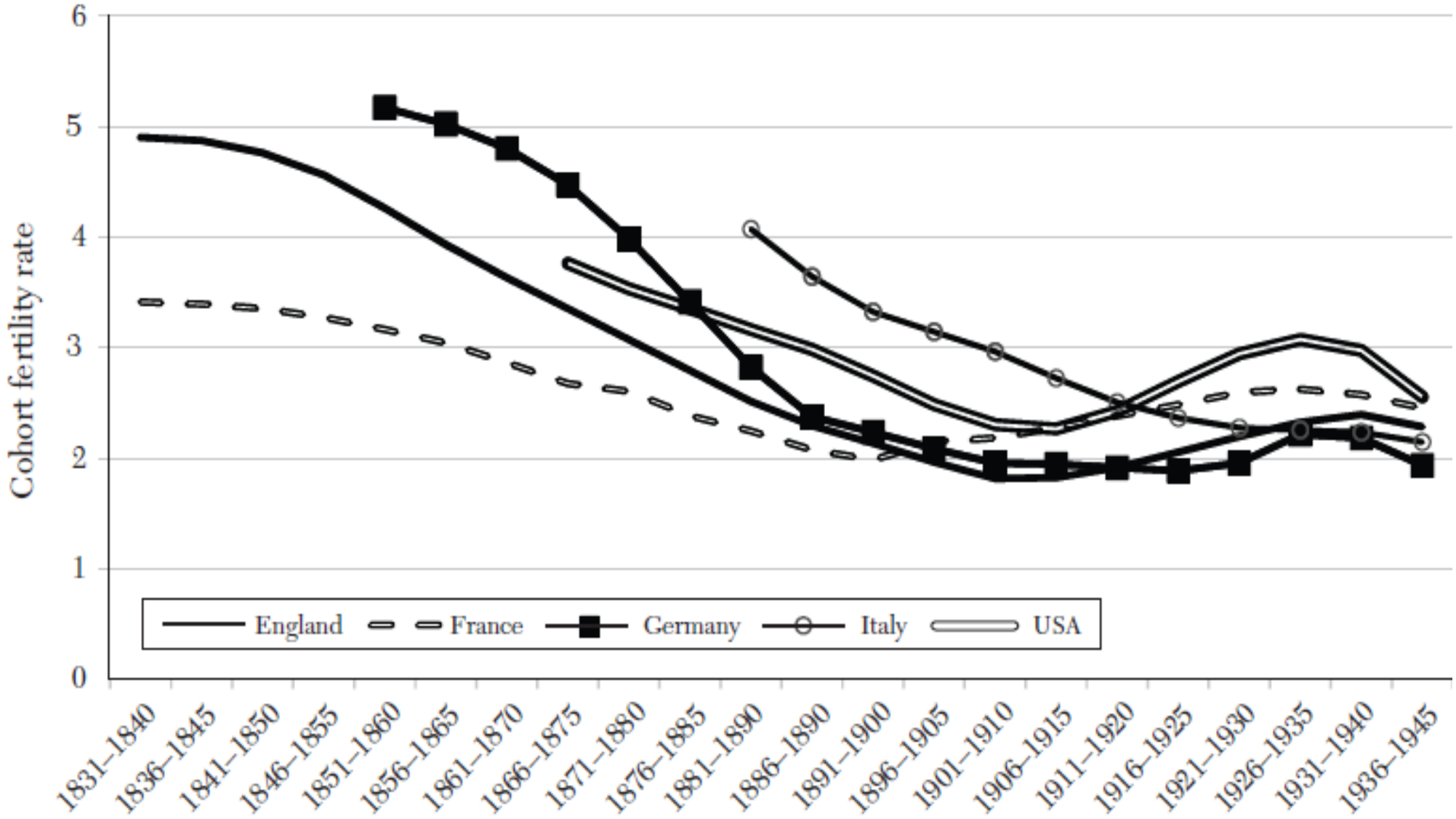


Figure 3. Cohort Fertility Rates, 1831–1945

Explaining the early French demographic transition

- During 18c, France was by far the most populous country in Europe; it inspired Malthus' dark predictions about population growth and poverty (via Young's travel diaries & fear of French Revolution)
- Starting in the late 18c & during the entire 19c, France then became the **first birth-controlled country in history, with declining fertility as early as 1750-1780**
- See Goubert, "Historical Demography and the Reinterpretation of Early Modern French History: A Research Review", JIH 1970
- One possible explanation: France also seems to be the first country with **decline of religious beliefs and religious practice → rise of natural contraception and birth control**
- On the impact of secularization at the level of départements (decline in fertility vs proportion of priests swearing oath of allegiance to the Revolution in 1791), see Murphy « Old Habits Die Hard (Sometimes): What Can Department Heterogeneity Tell Us About the French Fertility Decline? », JEG 2015

The Limited Historical Role of Innovations in Contraceptive Technology in Explaining the Fertility Transition

- There was no modern contraceptive technology before late 19^{c}-early 20^{c}, and fertility decline started much before: late 18^{c} for France, early 19^{c} for US, late 19c for UK or Germany → traditional withdrawal techniques (or abstinence) are sufficient to adjust fertily behavior; modern techniques do not play a central role before mid 20^{c}
- Without such traditional techniques, historical fertility should have been much higher for centuries: 9 births per couple if 5 sexual intercourse every 24-day-cycle & no withdrawal (>5-6 births per couple in traditional societies)
- Some demographers today recommend to expend access to contraceptive methods in order to reduce fertility in Africa
- But this does not seem to be the way the historical fertility transition took place. It took place when parents decided to have fewer children. Contraception is very useful, but mostly for other reasons (welfare,HIV); maybe not to reduce fertility.

- **Other explanations.** French Revolution & **Civil Code 1802** instituted equal sharing of inheritance among siblings (*quotité disponible*=1/n+1: 50% if one kid, 33% if two kids, 25% if three kids or more) → reduction in fertility in order to avoid fragmentation of land and property (major theme in 19c historical demography: Le Play, declining fertility & paternal authority, etc.)
- **Post-revolution Mathusian trauma**: the French experienced the negative consequences of excessive population on wages and revolutionary chaos & reacted by reducing fertility during 19^{c}
- **OK, except that declining fertility started in 1750-1780**
- After WW1-WW2 military shocks, new national trauma: family policies (child benefits, kindergarden, tax incentives & penalties,..) in order to become more populated than Germany once again: according to UN, this should be done by 2060-2080

→ **Demographic history is always a mixture of intimate psychological decisions & national histories and identities** (e.g. Japan/Germany since WW2 and ex-communist countries today have much lower fertility than France/US/UK/Sweden; differentials are very large and difficult to explain just on the basis of different economic incentives and family policies)

Explaining the 21^{c} universal decline in fertility: role of **conflicting beliefs & norms** about **gender equality**, **planetary habitability**, etc.

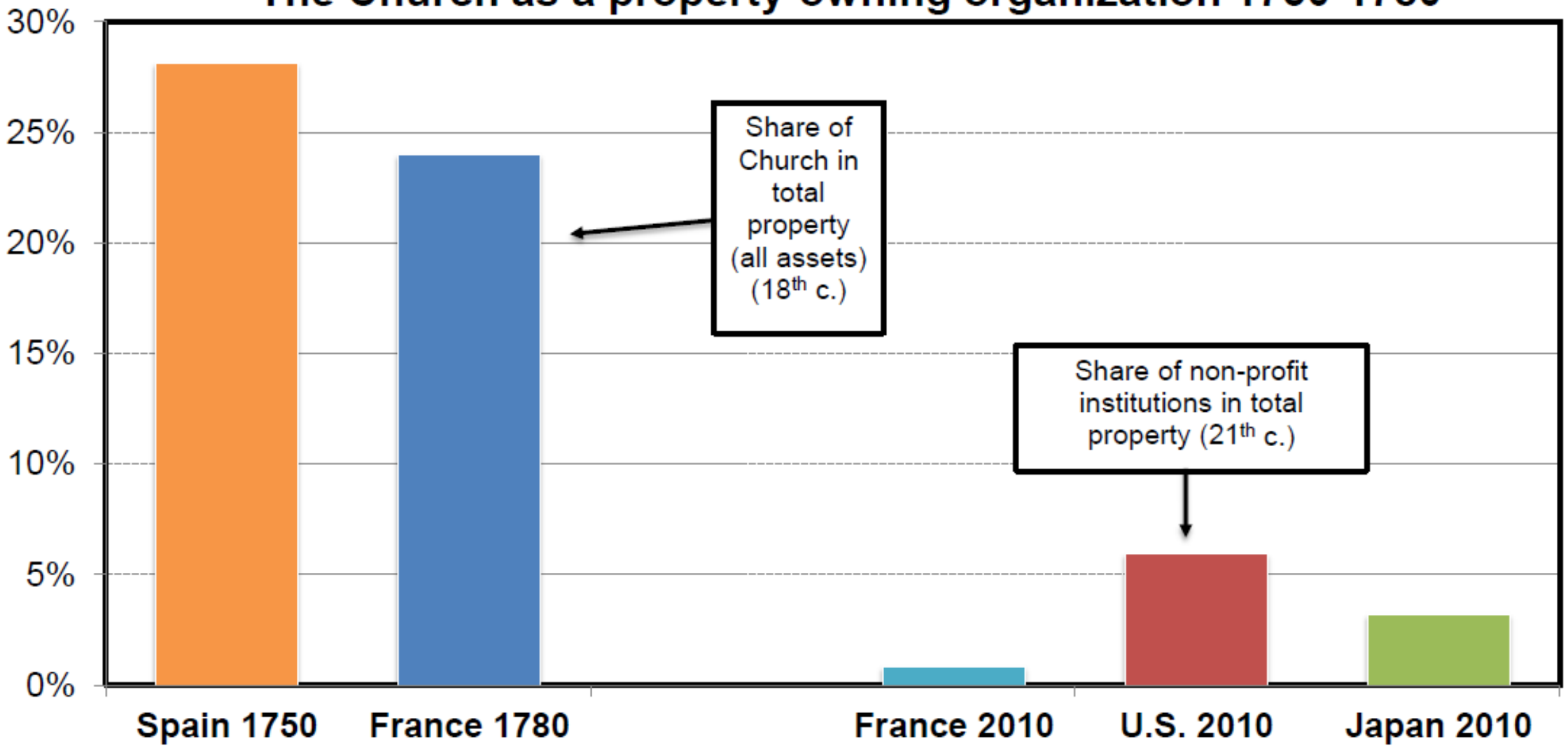
- **Declining fertility as women's response to inadequate male attitudes** regarding domestic labour, gender equality, etc.
- See Lei et al, 2025, "Reassessing the relationship between gender equality and fertility": higher gender equality seems to lead to higher fertility and family formation, but the effect appears to be quantitatively insufficient to reverse long-term fertility decline on its own
- More material response: **declining fertility due to mismatch between social evolutions** (life span shifted forward: PhD at 30, tenure at 40…) **and (lack of) biological evolutions**

(in any case, this has little to do with quantity-quality trade-offs)

More generally, beliefs systems about desirable family structures (not just fertility) **are often closely related to world views about the desirable organization of society as a whole: family is deeply political**

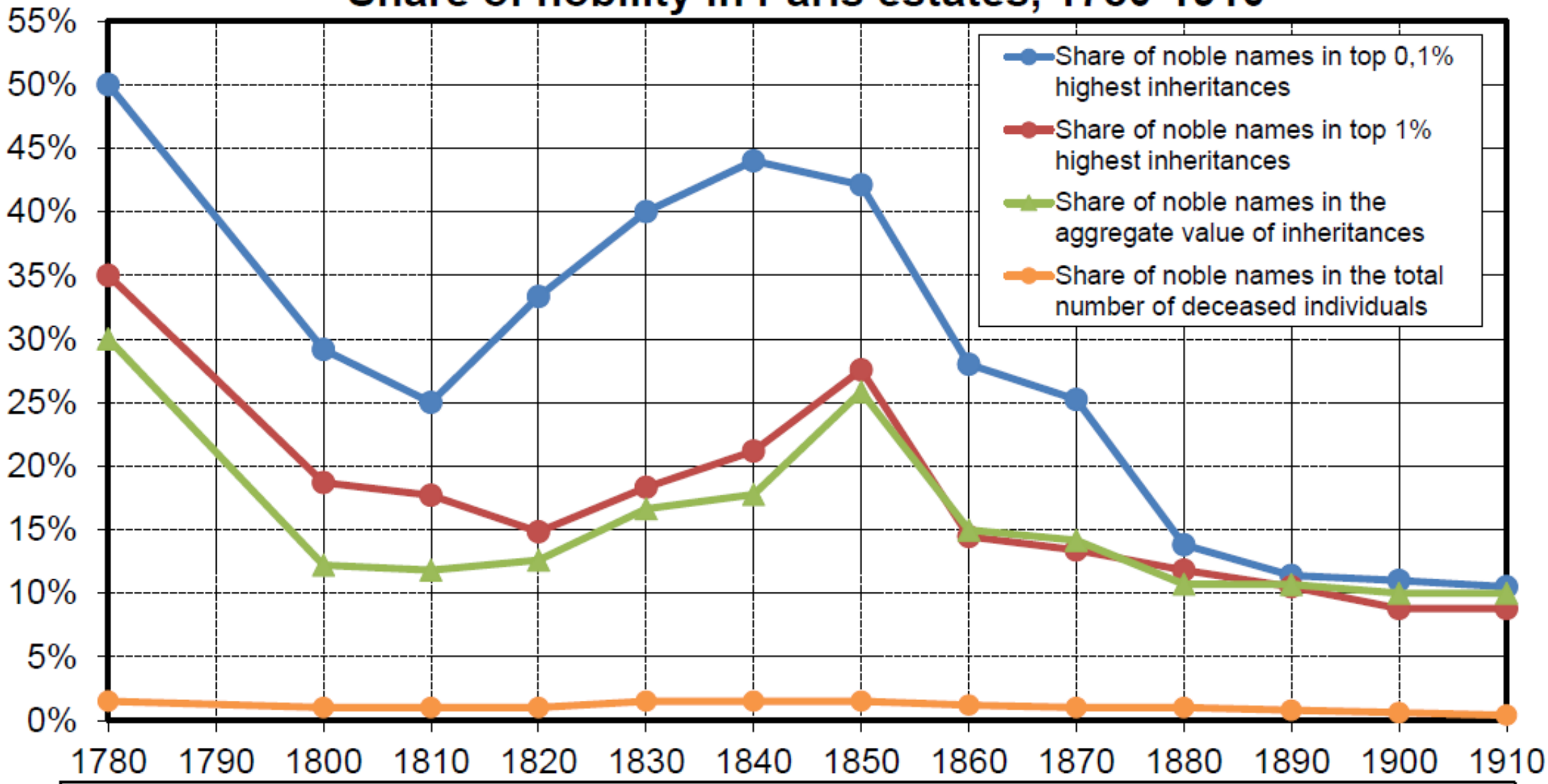
- **Inceste prohibition is social (circulation of husbands & wifes), not biological**. C. Levi-Strauss, *The Elementary Structures of Kinship*, 1949
- **Large shift from Roman family norms to Christian family norms**: **rise of priestly celibacy & trifunctional societies (clergy, nobility, labourers), stigmatization of adoption, remariage of widows & mariage btw first degree cousins =** opposite of Roman norms, weakening of family transmissions, incentives for church gifts, quick build up of church wealth & quasi-state capacity
- J. Goody, *The European Family*, 2000
- P. Brown, *Through the Eye of a Needle. Wealth, the Fall of Rome and the Making of Christianity in the West, 350-550 AD*, 2012

The Church as a property-owning organization 1750-1780



Interpretation. Around 1750-1780, the Church owned between 25% and 30% of total property in Spain and close to 25% in France (all assets combined: land, real estate, financial assets, including capitalisation of church tithes). By comparison, in 2010, the set of all non-profit institutions (including religious organizations, universities, museums, foundations, etc.) owned less than 1% of total property in France, 6% in the United States and 3% in Japan. **Sources and series**: see piketty.pse.ens.fr/ideology (figure 2.3).

Share of nobility in Paris estates, 1780-1910



Interpretation. The share of noble names among the top 0,1% highest inheritances in Paris dropped from 50% to 25% between 1780 and 1810, before rising to about 40%-45% during the period of censitory monarchies (1815-1848), and finally declining to about 10% in the late 19th century and early 20th century. By comparison, noble names have always represented less than 2% of the total number of deceased individuals between 1780 and 1910. **Sources and series**: see piketty.pse.ens.fr/ideology (figure 2.2).

- In the longer-run, this also leads to the development of sophisticated property law and electoral governance systems → **family-free Christian property-owning organizations as laboratories of Western modernity & capitalism**
- G. Todeschini, *Les marchands et le temple. La société chrétienne et le cercle vertueux de la richesse du Moyen Age à l'époque moderne*, 2017

- **Until expropriation-privatization of church property by the centralized state** (England 1535, France 1790) **& the full rise of proprietarian ideology** (sharp division between private property holders & public regalian functions) (transition from trifunctional to proprietarian order) (≈ feudalism to capitalism)
- R. Blaufarb, *The Great Demarcation. The French Revolution and the Invention of Modern Property*, 2014
- T. Piketty, *Capital & Ideology*, 2020

Many open questions in historical demography: is the social gradient of fertility positive or negative and how does it change over time?

- **Wealth-fertility gradient in France: mildly positive until 1760-1780, turned negative at the top before and after 1789**. Demand for upward mobility and equality by the middle class & upper middle class (to catch up with nobility), both viewed as a cause and consequence of 1789

See N. Cummins, "Marital Fertility and Wealth During the Fertility Transition: France 1750-1850", EHR 2013

- **Wealth-fertility gradient in England: very positive 1500-1800** (Darwinian rise of capitalist virtues according to Clark), **flattening 1800-1900**

See G. Clark, N. Cummins, "Malthus to Modernity: Wealth, Status and Fertility in England, 1500-1880", JPopE 2014

- **Very different stories than Malthusian quantity-quality trade-offs: fertility transition seems to come from the top, not from the bottom**
- Relatively fragile results (small samples collected in archives)

Figure 4: Net Marital Fertility by Wealth Decile, Marriages 1500-1779 and 1780-1879

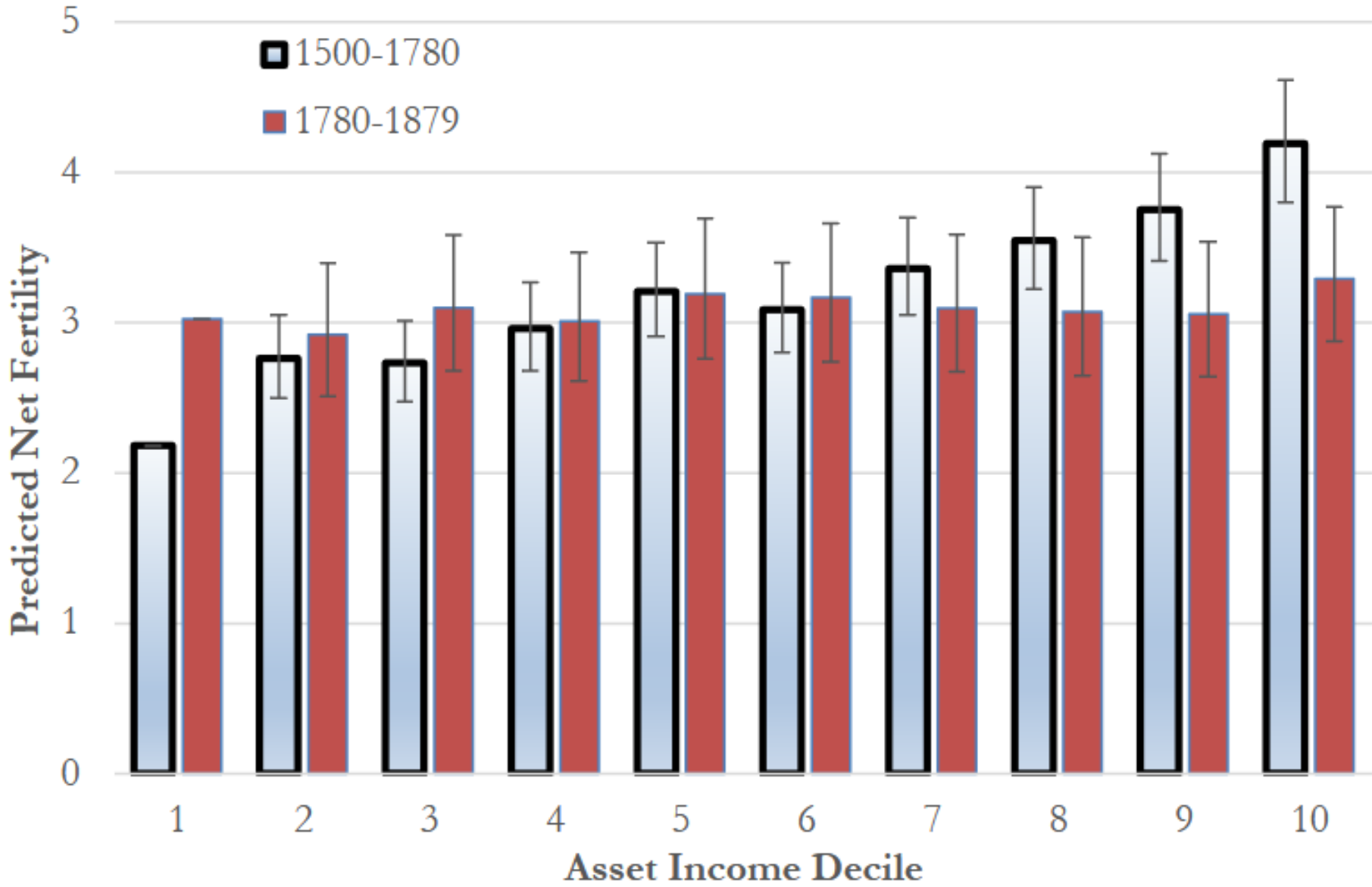
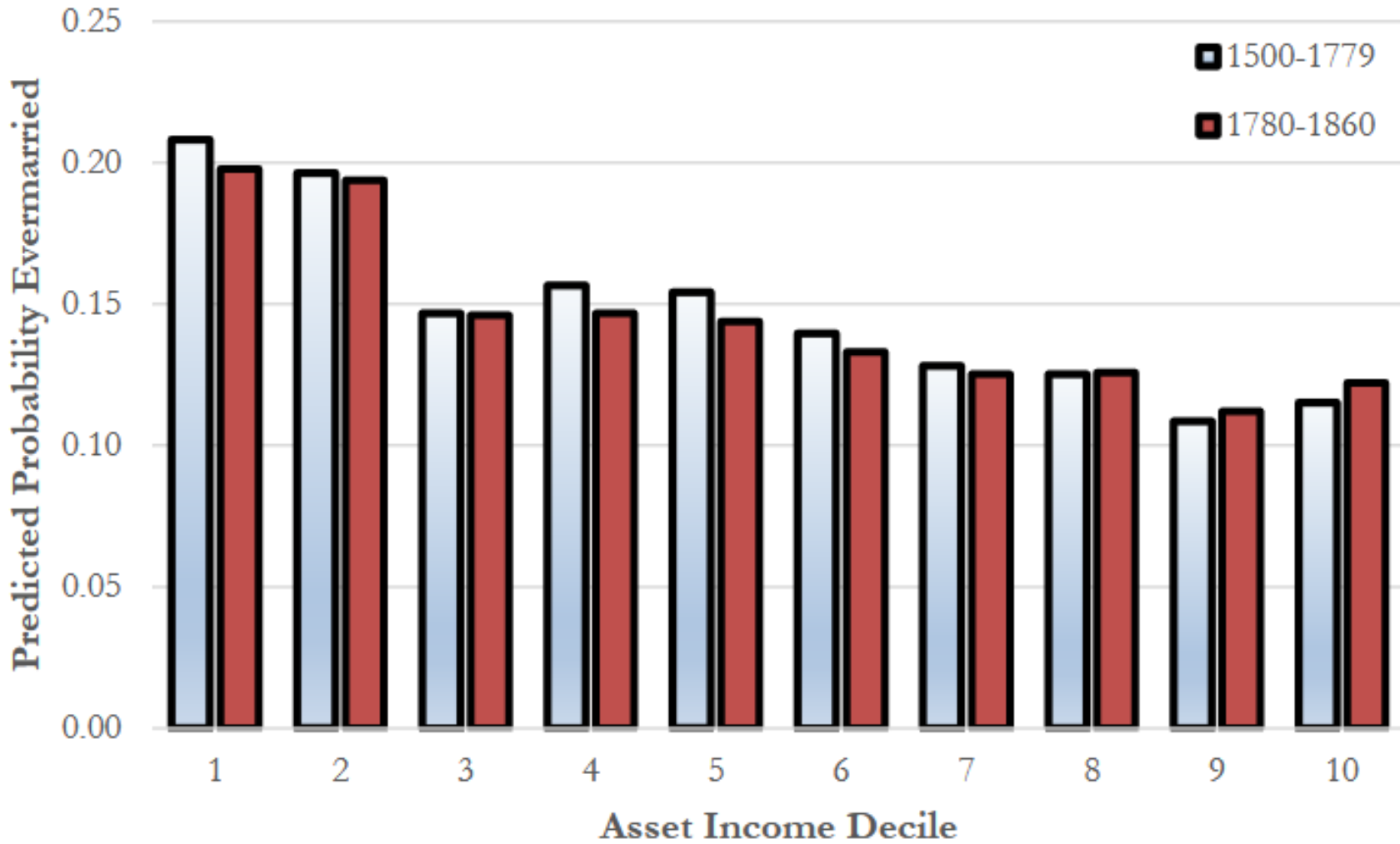


Figure 9: Fraction Never Married, by wealth decile, Marriages, Pre and Post 1780



Other open questions: birth order and inequality

- See Pande et al, "Why Are Indian Children So Short: The Role of Birth Order and Son Preference", AER 2017
- See Kristensen-Bjerkedal, "Explaining the Relation between Birth Order and Intelligence", Science 2007
- Growing literature using recent data, but no systematic comparative & historical perspective

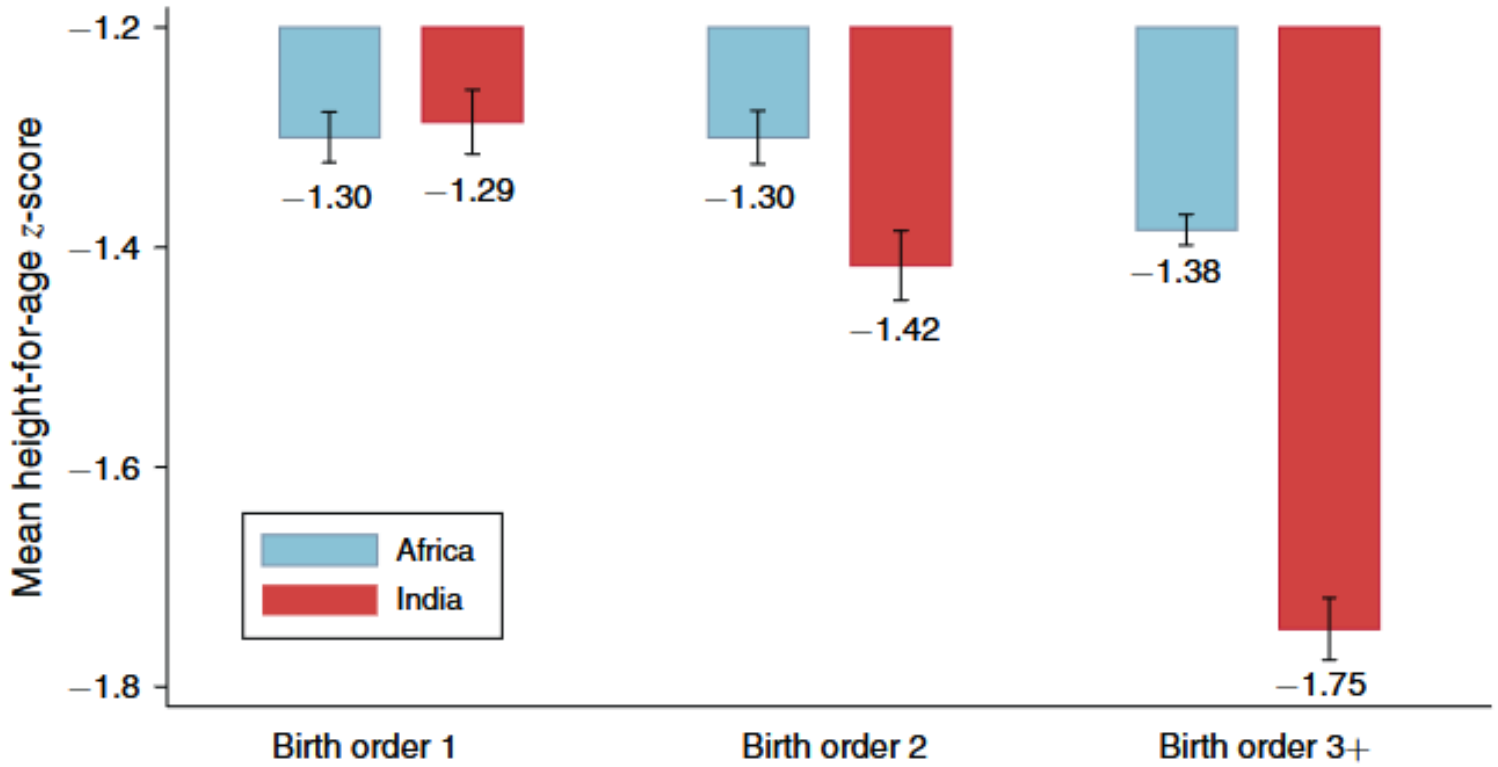


FIGURE 2. CHILD HEIGHT IN INDIA AND AFRICA, BY CHILD'S BIRTH ORDER

Notes: The figure depicts the mean child height-for-age z-scores for sub-Saharan Africa and India, by the birth order of the child. The mean is calculated over all children less than 60 months old.

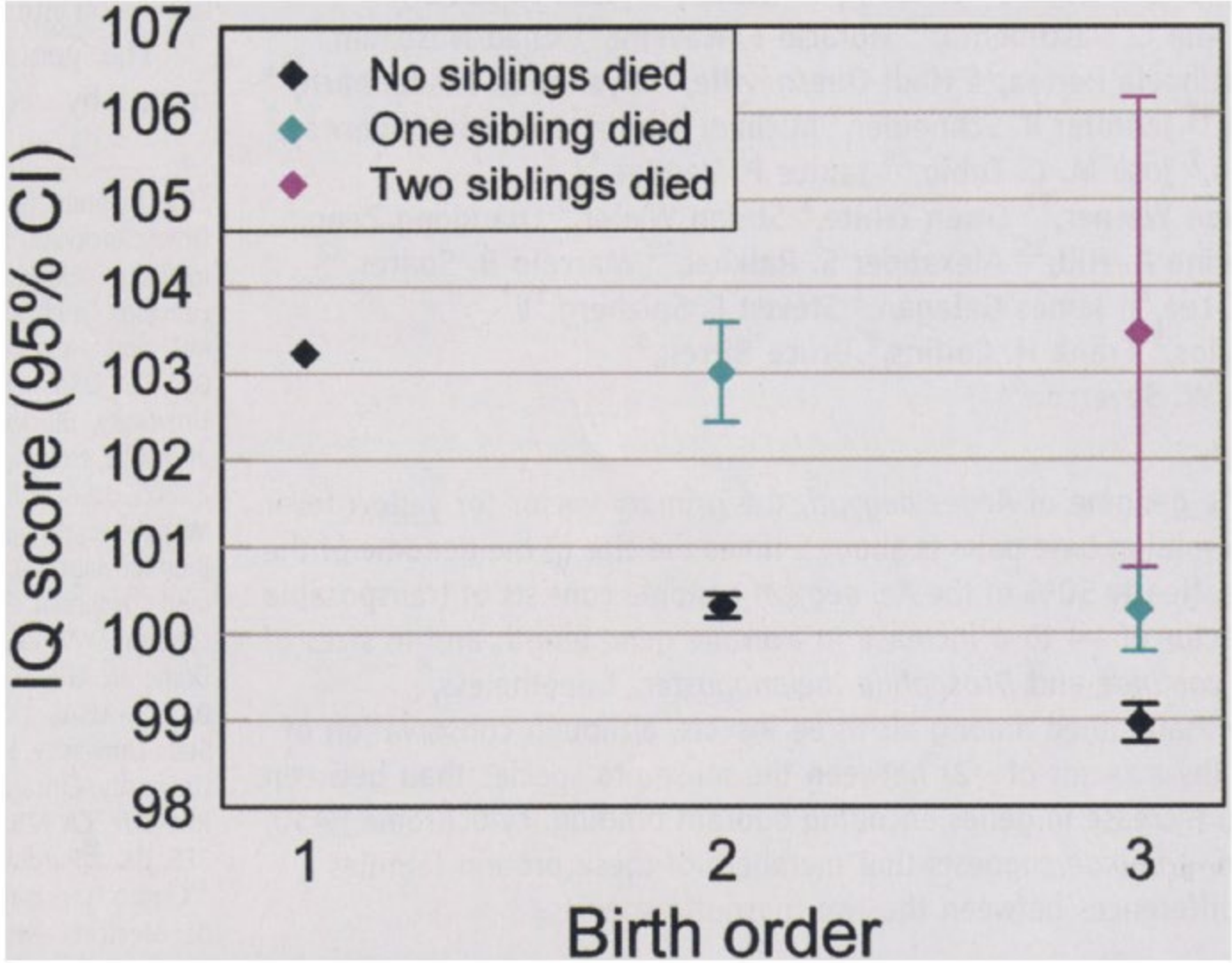


Fig. 1. Relation between birth order and IQ score. Mean IQ scores for male conscripts, first-, second-, and thirdborn in Norway to mothers with single births only and first birth from 1967 through 1976, according to birth order and number of elder siblings who died in infancy (age < 1 year). Scores are adjusted for parental education level, maternal age at birth, sibship size, birth weight, and year of conscription. Error bars show 95% confidence intervals (CIs). Reference: birth order one.

Conclusion of Lecture 2

- **Labour hours & the gendered structure of production & reproduction have gone through enormous transformations in the long run**. Average economic labour hours per worker have declined from 3000h/year in 1900 to 2100h in 2025 (1500h in Europe). Maybe 1000h by 2100, with gender equality in economic labour & domestic labour?

- **Transformations of labour hours & family structures are highly political and ideological & depend on power relations and market forces.** Too little is known about labour hours & family structures in historical perspective. Rising social demand for gender equality & planetary habitability might play leading role in 21c.