GLOBAL LABOUR HOURS IN PAID AND UNPAID WORK: INEQUALITY, PRODUCTIVITY AND STRUCTURAL TRANSFORMATION, 1800-2100

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Global Labour Hours in Paid and Unpaid Work: Inequality, Productivity and Structural Transformation, 1800-2100*

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Abstract. This paper constructs global harmonized historical series on labour hours by gender, employment status and sector in 57 core territories – 48 main countries and 9 residual regions – covering all world regions across the 1800-2025 period. We quantify the global decline in labour hours and relate it to the long run rise in productivity, with sizable variations across regions, periods and sectors. At the global level, hourly productivity (net domestic product per work hour) rose from about 0.7€ in 1800 to 16€ in 2025 (PPP 2025 €). In 2025, hourly productivity ranges from 4€ across Subsaharan Africa to 55-60€ in the USA, Sweden, Germany or France. In the long-run, about 35-40% of the rise in productivity was used to reduce labour hours and obtain extra leisure and 60-65% to raise production. We also stress the role of power relations and unpaid labour in the changing structure of labour hours throughout the 1800-2025 period. In particular, we find that the gender gap in hourly pay is currently much larger than usually thought once we include unpaid domestic work. Using this definition, the gender pay gap reaches 40-50% in rich countries, as opposed to 10-20% in conventional estimates. Finally, based on historical trends, we discuss future trajectories for labour hours, productivity, gender inequality and structural transformation over the 2025-2100 period. In our central scenario, we estimate that global hourly productivity could reach about 100€ in all countries by 2100, together with substantial reduction in work hours and gender gaps and large sectoral reallocation of labour time away from the most polluting sectors.

*All series constructed in this research are available online in the World Inequality Database (wid.world), together with a detailed replication package including raw data sources, methods and codes.

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1. Introduction

This paper constructs global harmonized historical series on labour hours by gender, employment status and sector in 57 core territories – 48 main countries and 9 residual regions – covering all world regions across the 1800-2025 period. We quantify the global decline in labour hours over the past two centuries and relate it to the long run rise in productivity, with interesting variations across regions, periods and sectors. At the global level, hourly productivity (net domestic product per work hour) rose from 0.7€ in 1800 to 16€ in 2025 (PPP 2025 €). In 2025, hourly productivity ranges from 4€ across Subsaharan Africa to 55-60€ in the USA, Sweden, Germany or France. In the long-run, about 35-40% of the rise in productivity was used to reduce labour hours and obtain extra leisure (rather than extra production). We also stress the role of power relations and unpaid labour in the changing structure of labour hours throughout the 1800-2025 period. In particular, we find that the gender gap in hourly pay is currently much larger than usually thought once we include unpaid domestic work. E.g. it is about 50% in rich countries, as opposed to 10-20% in conventional estimates. Finally, we discuss several possible trajectories for labour hours, productivity, gender inequality and structural transformation over the 2025-2100 period. In our central scenario, we estimate that global hourly productivity could reach about 100€ in all countries by 2100, together with substantial reduction in work hours and gender gaps and large sectoral reallocation of labour time away from the most polluting sectors.

This work is closely related to a large literature on the evolution and determinants of labour hours. In particular, a number of recent papers have attempted to explore the distribution of labour hours at the global level and its determinants (see e.g. Bick et al (2018, 2022), Fuchs-Schundeln (2024), Gottlieb et al (2024), Gethin and Saez (2025)). One key difference is that many of these works usually focus on recent decades (i.e. they typically focus on the post-1980 or even post-2000 period), while we attempt to take a long-run, two-century-long perspective. There does exist a vast literature on the historical evolution of labour hours going back to the early 19th century (and sometime to the 18th century), but usually with a more limited geographical focus. In particular, most of the existing historical research focuses upon European countries and Western offshoots (see e.g. Huberman (2004) and Huberman and Minns (2007)) for an analysis of the main historical series covering Western countries beginning in the 19th century).[1] One exception is the work by Gilmore (2021), which puts together a large number of historical estimates on labour hours covering a large number of countries in

[1] There also exists estimates of labour hours going back to the mid-18th century for England and a number of other European countries. See in particular Voth (1998, 2001). See also Reid (1976), De Vries (2008) and Allen and Weisdorf (2011). We discuss this evidence in section 4 below.

all world regions (including in the global South) over the past two centuries.[2] We build heavily on this body of historical research, with two main differences and innovations. First, we put together a more complete and systematic historical database, including long-run series on labour hours by gender, status and employment sector covering 57 countries and subregions across the 1800-2025 period. Next, and most importantly, we analyse the long-run global decline in labour hours in relation to the long-run rise in productivity, and we build upon our historical findings in order to offer a prospective analysis of possible future trajectories over the 2025-2100 period.

Our long-run global perspective allows us to obtain new insights about the determinants of labour hours and to complement the conclusions reached by studies focusing on the recent decades and/or on specific countries. Generally speaking, the existing literature rightly stresses the existence of a negative elasticity of labour hours with respect to productivity. That is, labour hours tend to decline when countries become more productive, thereby opening the way for a high-productivity, high-leisure future, as famously analysed by Keynes (1930) in his writing on *Economic possibilities for our grand-children* (where the author of the *General Theory* predicted that productivity advances would eventually lead the way toward the 15-hour workweek in the long-run). On the basis of standard utility-maximizing economic logic, the usual interpretation for this historical pattern is that income effects dominate substitution effects. I.e. higher income leads to higher consumption of leisure, even though the relative price of leisure also rises. However, the literature has shown that this textbook consumer-theory logic is somewhat too deterministic and simplistic. In practice, there are many important variations in labour hours (for a given level of income and productivity) which this standard neoclassical theoretical framework cannot properly explain, in particular regarding the different speed of labour hours reduction over time and across regions, as well as the complex and multifaceted transformations in the gender structure of labour hours (see e.g. Bick et al (2018, 2022), Fuchs-Schundeln (2024), Goldin (1995, 2024), and Gottlieb et al (2024)). In short, institutions and power relations matter a great deal for the determination of labour hours.

Our historical results are fully consistent with this general conclusion and bring additional long-run perspectives into the discussion. More specifically, we come with three main sets of results. First, we quantify a sizable global decline in labour hours over the 1800-2025 period. Annual labour hours per worker drop from about 3200 hours to around 2100 hours (-34%), while annual hours per working-age individual (15-

[2] For early work on the global historical evolution of labour hours, see Maddison (1964, 1982) and the references provided by Huberman (2004), Huberman and Minns (2007) and Gilmore (2021).

to-64-year-old) drop from 2100 hours to 1300 hours (-38%). At the same time, we see large variations across periods and regions in the speed of work time reduction, including for a given level of income. Generally speaking, the main period of work time reduction happens between 1860 and 1980. This corresponds to the rise of the labour movement and the development of powerful new organizations (trade unions and working-class political parties of various stripes: labour, socialist, social-democratic, communist, etc.), which played a critical role in shaping class relations, state legislation and collective bargaining in order to build the welfare state and reduce work time. We also observe major changes in the gender patterns of work, including a long-run pattern of U-shaped women employment rates (with a key role of unpaid family work in agriculture and other traditional self-employment activities in early development) and a very slow rise of men domestic labour (again with large regional variations, for given income level). We compare the long-run magnitude of unpaid women work to other forms of unpaid labour (including forced labour) over the 1800-2025 period. Generally speaking, the results emphasize that the long-run history of labour time is a complex socio-political history involving collective mobilizations, power relations, class struggles, changing institutions and social norms, and not simply an economic history involving income and substitution effects.

Next, we relate the decline in labour hours to the global rise in labour productivity over the 1800-2025 period. In particular, we use our global historical series to estimate the elasticity between labour hours and productivity. In our baseline specification, we find an elasticity of about -0.15 (around -0.12 and -0.18). I.e. when productivity rises by 1%, labour hours decline by 0.15%. This is quite substantial. For instance, this means that if productivity is multiplied by 24 (which is approximately what happened at the global level between 1800 and 2025), then labour hours decline by about 35-40%.[3] To put it differently, about 35-40% of the 24-fold rise in productivity was used to reduce labour hours and obtain extra leisure (rather than extra production), and 60-65% was used to raise production, so that per capita NDP was multiplied by 15 (rather than by 24). We stress that this global elasticity cannot be interpreted in a mechanical manner. In practice, work time reduction might partly reflect some fundamental preference for leisure (especially when labour time is huge and/or when purchasing power is very large), but requires major collective mobilizations and institutional transformations in order to materialize. In other words, this elasticity should be viewed as a “political” elasticity rather than a pure economic elasticity.

[3] $24^{-0.15}$=0,62.

Finally, on the basis of historical trends, we discuss several possible trajectories for labour hours, productivity, gender inequality and structural transformation over the 2025-2100 period. In the “Business-As-Usual” scenario, we assume a continuation of observed 1990-2025 country-level growth rates in productivity. This leads to widening North-South inequality. In particular, hourly productivity rises to only 9€ (PPP 2025 €) in Subsaharan Africa by 2100 (vs 4€ in 2025). At the same time, population in Subsaharan Africa is expected to rise to about 3.3 billion by 2100 (vs 1.3 billion in 2025) according to UN population prospects. This entails an explosive socioeconomic path for the planet, with enormous demographic pressures, rising political conflict about climate/post-colonial reparations and very large difficulties to cooperate on the climate and other global challenges. We also look at a more optimistic “Global-Convergence” scenario which we take as our central scenario. Thanks to massive investment in human capital and infrastructures in the global South (especially Subsaharan Africa & South/South-East Asia), we assume that all countries converge to about 100€ in hourly productivity by 2100 (again in PPP € 2025). We also assume that this “global convergence” scenario includes complete gender equality, i.e. full convergence between women and men’s employment rates, economic labour & domestic labour time by 2100. A key question for future work is whether such a path with 100€ in hourly productivity for all countries by 2100 is viable, i.e. whether this is compatible with ecological constraints and planetary habitability, in particular as climate pressure attenuates productivity growth in the hardest hit regions of the world. We argue that it is potentially viable, but only if it comes together with structural transformation (i.e. with a large sectoral reallocation of labour time away from the most polluting sectors) and with a substantial reduction in work hours (comparable in size to what happened over 1860-1980 period). While this path involves considerable difficulties, which we do not fully address in the present research, we stress that they are arguably less severe than under the “Business-As-Usual” scenario.

The rest of this paper is organized as follows. We briefly discuss our concepts and methods in section 2. All technical details about data construction (from raw sources to final data series) are available in the online data appendix, and we refer interested readers to this material for more additional information about methodological issues. In section 3, we present our main findings on the global reduction of labour hours over the 1800-2025 period and the long-run transformations in the gender patterns of work and the global share of unpaid work. In section 4, we relate the global decline in labour hours and the global rise in productivity and estimate the elasticity of labour hours with respect to productivity. In section 5, we analyse different possible scenarios for the

global evolution of labour hours and productivity over the 2025-2100 period. Finally, we offer concluding comments and discuss future research prospects in section 6.

2. Concepts and Methods

2.1. Concepts of Labour Time: Economic vs Domestic

Our long-run analysis of labour time and productivity will focus for the most part upon "economic labour", which we define as labour time that is used as an input to produce the various forms of output in goods and services that are included in existing national accounts (see Table 1). In practice, this includes all goods and services which are produced for sale on a market (at least in part) by households, corporations and other organizations, as well as goods and services provided for free by government and non-profit organizations.[4]

Economic labour is a relatively broad concept, in the sense that it includes many forms of market and non-market labour, formal and informal labour, paid and unpaid labour. As an example of non-market labour, one can think of the labour time supplied by public-sector teachers, nurses or doctors. In national accounts, their output is valued at production costs, i.e. it is equal to the monetary value of the public sector wages and intermediate consumption used to provide these services. In that sense, it follows a process of political valuation (determined by various forms of public deliberation and collective decision-making procedures) rather than "pure" market valuation. As an example of informal and unpaid labour, one can think of female (or sometime male) informal labour as unpaid family worker in agricultural sector or other self-employment activity. The corresponding output is also included in national accounts, generally on the basis of the estimated market value of the relevant goods and services. This can represent a very large share of gross domestic product in many countries and time periods. As we go back through time, economic labour also includes other forms of unpaid work, including slave labour and various types of forced labour used in plantation economies and other contexts.

Though it is a relatively broad concept, economic labour does exclude "domestic labour", which we define as labour time that is used to produce goods and services

[4] We follow the definitions used in the latest international guidelines on national accounts (SNA 2008; SNA 2025, in progress). In practice, the exact boundaries of goods and services included in national accounts have changed regularly in the various SNA (System of National Accounts) guidelines adopted by the United Nations and other international organizations since the 1940s-1950s, but these changes have relatively little impact for our purposes.

that are not included in existing national accounts. Domestic labour includes different forms of labour, and in particular housekeeping tasks (cleaning, cooking, child-caring, old-age care, etc.). This excludes self-care, education and leisure time. The best way to measure domestic labour is provided by "time-use surveys", which are based on time diaries filled by a representative sample of respondents over a period of several days (typically a week). If we put together the time-use surveys conducted in various parts of the world, poor and rich countries alike, one general finding is that women always tend to work longer hours than men. I.e. in all categories of countries women provide fewer hours of economic labour but a lot more hours of domestic labour, so that their total labour time is always significantly larger than that of men, particularly in low-income and middle-income countries (see Figure 1).

In spite of the fact that women work more than men, they earn a lot less, in all parts of the world (see Figure 2).[5] This reflects the fact that women supply a very large share of domestic labour (which is entirely unpaid), and that when they supply economic labour they also get paid a lot less than men (and sometime not at all).

Ideally, it would be very interesting to fully include domestic labour into our historical analysis and to study the global distribution of total labour time (economic and domestic) over the 1800-2025 period and across world regions. In the same spirit, one might want to re-define and re-estimate GDP entirely on the basis of total labour time. In order to do this, we would need to value the output of domestic labour. One standard way to do this consists of using existing market prices for similar goods and services.[6] One could also use various forms of political valuation (and not only market valuation), in the same way as for the case of public sector output. For instance, one could decide that women and men's labour time (as well as domestic and economic labour time) should be attributed the same average value, both in the way we measure GDP and in the manner income ought to be distributed. Given that domestic labour represents roughly as many work hours as economic labour, this implies that extended GDP would typically be about twice as large as conventional GDP. It would also be distributed very differently between women and men as compared to conventional GDP. In this research, we will however not attempt to develop such computations on "extended GDP". The main reason is that we have very limited information on the long-run evolution of domestic labour over time, so that such computations would mostly rely on assumptions and would have limited interest (in our view). In this case, rather than

[5] The estimates on women's shares in total labour income (wage income + 70% of self-employment income) reported on Figure 2 come from WID series. See Neef and Robilliard (2021).
[6] For attempts to include the output of domestic labour into historical GDP estimates, see e.g. the references provided by De Vries (2008, p.30).

trying to attribute a monetary value to these concepts, we will develop new forms of "material accounting" (including labour time accounting, carbon accounting, natural resources accounting, etc.) in order to address the issue of domestic labour.

Generally speaking, time-use surveys are a very useful source to develop such a material accounting approach. Unfortunately, they are entirely missing for many countries. When they are available, they usually cover a small number of years, so it is difficult to build country-level series on domestic labour time, even for the post-1970 or post-1980 period. Most importantly, there exists no time-use survey before 1960, so that by construction it is wholly impossible to use such sources and methods in order to study rigorously the long-run evolution of domestic labour time over the course of the 20th century (not to mention the 19th century).[7] In contrast, despite their many imperfections, there are relatively well-developed data sources on economic labour hours for many countries and in most parts of the world since the 19th century, allowing for meaningful long-run analysis. This is why our main historical series covering the 1800-2025 period will focus upon economic labour and exclude domestic labour. In particular, our analysis of labour productivity will concentrate on economic labour and conventional GDP (as currently defined). We will however address the question of domestic labour when we analyse recent decades (1960-2025) and when we discuss future trajectories for work hours and gender gaps over the 2025-2100 period. We will see for instance that the pattern described on Figure 1 prevails in all world regions (with important variations) and that it has changed relatively little since the 1960s in Europe and the United States (see Section 3.2). We will also provide some approximate assessment of the share of unpaid labour (including domestic labour) in global labour time over the 1800-2025 period (see Section 3.3) and analyse the implications of unpaid labour (including domestic labour) for the measurement of the gender gap in labour pay (see Section 3.4).

2.2. Geographical Coverage and Data Sources

Our main objective is to construct homogenous series on labour hours covering 57 core territories in the world over the 1800-2025 period (see Table 2).[8]

[7] There exists one time-use survey that was conducted in the US in 1965, but in most European countries the first large-scale time-use surveys were not conducted before the 1970s or 1980s. In many countries time-use surveys do not exist before 1990 or even 2000.

[8] The list of 57 core territories described on Table 2 (including 48 countries and 9 residual regions) is an extended version of the set of 33 core territories (including 24 countries and 9 residual regions) introduced by Chancel and Piketty (2021) in order to study the long run evolution of the global income distribution. See Nievas and Piketty (2025).

Whenever possible, we use available micro-files from time-use surveys, employment surveys or other relevant household surveys in order to estimate labour hours and their decomposition by gender, status and employment sector. This is the best way to ensure that the resulting series are as homogeneous as possible and rely on similar variables, questionnaires and methods. When this is not possible, we also use existing harmonized labour hour data, in particular the ILO database and the JOIN database compiled by the World Bank.[9]

Historical estimates covering the 19th century and the early 20th century usually come from manufacturing surveys and other surveys conducted at the time and are generally not available in the form of micro-files. One needs to resort to statistical volumes and yearbooks and other official publications where these estimates were originally published. We also use the global historical series on labour hours compiled by Huberman (2004), Huberman and Minns (2007) and Gilmore (2021), as well as the global series on male and female labour participation rates compiled by Dili et al (2021). All details about data construction (from raw sources to final data series) are provided in the online data appendix, and we refer interested readers to this material for full information on methodological issues.[10]

In effect, our long-run series combine micro data (employment & time-use surveys) over the 1960-2025 period with historical series 1800-1960 coming from industrial surveys. These surveys cover mostly the manufacturing sector, which potentially can introduce important biases. However, we have checked that work hours in manufacturing and non-manufacturing display consistent trends over time & across regions over the 1960-2025 period. Generally speaking, average weekly work hours tend to be longer in manufacturing than outside manufacturing, but the between-sector gap is relatively small (typically about 1-2 hours per week or less) as compared to the overall between-region gap (as much as 10-15 hours per week). E.g. in Europe average weekly work hours for employed working-age men (15-to-64-year-old) in 2000-2025 are 36,5 hours in manufacturing and 36,2 hours in non-manufacturing, vs 48,5 hours in manufacturing and 46,2 hours in non-manufacturing in South & South-East Asia (see Figure 3).[11]

[9] The ILO and JOIN database on labour hours cover more countries outside developed countries than OECD or BLS databases, and appear to be more homogeneous than the Penn World Tables data series on labour hours (used by Ahmed (2023), but which we do not use in the present work. For the subset of rich Western countries in recent decades, all databases basically deliver the same series.
[10] See Online Appendix for a list of micro surveys and additional sources that were used for each country.
[11] See Online Appendix for complete series.

It should be noted that different methods can be used to estimate annual working hours, especially when we only observe weekly working hours (or sometime daily working hours). In order to reach estimates that are as comparable as possible over time and across countries, we follow the method and assumptions proposed by Gilmore (2021) regarding the gradual transition from a 6-day work week to the 5-day work week over the course of the 20th century and the slow rise of paid vacations over the 1800-1960 period.[12] For more recent period (1960-2025), we use micro surveys in order to measure directly work days, vacation days and the number of weeks worked per year, which we use to translate weekly working hours into annual hours.

We should make clear at the outset that we obviously face important limitations in terms of historical data sources. Given these limitations, there are many key issues related to the global long-run history of labour time that cannot be properly addressed, especially regarding the most ancient periods. Generally speaking, the 1960-2025 period – for which a large set of micro surveys is available – can be analysed in a much more systematic manner than the 1800-1960 period. We stress however that there are also several important issues on which relatively robust conclusions can be drawn, including for the full 1800-2025 period. Such a global historical perspective can shed new light on on-going discussions about structural transformation, work hours and socioeconomic development in the 21st century.

3. The Changing Structure of Labour Hours, 1800-2025: Patterns and Variations

3.1. The Global Reduction of Annual Labour Hours, 1800-2025

There are four key evolutions that characterize the changing structure of labour hours in the long-run. The first one is the global decline in annual economic labour hours (whether we look at economic labour hours per employed individual, per working-age individual and per capita). The second one is the transformation of the gender patterns of work, with a long-run U-shaped evolution of women's employment rates and the very slow and uneven rise of men's domestic labour and the very slow reduction in gender gaps in total labour hours in recent decades. The third one is the long-run transformation in the role of unpaid work in global labour time, with a decline in forced labour and a rise in the relative importance of domestic labour. The fourth one is the persistence of an enormous gender gap in labour pay, especially if we take into account the role of domestic labour.

[12] See Gilmore (2021, Tables 3.3-3.7 and note 12). Generally speaking, there exists no fully standardized method to compute and compare annual hours at the international level. See Ward et al (2018).

We begin with the global decline in economic labour hours over the 1800-2025 period. Generally speaking, the number of annual economic labour hours per capita can be broken down into three terms:

Annual economic labour hours per capita
= Annual economic labour hours per worker
x Employment rate among working-age population (15-to-64-year-old)
x Working-age population/Total population (1)

The third term is purely demographic: it measures the evolution of the share of the working-age population (defined as the population aged 15-to-64-year-old) in total population. In practice, this term shows little long-term evolution and plays a limited role in our analysis: working-age population has always represented about 60-65% of total population at the global level over the 1800-2025 period. This reflects the fact the decline in the share of young-age population (0-to-14-year-old) – from about 35% to 25% of total population at the global level between 1800 and 2025 – has been approximately compensated by the rise in the share of old-age population (65-year-old and over) – from 2% in 1800 to over 10% in 2025 at the global level. This evolution is scheduled to continue over the course of the 21st century.[13]

The first term – i.e. annual labour hours per worker - is the most important one in the long-run. To be more precise, we are looking at average annual hours of economic labour among individuals with positive hours of economic labour, irrespective of their gender or labour status (wage earners, self-employed, unpaid family workers). We find in all world regions a very large decline of annual labour hours per worker over the 1800-2025 period, from about 3200 hours to around 2100 hours (-34%) on average at the world level (see Figure 4). At the same time, we also observe large variations across periods and regions in the speed of work time reduction, including for a given level of income or productivity. Note that annual labour hours around 3200 hours observed during the first half of the 19th century reflect very large worktime by modern standards: this corresponds to about 60-65 hours per week all year long. In contrast, annual hours around 2000 correspond to about 40 hours per week during 50 weeks (2 weeks in paid vacations), and annual hours around 1600 hours (such as those currently observed on average in Europe) correspond to about 35 hours per week during 47 weeks (5 weeks in paid vacations). In practice, all margins have played a significant role in the historical reduction of labour hours: the compression of average

[13] See Appendix Figures A1-A9 and Gomez Carrera et al (2024).

work hours per day, the reduction of average work days per week (with the historical shift from 6-day to 5-day work week) and the average work weeks per year (with the rise of paid vacations).

Generally speaking, the main period of work time reduction happens between 1860 and 1980. This corresponds to the rise of the labour movement and the development of powerful new organizations (trade unions and working-class political parties of various stripes: labour, socialist, social-democratic, communist, etc.), which played a critical role in shaping legislation and collective bargaining to reduce work time. This can also explain why worktime reduction was particularly strong since the 19th century in Europe, which has been the historical home of the labour movement, much more so than the US (a feature that has been attributed to several factors, including the existence of extreme racial divisions within the US working class).[14] Similarly, the rise of labour time in the early 19th century Europe is often attributed to the lack of an organized labour movement in the early stages of the Industrial Revolution. We will return to the discussion and interpretation of these various historical and regional patterns when we relate work time reduction to productivity growth (see section 4).

The second term – i.e. the employment rate among working-age population – also displays important historical changes over the 1800-2025 period, but these changes tend to counterbalance each other in the long-run. As far as working-age men are concerned, the striking fact is that their employment rate has been relatively stable around 80-85% at the global level in the long-run, from 1800 until the 1960s-1970s, with a gradual decline from 80-85% to around 75% between the 1970s-1980s and the 2010s-2020s (see Figure 5). Generally speaking, this decline can be accounted for by a variety of factors: late entry of younger generations into the labour market due to educational advances; early retirement of older generations; lack of attractive employment opportunities due to insufficient capital investment or mobility constraints, etc. In practice, though the exact combination varies across regions, the first factor – late entry of young generations – is by far the most important. The employment rate of the youngest working-age men (15-to-24-year-old) was almost as high as the average rate up until the 1960s-1970s, when access to higher education was very limited in most world regions (typically less than 10% of a cohort), and it is now less than 50% in most world regions, as the fraction of a cohort accessing higher education is approaching or even overtaking 50% in many countries.[15]

[14] See e.g. Alesina et al (2001).
[15] In order to account for the large variations in employment rates over time and across countries, Bick et al (2022) also stress the role of declining fixed costs of employment over time (which could be interpreted as the consequence of multiple factors: lower commuting time due to urban setting, less

The long-run evolution of employment rates for working-age women is more complex – and in many ways more interesting – than that observed for men. The general pattern is characterized by a U-shaped evolution (see Figure 6 for absolute women employment rates, and Figure 7 for relative women employment rates). That is, women start with high employment rates almost everywhere in the early 19th century in the context of largely agricultural societies; then employment rates tend to decline for women in the late 19th century and until the middle of the 20th century, together with the rise of manufacturing employment and the breadwinner model; and finally women's employment rates rise again in the second half of the 20th century and in the early 21st century, together with development of the service sector and the rise of stronger social norms pushing in the direction of gender equality.

This general U-shaped pattern has been analysed extensively in the research literature, particularly in the case of Western countries (see e.g. Goldin (1995, 2024)). However, several important points should be emphasized. First, existing research suggests that the declining part of the U-shaped pattern is more modest in size than the rising part (see Ngai et al (2024)). Next, there are large variations across countries, and the observed longitudinal U-shaped pattern in developed countries and cross-sectional U-shaped pattern at the world level do not always translate into longitudinal U-shaped evolutions in all world regions (see e.g. Mamen and Paxson (2000), Klasen (2019) and Dinkelman and Ngai (2022)). Our global long-run estimates confirm that the U-shaped pattern for women employment rates holds in most regions, but with significant variations and several exceptions. For instance, the rebound of women employment rates in the MENA region in recent decades appears to be very small – almost non-existent as compared to other regions – at this stage (see Figures 6-7). Most importantly, we stress that we are confronted with very serious measurement limitations when we try to compare the long-run evolution of women employment rates at the global level (an issue on which we return in section 3.2 below). This suggests that seminal analyses of U-shape patterns of female employment over time do not translate seamlessly to settings where time has been less associated with less growth than the US – giving way to less structural transformation - and to methodologies that combine longitudinal with cross-country variation.

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frequent work casualties, etc.). This could contribute to explain convex employment rates but concave hours. They also stress the existence of very high employment rate but low hours in traditional self-employment sectors, with declining relative productivity over time.

If we put together men and women, we find that total employment rates have been relatively stable around 60-65% of working-age population over the 1800-2025 period, usually with a moderate-size long-run U-shaped pattern (see Figure 8). In most regions, the decline in men employment rates observed since the 1970s-1980s has been more than compensated by the rise of women employment rates, so that total employment rates increased significantly. The only exception to this pattern is the MENA region, where total employment rates declined in recent decades.

If we now combine our findings on annual labour hours per employed individual with those on employment rates, we find that annual hours per working-age individual (15-to-64-year-old) have dropped significantly at the global level over the past two centuries, from about 2100 hours to around 1300 hours (-38%) (see Figure 9). Given that total employment rates have shown little variations in the long run, the decline in annual labour hours per working-age individual has been approximately the same (a little larger) than that of annual labour hours per worker. We also observe approximately the same decline of annual labour hours per capita, in line with the fact that the fraction of working-age population (15-to-64-year-old) in total population has also been relatively stable (around 60-65%) in the long run.[16] Although there are important variations across regions, it is striking to see that this massive decline in labour hours happened pretty much all over the world during the past two centuries.

3.2. The Changing Gender Patterns of Work: Uncovering the Invisible

As we already noted, the history of labour hours over the past two centuries is characterized by several major transformations. The first transformation is the global decline in annual economic labour hours, which is relatively well measured and documented. The second transformation is the multifaceted restructuring of the gender patterns of work, which is much less well measured and documented. In many ways, women labour has been made invisible, or at least has been made much more difficult to measure and document in an historical and comparative perspective, reflecting the fact that women labour has received a lot less attention than men labour from public administrations, statistical surveys and societies as a whole.

When we refer to the changing gender patterns of work, we should make clear that we are referring to two different (though interrelated) evolutions: first, the long-run U-shaped evolution of women's employment rates in terms of economic labour; next, the

[16] See Appendix Figures B1-B10. At the global level, annual labour hours per capita declined from about 1300 hours in 1800 to around 800 hours in 2025 (-38%).

very slow and uneven rise of men's domestic labour and the very slow reduction in gender gaps in total labour hours in recent decades.

Regarding the first evolution, the key point is that it is only in recent decades that we have started to see the development of labour force surveys allowing for a rigorous measurement of all forms of economic labour and work status, including not only wage labour and self-employment but also unpaid family work, which has played a major role in the history of women labour (both in agriculture and other sectors). By putting together employment surveys covering 35 countries in all world regions over the 2010-2025 period, we come with a number of findings. First, unpaid family work is systematically more widespread among women, and particularly so in the developing world and in agricultural economies. In low-income countries, 38% of all employed women are wage-earners, 36% are self-employed and 26% are unpaid family workers. In contrast, 47% of all employed men are wage-earners, 43% of self-employed and 10% are unpaid family workers (see Figure 10). Unpaid family work is particularly common among women in MENA, Subsaharan Africa and South & South-East Asia (see Figure 11). In some cases, we observe an additional category within the self-employed (namely we observe the subset of self-employed who are employers, i.e. who employ other individuals as wage workers, and we find that the proportion of employers within the self-employed is always a lot larger for men than for women (in all regions))[17]. We also have surveys using similar questionnaires and concepts since the 1970s-1980s in rich countries. Unpaid family work among women was relatively common at the time, comparable to middle-income countries today, especially in European countries with a large agricultural sector (see Figure 12). Unpaid family work was already very low in North America/Australia/New Zealand in the 1970s-1980s, reflecting the fact that the agricultural sector was already very small (see Figure 13).

In some countries, and particularly in the US and in a number of countries in most world regions, the information available in censuses makes it possible to estimate the very large importance of unpaid family work for women in the agricultural sector and other economic sectors in the in the 19th century and early 20th century. It is by using such census data that Goldin and others were able to estimate the U-shaped pattern of employment rates for the US (see e.g. Goldin (1995, 2024)) and this is also what we did in order to estimate our global long-run series on women employment rates (see Figures 6-7). However, we stress that the methods and questionnaires used in historical censuses in order to measure agricultural work and other forms of paid and

[17] See Online Appendix. Unfortunately, the questionnaires allowing for such decomposition are not entirely homogenous across countries and over time and do not allow for a systematic analysis.

unpaid labour status vary substantially over time and across countries and are not entirely comparable to modern labour force surveys. The general patterns and the broad orders of magnitude appear to be robust, but this clearly puts strong limitations on our ability to analyse long-run comparative evolutions in a fully satisfactory manner. More extensive data collection using historical censuses might allow uncovering novel interesting patterns and new aspects of the largely invisible history of women labour.[18]

Measurement problems are even more acute when it comes to the study of total labour time, including both domestic and economic labour. Modern time-use surveys begin in the 1960s-1970s in rich countries, but global coverage extends very gradually and it is only in the 2000s-2010s that we start to cover most world regions in a comparable manner. Before the 1960s-1970s, there exists no data source which would allow for rigorous comparisons with modern time-use surveys. There is extensive historical evidence (including literary material) suggesting that women already supplied most domestic labour in the 19th century and early 20th century in all world regions, but there seems to be little way to make precise quantitative comparisons between countries in the long-run. By putting together time-use surveys covering 35 countries in all world regions over the 2000-2025 period, we come with two main findings. First, as we already stressed in section 2, women work more than men in all categories of countries, whether they are low-income, middle-income or high-income countries. All over the world, women supply fewer hours of economic labour than men, but they supply so many more hours of domestic labour time that their total labour hours are always higher than those of men (see Figure 1 above). Next, we find significant variations across world regions. In particular, the gap in total labour hours between men and women is very large in MENA, East Asia, Russia and Central Asia and South & South-East Asia (see Figure 14). This comes from the fact that women supply a lot more domestic labour than men in these regions, and that in addition they also supply substantial economic labour. Note that women supply very limited economic labour in Middle East/North Africa, but that they supply so much more domestic labour than the total gap is virtually the same. In contrast, women appear to supply less domestic labour in Sub-Saharan Africa

[18] For instance, by re-exploiting historical US census data, Goldin (1977) shows that changing social norms and social valuation of women's work are critical in order to explain the much larger employment rates observed among black women than among white women around 1890-1920 (including for a given level of education and household income). In effect, post-slavery black women appear to value salaried work, while white women associate women salaried work to black women (for servant-type jobs and other unskilled jobs held by black women).

By putting together the time-use surveys conducted in Europe and North America/Oceania since the 1960s-1970s, we also find that the gender gap in total labour hours has declined relatively little in recent decades. This reflects the fact that the decline in women domestic labour has been relatively slow and that it has been largely compensated by the gradual rise of women economic labour (see Figures 15-16). Note that the gender gap in labour time (and particularly domestic labour time) appears to be particularly large in Europe in the 1960s-1970s, roughly of the same magnitude as in South & South-East Asia, East Asia or Middle East/North Africa today (or even a bit larger according to our estimates; see Table 3).[19] The gender gap in labour time did narrow in Europe between the 1960s-1970s and the 1980s-1990s, but since then it has changed very little. In North America/Oceania, the gender gap appears to increase in recent decades, reflecting the fact that the decline in women domestic labour hours has been more than compensated by the rise of women economic labour hours.[20] Generally speaking, the most striking fact is that women always supply more labour hours than men, in all regions and across all time periods. The variations around this basic fact are interesting but remain of limited magnitude as compared to this main regularity. Women generally supply about 55% of total working time – or a little more in less developed countries (about 56-57%) and a little less in the most developed countries (about 53-54%) (see Table 3).

While we use a different set of time-use surveys and apply specific definitions, our general findings are very much consistent with other studies (see e.g. Gottlieb et al (2024)). Gottlieb et al also show that in order to explain huge variations in domestic and economic labour hours across countries, including for a given income level, it is not enough to look at gender gaps in relative wages and productivities. One needs to acknowledge the existence of large between-country variations in the non-monetary costs of women *economic* labour (which appears to be particularly large in middle-income countries) and of men *domestic* work (which appears to be especially large in low- and middle-income countries). Or, to put it another way, social norms, institutions, ideology and power relations seem to matter at least as much as "pure" economic factors in order to account for variations in labour patterns over time and across countries.[21] We should also stress that these differences between countries are not "frozen" over time. Large-scale political transformations can radically alter work

[19] We have few time-use surveys for Europe in the 1960s-1970s, but the main available surveys (in particular for France and Germany) all display very large domestic labour hours for women (almost 46 hours per week).
[20] Note however that time-use surveys are not perfectly homogeneous over time and do not cover exactly the same years for all countries within North America/Oceania, which might affect comparisons.
[21] See e.g. Gottlieb et al (2024, p.37, table 6) for an attempt to relate gender gaps in labour hours, gender norms and religion (using data from the World Religion Project).

patterns, as exemplified by unusually large economic labour hours supplied by women in ex-communist countries. We see much less impact on domestic labour patterns, however. It is also worth noting that Gottlieb et al (2024) focus on married working-age men and women, while we look at all working-age men and women (irrespective of marital status). This appears to explain why Gottlieb et al (2024) find somewhat longer total labour hours than we do.[22] This does not affect the general pattern that women work more than men in all countries, which appears to be very robust.

3.3. Paid vs Unpaid Work: A Global Assessment 1800-2025

Although available historical data sources are imperfect, it is possible to quantify the evolution of the share of paid and unpaid work at the global level over the 1800-2025 period, at least as a first approximation. We start with economic labour. Unpaid family work can be estimated to be as large as 28% of total economic labour hours in 1800 (including 21% for women and 7% for men), and to be about 8% of total economic labour hours in 2025 (including 6% for women and 2% for men). As we go back through time, unpaid labour also includes slave labour (as recorded for instance by pre-1865 US censuses) or "corvée" labour and other types of forced labour in colonial empires until the 1940s-1950s (as recorded in colonial censuses and administrative sources).[23] These various forms of forced labour can be very large in certain territories and time periods, e.g. as much as 90% of total economic labour hours in the British and French slave islands of the Caribbean and the Indian Ocean until the abolition of slavery by Britain in 1833-1843 and by France in 1848, and about 30-40% in Southern US (and about 10-15% for the US as a whole) before the Civil War and the end of slavery in 1865.[24] At the global level, one can estimate that forced labour made up about 6% of total economic labour hours between 1800 and 1860, down to about 3% in 1910 and about 1% in 2025.[25] Although 6% can seem relatively small, it should be noted that forced labour made the majority of labour hours in certain strategic economic sectors

[22] See Appendix Figure B12. There are other definitional differences which can contribute to explain the gaps. Our concept of "economic labour" is similar to what Gottlieb et al call "market labour". One difference is that they introduce a division between different categories of domestic tasks, with a distinction between "domestic" labour strictly speaking (cooking, cleaning, etc.) and "care" labour (child care, etc.), while we put everything into domestic labour. The main difference in total labour hours seems to come from their focus on married men and women (and a different of countries and years).

[23] See Van Waijenburg (2018), who estimates on the basis of French colonial archives that "corvée" labour brought additional revenues equivalent to about 20-30% of colonial budgets (i.e. about 2-3% of GDP and 4-5% of total economic labour hours) in French Africa over the 1910-1940 period.

[24] See e.g. Piketty (2020, Figures 6.1-6.4 and Table 6.1, p.215-232). In Brasil, forced labour made about 15-20% of the workforce prior to the abolition of slavery in 1888. In Russia, forced labour made about 35-40% of the workforce prior to the abolition of serfdom in 1881. See op.cit., p.246-250.

[25] According to ILO (2022), there are currently about 28 million individuals in a situation of forced labour in the world. The historical estimates provided here include not only forced labour in Western colonies and territories but also in other world regions. See Online Appendix.

in 19th century, particularly in the export-oriented plantation economy (cotton, sugar, coffee, etc.) until the 1860s. Including all forms of unpaid labour together (unpaid family work and forced labour), we find that the share of unpaid labour declined from 34% in 1800 to 9% in 2025, and that unpaid labour has always consisted primarily of women unpaid labour (see Figure 17).[26]

If we now look at total labour time (economic and domestic), then we find that the share of unpaid labour has also declined in the long run, but in a much more limited manner (see Figure 18). In the long run, the decline in unpaid family work and forced labour has been to a large extent compensated by the rise of the share of domestic labour in total labour hours.[27] This illustrates the fact that these different forms of unpaid labour correspond to very different social realities and power relations. From a normative perspective, unpaid labour should certainly not be viewed as problematic as such. Assuming that it becomes equally distributed between women and men, the long-run rise of domestic labour can be viewed as a positive transformation, reflecting a decline in economic labour (thanks to rising productivity) and the rise in non-lucrative and non-hierarchical labour relations centred on household tasks, care and voluntary work. In the long run, one can very well imagine a scenario where economic labour pursues its historical decline, together with a rise in the share of domestic labour (and hence unpaid labour) in total labour hours (or stabilizes at a relatively high level, e.g. around one half of more), and where both economic and domestic labour would be equally distributed between men and women (see Section 5).

3.4. The Real Gender Gap: Including Domestic Work

The magnitude of domestic work (and unpaid work in general) is massive in all world regions and time periods. Many authors have also stressed the key role of domestic labour for the reproduction of society and the functioning of the overall economic and social system (see e.g. Bhattacharya (2017) and Arruza et al (2019)). Despite this, the

[26] The proportion of women among slaves varied across territories but was generally very small in 18th century plantation slavery system, as new male slaves were brought permanently from Africa (with huge mortality and very few women). By the end of the century and during the first decades of the 19th century, the system shifted to one were women made close to half of slaves and where natural reproduction was the main factor behind the growth of the slave population. In the US, women make 48% of the slave population in the census of 1820, 50% in the census of 1830 and 51-52% in the censuses of 1840, 1850 and 1860. See *Historical Statistics of United States*, Bicentennial Edition, 1976, Series A91-104.

[27] Here we assume that domestic labour follows the same long-run evolution as the cross-sectional and time-series patterns observed in recent decades. See Online Appendix for all details on these estimates. In practice, the absolute number of domestic labour hours appears to rise slightly with income level and then to stabilize (or maybe to decline slightly) at higher income levels (see Figures 1 and 13-15). Whatever the uncertainty about the exact historical evolution of domestic labour hours, there is no doubt that their share in total labour hours has declined enormously in the long run, given the very large fall in the absolute number of economic labour hours.

role of domestic labour is rarely taken into account explicitly when it comes to the measurement of the gender gap in labour income.

We can first illustrate this general point with the case of Europe. According to the most recent available evidence (2020-2025), women receive about 39% of total labour income in Europe and they supply about 42% of total economic labour hours. Therefore, if we compute the average hourly labour income of women and men on the basis of economic work alone (as is commonly done) we find that the gender gap in hourly pay is not that large: the average hourly labour income of women appears to be 12% smaller than that of men. However, the picture looks quite different if we include domestic hours. Women then supply 54% of total economic and domestic labour hours, which given that they receive only 39% of total labour income means that their average hourly income is 45% smaller than that of men (see Figure 19).

Given the key role played by domestic labour for the overall functioning of modern economic and social systems, we feel that the “real gender gap” indicator provides an interesting perspective that complements the conventional indicators that exclude domestic labour from the analysis. In any case, we stress that this has a huge impact on the overall magnitude of gender inequality in labour pay.

If we use standard indicators based on economic labour only, then we find that the gender gap in hourly pay is relatively limited – about 10-20% or less – in the most advanced economic regions in the world (see Figure 20). The gender gap even seems to be close to 0% in Latin America in recent years. Also note that with this indicator the most unequal region appears to be South & South East Asia. Women in this region do receive a slightly larger share of labour income than in Middle East/North Africa (see Figure 2), but they supply so many more hours of economic labour that their relative hourly income is even worst (see Figure 20).

If we use our indicator of “real gender gap” based on economic and domestic labour, then the order of magnitudes change completely (see Figure 21). In the most advanced regions of the world like Europe or North America/Oceania, we find that the gender gap in hourly pay is now about 40-50% or more (rather than 10-20% or less). I.e. men receive about twice as much monetary income than women for each labour hour that they provide. In regions like South and South-East Asia or MENA (which becomes again the most unequal region in the world), the gender gap is as large as 80-90%. I.e. men receives as much as 10 times more monetary income than women for each labour hour that they provide. The advantage of this indicator is that it clearly illustrates the

magnitude of unpaid labour in modern economic systems. Note that we are not suggesting that domestic labour should receive monetary compensation. We rather feel that it would be preferable than domestic labour remains unpaid (not everything has a price) but that women and men share both domestic and economic work equally (as well as the money income from economic work). We return to this discussion in Section 5.

A related perspective on economic vs domestic labour stresses the connexions between the two spheres. Indeed, the domestic burden that accrues to women, in particular when they have children, prevents them from participating to the labour market or, at least, from accessing highly paid jobs. As highlighted by Golding (2014), labour markets in developed economies disproportionately reward individuals who work labour long particular hours. In the context of couples with children, spouses will tend to specialize with men, in general, taking the less flexible / higher paid jobs in the corporate, financial, and legal sectors while women take more flexible / lower paid jobs in the public and social sectors. Similarly, Kleven et al. (2019) show that 80% of the remaining earnings inequality between men and women in Denmark results from "child penalties" faced by mothers, but not fathers.

4. The Rise of Productivity and the Decline in Labour Hours, 1800-2025

4.1. The Long-Run Rise of Hourly Productivity

We now relate the long-run decline in economic labour hours to the long-run rise in economic productivity. In order to compute productivity, we simply divide net domestic product (NDP), i.e. gross domestic product (GDP) minus capital depreciation (also referred to as consumption of fixed capital (CFC)), by total annual hours of economic labour. We use the historical dataset on NDP covering 57 core territories over the 1800-2025 period provided by the World Inequality Database (WID).[28] It is conceptually more satisfactory to use NDP rather than GDP to measure productivity, but in practice it does not make a huge difference in terms of long-term trends, as CFC typically represents a relatively stable fraction of GDP (generally around 10-15%).[29] All

[28] WID historical national accounts series combine Maddison series with new country-specific series (when available). See Chancel and Piketty (2021), Moshrif et al (2024), Gomez-Carrera et al (2024) and Nievas and Piketty (2025). Complete series and methodological details are available on wid.world.

[29] CFC actually tends to rise over time (capital obsolescence effect): it typically ranges from less than 10% of GDP in the 19th century to as much as 15-20% of GDP in the most advanced economies in the early 21st century. This implies that the long-run rise of hourly NDP is somewhat smaller than that hourly GDP. As compared to the magnitude of long-run growth trends, this is not a very large effect, however. See Dietrich et al (2025).

our results and NDP series used here are expressed in purchasing power parity (PPP 2025 €) using the latest available international price surveys.[30] For annual hours of economic labour, we use the series constructed in the present research.

We obtain the following results. At the global level, per capita annual NDP rose from about 900€ in 1800 to 14,000€ in 2025 (all amounts in PPP 2025 €). I.e. it was multiplied by about 15, which corresponds to an average real growth rate of 1.2% per year (see Figure 22). Given the long-run decline in annual labour hours per capita, this implies that hourly NDP has grown even more, from about 0.7€ in 1800 to 16€ in 2025. I.e. hourly productivity was multiplied by about 24, which corresponds to an average real growth rate of about 1.5% per year (see Figure 23). Together with this dramatic productivity growth, huge gaps persist between countries. In the latest available estimates (2025), hourly productivity varies from as little as 4€ on average in Subsaharan Africa to as much as 55-60€ in the richest countries of the world in Europe and North America/Oceania. If we look at individual countries, we find the US and top European countries (Germany, Sweden or France) have productivity levels that are virtually indistinguishable in recent years (see Figure 23).[31] In other words, the fact that the US have higher per capita GDP in PPP terms (with a gap of about 20-30% with top European countries in the latest available years) comes entirely from longer labour hours in the US.

Several remarks are in order here. First, while the growth rate of hourly productivity has been on average about 1.5% per year at the global level over the 1800-2025 period, we also observe very large variations over time and across countries. Generally speaking, productivity growth appears to have accelerated over time, from 1.1% per year over the 1800-1910 period to 1.9% over 1910-1950, 2.1% over 1950-1990 and 1.8% over 1990-2025 (see Table 4). The fastest historical examples of productivity growth include Europe over 1950-1990 (3.4% per year) and East Asia over 1950-1990

[30] Namely we use the results from the latest round of the International Comparison Program (ICP 2021) that were published in 2024. There are some gaps with the previous round (ICP 2017), but they are relatively small as compared to the magnitude of the long-run trends studied here. See Gomez-Carrera et al (2024).

[31] See Online Appendix for complete country series. The fact that the US and top European countries have virtually indistinguishable hourly productivities holds with our series as well as with OECD and BLS series. See also Ward et al (2018, Figure 4.2), who show that this conclusion prevails using different methods to measure labour hours. Generally speaking, the main differences between our database and the OECD or BLS series on annual labour hours are twofold. First, we attempt to go back to micro data, employment surveys and time-use surveys in order to construct series that are as comparable and homogenous as possible. In practice, regarding OECD countries, our series are very close to OECD and BLS series for recent decades. Next, and most importantly, we adopt a long-run perspective and cover all world regions. Note that there exists a relatively large literature studying annual labour hours and hourly GDP across OECD countries. See e.g. Bergeaud, Cette and Lecat (2016, 2018). The main novelty here is the global perspective (as well as the historical and prospective dimension).

(3.7% per year, largely driven by Japan) and 1990-2025 (4.4% per year, mostly driven by China). These episodes typically correspond to patterns of convergence with the world productivity frontier (generally the US), which by construction cannot last forever. At the world level, productivity growth rates have never been more than 1.5-2% per year over long time periods, which is already very large: a sustained global productivity average growth rate of 1.5% per year over 225 years was sufficient to multiply global productivity by 30 between 1800 and 2025. Also note that the lowest productivity growth rates are observed in Subsaharan Africa, with only 1.2% per year on average between 1990 and 2025. This is better than between 1950 and 1990 (0.5% per year), but this is still below the world average. Generally speaking, the global picture offers a sharp contrast of convergence episodes between certain regions and persistent inequality (or even aggravating inequality) between others.

Next, we should stress that there are obvious limitations in our collective ability to measure both NDP and labour hours at the global level, so that it is better to concentrate on the big picture, the global patterns and the broad orders of magnitude, rather than on small differences between countries. In principle, we have tried to measure labour hours in a way that is as comparable as possible across countries and over time, by going back to the labour force surveys and time-use surveys whenever they are available in order to use the same questionnaires and definitions across countries, especially for the recent decades. But there are so many possible measurement errors that small variations in productivity over time or across countries should be interpreted with caution. In contrast, large variations over time and across countries should be considered as robust and meaningful.

Next, and maybe most importantly, one should interpret with caution the variations in hourly NDP over time and across countries. By definition, NDP is based for the most part on the market value of the output produced by the various countries (or the cost value of output for the government, non-market sector component of NDP). Higher hourly productivity, as measured by hourly NDP, partly reflects differences in the productivity of human labour, due in particular to differences in human capital and educational investment. It is not a coincidence if the US – which has been the productivity leader of the world during most the 20th century – has also been for a long time the educational leader of the world.[32] However, it would be misleading to attribute all differences in hourly NDP to gaps in human capital. Variations in hourly NDP reflect many other factors, including the availability of equipment, machinery, patents and

[32] See e.g. Goldin (2001).

other forms of non-human capital, as well as the patterns of sectoral specialization and interstate power relations in the global division of labour.[33]

Finally, one should be particularly careful when interpreting large productivity growth over long periods of time. When hourly NDP is multiplied by 24 between 1800 and 2025 at the global level, this obviously does not mean that labour productivity was multiplied by 24 for all goods and services. In practice, the pace of productivity growth has been very diverse in the different economic sectors. Generally speaking, it has been above average in manufacturing, below average in the services and around average in agriculture. Most importantly, long-run economic growth is characterized by rising diversification of products in all sectors, as well by major structural transformation: the agricultural sector has been largely replaced by manufacturing and the services in the 19th and the 20th centuries, and the manufacturing sector is to a large extent already scheduled to be replaced by the services in the 21st century. This has major consequences for the sustainability of economic growth, and this also implies that any single-dimensional measure of productivity is bound to be an enormous simplification of reality. We return to this discussion in Section 5.

4.2. The Negative Elasticity of Labour Hours with Respect to Productivity

In order to analyze the relation between labour hours and productivity, the simplest way to proceed is to run a regression of the following form:

$$Log(LabourHours_{it}) = a + b\ Log(Productivity_{it}) + e_{it} \qquad (2)$$

With: $LabourHours_{it}$ = average annual labour hours in country i and year t
$Productivity_{it}$ = hourly productivity (hourly NDP) in country i and year t

In our baseline specifications using the entire time span (1800-2025), we find negative elasticities of labour hours around -0.15, i.e. between -0.12/-0.13 without country fixed effects and -0.18 in the presence of country fixed effects. The elasticities are virtually identical whether we use average annual labour hours per employed individual or per working-age individual (see Table 5). Intuitively, an elasticity of -0.15 means that labour hours decline by 0.15% when hourly productivity rises by 1%. To put it another way, if productivity is multiplied by 24, which is approximately what happened at the global level between 1800 and 2025, then labour hours should decline by about 40%.[34] This

[33] See e.g. Pomeranz (2000), Parnasarathi (2006), Beckert (2015), Piketty (2020, 2022).
[34] $24^{-0.15}=0.62$.

is fairly substantial: this corresponds to a situation where 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 15 (rather than 24). I.e. 40% of the historical rise in productivity was used to increase leisure and 60% was used to increase production.

In standard neo-classical economics, the usual interpretation of such a negative elasticity is that income effects dominate substitution effects. I.e. the elasticity of labour hours is typically interpreted as the elasticity of labour supply in a model where each country is populated by a utility-maximizing representative agent choosing freely his or her labour hours, given his productivity. Using standard consumer theory, the choice of shorter labour hours in response to higher productivity reflects the fact that the representative agent is characterized by large income effects. I.e. with higher productivity and higher income, rational agents choose to consume more leisure in order to derive more utility, in spite of the rise in the "relative price" of leisure (substitution effect). This neoclassical reasoning is interesting because it stresses the role of utility for leisure (i.e. the fact that human beings do not care only about extra material consumption), which is clearly an important part of what has been going on historically.

That being said, this neoclassical interpretation of the observed historical elasticity of labour hours is clearly problematic and reductionist. In practice, labour hours are not freely chosen by workers. Labour hours are determined by a complex collective process involving bargaining power of employers and workers, labour institutions and trade unions, state legislation and policy platforms, social struggles and political mobilization. Employers have an obvious incentive to extract as many labour hours as they can for the lowest possible pay. If they have the power to do so, they will do it with little hesitation, as the extreme example of forced labour illustrates. In practice, the important point is that the observed historical elasticity of labour hours should primarily interpreted as a political elasticity, reflecting the changing ability of workers to form social and political coalitions and impose the reduction of working hours to reluctant employers. Irrespective of employers' power, workers might also face difficulties taking individual decisions to reduce worktime and income as long as others do not the same (e.g. due to private concerns about relative consumption), so that collective decisions are necessary to circumvent this externality problem. The fact that labour hours of the self-employed tend to move in the same direction as those of wage-earners (both over time and across countries) also confirms the importance of social norms, policies and institutions in the historical determinants of worktime reduction.

It is particularly striking to note that worktime reduction was especially important during the 1860-1980 period, which is the period of maximal strength of the labour and socialist movement. The fact that historical worktime reduction was substantially larger in Europe (the birthplace of the labour movement) than in the US goes in the same direction.[35] Note also that we find a substantially smaller elasticity of labour hours if we restrict ourselves to the post-1980 period, a period with declining union power and socialist mobilization (see Table 4). Generally speaking, the fact that the cross-sectional elasticity using contemporary data is lower than the historical elasticity could also be due to additional factors, including a possible "leisure satiation" effect since the 1980s-1990s. That is, the private value of additional leisure was arguably much larger when labour hours were as large as 50-60 hours per week (with no little or paid vacation) than it is today with 40 hours per week (or less) and several weeks of paid vacation. This could potentially contribute to explain the lowering of the elasticity since the 1980s-1990s.[36] However, the striking fact is that worktime reduction has been stronger in recent decades in high-income Europe than in other parts of the world with lower income, which again goes in the direction of a "political" elasticity.

Finally, note that the period of rising labour hours observed in the late 18th century and in the early 19th century also seems to fit well with the notion of a "political" elasticity. Rising labour hours between the 1770s-1780s and the 1830s-1840s are well documented in the context of European manufacturing, in the UK and in other countries, with extremely long and rising weekly hours (60 hours or more) and an increase in the number of work days per year.[37] These very long work hours should be analysed in the context of the unorganized urban proletariat of the time, weak workers power relative to employers and very low wages and living standards. In other words, workers were working longer and longer hours because employers were able to impose them and workers lacked the power and organizational capacity to oppose this.

[35] Some authors have argued that lower work hours in Europe could be interpreted as a neoclassical response to higher taxation (see e.g. Prescott (2004)). However this interpretation does not square very well with the large historical reduction of work hours in Europe, which started much before the rise of modern taxation. Also, by using contemporary micro data from LFS surveys covering over 80 countries, Bick et al (2018, 2022) show that higher productivities and hourly wages (and not higher tax rates) are the primary determinants of lower working hours.

[36] Other potential explanations for the fact that cross-sectional elasticities using contemporary data are lower than historical elasticities include technological change. I.e. available technologies were arguably more labour intensive for early industrializers in 19th century Europe than they have been for late industrializers in recent decades in other parts of the world. See e.g. Voth (2001).

[37] See e.g. Reid (1976), Voth (1998, 2001) and Allen and Weidsorf (2011).

This interpretation is substantiated by available evidence showing a marked decline in average height in the UK between the 1770s-1780s and the 1830s-1840s.[38]

5. How Will Labour Hours and Productivity Co-Evolve over 2025-2100 period?

We now come to the discussion of future possible trajectories. We focus on two main scenarios: a "Business-As-Usual" scenario and a "Global-Convergence" scenario. In the "Business-As-Usual" scenario, we basically assume that the trends observed during the 1990-2025 period extend to the 2025-2100 period, both in terms of productivity growth, labour hours, gender gaps and sectoral structure. This leads to a perpetuation of very high inequality between countries and between genders (or maybe a very slow decline). In the "Global-Convergence" scenario, we assume an accelerated process of convergence toward more equality between countries and between genders and toward declining labour hours and a more sustainable sectoral structure. We consider this second scenario as our central scenario, and we view it not only as more desirable than the first one but also as more realistic (to some extent). Needless to say, there exists a multitude of plausible alternative scenarios that could be considered. Our objective here is not to predict the future, but rather to highlight the diversity of potential trajectories, in light of historical evidence.

In the "Business-as-Usual" scenario, we assume that the hourly productivity growth rates observed in each country and world region between 1990 and 2025 extend until 2100. The consequence is a perpetuation of very high inequality between countries, and in some important cases an enlargement of inequality (see Figure 25). In particular, Subsaharan Africa will experience very slow productivity growth (1.2% per year, vs 1.6% for the world average). As a consequence, hourly productivity will rise only modestly in Subsaharan Africa, from 3.9€ in 2025 to 9.4€ in 2100 (PPP 2025 €). Over the same period, hourly productivity will rise from 15.8€ to 52.1€ at the world level, from 48.2€ to 136.8€ in Europe and from 52.9€ to 150.1€ in North America/Oceania (see Table 6). In practice, this "Business-as-Usual" scenario can lead to a highly unstable and unsustainable trajectory. In particular, large and widening North-South inequalities can have explosive geopolitical consequences, especially in a context of rising climate damages incurred by the South and major demographic imbalances. According to UN demographic projections, the population of Subsaharan

[38] See Nicholas-Steckel (1991). On wage stagnation in the late 18th century and the first half of the 19th century, see Allen (2009). One alternative explanation for the "industrious revolution" is the idea that households responded to increasing diversity of consumer goods by supplying more market labour. See De Vries (1998, 2004). While this explanation might have some relevance for certain sectors and social groups, this does seem to be consistent with the evidence on low wages and declining living standards.

Africa is scheduled to reach 3.3 billion by 2100 (vs 1.3 billion in 2025), which is likely to lead to enormous migration pressures if productivity levels and living standards stagnate in this region. [39]

In the “Global-Convergence” scenario, we assume instead that productivity levels will converge to about 100-120€ in all world regions by 2100 (see Figure 26). This implies very fast productivity growth in the poorest world regions, e.g. 4.5% per year between 2025 and 2100 in Subsaharan Africa (see Table 6). Although this is indeed very fast, it is interesting to note that this is approximately the same growth rate as that observed in East Asia between 1990 and 2025 (see Table 4). That being said, such a fast catch-up process can happen only if a number of conditions are met. First, it is critical that the poorest regions in the world benefit from massive investment plans in human capital (especially education and health) and in infrastructures (in particular new energy and transport systems), together with a transformation of the trade regime and the international economic system which would allow these countries to find an adequate sectoral specialization.

Next, it should be noted that this accelerated catch-up process comes with a substantial increase of the global productivity growth rate between 2025 and 2100: 2.6% in the “Global-Convergence” scenario, vs 1.6% in the “Business-as-Usual” scenario (see Table 6). Whether such an accelerated growth pattern is compatible with climate objectives, the size of the remaining carbon budget and the preservation of planetary habitability remains to be carefully demonstrated. At the very least, this would need to come with a large sectoral reallocation of labour time away from the most polluting sectors, e.g. via an expansion of relatively low-emissions sectors like education and health and a compression and restructuration of high-emission sectors like manufacturing, construction and energy (see Figure 27).

In addition, in order to raise welfare and to limit the material footprint associated to output growth, this would need to come with substantial worktime reduction. In our central scenario, we assume that annual economic labour hours per worker would decline to about 1000 hours by 2100 in all world regions (see Figure 28). How this affects welfare will depend crucially on the gender division of work: we assume full gender equality by 2100, with employment rates equal 80% for working-age men and women (see Figures 29-30) and an equal sharing of domestic work and labour income (see Figure 31).[40] In effect, according to this scenario, 45% of productivity gains would

[39] See Gomes-Carrera et al (2024).
[40] Reaching 80% employment rates for men and women could also be facilitated by the development of adequate policies and institutions like the “job guarantee” program. See e.g. Tcherneva (2020).

be devoted to worktime reduction, and living standards (as measured by annual per capita net domestic product) would reach about 50-55k € in all world regions by 2100, i.e. a level more than 30% higher than the level observed today in North America/Oceania (see Table 7). In an alternative, less ambitious scenario, we assume that annual labour hours would decline to about 1260 hours by 2100. I.e. 31% of productivity gains would be devoted to worktime reduction, and living standards would reach about 60-65k € by 2100 (see Table 8). Both scenarios of worktime reduction might seem too ambitious or unrealistic to some readers. It should be pointed out, however, that the fraction of productivity gains that we assume will be devoted to worktime reduction in the future is relatively close to what was done on average over the past two centuries, especially over the 1860-1980 period (see Table 9). This certainly does not mean that this will happen easily: one the main lessons from the history of labour time is that worktime reduction requires sizable political mobilization, large-scale social struggles and massive institutional and legislative transformations. As compared to the mobilizations of the past, which took place in a context of very long working hours and relatively low living standards, the mobilizations of the future will take place in a setting characterized by relatively lower working hours, high living standards and massive environmental damages to planetary habitability. The lessons from past mobilizations can help, but will not be sufficient to address the challenges of the future: new political strategies will need to develop.

Needless to say, many aspects of the “Global-Convergence” scenario should be analysed in a more detailed manner by future research. In particular, one additional advantage of accelerated productivity growth in the world’s poorest regions is that this is likely to reduce demographic pressures (in particular in Subsaharan Africa) and therefore environmental pressures. In practice, as the various scenarios analysed in UN projections illustrate, the impacts on total population could be very large. E.g. instead of a world population around 10 billion inhabitants by 2100 (the level associated to the “Business-as-Usual” scenario), the “Global-Convergence” scenario could lead to a world population around 8-9 billion inhabitants.

Finally, one central aspect of the “Global-Convergence” scenario is that it includes a sharp compression of gender inequality in labour hours: employment rates, economic labour hours and domestic labour hours are scheduled to be the same for women and men in all world regions at the latest by 2100 (and as early as possible before this). In the same way as for worktime reduction and the preservation of planetary habitability, this is an objective that is very widespread among the youth and the new generations in many parts of the world, but which will require enormous political mobilizations and

massive changes in institutions, public policies and social norms in order to materialize. A number of policy tools in favour of gender equality could be systematized and reinforced, including equal parental leave, anti-discrimination rules, gender quotas for job promotion. More radical tools could also play a role in order to rebalance power relations within households, including fiscal equalization of income between women and men (or very sharp reduction of gender gaps). Generally speaking, policies aiming at compressing income and wealth scales are very complementary to gender equality policies, as men are massively overrepresented in top income and wealth brackets. These issues should be considered as top priority for future research.

6. Concluding Comments and Research Perspectives

In this paper, we have offered a global historical perspective on labour hours covering the 1800-2025 period, as well as a prospective analysis for the 2025-2100 period drawing upon the lessons from history. We have stressed the importance of worktime reduction in the long-run and the key role of political mobilizations and social struggles to deliver these changes. We have also analyzed the multifaceted transformations in the patterns of gender inequality over labour hours, and the (very) slow movement toward more gender equality in recent decades. Finally, we have emphasized that both structural transformations – worktime reduction and gender equality – should continue their historical trajectory in the 21st century, in the context of rising social demand for the preservation of planetary habitability and socioeconomic justice. We have briefly described some features of a possible “Global-Convergence” scenario and its main differences with the “Business-as-Usual” scenario (based upon the continuation of recent trends), but it is clear that a lot more research is needed to better understand the social, economic and political conditions under which these various possible trajectories are likely to take place.

First, a better understanding of the historical evolution of productivity differentials between countries would require the analysis of long-run series on (non-human) capital stock and capital shares, as well as on human capital investment. One would also need to explicitly consider the role of unequal exchange patterns and trade rules, as well as the impact of within-country inequality on productivity growth. Next, the study of productivity growth, labour hours and structural transformation in the 21st century should rely extensively on detailed analysis of sectoral shifts, carbon emissions by sector and more generally on the impact of socioeconomic development on planetary habitability. Finally, and maybe most importantly, future research should also focus upon the political strategies and the political coalitions which can contribute to make

these various trajectories viable. We very much hope that the present paper will contribute to stimulate future research in this area.

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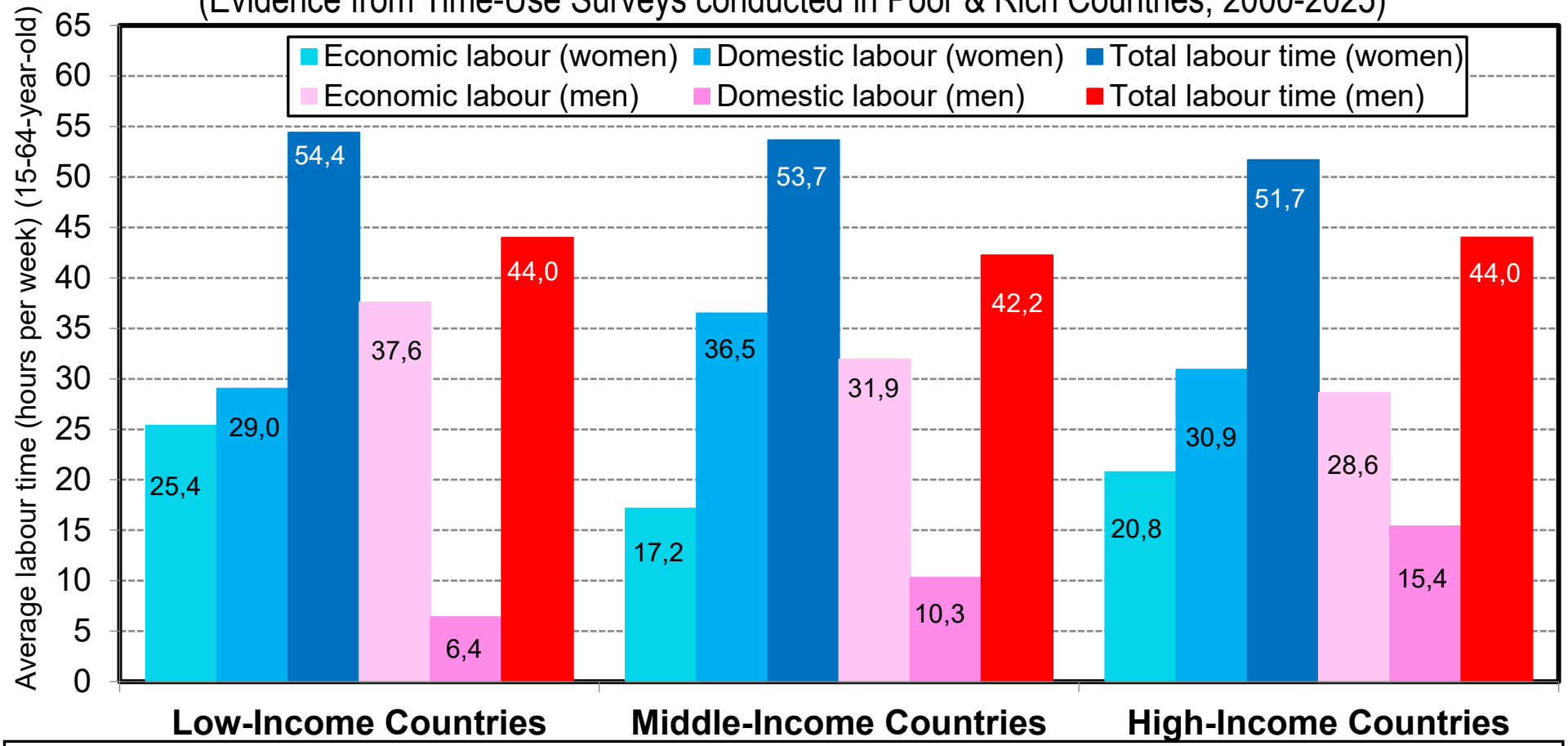
Table 1. Economic Labour vs Domestic Labour: Concepts Used in this Research

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

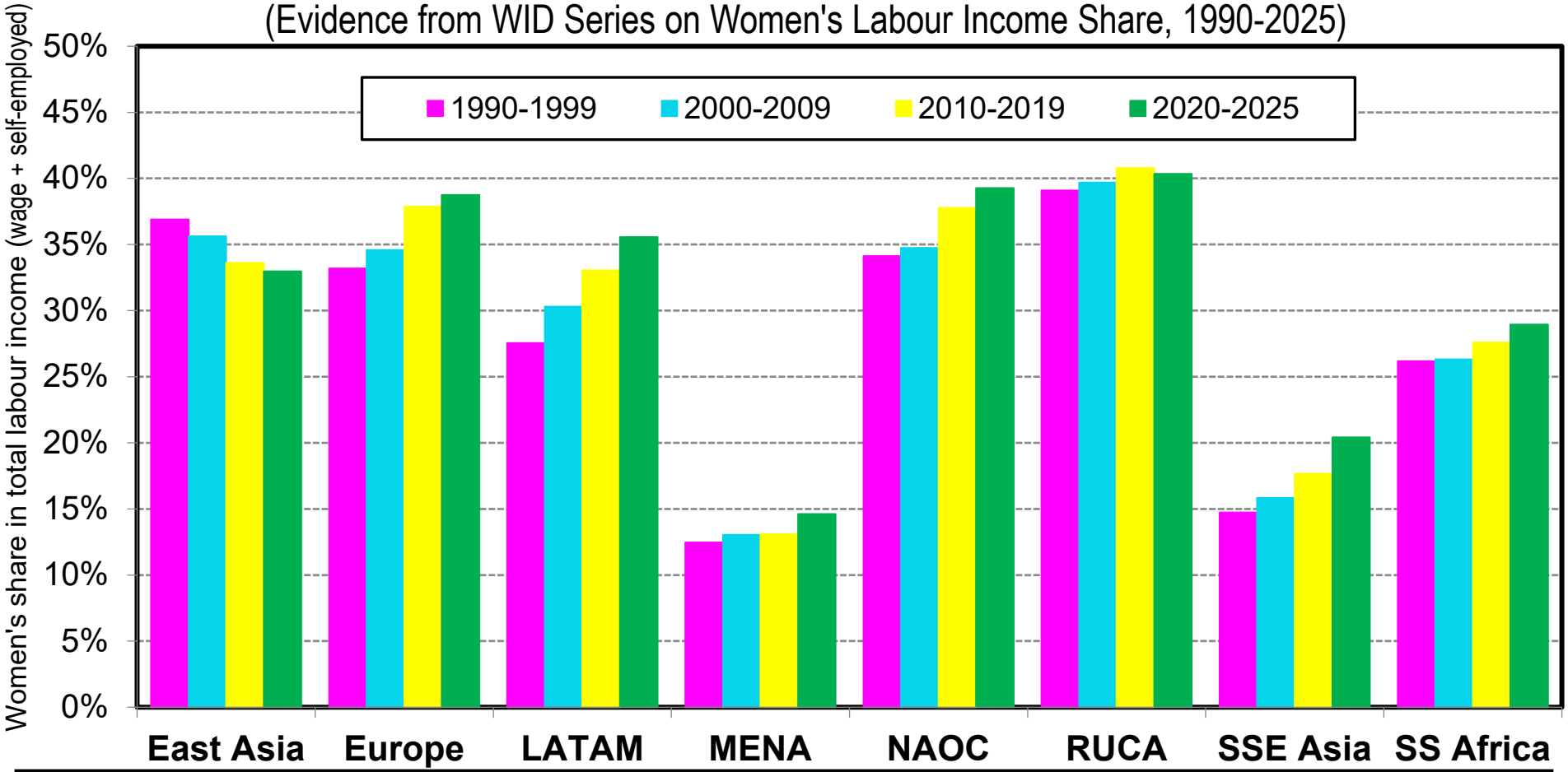
(Evidence from Time-Use Surveys conducted in Poor & Rich Countries, 2000-2025)



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

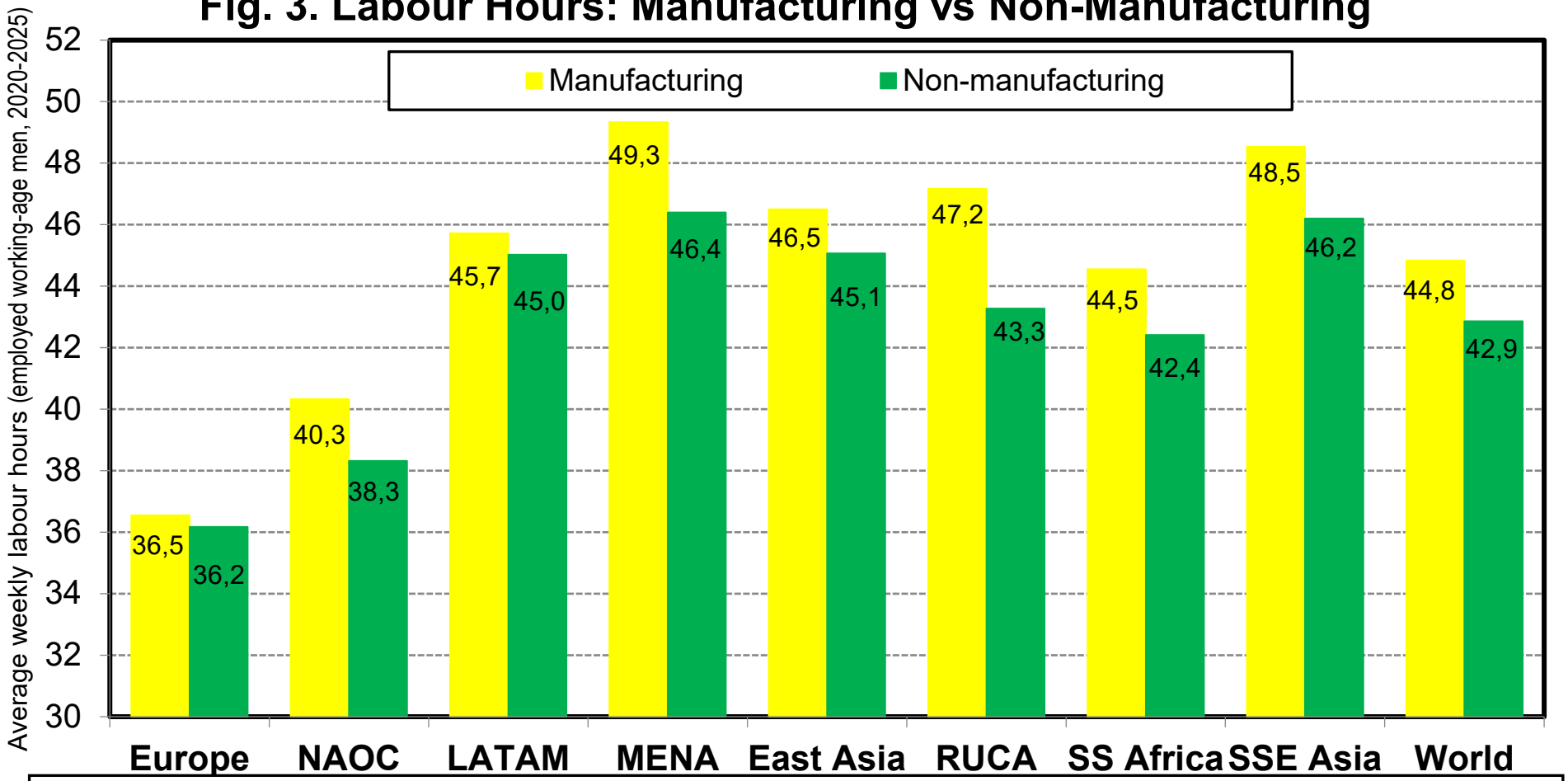
(Evidence from WID Series on Women's Labour Income Share, 1990-2025)



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

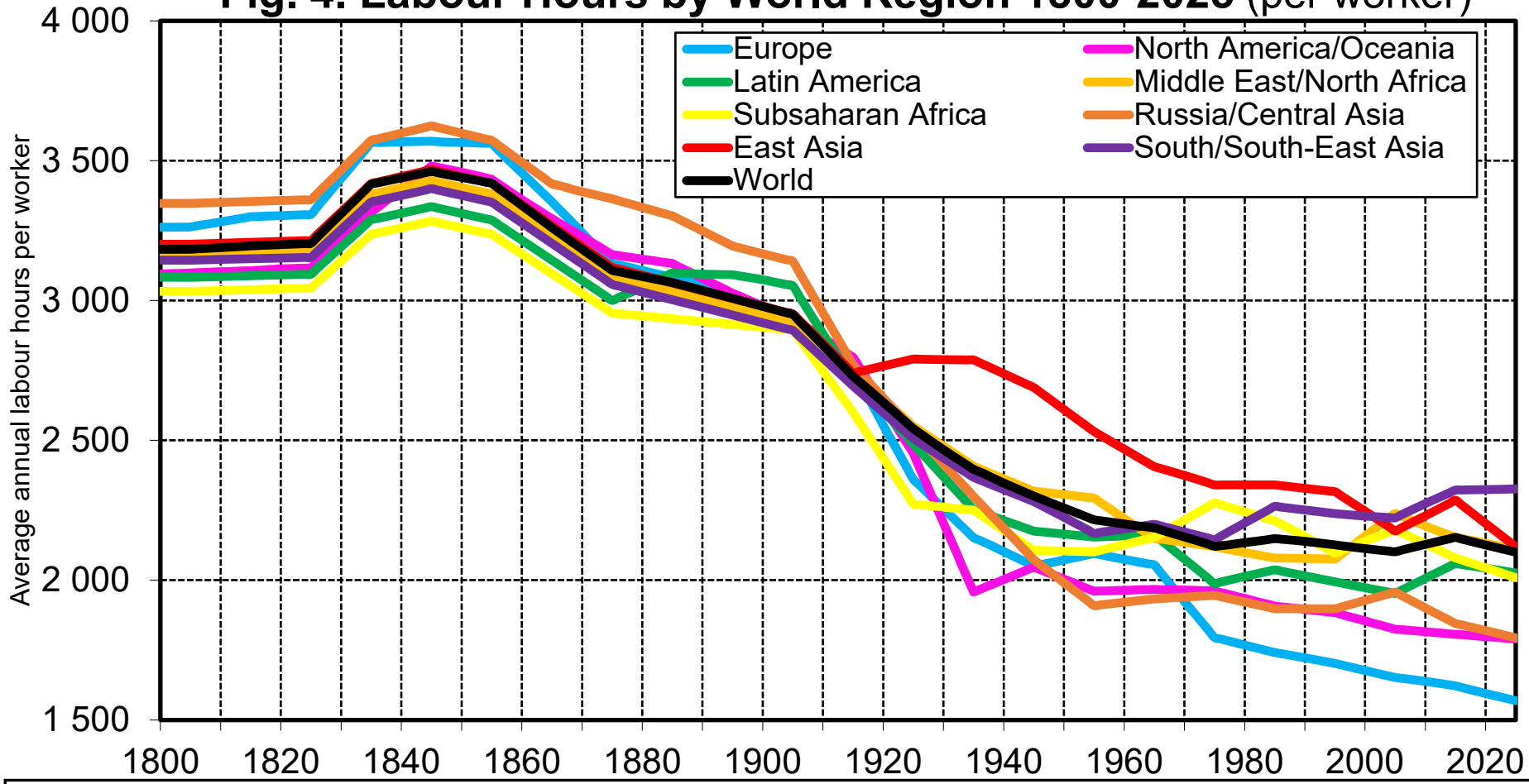
Table 2. A New Global Labour Hours Database: Geographical Coverage (57 core territories = 48 main countries + 9 residual regions)	
East Asia (5)	China, Japan, South Korea, Taïwan Other EASA
Europe (11)	Britain, Denmark, France, Germany, Italy, Netherlands, Norway, Spain, Sweden, Other W.EUR, Other E.EUR
Latin America (6)	Argentina, Brasil, Chile, Colombia Mexico, Other LATAM
Middle East/ North Africa (8)	Algeria, Egypt, Iran, Morocco, Saudi Arabia, Turkey, UAE, Other MENA
North America/ Oceania (5)	USA, Canana, Australia, New Zealand Other NAOC
Russia/ Central Asia (2)	Russia Other RUCA
South/South-East Asia (9)	Bengladesh, India, Indonesia, Myanmar, Pakistan, Philipinnes, Thailand, Vietnam, Other SSEA
Sub-Saharan Africa (11)	DR Congo, Ethiopa, Kenya, Ivory Coast, Mali, Niger, Nigeria, Rwanda, Sudan, South Africa, Other SSAF
Interpretation. Our global historical database on labour hours aims to cover 57 core territories (48 main countries + 9 residual regions) over the 1800-2025 period. Whenever possible, we provide estimates for average annual working hours for working-age population (15-to-64-year-old) broken down by gender, status (wage work; self-employed; unpaid work) and employment sector (manufacturing vs non-manufacturing).	

Fig. 3. Labour Hours: Manufacturing vs Non-Manufacturing



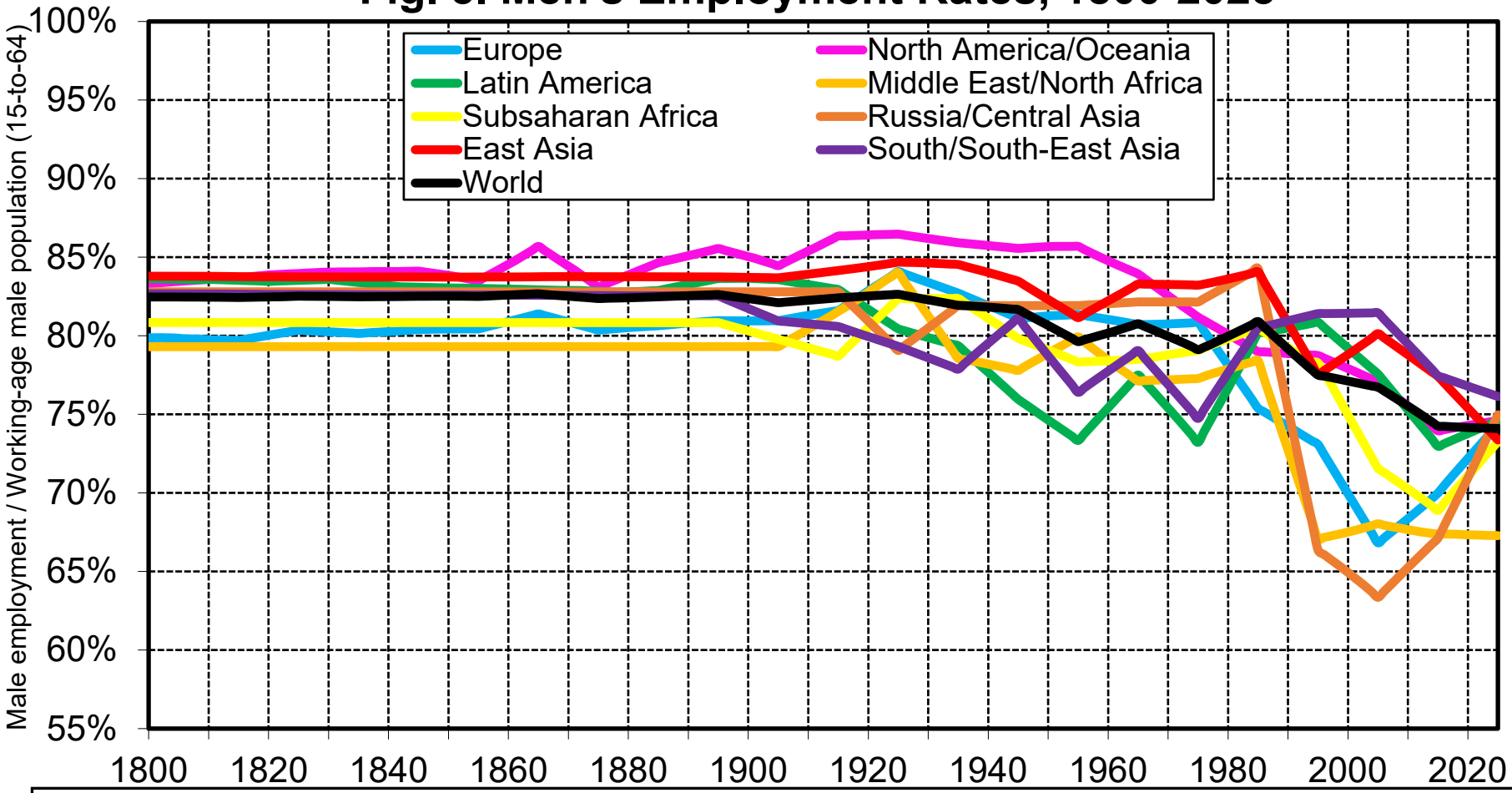
Interpretation. Average weekly economic labour hours are longer in the manufacturing sector than in the non-manufacturing sector, but the between-sector gap is relatively small as compared to the overall between-region gap. E.g. in Europe average weekly work hours for employed woorhing age-men (15-to-64-year-old) in 2000-2025 are 36,5 hours in manufacturing and 36,2 hours in non-manufacturing, vs 48,5 hours in manufacturing and 46,2 hours in non-manufacturing in South & Sout-East Asia. **Note.** Authors' computations using micro surveys run in 35 countries over 2000-2025 period. Averages are computed over all employed men aged 15-to-64. **Sources & series**: wid.world

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



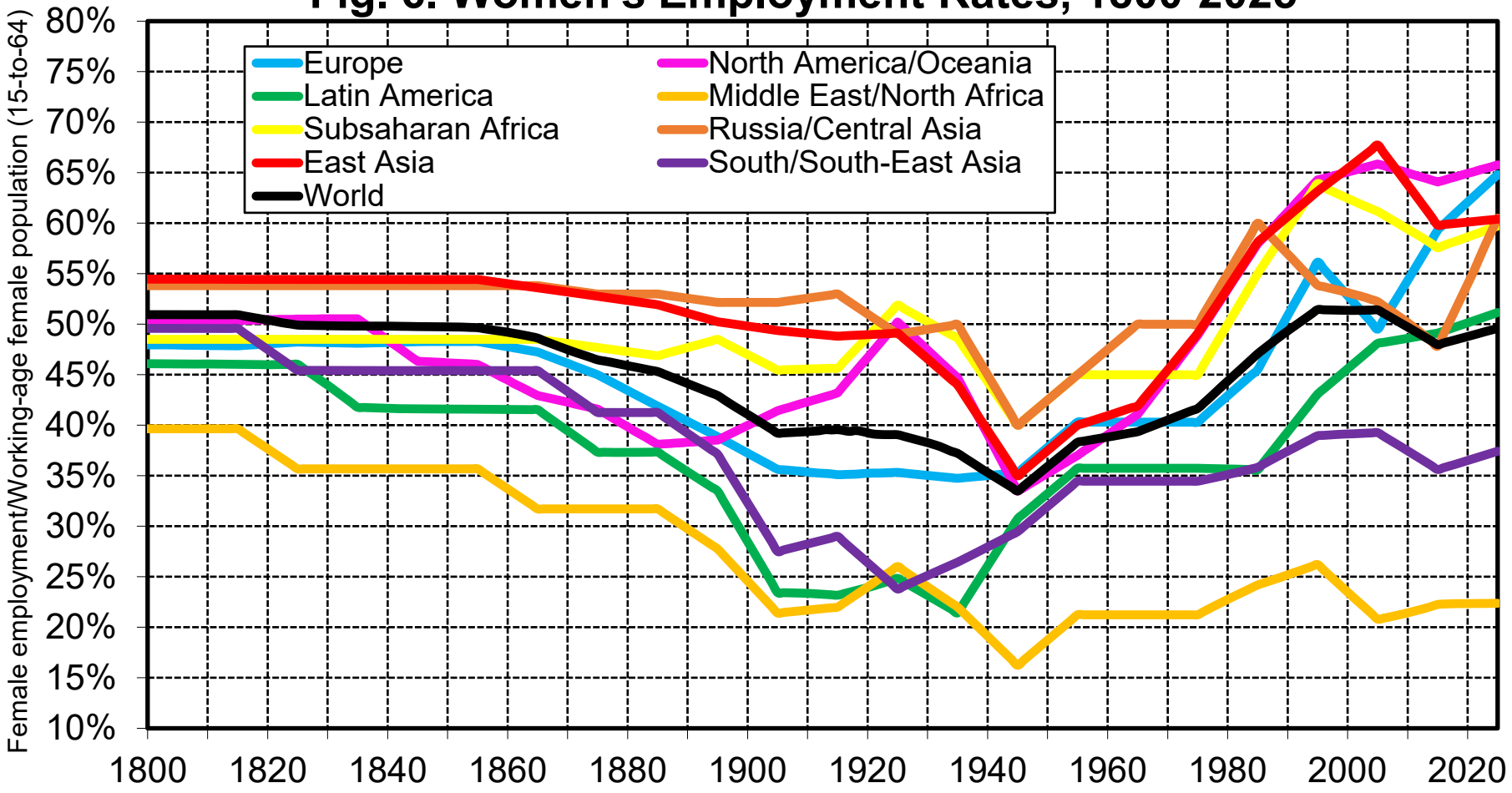
Interpretation. We observe a large long-run decline in average economic labour hours per worker (all employed persons aged 15-to-64 combined, irrespective of gender, employment status or sector). Annual labour hours around 3000-3500 hours correspond to about 60-65 hours per week all year long. Annual 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



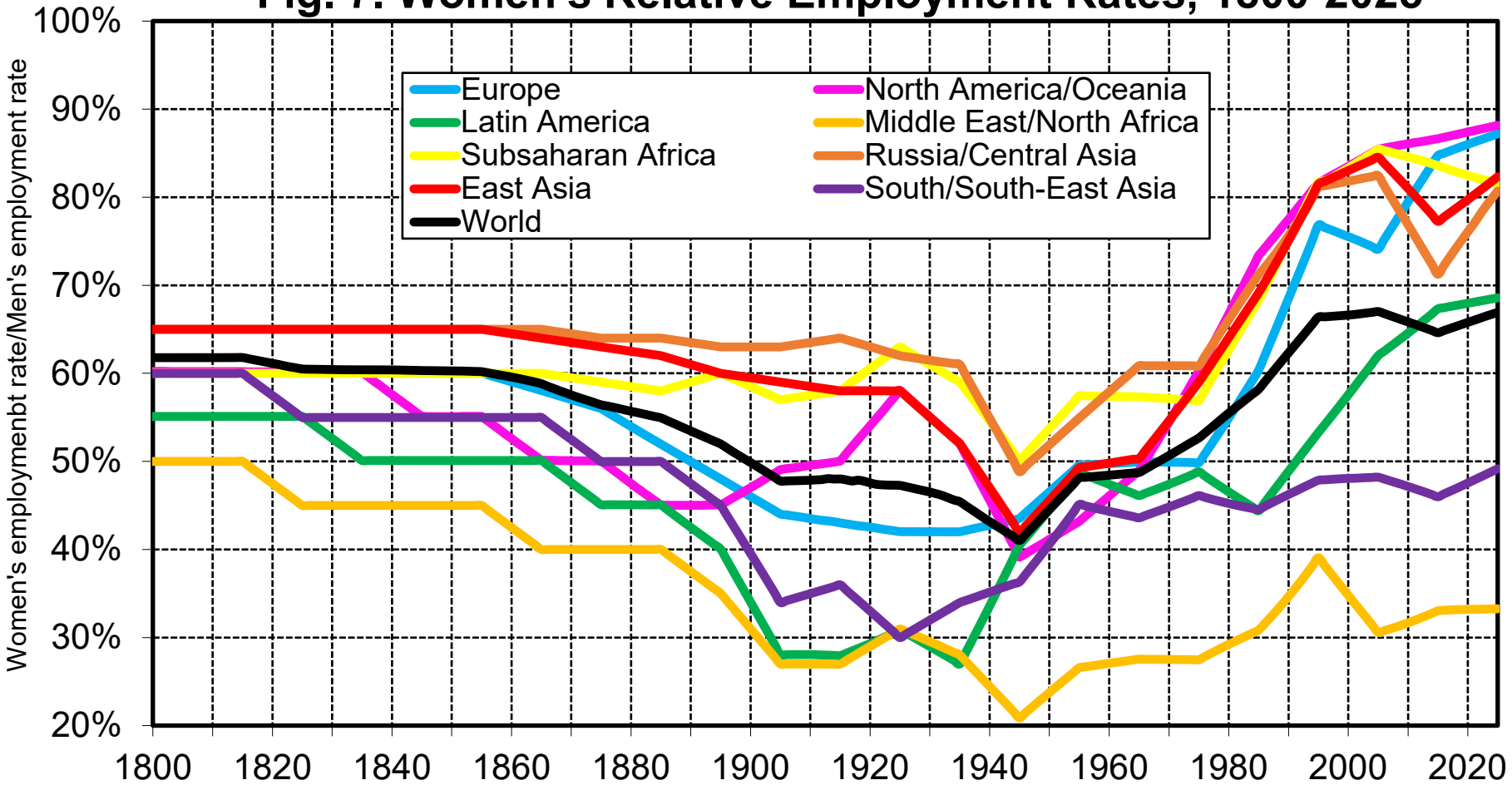
Interpretation. Men's employment rate, defined as the ratio between total male employment (irrespective of status or sector) and working-age male population (15-to-64-year-old), has been relatively stable around 80-85% at the global level in the long-run, with a gradual decline in recent decades due 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



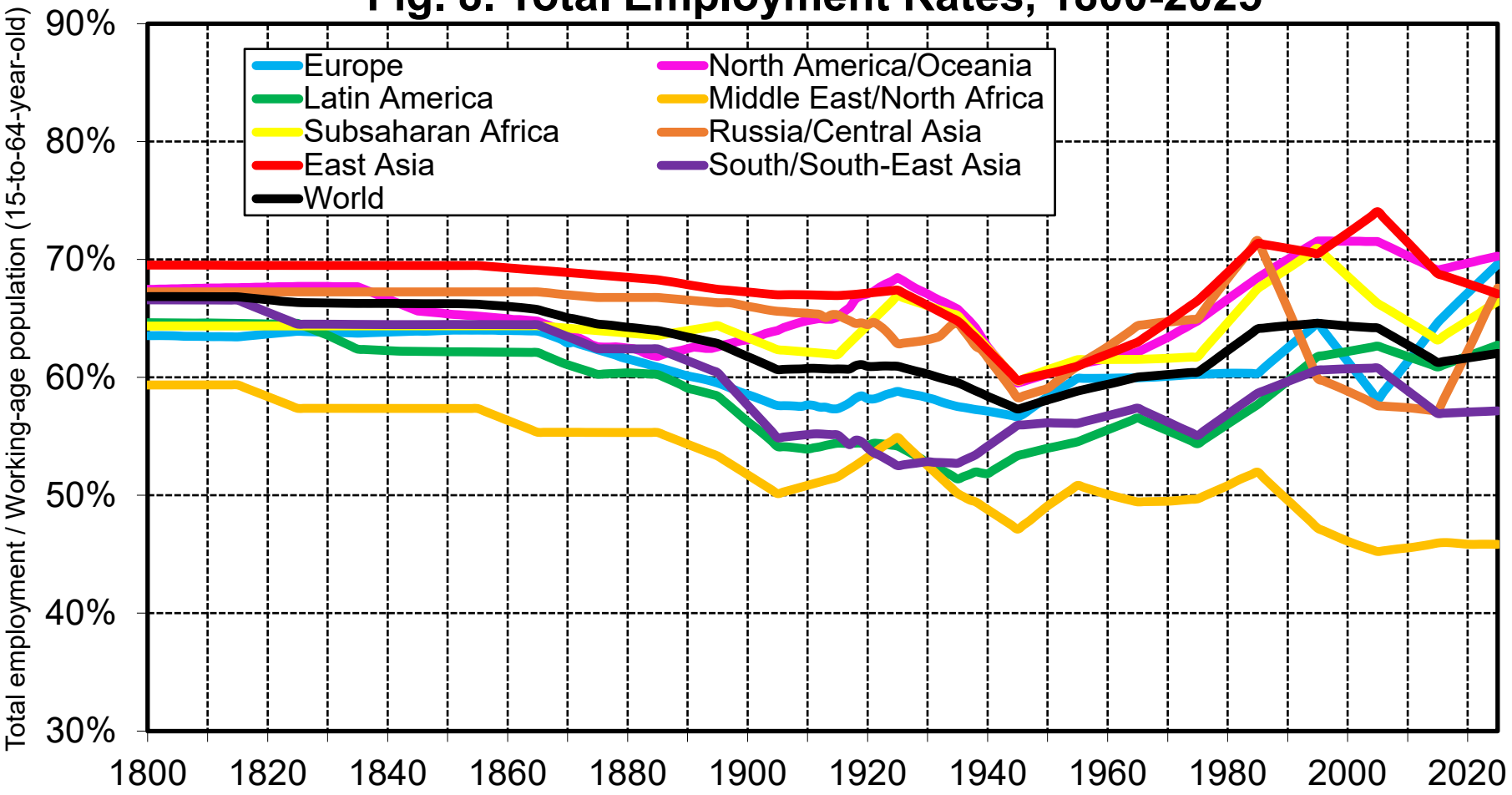
Interpretation. Women's employment rate, defined as the ratio between total female employment (irrespective of employment status or sector) and working-age female population (15-to-64-year-old), has followed a U-shaped curve at the global level over the 1800-2025 period, with important time and regional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

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



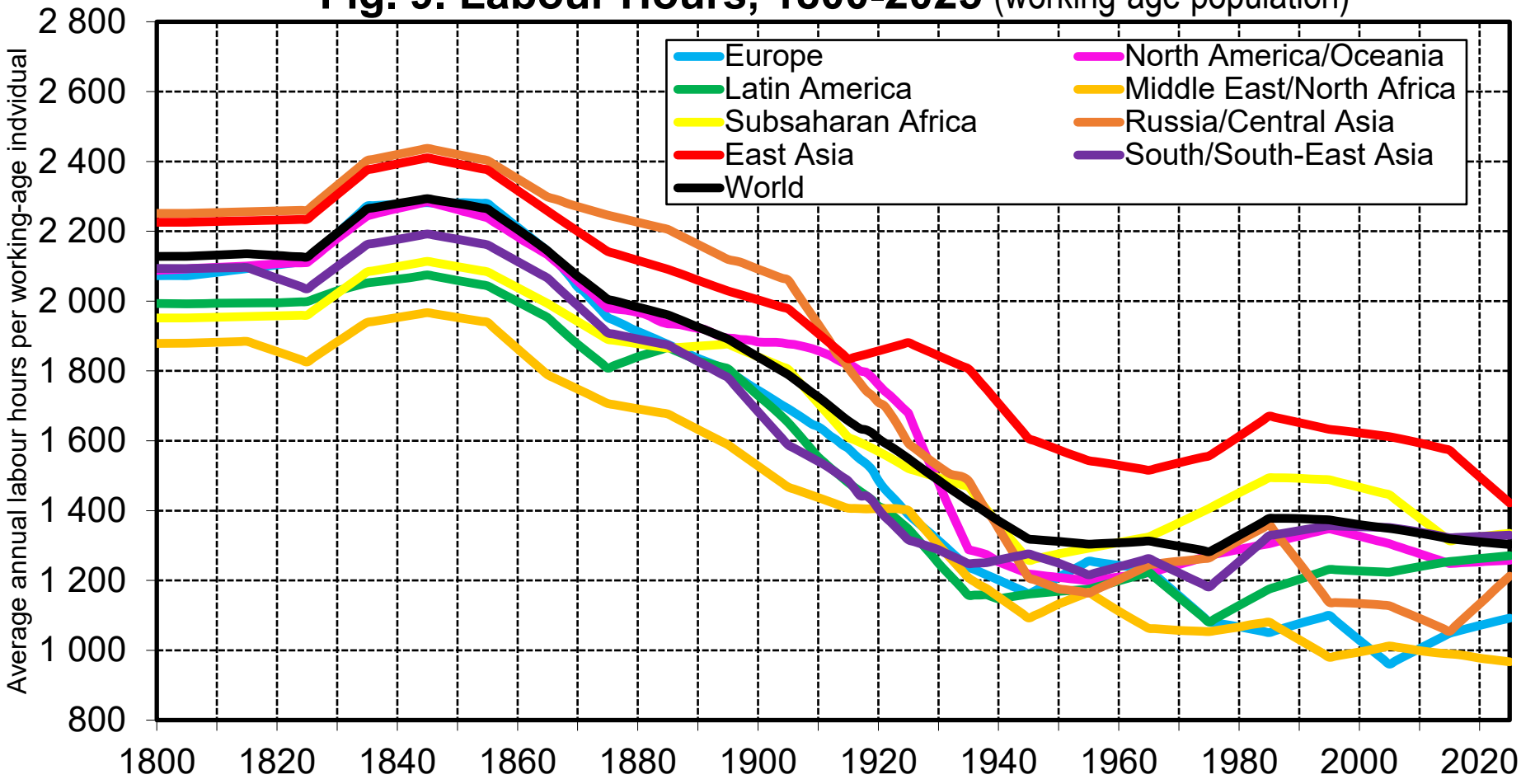
Interpretation. Women's relative employment rate, defined as the ratio between total women's and men's employment rates among the working-age female population (15-to-64-year-old), has followed a U-shaped curve at the global level over the 1800-2025 period, with important time and regional variations.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

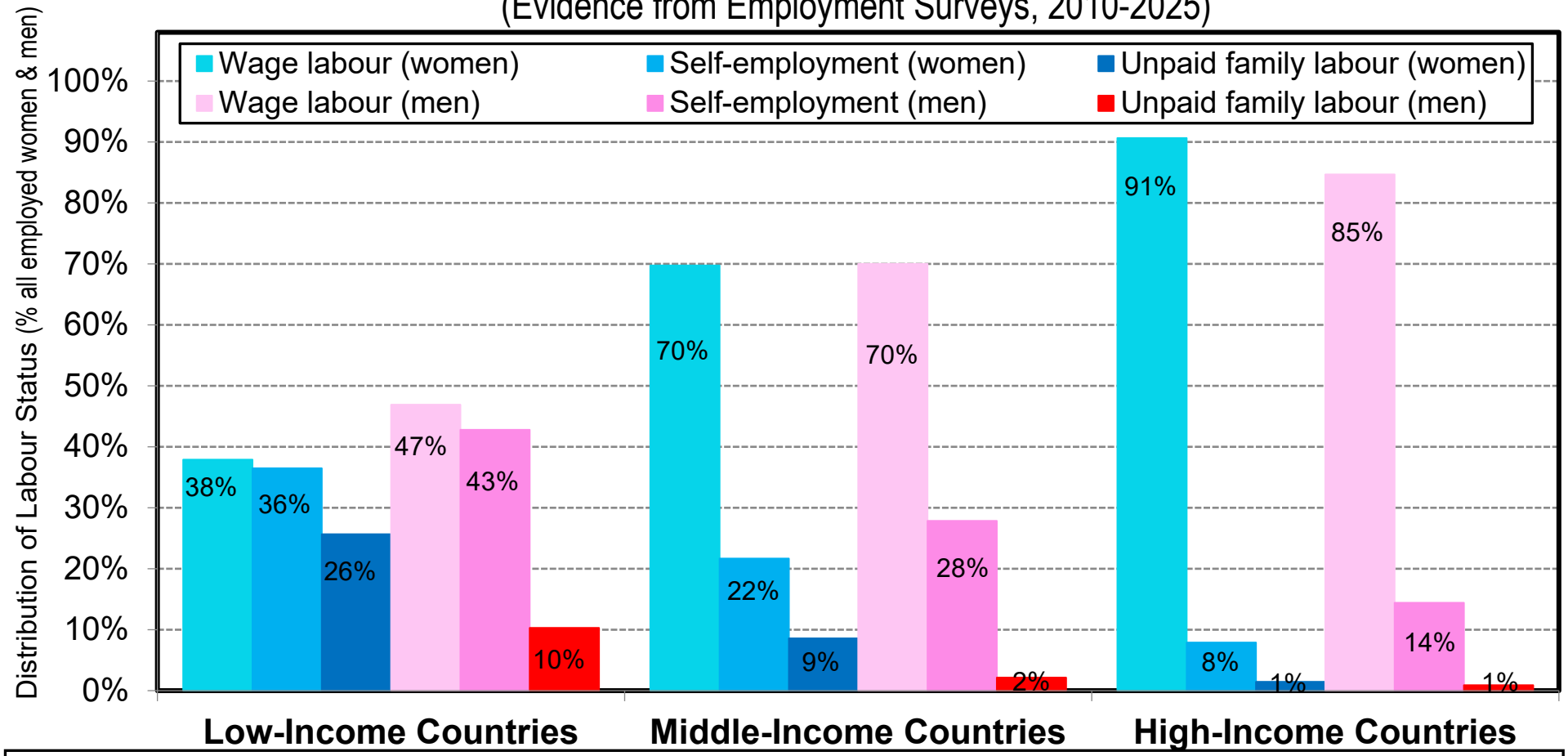
Fig. 9. Labour Hours, 1800-2025 (working-age population)



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

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

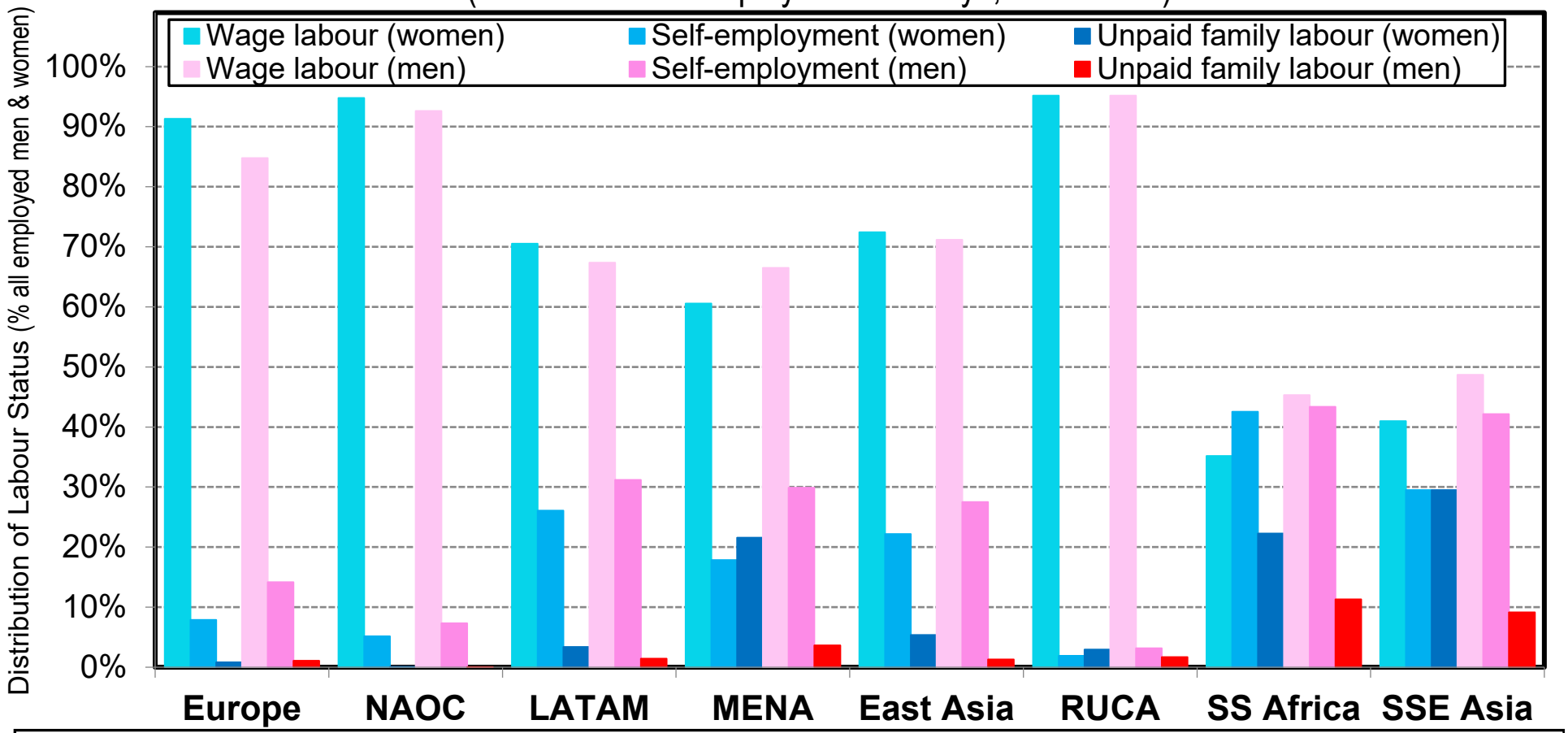
(Evidence from Employment Surveys, 2010-2025)



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)

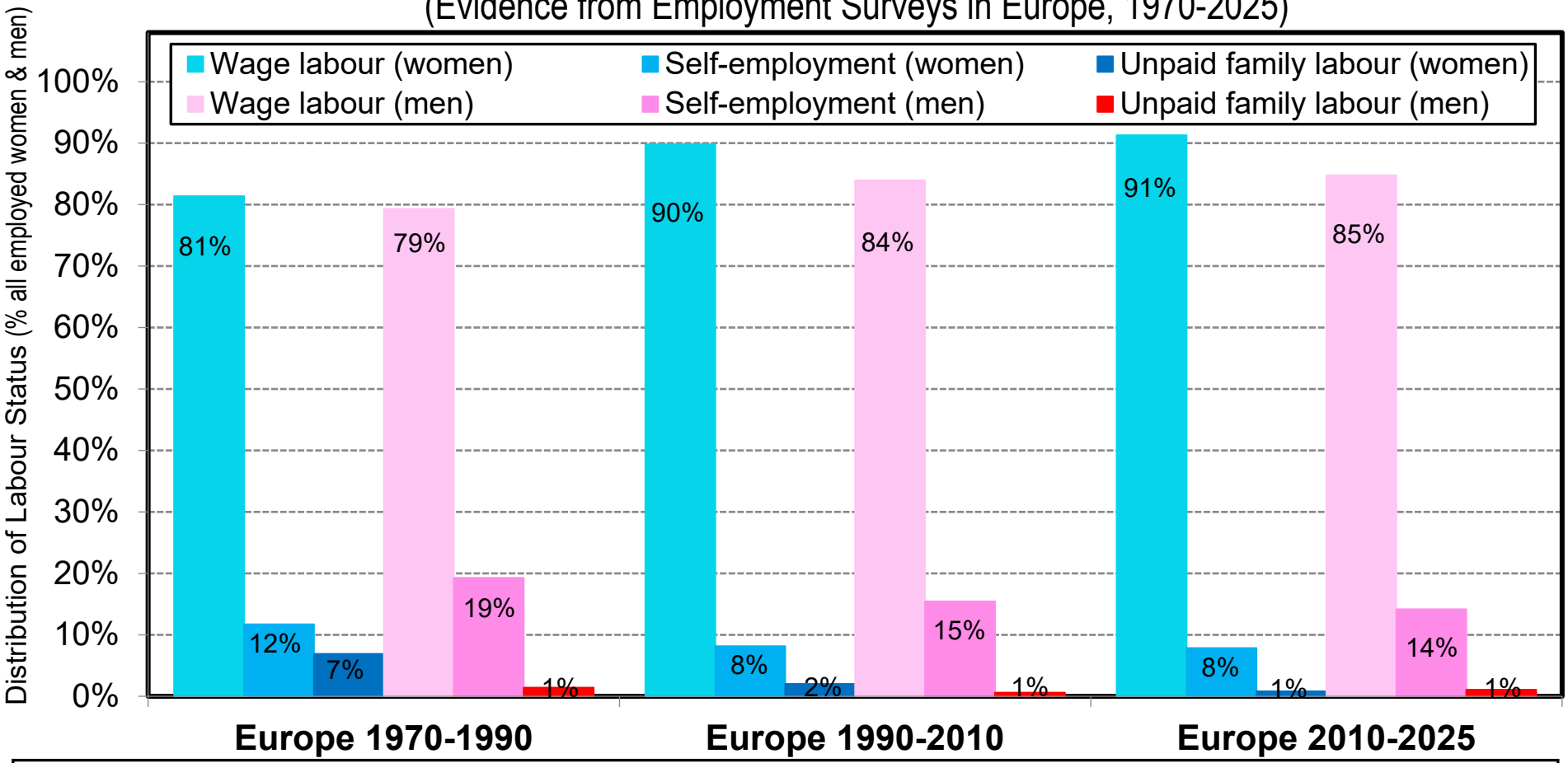


Interpretation. In 2010-2025, the proportion of unpaid family labour within employed women is particularly large in Middle East/North Africa (22%) Subsaharan Africa (22%) and South/South-East Asia (30%).

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)

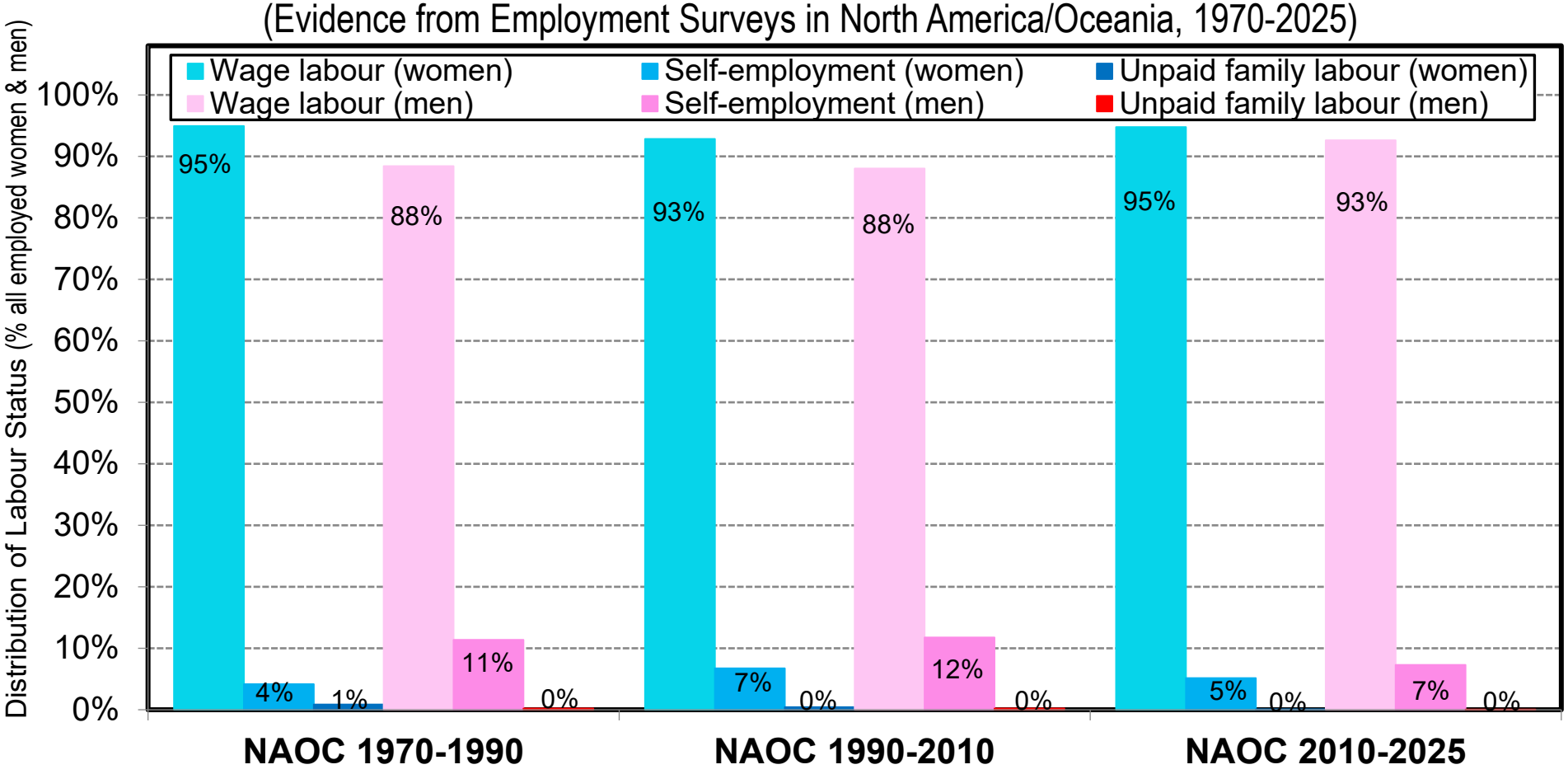


Interpretation. In 1970-1990, the proportion of unpaid family labour within employed women (7%) was comparable to middle-income countries in 2010-2025 (9%).

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)

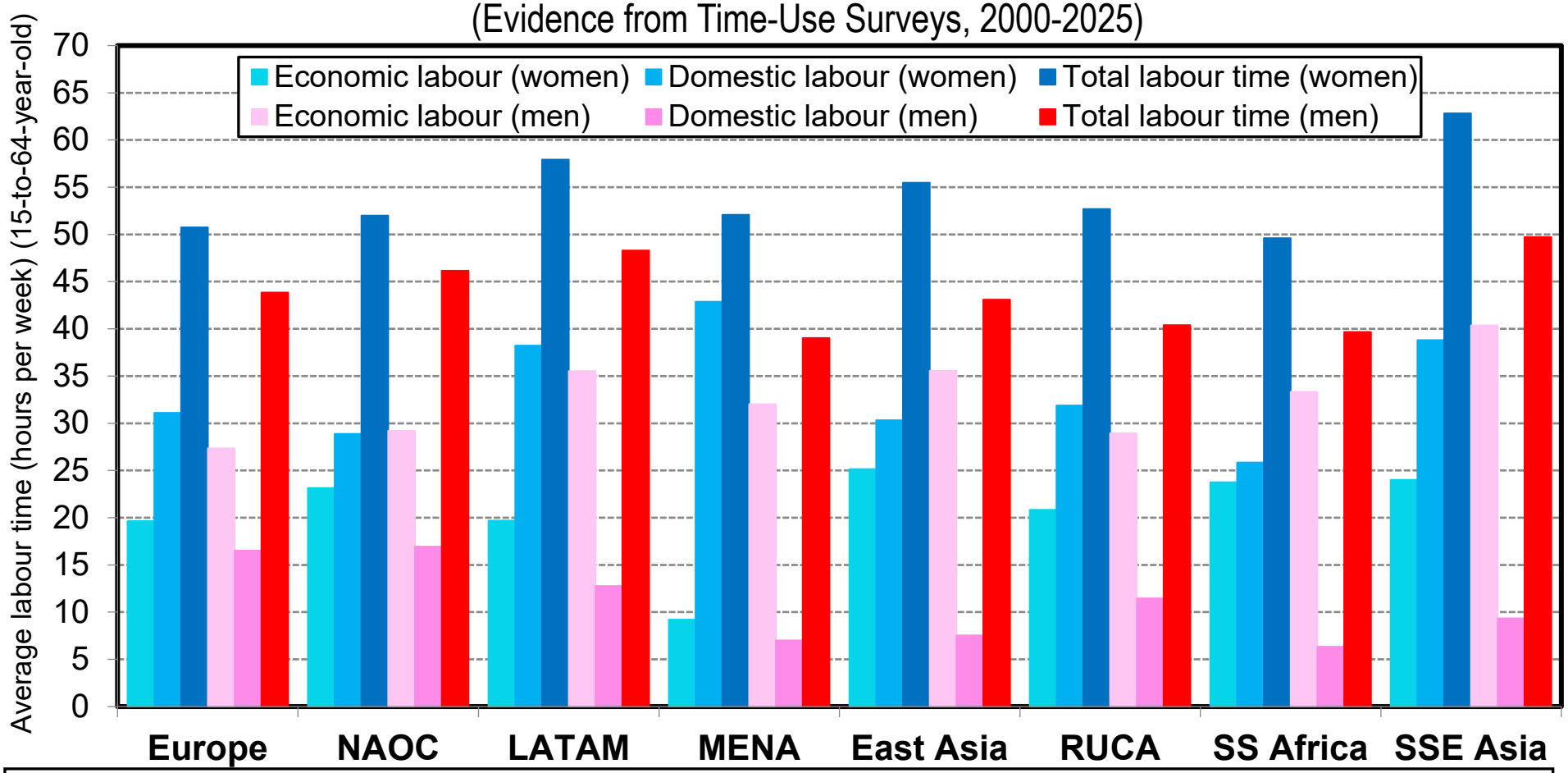


Interpretation. In 1970-1990, the proportion of unpaid family labour within employed women (1%) was already negligible in North America/Oceania, reflecting an early decline of the agricultural sector and other traditionnal familly self-employment activities.

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

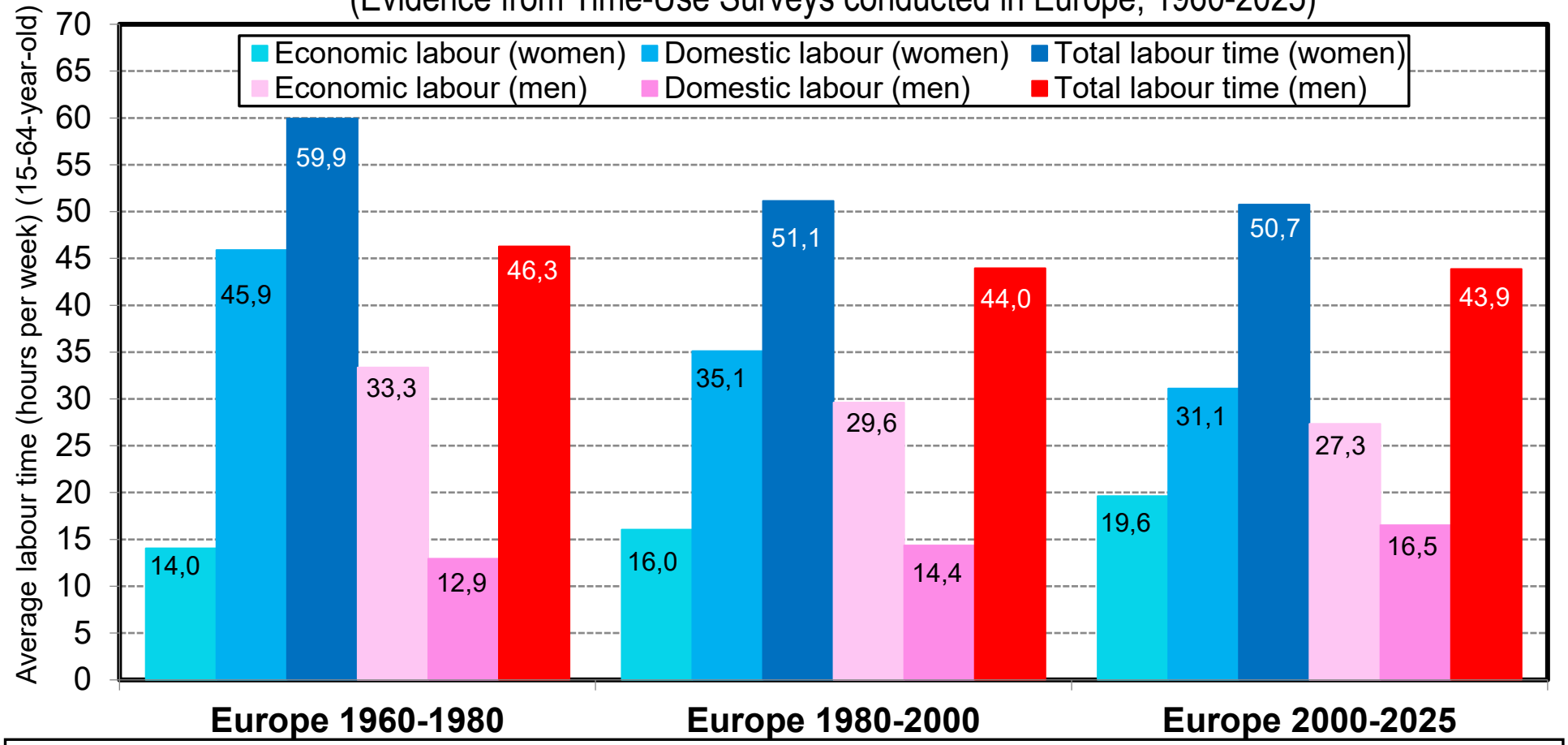
(Evidence from Time-Use Surveys, 2000-2025)



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

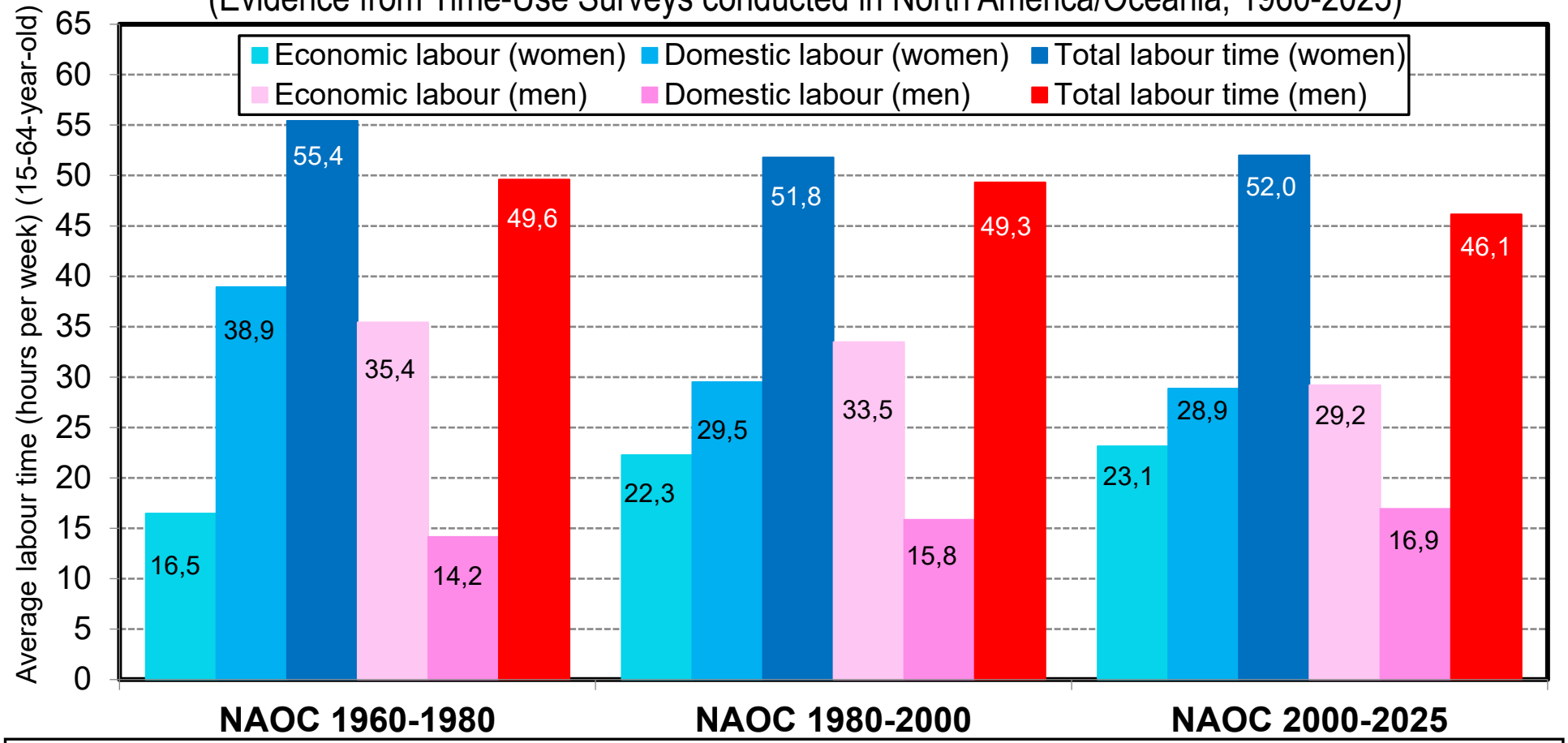
(Evidence from Time-Use Surveys conducted in Europe, 1960-2025)



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)



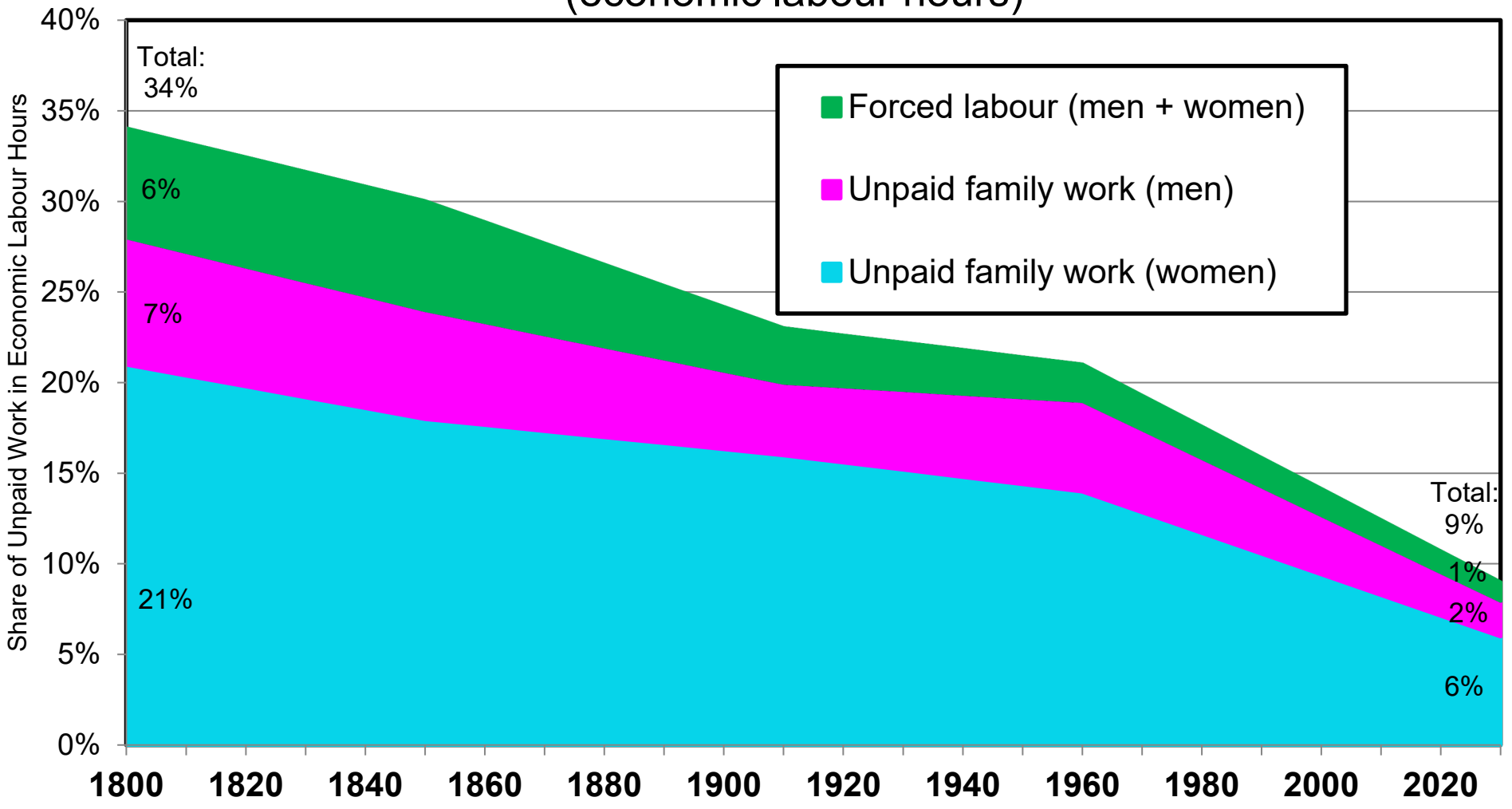
Interpretation. If we look at total labour time (economic + domestic), we find that women have always worked more men in North America and Oceania, with no reduction of the gap in recent decades. **Note.** Economic labour includes labour used to produce goods & services included in national accounts. 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

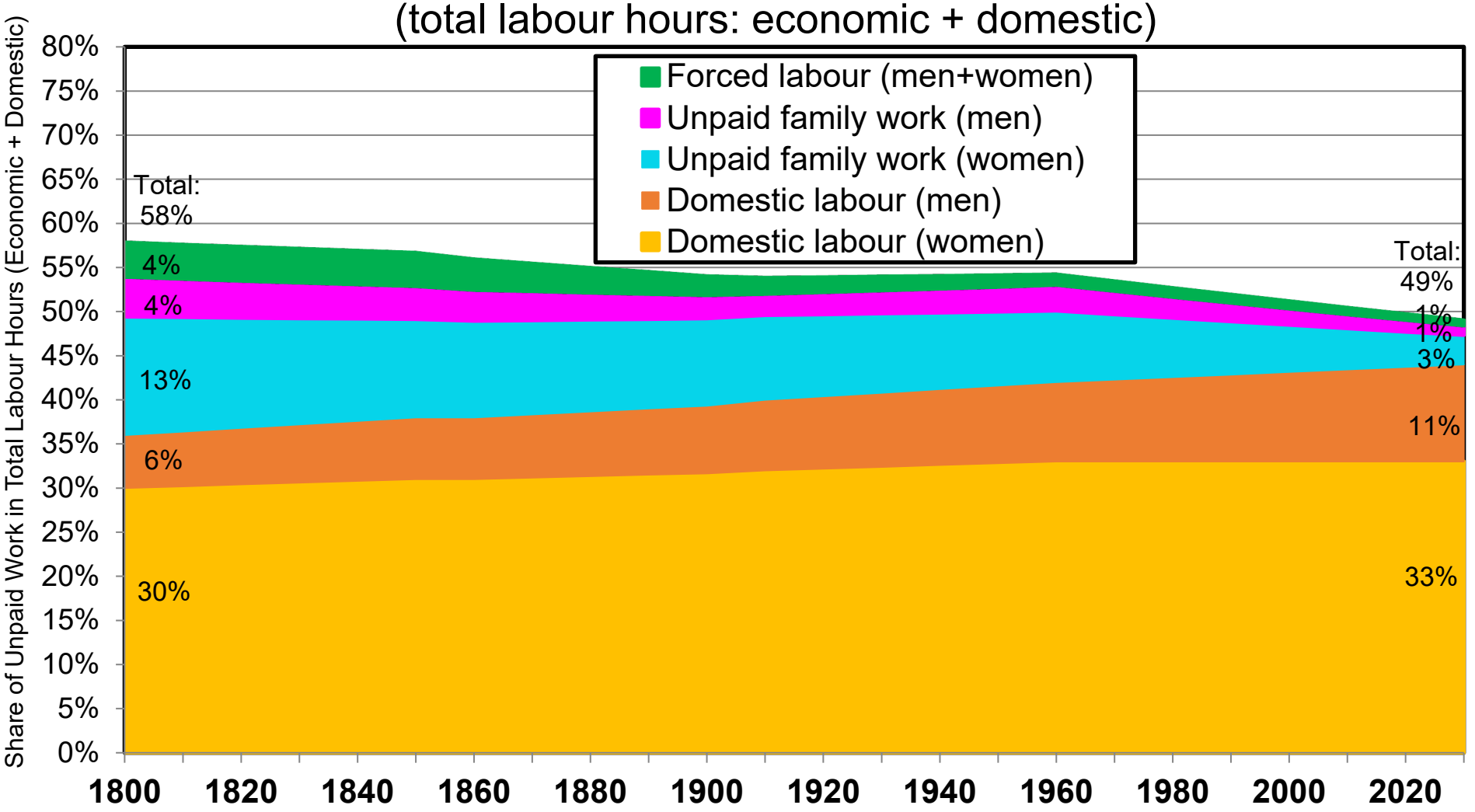
Fig. 17. Unpaid Work: A Global Assessment 1800-2025
(economic labour hours)



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

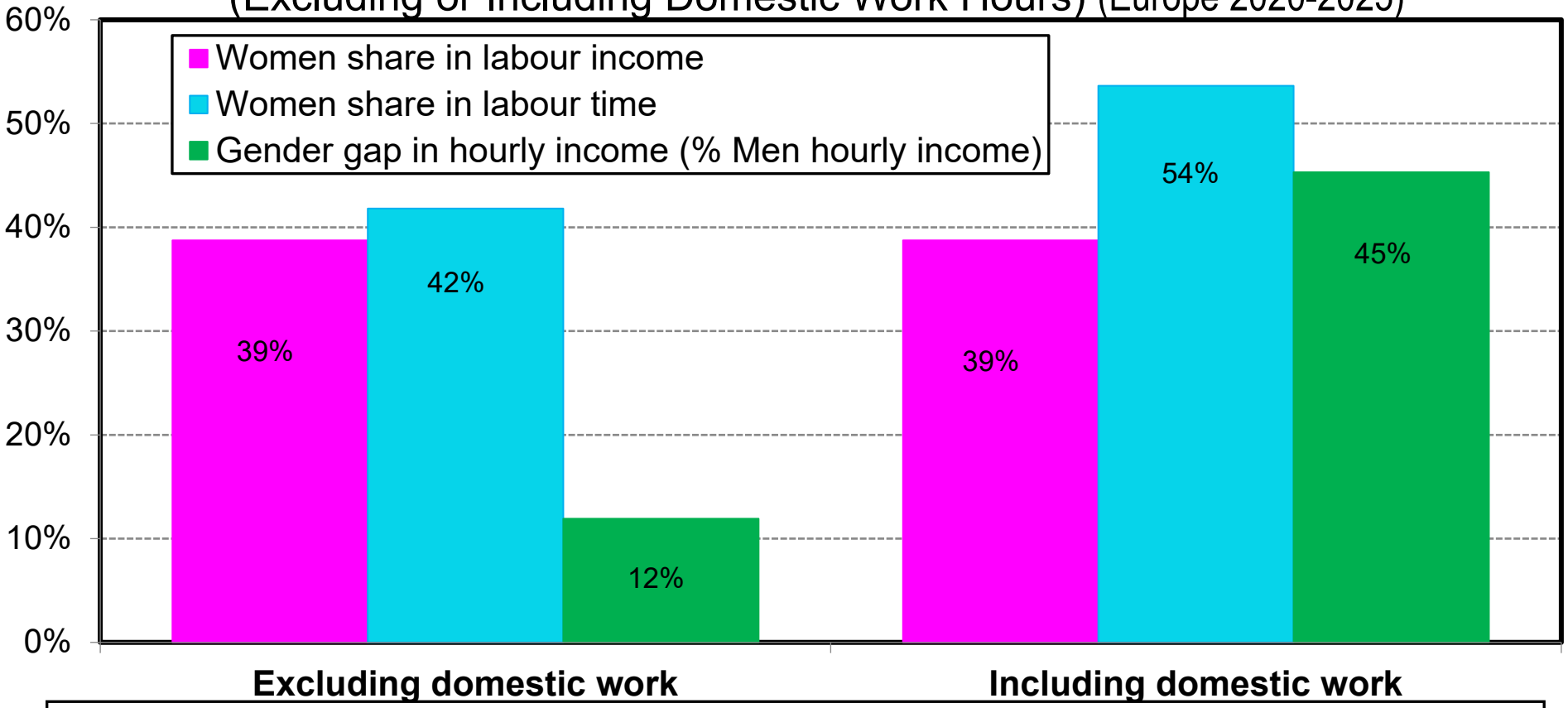
(total labour hours: economic + domestic)



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

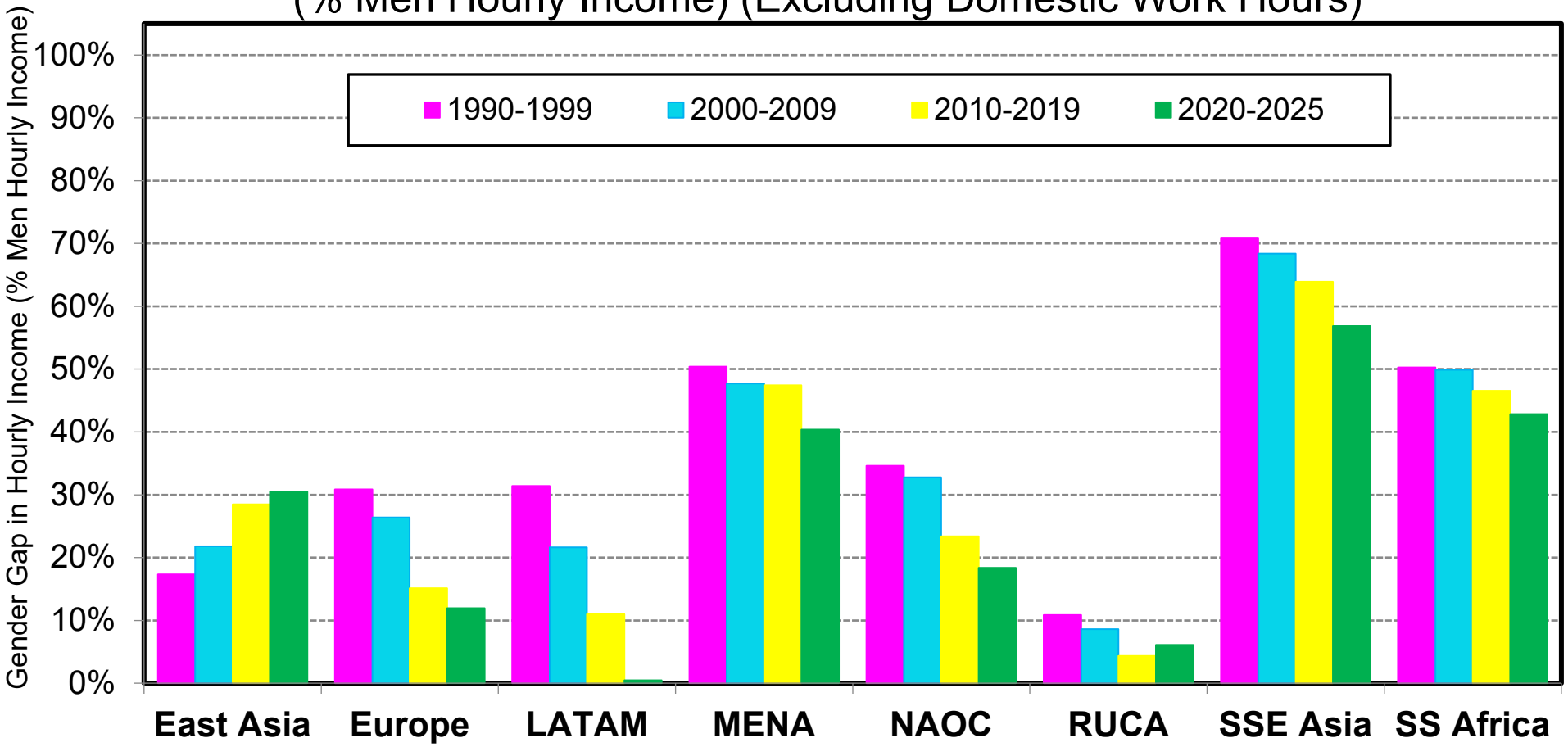
(Excluding or Including Domestic Work Hours) (Europe 2020-2025)



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

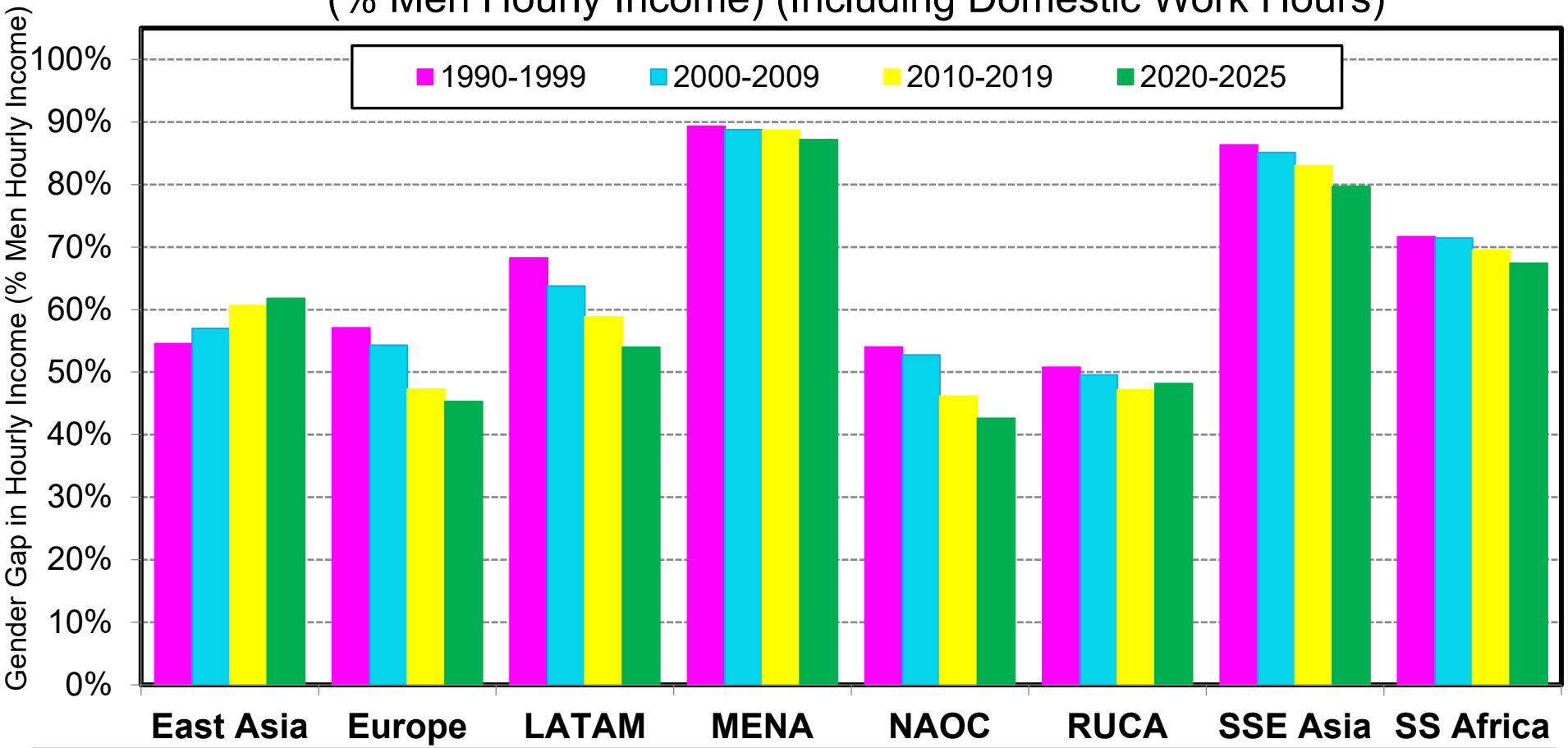
(% Men Hourly Income) (Excluding Domestic Work Hours)



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

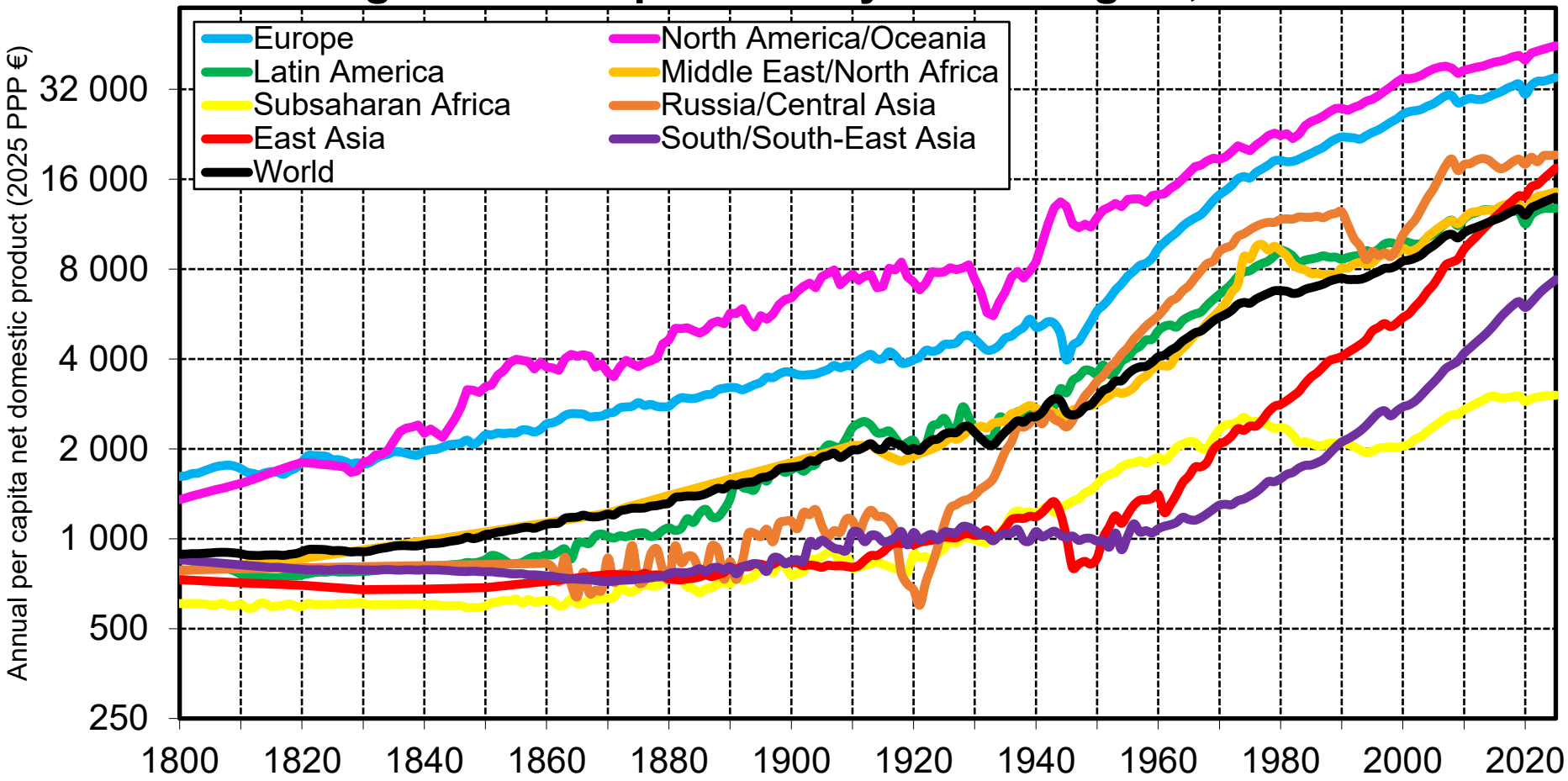
Fig. 21. The Real Gender Gap in Hourly Income

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



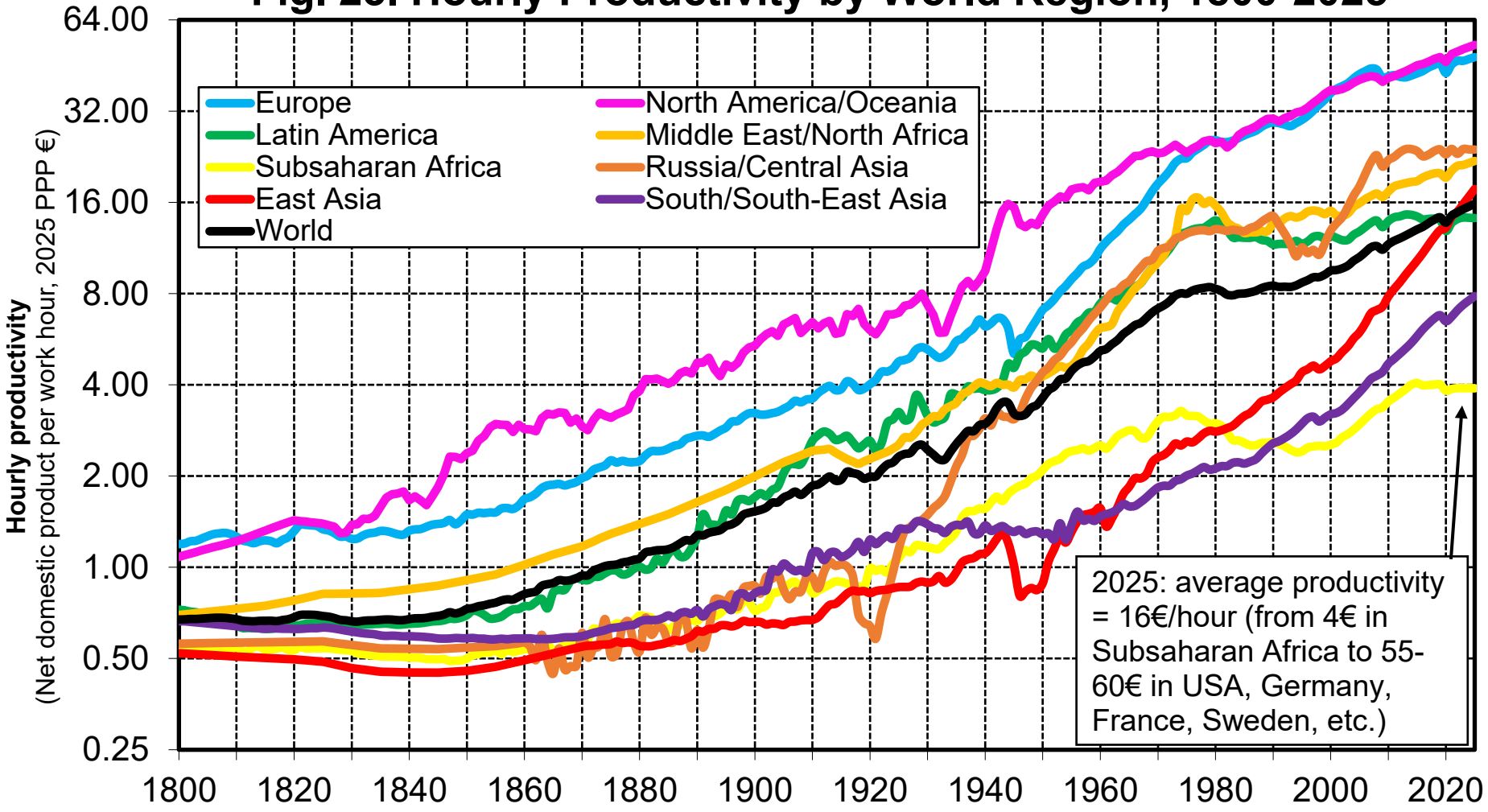
Interpretation. Average women labour income per work hour (including both economic and domestic work hours) was 57% smaller than average men labour income per work hour in Europe in 1990-1999, and it is 45% smaller in 2020-2025. The bottom line is that when we include domestic work then the gender gap 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

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



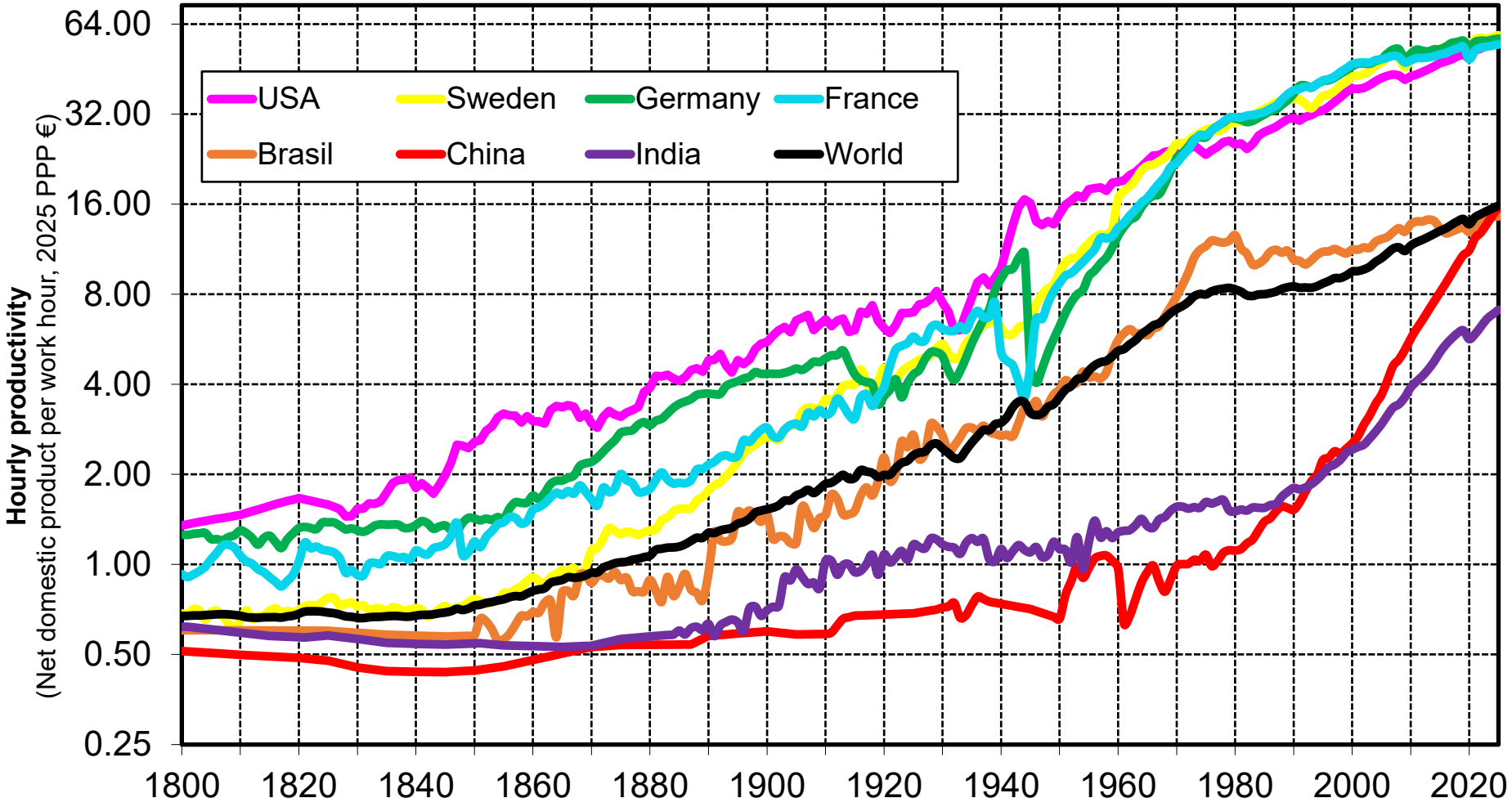
Interpretation. Expressed in 2025 PPP €, annual per capita net domestic product (NDP) rose from about 900€ in 1800 to 14 000€ in 2025 at the global level. I.e. it was multiplied by about 16, which corresponds to average annual real growth rate of 1,2% per year, with large variations over time and across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

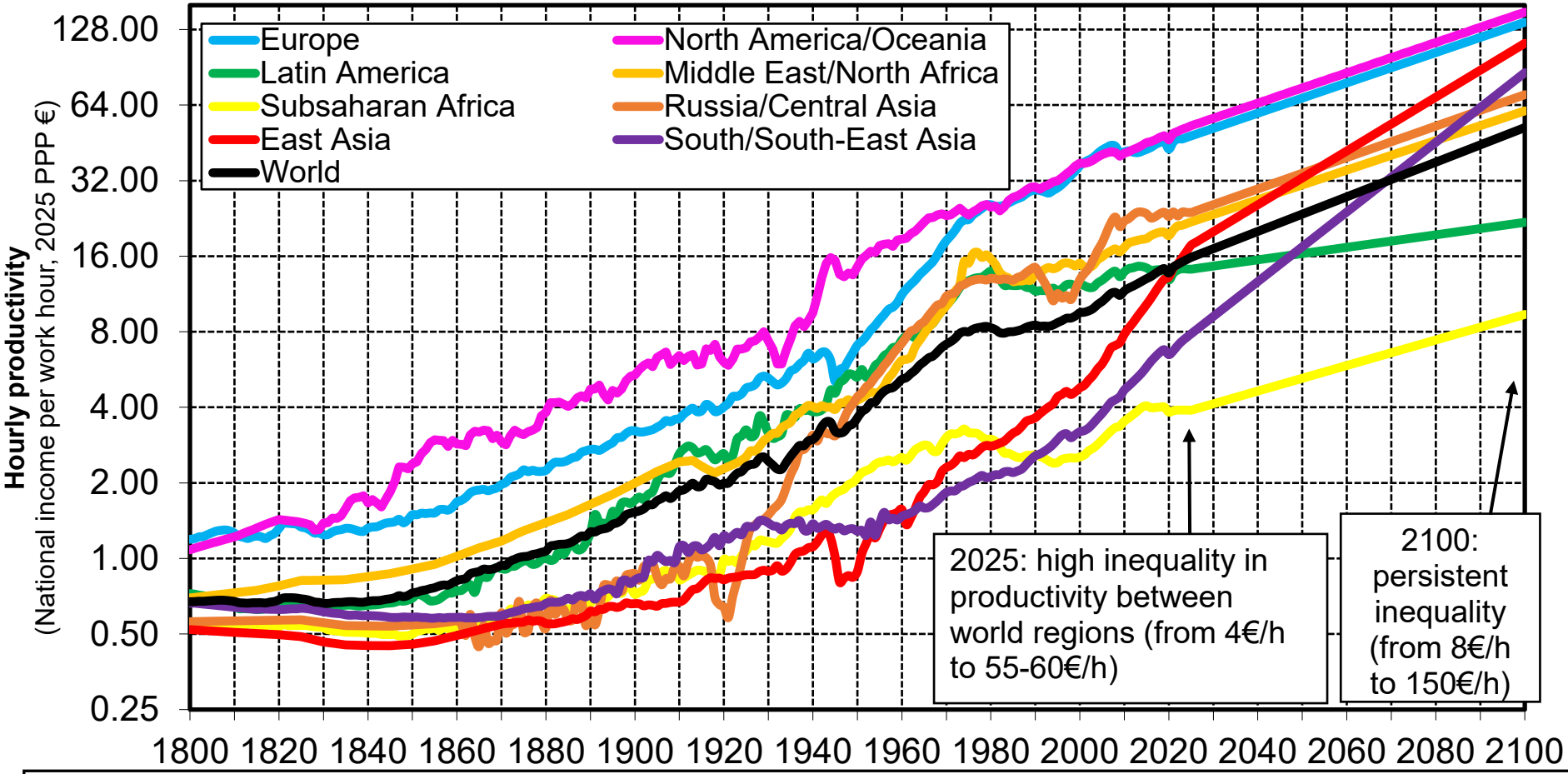
Table 4. Productivity Growth by World Regions (1800-2025)					
Annual real growth rate of productivity (hourly NDP)	1800-2025	1800-1910	1910-1950	1950-1990	1990-2025
East Asia	1.6%	0.2%	0.7%	3.6%	**4.6%**
Europe	1.7%	1.0%	1.7%	3.6%	**1.4%**
Latin America	1.3%	1.2%	1.8%	2.0%	**0.6%**
Middle East/ North 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

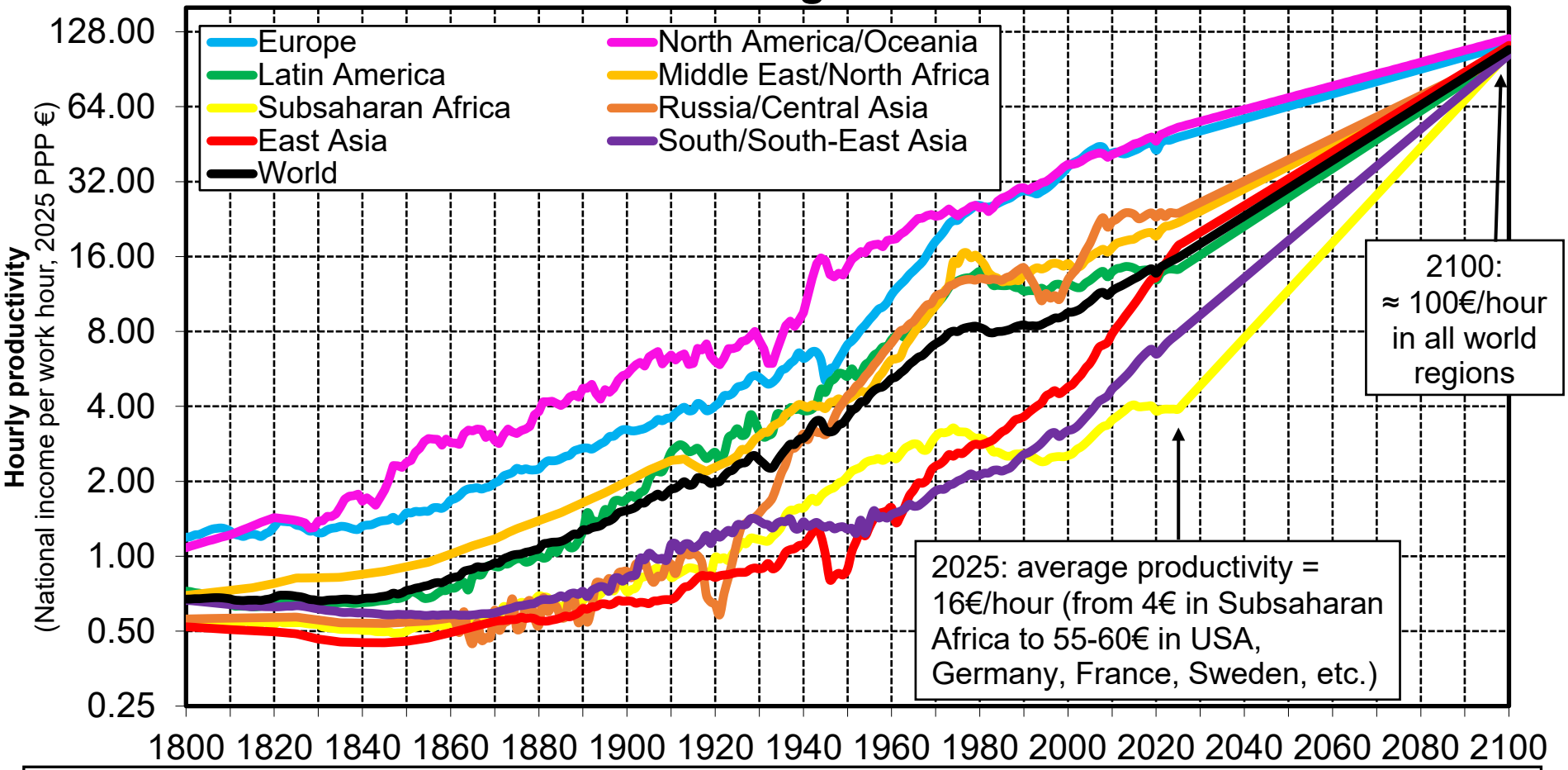
Interpretation. When hourly productivity increases by 1%, labour hours decline by 0.13% (specification without country fixed effects) or by 0.18% (specification with country fixed effects). The estimated coefficients are smaller if we restrict to the post-1980 and do not use the full historical variations.

Fig. 25. World Productivity Trends 2025-2100: Business-As-Usual Scenario



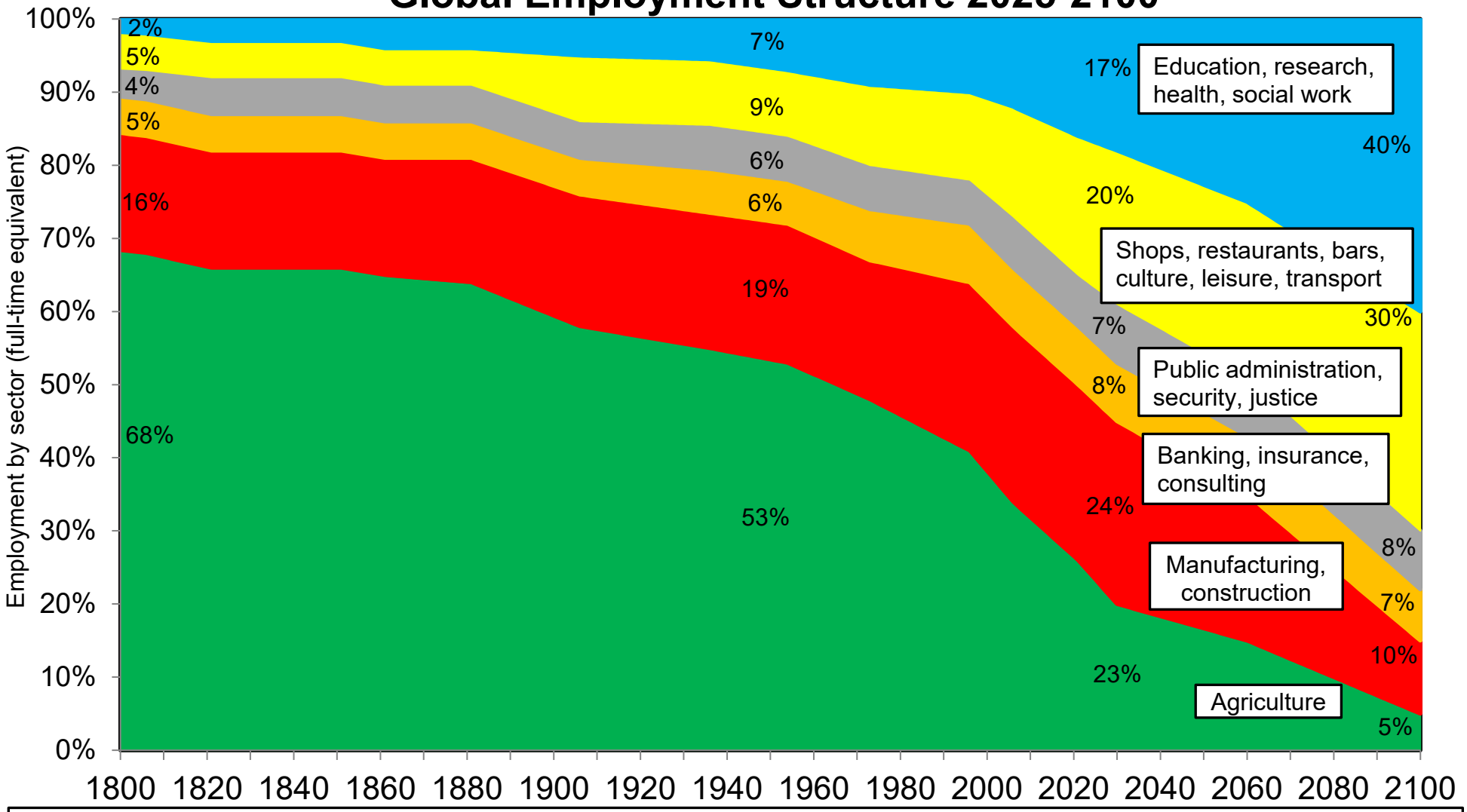
Interpretation. Under the "business-as-usual" scenario (same productivity growth rates as in 1900-2025, with minor changes), inequality in hourly productivity is projected to remain very high between world regions by 2100. In particular, productivity in 2100 would be only 9€/hour in Subsaharan Africa (with a population reaching 3.3b in 2100, vs 1.3b in 2025 according to UN central scenario). **Sources and series**: see wid.world

Fig. 26. World Productivity Trends 2025-2100: Global Convergence Scenario



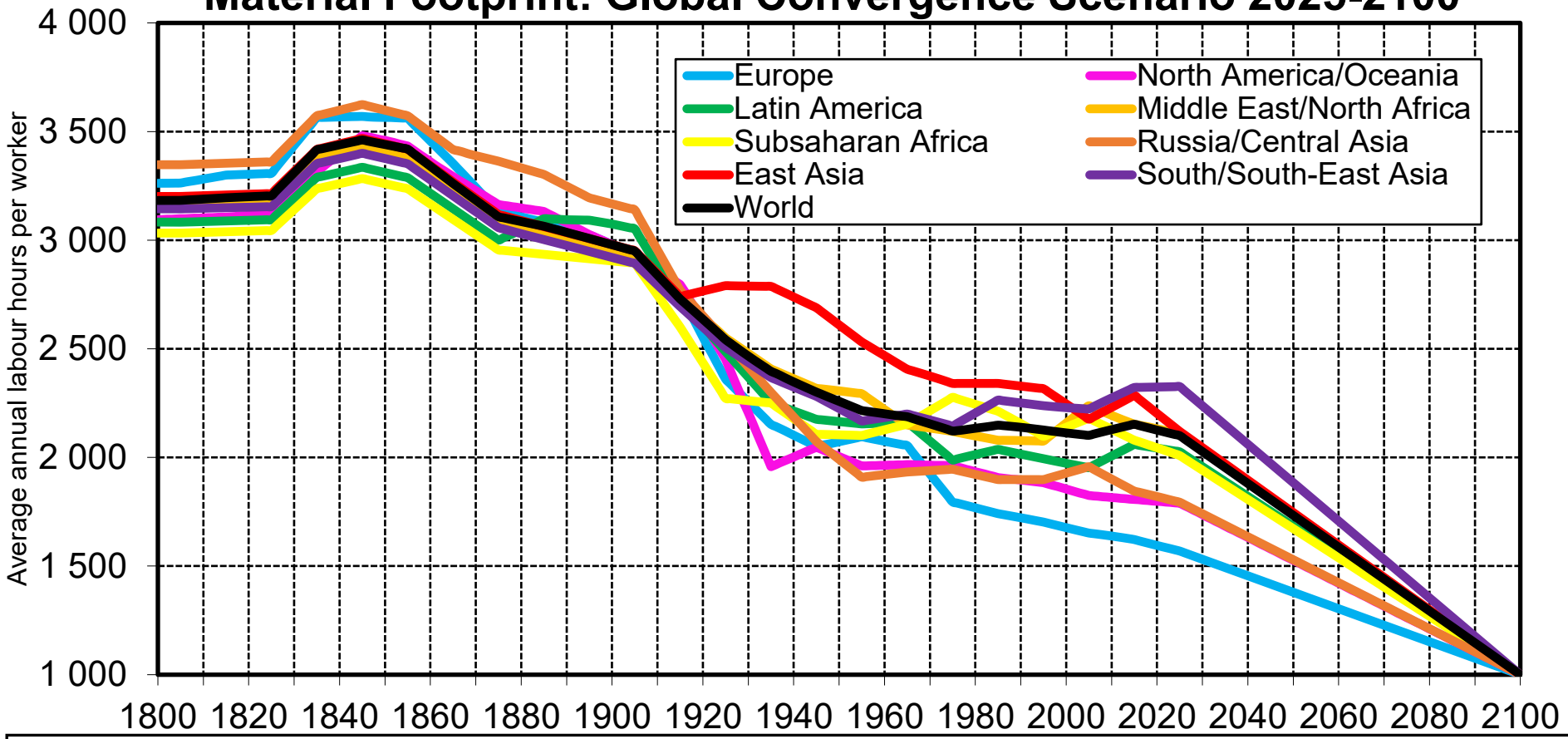
Interpretation. Under the "global convergence" scenario, productivity growth rates are assumed to be such that all regions converge to about 100-120€/hour by 2100. This requires in particular a large acceleration of productivity growth in Subsaharan Africa (4.5% per year over 2025-2100 period, i.e. about the same as in East Asia 1990-2025). **Sources and series**: see wid.world

Fig. 27. Planetary Habitability & Structural Transformation: Global Employment Structure 2025-2100



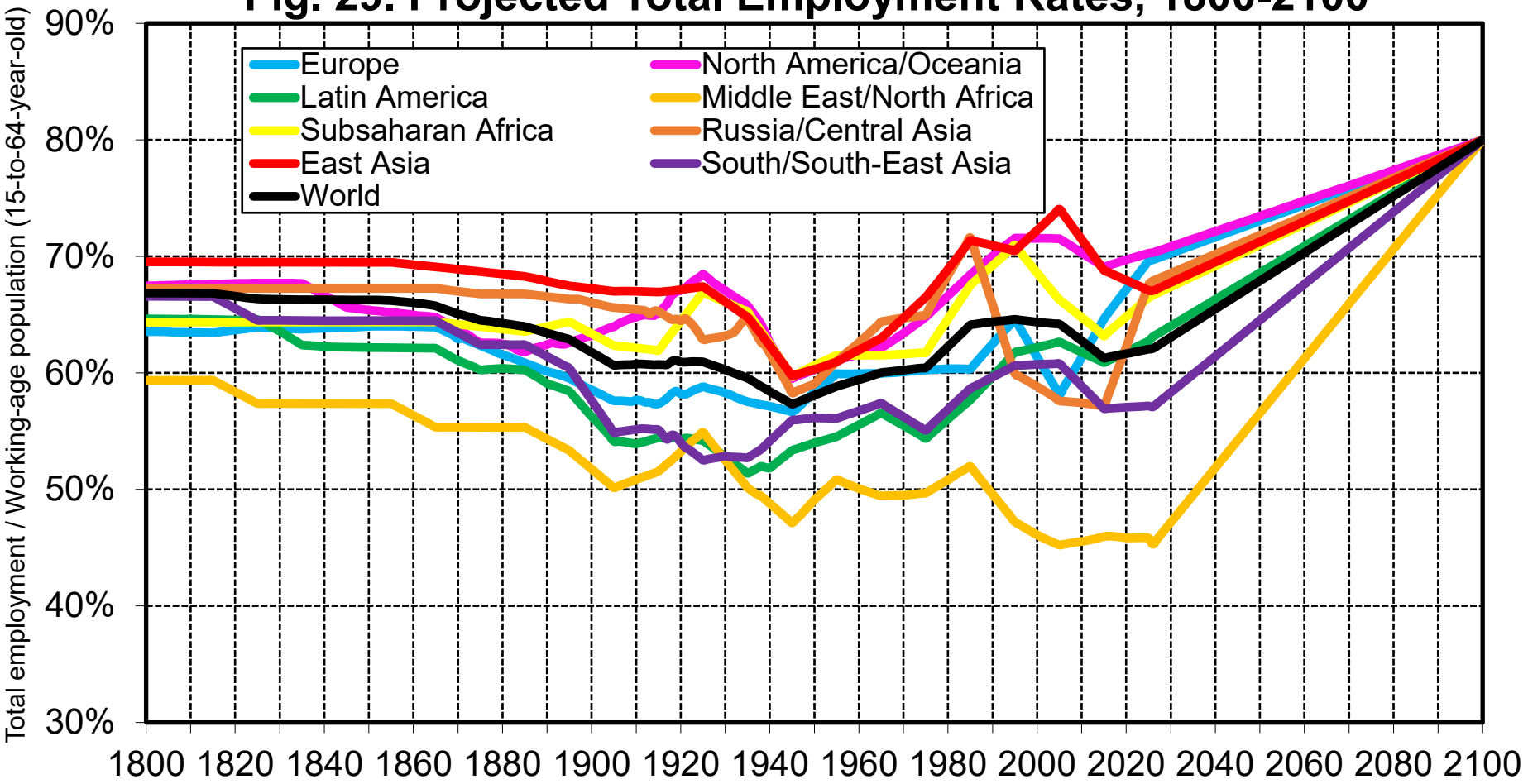
Interpretation. At the world level, the share of agriculture (including agri-food industry) in total employment dropped from 68% in 1800 to 53% in 1950 and 23% in 2025, and could further drop to about 5% by 2100. **Sources and series** : see wid.world

Fig. 28. Using Productivity Gains to Reduce Work Hours & Material Footprint: Global Convergence Scenario 2025-2100



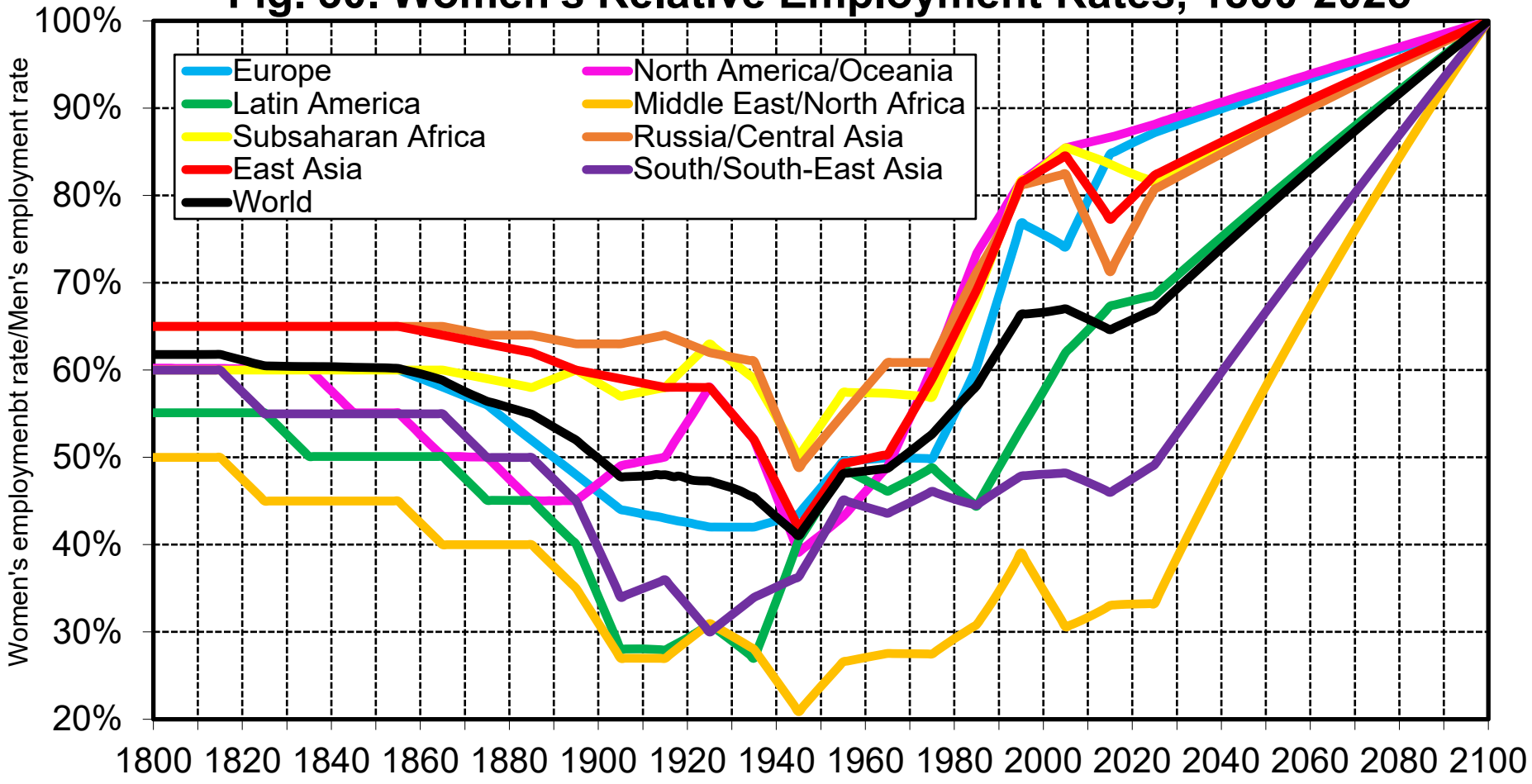
Interpretation. According to the global convergence scenario, annual labour hours per work should decline around 1250 hours per worker in all world regions around 2100. Note. Annual labour hours around 3000-3500 hours correspond to about 60-65 hours per week all year long. Annual hours around 2000 hours 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**: see wid.world

Fig. 29. Projected Total Employment Rates, 1800-2100



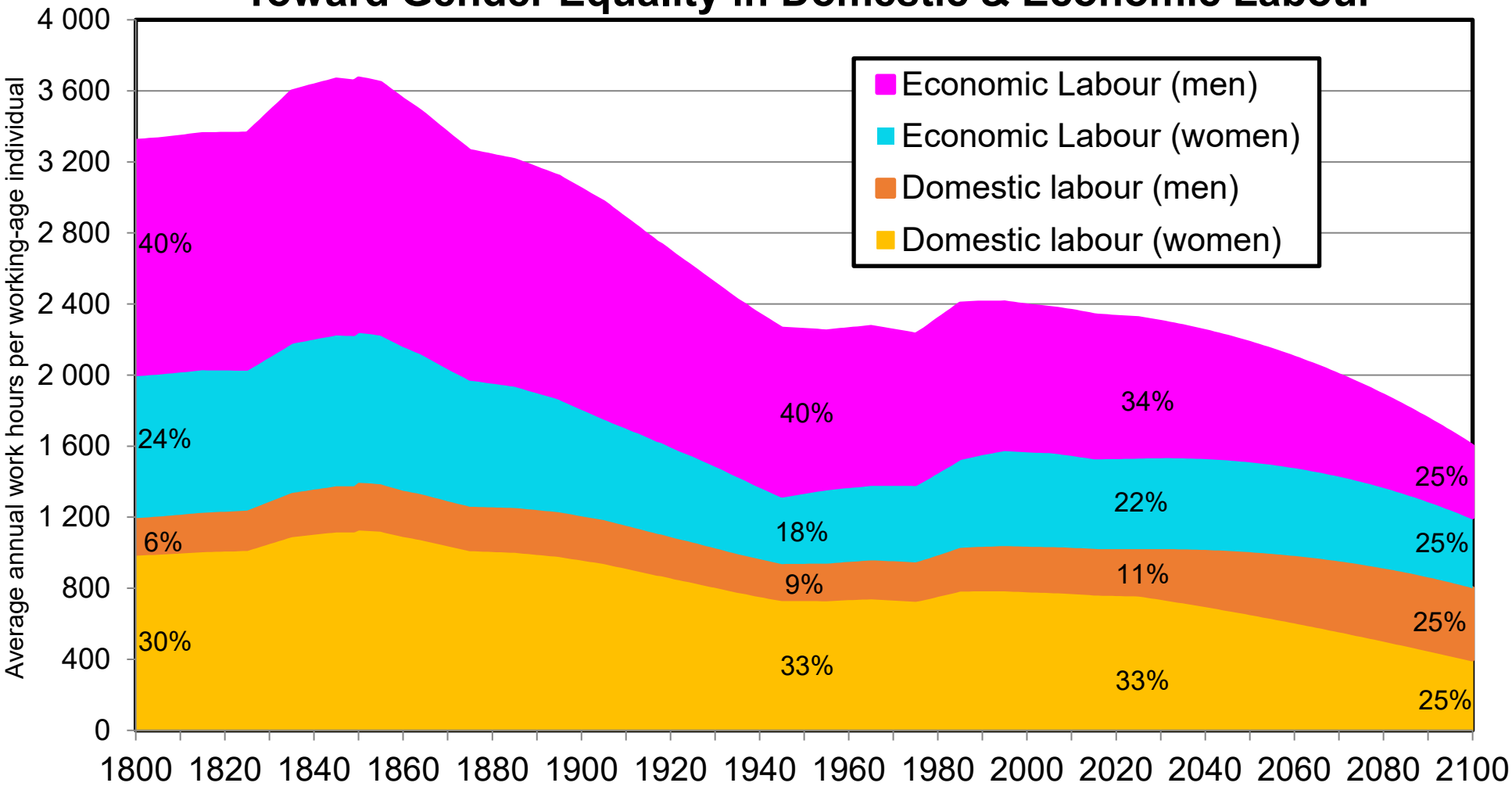
Interpretation. In the global convergence the scenario, the employment rate, defined as the ratio between total employment (irrespective of employment status or sector) and working-age population (15-to-64-year-old), is expected to converge toward 80% in all world regions by 2100, both for men and women.
Sources and series: see wid.world

Fig. 30. Women's Relative Employment Rates, 1800-2025



Interpretation. In the global convergence the scenario, the employment rate, defined as the ratio between total employment (irrespective of employment status or sector) and working-age population (15-to-64-year-old), is expected to converge toward 80% in all world regions by 2100, both for men and women, so that the relative women/men employment rate converges toward 100% everywhere.
Sources and series: see wid.world

Fig. 31. The Structual Transformation of Work 1800-2100: Toward Gender Equality in Domestic & Economic Labour



Interpretation. In the global 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**: wid.world

Table 6. Projections for Productivity Growth (2025-2100)					
	Productivity 2025 (hourly NDP) (PPP € 2025)	**Business-as-Usual Scenario**		**Global Convergence Scenario**	
		Productivity growth rate 2025-2100	Productivity 2100 (PPP € 2025)	Productivity growth rate 2025-2100	Productivity 2100 (PPP € 2025)
East Asia	**17.7**	2.5%	**112.8**	2.5%	**112.8**
Europe	**48.2**	1.4%	**136.8**	1.2%	**113.7**
Latin America	**14.2**	0.6%	**21.8**	2.7%	**104.7**
Middle East/ North Africa	**21.9**	1.4%	**60.7**	2.1%	**104.1**
North America/ Oceania	**52.9**	1.4%	**150.1**	1.1%	**120.2**
Russia/ Central Asia	**23.9**	1.5%	**70.4**	2.0%	**105.5**
South/South-East Asia	**7.8**	3.2%	**86.2**	3.5%	**103.6**
Sub Saharan Africa	**3.9**	1.2%	**9.4**	4.5%	**105.7**
World	**15.8**	**1.6%**	**52.1**	**2.6%**	**108.5**

Interpretation. In the "business-as-usual" scenario, productivity growth in 2025-2100 is the same as in 1900-2025 (except in East Asia, where it is assumed to drop from 4.4% to 2.5% as the region catches up with the world productivity frontier, and in Europe/NAOC, where it is assumed to drop from 1.6-1.7% to 1.4%). In the "global convergence" scenario, productivity growth rates are assumed to be such that all regions converge to about 100-120€ in hourly productivity by 2100. This requires in particular a large acceleration of productivity growth in Subsaharan Africa, thanks to massive investment in human capital and infrastructures. **Sources and series**: wid.world

Table 7. Using Productivity Gains to Reduce Work Time & Material Footprint
Global Convergence Scenario: 1000h worktime in 2100 (25h x 40w)

	Productivity 2025 (hourly NDP) (PPP € 2025)	Living Standards 2025 (per capita NDP) (PPP € 2025)	Productivity 2100 (hourly NDP) (PPP € 2025)	Living Standards 2100 (per capita NDP) (PPP € 2025)	**Share of Productivity Gains Devoted to Extra Leisure** (vs Extra Production)
East Asia	17.7	17 423	112.8	54 138	51%
Europe	48.2	35 031	113.7	54 568	34%
Latin America	14.2	12 793	104.7	50 273	47%
Middle East/ North Africa	21.9	14 511	104.1	49 984	28%
North America/ Oceania	52.9	44 755	120.2	57 690	43%
Russia/ Central Asia	23.9	19 276	105.5	50 643	41%
South/South-East Asia	7.8	7 373	103.6	49 713	49%
Sub Saharan Africa	3.9	3 024	105.7	50 757	38%
World	**15.8**	**13 931**	**108.5**	**52 088**	**45%**

Interpretation. According to the "global convergence" scenario, 45% of productivity gains will be devoted to extra leisure (as opposed to extra production) at the global level over the 2025-2100 period.

Note. Computations are made under the assumption that employment rate converges to 80% for working-age men and women in 2100 and that fraction of working-age population in total population is equal to 60% in 2100. **Sources and series**: wid.world

Table 8. Using Productivity Gains to Reduce Work Time & Material Footprint
Less Ambitious Scenario: 1260h worktime 2100 (30h x 42w)

	Productivity 2025 (hourly NDP) (PPP € 2025)	Living Standards 2025 (per capita NDP) (PPP € 2025)	Productivity 2100 (hourly NDP) (PPP € 2025)	Living Standards 2025 (per capita NDP) (PPP € 2025)	**Share of Productivity Gains Devoted to Extra Leisure** (vs Extra Production)
East Asia	17.7	17 423	112.8	68 214	39%
Europe	48.2	35 031	113.7	68 756	17%
Latin America	14.2	12 793	104.7	63 344	33%
Middle East/ North Africa	21.9	14 511	104.1	62 980	9%
North America/ Oceania	52.9	44 755	120.2	72 689	29%
Russia/ Central Asia	23.9	19 276	105.5	63 810	25%
South/South-East Asia	7.8	7 373	103.6	62 639	36%
Sub Saharan Africa	3.9	3 024	105.7	63 954	22%
World	**15.8**	**13 931**	**108.5**	**65 631**	**31%**

Interpretation. According to the less ambitious scenario, 31% of productivity gains will be devoted to extra leisure (as opposed to extra production) at the global level over the 2025-2100 period.
Note. Computations are made under the assumption that employment rate converges to 80% for working-age men and women in 2100 and that fraction of working-age population in total population is equal to 60% in 2100. **Sources and series**: wid.world

Table 9. Using Productivity Gains to Reduce Work Time: Lessons from the Past and Scenarios for the Future	
	Share of Productivity Gains Devoted to Extra Leisure (vs Extra Production)
1800-2025	**33%**
incl. 1800-1860	-4%
incl. 1860-1980	41%
incl. 1980-2025	-8%
Global Convergence Scenario 2025-2100 (Target 2100: 1000h = 25h/w x 40w)	**45%**
Less Ambitious Scenario 2025-2100 (Target 2100: 1260h = 30h/w x 42w)	**31%**
Interpretation. According to the "global convergence" scenario, 45% 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). **Sources and series**: wid.world	