

Population Dynamics and World-Systems Analysis

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Abstract

World-systems analysis has given scant attention to population dynamics. Overlooked are large-scale macrohistorical population trends and their microhistorical foundation on procreative decisions—decisions which are taken by a historically changing subject of procreation: local elders or other authorities, head(s) of the household, couples, and women. The discipline of demography is also not as helpful as it could be, given its basis in modernization theory, which fails to recognize intentionality in reproduction in pre-capitalist societies. It assumes a model of “demographic transition” from a state of “natural fertility” to a state of conscious family planning, while also treating mortality as independent of fertility. Marxism recognized the importance of population as a source of labor for profit and capital accumulation. With its tools Sydney Coontz developed a demand for labor theory explaining in particular the decrease in the birth rate in England and the United States at the turn of the century. This theory was further developed by anthropologists of the “mode of production and population patterns” who, with other authors, offer useful theories and insights to advance world-historical research on population. This article explores connections between population dynamics and world-systems analysis. I explore six key questions at different levels of analysis, including: 1) Are there world-systems' imperatives concerning human reproduction?; 2) Do human reproduction imperatives differ across world-systems?; 3) How do the (eventual) system's requirements get transmitted to households and individuals?; 4) Why do people have children?; 5) Who is the subject of procreation decisions?; and 6) How is the number of offspring chosen? Finally, I offer guidelines for applying the six questions to the capitalist world-economy.

Keywords: population, procreation, demography, labor demand, women's status, children's labor

The more human beings, the more surplus value is in principle possible. It is no accident that the so-called population law of capitalism is considered to be nothing less than the “general law of capitalist accumulation” (Marx). It is this law that turns women into child-bearing machines and is responsible for the so-called population explosion (Claudia von Wehrlof, 1984).

Population dynamics and their foundations in procreation are a fundamental field of historical-structural inquiry that has lacked attention in world-systems analysis, even though these dynamics contribute powerfully to the development of world-systems' historical trajectories.¹ In any world-system the new generations represent the future producers and a source of political power for the

¹ There are important exceptions, a few authors that I examine later on.

social aggregates they belong to. Yet, their number must be kept in balance with the resources at the disposal of households and society, given the environment and the technology that a particular world-system uses in accordance with its social relations of production. Population dynamics are the result of the interaction between the requirements of the systems and the choices taken by people within the institutions composing them, framed by the structures of opportunities configured by systems and institutions as a result of internal and external struggle. Population dynamics include mortality levels, which are not entirely within the range of social determination, and can be an important component of alterations in class relations. Finally, procreation dynamics are the result of the power conflicts within households over its costs and benefits and how to distribute them.

The disciplinary corpus of demography is not very useful in filling this gap. Demography is a late formation in the liberal intellectual division of labor (Livi Bacci, Blangiardo and Golini 1994, Szreter 1993), and – as the other disciplines resulting from this division of labor (Wallerstein 1996, Wallerstein 2004) – suffers from limitations of perspective and political bias. Demographers still consider as their founding father Thomas Robert Malthus, who saw excessive procreation as the main cause of poverty, and thus they tend to omit class analysis and reify as causes social phenomena that must themselves be accounted for: marriage rates, spacing of children, use of contraceptives (e.g. Dyson 2010).

Demography often naturalizes its concepts and “laws”: Malthus himself posited instinct as the cause of procreation, nearly completely disregarding social dynamics (he did find a check for this instinct in the variable age at marriage). With few exceptions, demographers use nations as units of analysis, applying to them its central concept of the “demographic transition.” Contemporary demographers supporting the demographic transition theory paint the familiar picture of a shift from “traditional” to “modernized” society where fertility moves from “natural” to “rational.” Contrary to this ideology, the act of procreation has hardly ever been left to “natural fecundity” (Henry 1953) or to chance, as the survival of human societies depends on the right balance between environment, technology and social relations of production on one side and the number of people on the other. The “number of people,” moreover, is not composed of homogenous individuals, but of humans of different ages and abilities who pass through phases of dependence and of active participation to production, cooperation and care for the young, the sick, the disabled, and the old.

Marvin Harris and Eric Ross gathered evidence against two such naturalized concepts, still fundamental in demography: “natural fertility” and “natural mortality.” The two anthropologists showed that the necessary and sustainable number of children is achieved even in precapitalist societies with various methods of birth and death control. Not only were contraceptive or abortifacients methods (such as prolonged breastfeeding or blows to the belly) known in a number of societies (possibly everywhere, even in the past), but high fecundity could even be a direct cause of high mortality. The methods of last resort for unwanted pregnancies were neglect, abandon, and outright infanticide. This is not to say that reproduction can be analyzed as a completely rational act,² but it is certainly shaped by human decisions, as the survival of a particular group depends upon such control.

While denying population balance as a target of precapitalist societies, demography postulates a central concept of balance in population at the unprecedentedly high contemporary human numbers, which its practitioners urge nations to assume as a target. This “stationary state” that nations should aim for with a “replacement rate” of 2.1 children per woman,³ is the

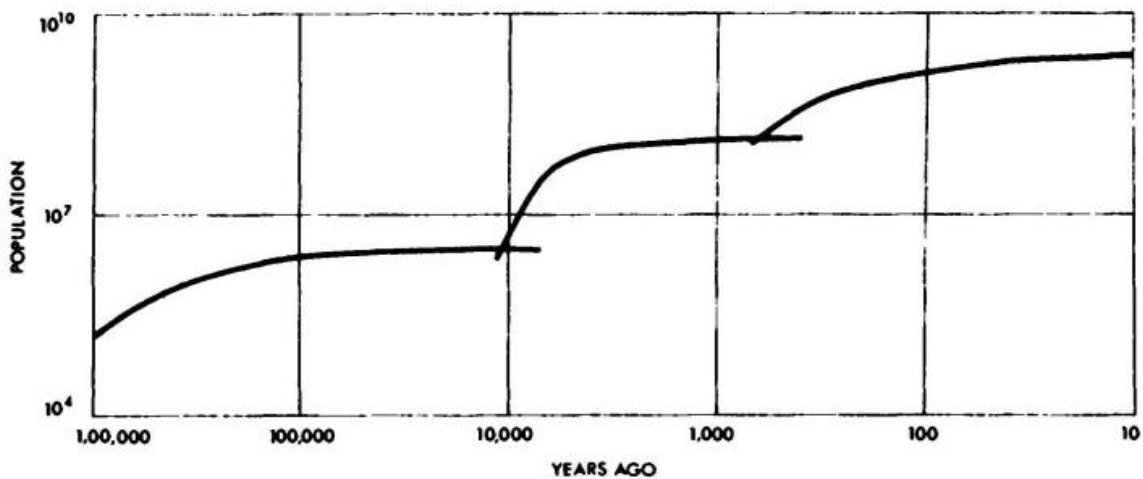
² See for example the volume edited by Handwerker (1986a), where Crosbie examines rationality models and finds them to predict demand for children instead of actual reproductive behavior, while Schumann finds that in Chiapas “variations in fertility have determined which families could take advantage of economic opportunities requiring increased family labor inputs” (Handwerker 1986a:1) without having directly caused these variations.

³ This number is highly popularized, but actually it is not very precise, as it does not take into account the mortality of women, supposing it not influential on the final fertility outcome, as it in fact it happens in Western countries. Wilson and Airey (1999) therefore argue that the prevalent use in demography of the total fertility rates (the “replacement rate”

demographic equivalent of the equilibrium point in neoclassical economics. But concepts of balance in capitalism are highly misleading, since growth of capital is the engine of the system, requiring a growing amount of labor during its expansive phases.

While the most common representation of aggregate human population by demographers is an exponential curve accelerating after 1750 (Chesnais 1991; Vallin 1995; Livi Bacci 2012), it seems much more likely that our species evolved along a series of successive logarithmic curves (net of oscillations), as seminal innovations and class dynamics permitted an increasingly intense appropriation of natural resources by humans from hunting and gathering to agriculture and from agriculture to those technologies permitting the large scale application of fossil fuel energy that we term “industrial revolution.”

Figure 1. Logarithmic population curves



Source: Polgar 1972:204

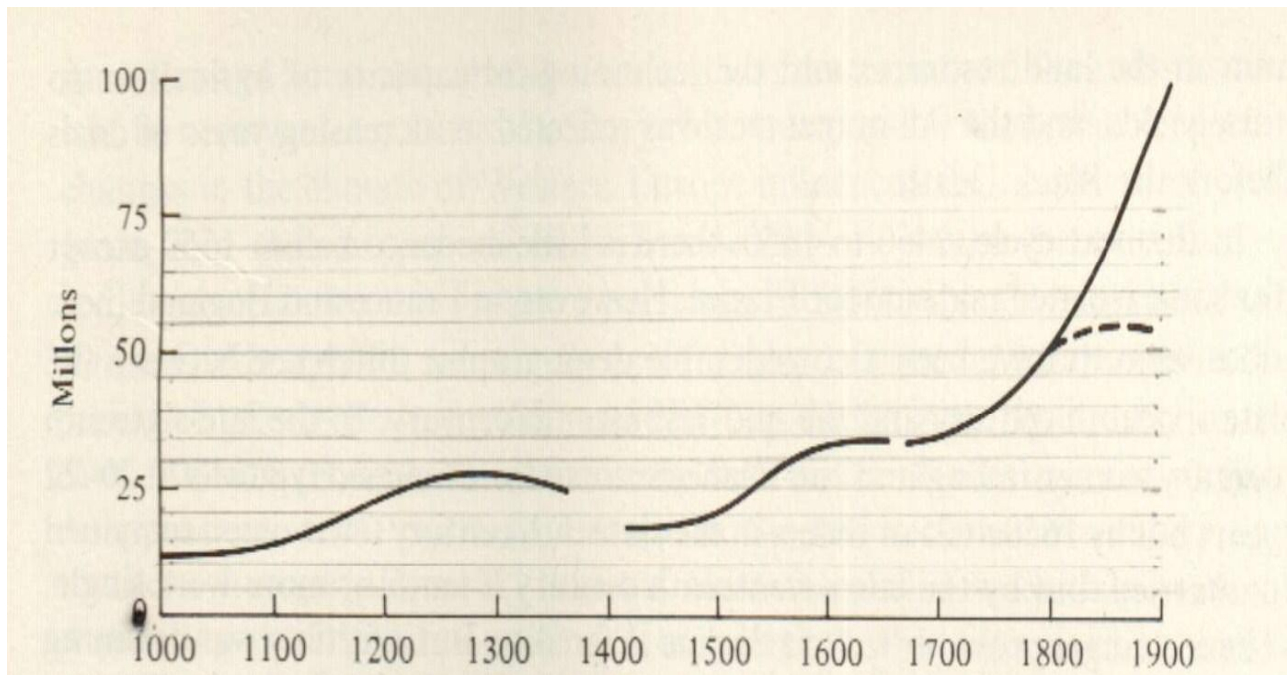
The end of massive epidemics after 1750 led demographers to consider this period as a turning point, starting an exponential population trend. But in fact this is relevant only for Europe and for the peoples of European descent, as the diseases they brought from the old country continued to kill the inhabitants of other regions in epidemic proportions (see fig.2). For instance, India suffered immense population loss when its system of granaries that had been effective for centuries in preventing famines was disrupted by English colonial administrators, who exported grain from famine-stricken regions, like the English landlords who were importing grain from Ireland at the time of the potato blight.

To study population dynamics and their foundations in procreation decisions⁴ means to truly consider society as an evolving whole. This includes a temporal dimension to the analysis, and attention to the organization of cooperation and conflict among humans in societies.

is one of these) is a result of Western ethnocentrism.

⁴As explained above, I am talking about procreation “decisions” and not “events” because intentionality is highly prevalent, and even in case of unplanned “events”, an element of acceptance is generally present, as unwanted pregnancies can end in abortion, infanticide, abandonment or fatal neglect of the newborn.

Figure 2. A schematic representation of population growth in Western Europe. Continuous line: total population; broken line: rural population



Source: Grigg 1980:283.

Modes of Production and Reproduction

In much of world-systems literature, references to population dynamics are usually just made in passing, and have not been coherently systematized (Danna 2013b). An exception is the comparative world-systems analysis by Christopher Chase-Dunn and Thomas Hall (1997), which analyzes the demographic (and economic) constraints behind social change. Drawing from Marvin Harris' cultural materialism (more on this below), Chase-Dunn and Hall theorized a uniform dynamic based on population pressure in all world-systems. Peter Grimes (1981) and Kathryn Ward (1983, 1984, 1985) are other exceptions dedicating substantial attention to quantitative analyses of the birth rates of all periphery countries with dependent development. Grimes showed that neo-Malthusian analyses and modernization theory were less able to account for fertility rates than dependency theory. Among five models operationalizing different theories about fertility, the dependency model was more consistent with the data, with fertility being kept high by inequality and by the dependency status of the economy, which cannot take full advantage of the degree of development reached.⁵ Ward found that dependency was preventing the decrease in the birth rates typically expected with rising GNP.

Another work at the macrohistorical level is the analysis of secular cycles in agrarian societies with a demographic-structural approach (Turchin and Hall 2003, Chase-Dunn, Hall and Turchin 2007, Turchin and Nefedov 2009). A net correspondence appears between population dynamics and a “misery index” obtained from the real wages series, and Hall and Turchin (2007) showed with data on England that this correspondence could not be causal: the common cause was rather sociopolitical instability. The microhistorical level has nevertheless not yet been investigated

⁵ To the contrary, Nolan and White (1983) and Nolan (1988) perform quantitative analyses on the World Bank data that attribute more explanatory power to both the demographic transition and the ecological-evolutionary theory, rather than to world-systems analysis.

by these authors, who generally postulate a tendency of the population to grow. It is rather ironic that the only actual organic reflection on population by world-systems analysts should rest on the side of Malthus rather than Marx. But it is in Marxism and in cultural materialism that we find the most useful analyses and theories regarding population.

Karl Marx rejected a universal “law of population,” such as that proposed by Malthus, in favor of specific historical laws. In his view the mode of production remains central, and the mode of reproduction follows it. Marx described the importance of either lengthening the working hours or putting more laborers to work in order to expand the mass of surplus value. The expansion of the system, including a rise in its population through incorporation of new areas, was recognized by Rosa Luxemburg as a necessity. Friedrich Engels and August Bebel wrote about procreation at the microhistorical level, stressing the importance of children’s labor for the survival of dispossessed workers’ households, as children could enter the “Satanic mills” of the industrial revolution and work for a pay.

The most organic contribution to population theory by a Marxist author is by the economist Sydney H. Coontz. In *Population Theories and the Economic Interpretation* (1961) he elaborated a demand for labor theory that explained the reduction in fertility in England and the United States with the change in demand from unskilled to skilled labor, as capital accumulated and technology advanced. The demand for labor theory was reprised in the 1970s and 1980s by authors that Richard Franke (1981) has grouped in an anthropological paradigm he calls “mode of production and population patterns” (Mamdani 1972; White 1973; Folbre 1977; Gimenez 1977; Wasserstrom 1978; Kleinman 1980; Gregory and Piché 1981). These authors found that the population explosion phases in the neocolonial periphery were fostered by its dependency status. Also, their analysis embeds the mode of reproduction within the constraints of the mode of production. Later on, in the 1990s, the sociologists Wally Seccombe (1983, 1992, 1993) and Asoka Bandarage (1997) also integrated fertility into the mode of production, considering demographic forces as a result of the social relations of capitalism.

In the same period of the “mode of production and population patterns” paradigm, other anthropologists – Claude Meillassoux, Marvin Harris and Eric Ross – posited instead that the mode of reproduction should be analyzed independently from the mode of production. As it turned out, this was not without problems. Meillassoux (1975) considered the mode of reproduction as the equivalent of the mode of production for precapitalist societies, where control was exercised not on the means of production but on the means of subsistence and on the women, as the producers of the producers. Possibly under the influence of Lévi-Strauss, Meillassoux treated women’s submission as a constant, despite its historical variability. Harris (1979) divided the elements composing society into infrastructure, structure, and superstructure, with infrastructure consisting of both productive (technological and economic) and reproductive (demographic) forces. But when he and Eric Ross fleshed out this scheme in *Death, Sex and Fertility*, their fundamental contribution to debunking the demographic transition theory, they left this interplay open: “We are not prepared to make any categorical assertion that either mode of production or mode of reproduction is dominant over the other” (Harris and Ross 1987:2). The importance of their work lies – much more than in their description of a hypothetically independent “mode of reproduction” – in the attribution of intentionality to reproduction in human groups, be it individually conscious or not. This control over fertility and (to a certain extent) mortality allows for a generational renewal that is in line with the requirements of the social relations of production and the material forces of production. In fact in the examples presented in this book the causal arrow goes obstinately from the production mode to the reproduction.

Harris and Ross suppose that this collective rationality can also align itself unconsciously with the material requirements concerning reproduction. But it is not necessary to postulate unconscious processes and collective rationality. Rather, the limited rationality of the subject(s) of reproduction can work against the needs of the collective or of the system, and conscious choices can incur unanticipated consequences. Recognizing this, Wally Seccombe wrote that the

relationship between destruction and reproduction of the workforce, which is mediated by households, is open to contradictions: families can (in his words) unconsciously adapt to the system's requirements, but sometimes familial practices go against the needs of the system:

We would expect to find that demographic forces periodically get out of alignment with other elements of the socioeconomic system (such as its subsistence capacity and labor demand). The resulting disruptions alter the contours of the mode of production or push it towards a full-blown crisis (Secombe 1992:12).

This alternative stance is reasonable as in history there are examples of changes in the relations of production brought about by demographic forces. To name just a couple of cases: rising wages and new freedom for the serf class were the legacy of the Black Death (Aston and Philpin 1985; Heller 2011), and workers in core countries gained economic and social rights during the labor shortages and erosion of profits preceding the revolts in 1968, at a time of scarce international mobility of the factors of production.

In light of this discussion, how can we analyze the interplay of mode of production and demographic forces in the different world-systems, in order to understand procreation and population dynamics? We can start with a series of questions, which can be categorized at the macro- and micro-levels.

Accounting for Population Dynamics: Macro- and Micro-Historical Levels of Analysis

Population and procreation must be incorporated into the various levels of world-systems analysis. At the world-systemic level, we must account for population's role in mini-systems, world-empires, and world-economies. Thus, at this macrohistorical level the main research questions should be:

- 1) Are there world-systems imperatives concerning human reproduction?
- 2) Are these imperatives different for the different world-systems? and
- 3) How do the system's requirements get transmitted to households and individuals?

To answer the first two questions we must distinguish between systems aiming at expansion or at stability. If the system is stable, the generational replacement must be reached and further fertility contained. We can assume that population stability is important for mini-systems (e. g. hunter-gatherer societies) in situations of circumscription. Alternatively, if the equilibrium with the environment is in peril, the solution to population growth is the spreading of human groups to different areas, that is to say migration (see the model of the demographic behavior and geographical spreading for small populations with simple technology in Fletcher et al. 2011).

World-empires seem to be subject to the same alternation between homeostasis and migration/expansion, depending on the human and natural environment beyond their borders. A growing population poses political problems of social order: "Numbers meant strength in war and industry. They also meant people to rule and mouths to feed. The optimal size is far from clear" (Wallerstein 1974:198). The dominant classes of world-empires are likely to be wary of new technologies—including those that can ease population pressure, such as innovations in agriculture—for fear of subversion of the established social relationships (e.g., the Chinese Empire, Tokugawa Japan before 1853). Note that population pressure is not an absolute concept, but relative to resources and technology in a specified, and circumscribed, area.

The capitalist world-economy instead has generally welcomed population growth ever since mercantilist states' need for expanding populations was openly theorized. In the core areas, various

pronatalist measures were taken when birth rates decreased,⁶ as in the 1930s and in the current period. The process of incorporation into the capitalist world-economy stimulated population growth in the new colonial periphery following the shocks of the European invasions that devastated people and land. In contrast, in the semiperiphery and periphery the core's racist worries about the multiplication of Black and colored people in postcolonial countries spurred the diffusion of birth control methods, sometimes via coercive means (Akhter 1992; Duden 1992; Knieper 2000, Hodgson and Watkins 1997:486).

In addition to being shaped by imperatives of the world-system, population dynamics are affected by ecological constraints. Adequate resources are needed to support human populations, regardless of elite ambitions. Anthropologist Steven Polgar underlined the importance of the absence of class exploitation to maintain population balance with the environment – a difficult endeavor for the capitalist world-economy and for world-empires: “Population growth in the feudal stage was often forced to reach (and sometimes exceed) the limits of supporting capacity,” writes Polgar, continuing:

The pronatalist effects of colonialism are in some respects a continuation of the feudal situation. In contrast to the largely autonomous village, the peasant community is heavily affected by outside economic interests. To outsiders the "surplus" they can squeeze from the peasant's production is of much greater relevance than the long-term productivity of the land or the standard of living of the peasant family. Boserup (1965) has recognized that intensification of labor input leads to declining yields per man-day of work; but she attributes this self-defeating cycle to population pressure, failing to recognize that where external dominance is weak or absent, agricultural people are quite capable of keeping population from becoming too dense (Polgar 1975:22).

A series of questions must be answered at the microhistorical level for minisystems, world-empires and world-economies alike:

- 4) Why do people have children?
- 5) Who is the subject of procreation decisions?
- 6) How is the number of offspring chosen?

This first question might sound baffling, but its legitimacy is clarified by the third: the historical variability in the number of children per woman in different societies and social strata does not reflect arbitrary individual (or couple's or household's or others') choices, but is a social fact requiring a social explanation, maybe even in absolute terms, as suggested by James Reed:

Anthropologists studying human reproduction in premodern cultures have found that the desire for children is not an innate human drive but an acquired motive which must be reinforced by social rewards and punishments sufficient to overcome the wish to avoid the pain of childbirth and the burdens of parenthood (Reed 1983:ix).

The reasons to have sex, and to choose a particular sexual activity is an interesting field of social enquiry. Harris and Ross (1987:9) write that “homosexuality, masturbation, coitus interruptus and noncoital heterosexual techniques for achieving orgasm can all play a role in regulating fertility.” All these variations in the sexual act are seldom even mentioned in demographic literature. These techniques were clearly condemned by nationalist and pronatalist states from 1800 onward and possibly also from the very beginning of capitalism (Federici and Fortunati 1984; Federici 2004).

⁶ And the so-called neo-Malthusian movement, propagating birth control methods, was repressed: in the most progressive core countries the repression lasted until the post WWI period, in the others until later (Reed 1983, Danna 2010).

Pregnancy as a result of sex is not always a rational act, of course, but this possibility can be socially approved or sanctioned – also depending on the “laws of reproduction” in a particular time and place and on the social relations of production.

A neglected fact in demographic transition theory is that children can have an economic value, and can be conceived in response to economic opportunities (e.g. Kertzner and Hogan 1989; Schneider and Schneider 1996). Children are not necessarily valued only as “means of pleasure and hope” (Bandarage 1997:159), but they can also be used as unpaid workers. For example, children worked in factories and mines during the industrial revolution (Engels 1845; Seccombe 1993), and contemporary street children support their families with enormous sacrifices:

In the burgeoning Third World cities vast numbers of urban people are unable to find regular wage employment. For many who are forced to survive in the so-called informal sector, children are still assets. Many urban slum communities are supported largely by “street children”. In São Paulo and Bangkok, child prostitutes are often the sole supporters of families (Bandarage 1997:162).

Demographer John C. Caldwell (1982) proposed a theory in which procreation depends mainly on the direction of the intra-familial wealth flow, composed of services, goods, and money. Purely economic reasons would dictate unlimited fecundity in “familial modes of production,” while zero fecundity should be the rational choice when children are a cost. Though his theory is still tied to the model of the demographic transition as it denies population balance as a collective goal for premodern societies, Caldwell recognized that children do have value from the material point of view as a workforce, sources of political power, providers of goods and services to the more powerful members of the household, and guarantors of their survival in old age. He abandoned the concept of natural fecundity, but still reasoned as if a high number of children would always be desirable in precapitalist societies. Anthropologists found instead that children’s labor acquires a substantial value only in sedentary societies:

On the cost side, sedentarism relaxed the need to transport neonates and toddlers, while on the benefit side, children’s labor plays a more important role, especially in tasks such as bleaching, grinding, and pounding of nuts and seeds, in the procurement of molluscs and small fish and game, and in varied house- and child-care activities (...) Up until the time of the emergence of sedentary communities and their “broad spectrum” economies, to judge from recent hunter-gatherer societies, the economic role of children was slight (Harris and Ross 1987:39).

The investment in children, rational at the household level, can be counterproductive for the exploited class:

Higher reproductivity was frequently their best short-term defense against miseration, even though, in the long run, the aggregate result was catastrophic. But, even this was not solely or even primarily because population outstripped production, but because food and other resources were being expropriated by the ruling class (Harris and Ross 1987:148).

In the Mexican county of Zongolica – to name just one historical example – large families were an advantage in that they added to household income, but population growth brought about land fragmentation over time. In addition, as Nancy Folbre observed: “The creation of a large reserve army of labor means that there is considerable downward pressure on wages” (Folbre 1977:53).

Beyond the ways additional workers affect household economies, it is also important to recognize that reproduction always happens at a biological cost to mothers. This cost includes the risks of health complications after childbirth, which can be (though in most cases aren't) life-

threatening. Neither Coontz nor mainstream demographers fully account for this cost. Disregard for this biological reality in mainstream demographic theory reflects the oppression of women. Inattention to the physical costs and risks inherent in pregnancy, childbirth, and child-rearing (plus the tabooization of the sexual alternatives to the heterosexual coitus) is only possible in a culture based on the historical oppression of women by men. Thus, world-historical relations play a role in shaping the unequal distribution of benefits and costs of household reproduction. The household must not be considered as a black box (as too often demographers do) but – especially in a theory concerned with social justice as is world-systems analysis – its internal power relations are a very legitimate field of study. Just how are reproductive decisions taken in different types of world-systems, geo-economic areas, and social classes? By the elders of the father or the mother, or of both? By the man? By the couple together? By the woman bearing the children with her own body and at her own risk? And is the historical development of this (changeable) subject of fertility decisions connected with the position it occupies in the world-system?

Each of these six questions generates multiple research questions, whose answers will certainly vary according to time, place, social class, and possibly other variables. In this final part of the article I outline another framework to address the six questions specifically within the capitalist world-economy.

Population in the Capitalist World-Economy

Focusing now on the capitalist world-economy, I can only start addressing certain aspects of these six questions, as the world-system in which we live spans more than 500 years and has extended itself progressively over the whole planet. The first three questions are appropriate to the level of geo-economic areas and of world-economy's institutions, the last three to the household level.

1) Are there Imperatives Concerning Human Reproduction in the Capitalist World-Economy?

The main characteristic of the capitalist world system is its expansionist tendency, as the motivation for organizing economic activities is profit (D-M-D') and capital accumulation without limit. Private initiative comes to a standstill if the prospects for profit are meagre, as John Maynard Keynes recognized. Profit is obtained by appropriating the results of human labor, which therefore must be increased—also via a growing population.⁷

Since the 16th century the European population has in fact steadily grown,⁸ and migrated to conquer newfound lands, converting to intensive agriculture the prairies and forests where hunter-gatherers dwelled, or appropriating the land of other farming peoples, forcing indigenous peoples (already decimated by conquest and illnesses) to work for the benefit of core states and companies. This demand for extra labor translated into extra children:

From the demographic point of view, this stage can be divided into two substages. In the first substage, the population of the colonizing peoples grew enormously (at average annual rates of 5 to 10 per 1,000), while the population of many subject societies was decimated through imported diseases, slavery, war, and forcible removal. In the second substage, in the metropolitan nations population increase slackened, while among subject peoples it generally surged. Thus, as I will elaborate below, the Third World is obviously not "starting"

⁷ See Hornborg 2001 on the unequal exchange of labor, energy and materials between areas of the capitalist world-economy.

⁸ In a way not correlated at all with K-waves according to Grigg's (1980:281) reconstruction of the trends in European population history (see also Danna 2013a).

now demographically where Europe was in the 16th century (Polgar 1972:205).

The capitalist world-system requires a workforce and obtains it through mechanisms such as separation of the producers from the means of production, taxation, indentured labor, slavery, and other forms of violence. Population expansion results as exploited workers answer the imperatives of capitalism by multiplying the household workforce in order to attain mere survival. The number of children rises to keep up with labor requirements (Nardi 1981). The edifice of proletarian labor must rest on much larger foundations of subsistence work (Smith, Wallestein and Evers 1984, Dunaway 2014a; 2014b). The same intensifying effect on fertility comes from commercialization of agricultural products (Weil 1986) and land degradation, because more labor is required to reach the same production as before (Cleveland 1986).

Demand for extra labor also translates into slave trafficking and other more or less coercive forms of migration. Steven Bunker applied the concept of the “mode of extraction” to the labor-force with slave trafficking, but immigration of any kind represents the appropriation of labor-force at no cost to the receiving society. Today, immigration helps maintain population growth even in core countries, where native birth rates are below replacement levels, despite policies to encourage reproduction such as education and other family subsidies, paid maternity leave and employment protection, and other supports.

In the 1980s some world-systems authors who reflected on population documented parallels between Third World poverty combined with population growth in the 1970s and 1980s, and the situation in early European industrialization (Ward 1983, 1984, 1985; Schiel 1984; Ingerson 1984). The Third World was the absolute periphery of the world-economy, caught in dynamics of dependent development, while England was reaching hegemonic status as it industrialized.⁹ If the position in the world-economy is different but the labor-intensive technology used is similar, this could account for the similar population expansion.

The technology used in semi-monopolistic production in core areas in the 18th and 19th centuries was even more labor-intensive than the one actually used in peripheral mechanized production processes. The situation of the core workers at the time of England’s rise was not much different from that of periphery workers today: they were subject to the same push to have more children in order to climb out of their misery and to alleviate their incertitude about the future and old age. The benefits to core country workers of surplus extraction in the periphery started much later. Wallerstein (1979) places the start of a redistribution of surplus production to lower classes at the beginning of the B phase in 1873, when it was used to ease social tensions. The redistribution was made easier first of all by the increasing use of fossil fuel: this new energy at the disposal of core inhabitants expanded the social product. Secondly, population in England and in other core countries expanded at a lower rate: the birth rate decreased among the working class, driven by the need to invest in some education for the offspring as the demand for skilled labor increased. Another theoretical consideration that emerges from this parallel is that, with respect to household fertility, the distinction between competitive or semi-monopolistic production processes is not decisive. Neither is the distinction between working for pay and subsistence activities (children do and did work in both sectors) – only class division is.

Agro-industry plays a role in population growth, too, as it provides the necessary food, increasing short-term yields at the expense of fertility maintenance. E. A. Wrigley (2004) found that present population growth could be achieved only by moving away from an exclusively organic economy to a fossil fuel-based one, while Lloyd T. Evans acknowledged that organic agriculture has been insufficient to sustain world human population after the third billion mark (Evans 1998:226). Paradoxically, even the Green Revolution is believed to have had stimulating effects for reproduction: the need for more hand labor grew because only jobs performed by men were mechanized, counting on unrewarded women's and children's labor for the labor-intensive tasks such as weeding in the fertilized crops fields (Boserup 1985).

⁹ To be precise, population expansion started at the time of the cottage industry with its putting out system (Braun 1966; Landes 1966; Gilles, Tilly and Levine 1992).

The macrohistorical level of the contemporary capitalist world-economy consists not only of different geo-economic areas (core, semiperiphery, and periphery) but it is also made up of interactions within and among different institutions: states, the interstate system, productive firms, classes, and identity (or status) groups. Therefore other questions arise that are peculiar to this world-system: how has the fundamental push of the system towards capital accumulation been translated in terms of population expansion? What are the institutions' stakes in procreation and how do they try to exert influence on the subjects (decisors) of procreation?

The identity or status groups (nation, race, ethnic group, religion, but also gender and sexual orientation) generally take advantage of their own multiplication and try to put limits on the others' (this is true in all world-systems). In their antagonism with groups with a different identity, they have a stake in their members' reproduction for the political power given by (organized) numbers. This is true even for the sexes: the phenomenon of "missing girls" is not a contemporary Asian anomaly, but the choice of many male-dominated households and societies throughout history (Harris and Ross 1987).

States prosper by having a large population from which work, taxes, and military power can be extracted (Graeber 2010). States have an interest in population growth, but they are also concerned with political stability, which population growth can undermine. Population control policies have thus been adopted by periphery nations in response to economic incentives from the core countries and to the ideology of raising per capita income if population is kept constant (Barrett and Tsui 1999; Luke and Watkins 2002; Barrett, Kurzman and Shanahan 2010).

Mercantilist states, right from the beginning of the capitalist world-economy, encouraged population growth, and nationalist states did the same. If the welfare states have assumed a portion of the costs of reproduction it is in part because of workers' class struggle but in part because they need able-bodied men for defence or militaristic ambitions. The military preoccupation of all states is in general to maintain a large population while curbing, or at least not encouraging, other states' growth, including the "inner enemy" of the racialized portion of the working class.¹⁰

The fight by women and all workers for more rights connected to citizenship brought some victories, among them support for reproductive work. As a result, states began playing enhanced roles in education and other services. Socialization of reproductive costs is in fact losing ground with current neoliberal policies (Teepie 1995). All productive processes benefit from large dispossessed populations that reduce the cost of labor. But while they benefit from the lower costs associated with crowded labor markets, companies resist contributing to the social costs of reproduction. In their hiring policies, many discriminate against women because they are or could become mothers. Few if any willingly provide childcare or other benefits to support working parents. Some states have forced productive companies to assume some of these reproductive costs.

2) Are the Capitalist World-Economy's Imperatives Concerning Human Reproduction Different from the World-Systems Preceding It?

Some answers to this question can be found above. Here I will specifically examine what happened during the incorporation of other systems into the capitalist world-economy. European expansion and conquest since the 16th century took a deadly toll with epidemics and massacres. However exploitation of the remaining local populations for their labor-force began soon after, and birth rates soared in contrast to the precolonial period. This mechanism is clearer on islands (e. g. for the Pacific Islands, see Pirie 2000).

Complaints about the lack of labor power in the colonies were often uttered, and the colonial

¹⁰ For example, both the population control policies sponsored by the United States in the 1960s and 1970s to curb population growth in newly independent countries, and their preoccupation with the growth of Black and Hispanic minorities (Folbre 2001) descended from this logic.

administrators had the means to induce procreation, as they could raise taxes, so that the natives would have to sell their labor power for the cash needed to pay them. Meanwhile, the subsistence work had to be performed by a growing number of children. For example, in Java between 1830 and 1900 the annual population increase was 2%, attributed to the pressure exerted by the Dutch sugar industry. The anthropologist Steven Polgar wrote:

Java in the 19th century is perhaps an extreme example, but it may be taken to illuminate this general phenomenon. Governor General van den Bosch introduced in 1830 the requirement that the Javanese were either to raise crops for the government on one-fifth of their own land or work for 60 days on government land. Geertz (1963:69) feels that this "culture system" was significantly correlated with population growth [...]. The rapid growth of the Egyptian population during most of the 19th century (from 2,500,000 to 9,000,000) occurred while the country was being reoriented to international trade, but before outright British annexation (Polgar 1972:207).

Another anthropologist, Richard Franke, examined population history in West Africa, finding that population growth and patterns of migration are primarily responses to changes in the nature of the production system both in colonial and in neocolonial times. He rejects the diagnoses of "overpopulation" for West Africa: historically the problem was the opposite: "Slavery should be understood as a response to the labor shortage" (Franke 1981:371). The passage to colonial relations of production exacerbated the problem. Franke explained the correlation between low fertility and the nomadic/herding mode of production, and high fertility in the agricultural one, with the lower demand for labor in herding along with the fact that "the herders were less susceptible to the labor demands imposed by the colonialist regime" (Franke 1981:367). In West Africa:

Workers were literally kidnapped from their villages and forced to become porters. Villages which resisted French-imposed taxes or labor conscription were burned down and the inhabitants killed. Porters themselves were underfed and overworked to such an extent that they died in large numbers. [...] But, to the effects of massive population loss and increased demand for labor by the colonial government, was added yet another policy destined to generate labor shortages: the forced migration of thousands of West African workers to plantation sites where their labor could be more efficiently exploited for cash-crop production (Franke 1981:375-6).

Coquery-Vidrovitch and Henri Moniot write similar words about Africa in general, absolving the Portuguese domination from later atrocities:

The distant past does not seem to testify scourges analogous to those that marked the discovery of the American continent, because Portuguese penetration in Africa was less extensive and at the same time, generally, more peaceful. If a demographic scarcity was present, it came later, starting at the end of the 17th century, being provoked indeed by the slave trade, then by wars of conquest: big famines and epidemics appeared mainly with the recent devastation born from colonial clashes. They caused populations to fall by at least a third between 1890 and 1925 in the regions that we studied.¹¹ And the problem is that they developed among peoples already weakened and on a declining path (Coquery-Vidrovitch and Moniot 1977:239, author translation).

¹¹ Reference to Coquery-Vidrovitch, Catherine. *Le Congo au temps des grandes compagnies concessionnaires, 1898-1930*. Paris, Mouton, 1972:494-503.

There are contemporary testimonies of the altered population dynamics:

Early nineteenth-century travellers, used to the high fertility rates of Britain, stressed the relatively low fertility of African societies. However, by the late 19th century, colonial officers who were accustomed to falling marital fertility in western Europe, began to emphasize the high-fertility societies they came across in East Africa. [...] Colonial officers in the 1920s and 1930s took the view that population in Tanzania generally had been falling since before 1885 up to 1920 (Lockwood 1998:25 and 27).

Thus, what happened to incorporated areas during colonization was not the first phase of the demographic transition with the spreading of rational control first on mortality and then on fertility, but a violent extraction by the capitalist world-economy of indigenous labor. This extraction was at first imposed on the working class of core countries, as they expanded their hegemonic influence in the early phases of the capitalist world-economy, and then moved towards the periphery. When the external areas are incorporated, their birth rate grows, mortality declines, and population soars. Everything changed in the relation between mortality and fertility. What was previously mainly a direct relationship (high birth rates provoked high mortality because of the need to keep the population balanced), became inverted under capitalism: the more intense the mortality, the more fertility had to make up for loss of workers (Murdoch 1980). Agriculture gets intensified and more labor is applied to obtain cheap products for the core workers and surplus for the ruling class.

World-systems analysts such as Michael Hout (1980), Peter Grimes (1981), Kathryn B. Ward (1983, 1984, 1985), Bruce London (1988), John G. Patterson and Nanda R. Shrestha (1988), found that the state of dependent development was heading away from the decreasing trend in births that core countries had experienced at the same income level. But Ward and others, also in the “mode of production and population patterns,” forecasted a continuously high birth rate in dependent countries, while it started decreasing after 1975-1980 even in the group of least developed countries (United Nations Population Division 2012). This is another aspect of population dynamics in need of interpretation and explanation.

Finally, technological progress—also driven by the social relations of production—structured the environment in a way that rewarded competition, and this encouraged population growth (Hayden 1986). Cooperative vs. competitive strategies in social life are effective in different environments. Cooperation emerges in human groups adapting to scarce and fluctuating resources and requires controlled reproduction. But in environments characterized by extreme scarcity or, *vice versa*, by extreme abundance and constancy of resources, competition emerges and reproduction is unbound. The use of fossil fuels is therefore very relevant to contemporary population dynamics:

Perhaps the most dramatic and pervasive example of increasing resources, however, took place during the Industrial Revolution, which opened up truly enormous and entirely untapped new reserves of energy resources, consisting of fossil fuels, water power, and electricity (Hayden 1986:186).

3) How Do the Capitalist World-Economy’s Requirements Get Transmitted to Households and Individuals?

The capitalist system’s imperative of population growth is translated into incentives or imperatives that affect household choices. Some of these material and even violent means of influence have been discussed above. There is a well-known body of historical literature addressing the cultural means of influence, the most important for the capitalist world-economy being the reproductive imperative of Christianity. Religious teachings and authorities still encourage births. Compulsory heterosexuality was spread from core areas to the periphery, and procreation defined as a public

interest, with pervasive restrictions on contraception and abortion (Handwerker 1990; Hartman 1995). Federici (2004) and Federici and Fortunati (1984) consider also the phenomenon of the witch hunt to have been spurred on by the need for an increased labor force, because the old women persecuted as witches were in reality the depository of the knowledge about how to regulate births and deaths. They were targeted by state forces wanting to obtain a surge in population numbers.

When oligopolies in the core started relying on higher labor skills for their production, capitalists directly influenced lawmakers to finance public compulsory education (Green 1990). Working class families remained wary of public education, as they wanted to avoid their children being exposed to its religious and ideological burdens in favor of the capitalist order (Secombe 1993).

Joan Smith and Immanuel Wallerstein (1992) edited a historical analysis of households belonging to different classes in the different regions of the world-system. The study revealed the strategic ways households used unpaid labor (including that of children) and adapted their composition in response to the different phases of the world-economy.

4) Why Do People Have Children in the Capitalist World-Economy?

There are many facets to all the six questions, but particularly to this one. Here I will concentrate on the issue of procreation among the poor. While for the upper classes children mainly represent the continuity of the household, for the lower classes they are an investment.¹² When children represent a net cost, the pleasure of procreating and taking care of one's offspring can be decisive, but when they are a net economic gain, procreation could be the only way to improve the household's situation above survival level—especially for the poorest households. At least since Malthus, the discussion about the causal direction of the observed relation between poverty and fertility has been charged with political implications. In the correlation between a high number of children and poverty, the causal arrow can be set in two ways: poverty makes people multiply carelessly using up the means of subsistence or—in circumstances of an expansive economy—the poor have a large number of children because the progeny will soon contribute to the household's functioning, from a very tender age. Malthus and Malthusians considered the multiplication of the poor irrational, while Marx and other radical thinkers saw it as the only investment that destitute classes could make, as it is signaled by the label “proletarian” which derives from the Latin “proles,” or offspring. The two conflicting interpretations still coexist: Daniel Chirot with Thomas Hall (1982) used population growth (which implies a diminution of GNP per capita) as a mechanism that better explains poverty in periphery countries than dependency theory, while William H. Murdoch concluded in his review that: “Rapid population growth and inadequate food supply are but the symptoms of poverty” (1980:307).

In fact, the first poor countries to reduce their population growth rates to less than 2% per year were China, Sri Lanka, Colombia, Chile, Burma, Cuba, and the Indian state of Kerala. As Frances Moore Lappé and Rachel Schurman (1990) observed, these countries¹³ shared low levels of economic growth, per capita income, industrialization, and urbanization (urban population is less prolific than the rural), but also effective redistributive policies. Two contrasting mechanisms could be at work (prior to the introduction in China in 1978 of the one-child policy): inequality reduction, as inequality had been found to be significant in maintaining high birth rates,¹⁴ or basic needs satisfaction. A higher educational level especially for women was also influential at least in some of these countries.

¹² Tilly (1978:33) estimated the class partition of European population increase from 1500 to 1900, finding that landlords, owners and managers of producing units doubled their mass, but all others increased by higher factors.

¹³ Apart from Burma, set aside for lack of reliable information.

¹⁴ See Repetto (1979), though Menard (1986) criticizes these result, finding his methodology insufficient, and pointing out that women's education is much more significant for fertility reduction.

Bandarage leans towards basic needs satisfaction as the main mechanism for birth rate reduction:

Fertility declines require alleviation of poverty and improvements in the living conditions of the poor, especially women. Where children's labor is not essential for family survival, where women and children have food and nutrition, education, health care and gainful employment, they are more likely to accept birth control and voluntarily lower their fertility (Bandarage 1997:174).

In fact birth control policies started to be effective only when at least some of these preconditions were satisfied (Bryant 2007). The villagers for whom Mahmood Mamdani (1972) had discovered a lack of motivation for fertility control, some years later started using enthusiastically the very devices that they had thrown away right after receiving them (Egerö and Hammar skjöld 1994).

Another interesting question is if and how population dynamics are connected with the growing inequality trend, because a component of this trend could derive from the sheer growth in the numbers of the dispossessed class. The secular trend towards proletarianization theoretically posited by world-systems analysis seems to be actually inverted by the absolute growth of rural population, in periphery and semiperiphery countries—even though urban population is growing in relative terms.

Since upward mobility is generally desired by households, when does the economic motive to have children stop? It does so when education becomes compulsory, raising the cost of children, and when women begin to have a say in procreation (Basu 1992). Productive processes that use more advanced technology need a specifically and formally educated labor force. The diffusion of mass schooling expresses both this need and the households' aspiration to social mobility through access to higher education for their children, where and when personal connections have yielded (to a greater or lesser extent) to formal qualifications in finding employment (Handwerker 1986b). In bureaucratized societies, as the wealth flow theory authors categorize them, the advantages of investing in children's formal education bear the consequence that families can afford fewer of them—even if some of those children, especially girls, are excluded from education (Handwerker 1986a). Even in the field of the unified growth theory, which applies Malthusian concepts, the timing of laws against child labor and decreasing birth rates coincides with industries' demand for more highly-skilled labor (Doepke and Zilibotti 2005, Galor 2011). Mainstream economists also accept the theory of demand for labor.

This dynamic seems to be at work in poor countries today: the universal reduction in birth rates is related to growing levels of education and increased opportunities for jobs in non-agricultural sectors. Women's positions are also largely improving, with a heightened capacity to set limits to their engagement in childbearing and rearing. This process seems irreversible: extensive poverty and the cut of nearly all welfare state provisions in post-socialist Eastern Europe have not been conducive to high birth rates. In fact, quite the contrary, as people could ill afford expenses for children in a proletarianized context.

5) Who Is the Subject of Procreation Decisions in the Capitalist World-Economy?

The subject of procreation decisions were the male heads of household, both where the family was extended or nuclear. This exclusive appropriation of offspring was legitimated even by state laws in the case of divorce. When women entered the paid labor force in great numbers and organized themselves politically they managed to change all laws and customs and obtained the right to continue their relationship with their offspring.

Women can no longer be ignored as decision makers in procreation. Theories that in the past excluded them from the analysis of procreation, considering the procreative power of women as a

“natural resource” bearing no costs (Folbre 2009), were perhaps justified by the fact that women were not very influential in decision-making. As capitalism advanced and absorbed and commodified women’s work, their economic and political power grew.

6) How Is the Number of Offspring Chosen in the Capitalist World-Economy?

According to Caldwell’s intergenerational wealth flows theory, economic rationality dictates either “As many as possible” or “None” on the two sides of the divide between children as an economic advantage or children as a cost. Economist Mohammed Sharif (2007), observing conditions in contemporary Bangladesh, found that landless laborers have high fertility while landholders’ households fertility is related to the size of their land holdings, i.e., proportional to their need for labor to work their land. Landlords have low fertility, as their children do not work and represent a net cost. The desire to have children for non-economic motives, including the pleasure in having kids, femininity or virility confirmation, simply conforming to social norms (Watkins and Danzi 1995; Behrman, Kohler and Watkins 2002), remains the main force behind procreation when children represent a cost. But other material factors can be recognized, going in opposite directions: on one hand the political force acquired with a large progeny, and on the other hand the preservation of the physical well-being of mothers who have fewer children.

Conclusion: The Capitalist World-Economy’s Population Parabola

The focus of the discipline of demography on the periodization and the causes and consequences of the “demographic transition” is misplaced. The concept of a demographic transition leads social scientists focus mainly on the causes of fertility reduction. In fact, many authors only analyze the decrease in fertility (that they usually call “decline,” in a pejorative way). The real questions should be instead why in the capitalist world-economy did population start to grow everywhere in an apparently uncontrollable way, and why at a later stage did the number of children per woman go down in successive waves, from the core to the periphery countries (United Nations Population Division 2012). The general principle to answer these questions is that the capitalist world-economy pushes for unlimited work force growth. Women produced the labor force for free, and children were beneficial for households in semiproletarian as well as proletarian conditions. But this situation was upset by the establishment of compulsory children’s education, the change in demand for labor changed from unskilled to skilled, and by an increase in women’s political power alongside their proletarianization. All these developments are slowing down population growth so that a vertex of the population parabola can be foreseen around 2045 (United Nations Population Division 2012), *ceteris paribus* of course.

A transitional phase of the world-economy is foreseen because of its asymptotic secular trends – for Wallerstein (1998) the exhaustion of cheap labor with decreasing numbers of semiproletarian households and continually improving political organization of proletarians; the rising tax bill for firms; the environmental limits – to which another asymptotic trend in terms of population dynamics must be added. The end and then inversion of the trend of “population accumulation” will also render the mechanism for capital accumulation shaky. On this forthcoming descending arc of the population parabola one of the conditions for capital accumulation will not be fulfilled: an increasing workforce. As the Marxian analysis foresaw, the system could compensate with a lengthening of the working hours both for the individual workers and collectively with the rise in eligible age for pensions (or their abolition!), but this is no guarantee that it will suffice to restore the expansion of the workforce needed for capital accumulation and growth.

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