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Global Fertility Chains: An Integrative Political Economy Approach to Understanding the Reproductive Bioeconomy

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Abstract

Over the last two decades, social scientists across disciplines have been researching how value is extracted and governed in the reproductive bioeconomy, which broadly refers to the various ways reproductive tissues, bodies, services, customers, workers, and data are inserted into capitalist modes of accumulation. While many of these studies are empirically grounded in single country–based analyses, this paper proposes an integrative political economy framework, structured around the concept of "global fertility chains." The latter articulates the reproductive bioeconomy

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as a nexus of intraconnected practices, operations, and transactions between enterprises, states, and households across the globe, through which reproductive services and commodities are produced, distributed, and consumed. Employing a diffractive reading of the literature on commodity chains and care chains, this unified approach scrutinizes the coproduction of value, biology, and technoscience and their governance mechanisms in the accumulation of capital by taking into account (1) the unevenly developed geographies of global fertility chains, (2) their reliance on women's waged and unwaged reproductive labor, and (3) the networked role of multiple actors at multiple scales without losing sight of the (4) constitutive role of (supra)national states in creating demand, organizing supply, and accommodating the distribution of surplus value. We empirically ground this integrative political economy approach of the reproductive bioeconomy through collaborative, multisited fieldwork on transnational reproduction networks in Israel/Palestine, Romania, Georgia, and Spain.

Keywords
bioeconomy, political economy, reproductive labor, the state, uneven development, value chains, governance, assisted reproduction

Introduction

Tammuz Family is Israel's first fertility agency with a specialization in surrogacy for same-sex couples. When its director was asked about the business model behind his company in 2014, he explained: "Basically, I united sperm from gay Israelis with eggs from donors in the USA or other Western nations, couriered the fertilized eggs to a clinic near Mumbai and implanted them in the wombs of Indian surrogate mothers."[1] When the Indian government prohibited surrogacy for foreign couples in 2016, however, Tammuz decided to change its business strategy and fly the Indian surrogates to neighboring Nepal. Here, Tammuz established its own fertility clinic in Kathmandu, integrating the medical and logistical services along the global surrogacy chain. As the director of Tammuz clarified in 2017: "We want to offer a one-stop-shop for surrogacy services, helping intended parents through all aspects of the surrogacy journey."

This ethnographic snapshot, taken from Vertommen's research on transnational surrogacy, illustrates how the introduction of in vitro fertilization (IVF) in the late 1970s has paved the way for the (re)development of a reproductive bioeconomy, crystallized around the global fragmentation and

flow of reproductive tissues, bodies, technologies (ART), services, workers, and consumers (Inhorn 2011; Weinbaum 2019).[2] According to recent studies, the global fertility market is estimated to become a US$40 billion market by 2026 (Databridge Market Research 2019). In the United States, the fertility power *par excellence*, the market for in/fertility services and technologies is expected to grow from approximately US$6 billion in 2019 to US$8 billion in 2023. In China, revenues are likely to double to over US$7 billion by 2023 (Frost and Sullivan 2019). In Spain, it has been calculated that the IVF industry generated around €550 million in 2013 alone (López Gálvez and Moreno García 2015).

In its broadest sense, the reproductive bioeconomy refers to the ways reproductive tissues, services, customers, workers, and data come to be part of ongoing capitalist modes of accumulation. Over the last two decades, social scientists across disciplines have researched how the reproductive bioeconomy operates, foregrounding the importance of sociotechnological innovations in the reproductive bioeconomy (Franklin and Lock 2003; Rajan 2006; Helmreich 2008; Pavone and Goven 2017). Others, however, have wondered whether there is something unique about the bioeconomy and suggest reframing theories of biological productivity through theories of rent and assets under neoliberal capitalism (Birch and Tyfield 2013; Birch 2019). Meanwhile, feminist scholars have emphasized the gendered exploitation of reproductive or clinical labor, from the perspectives of the primary sources of value extraction: surrogates and tissue donors (Nahman 2008, 2013; Pande 2010; Cooper and Waldby 2014; Lewis 2019). Notwithstanding some exceptions (Knecht, Beck, and Klotz 2012; Nahman 2013; Inhorn 2015), most empirical research on the reproductive bioeconomy resulted from single country–based analyses of the fertility or health-care industry in India (Rudrappa 2015; Pande 2014; Deomampo 2016), Mexico (Schurr 2017), Spain (Pavone and Arias 2012; Marre, Román, and Guerra 2018), Israel/Palestine (Teman 2010; Birenbaum-Carmeli and Carmeli 2010; Vertommen 2016, 2017), South Africa (Pande and Moll 2018; Namberger 2019), and the United States (Spar 2006; Smietana 2017). While all these studies undoubtedly introduce significant approaches to understanding how value is extracted, captured, and governed within the reproductive bioeconomy, what remains is to develop a coherent conceptualization and operationalization of how these unique national reproductive markets link together in the world economy and with what effects.

This article proposes an integrative political economy approach to the reproductive bioeconomy based on multisited qualitative fieldwork,

centered on the concept of "global fertility chains." It articulates the reproductive bioeconomy as a nexus of intraconnected practices, operations, and transactions among the enterprises, states, and households through which reproductive services and commodities are produced, distributed, and consumed across the globe in the accumulation of capital. This unified approach demands an understanding of the interdependence of four important dimensions: (1) the global, yet unevenly developed, geographies of fertility chains, (2) the reliance on biology/labor networks and women's waged and unwaged reproductive labor, and (3) a networked input–output structure comprising multiple actors at multiple scales, without losing sight of the (4) constitutive governance role of (supra)national states in creating demand, organizing supply, and accommodating the creation and distribution of surplus value. We will unpack this integrative conceptualization of value extraction and governance in the reproductive bioeconomy by exploring examples of existing global fertility chains from our respective fieldwork on transnational reproduction networks in Israel, Romania, Georgia, and Spain.

Over the past two decades, these countries have been directly and indirectly connected via emerging fertility chains in commercial surrogacy and egg cell provision. Since the early 2000s, a vibrant transnational fertility industry has developed in Israel that serves the reproductive needs of infertile and dysfertile couples who wish to have a biologically related child. Romania was one of the first countries where cheap and available egg cell providers were recruited in Israeli proxy clinics. Surrogates were first contracted in South East Asian countries, but after Thailand, India, Nepal, and Cambodia recently tightened their surrogacy regulations, Georgia emerged as one of the preferred surrogacy destinations for Israeli couples. Spain has become the egg donation hub in Europe: more than half of the egg donation cycles in Europe are performed in Spain, and more than 20 percent of the overall IVF cycles are catered to foreign recipients, who travel to Spain, mostly from Italy, Germany, United Kingdom, and France, to access egg donation and, to a lesser extent, IVF with preimplantation diagnosis. Finally, Spain is home to a number of intermediaries that offer support and guidance throughout the process of surrogacy to couples who are set to access this treatment abroad, as the latter is not currently allowed in Spain.

Sigrid Vertommen conducted qualitative research on international surrogacy in Israel/Palestine and Georgia based on more than sixty semistructured interviews with surrogates, egg cell providers, and surrogacy agents of fertility doctors, government officials, and lawyers in both Israel (2012-2019) and Georgia (2018). Vincenzo Pavone and his research assistant

conducted qualitative research on the (globalized) egg cell markets in Spain (2013-2015) based on twenty semistructured interviews with medical practitioners, embryologists, gynecologists, egg bank coordinators, and marketing directors in ten private and one public hospital in five different regions across the country. Michal Nahman conducted research on cross-border egg donation in Israel/Palestine and Romania (2002-2010), including interviews with fifty recipients of reproductive services; ethnographic research in three Israeli and Romanian egg donation clinics, involving hours of observation of clinical practice of oocyte extraction, fertilization, and implantation; interviews with recruiters and clinicians across the process; and interviews with twenty-one Romanian egg providers in 2002. She also conducted research with a focus on repro-migrations in two Spanish clinics in Barcelona, including seventeen interviews with migrant egg providers and additional interviews with clinicians in Barcelona, Spain (2016-2018). This paper draws on data from different time periods, as it is a collaboration among three authors who have done their research independently over the course of eighteen years. The theoretical intervention we are making here comes from several years of collaborative thinking around these topics. This is also one of the methodological arguments we make in this paper: More qualitative research on the reproductive bioeconomy should be done collaboratively and simultaneously along the fertility chain by multiple (teams of) researchers.

Drawing insights from distinctive yet interconnected fieldwork sites, the article will first take a closer look at the existing research on the political economy of the reproductive bioeconomy before proposing the alternative framework of global fertility chains and its different components as identified above.

The Reproductive Bioeconomy: State of the ART

Over the past two decades, researchers in anthropology, medical sociology, political economy, and science and technology studies have theorized the emergence of reproductive bioeconomies. These are broadly defined as biocapitalist projects of accumulation structured around the commodification and assetization of reproductive tissues, data, organs, and services for the production of babies or innovative medical technologies (Strathern 1992; Helmreich 2008; Cooper and Waldby 2014; Pavone and Goven 2017; Hogarth 2017; Geiger and Nicole, 2021).

From an science and technology studies (STS) perspective, scholars have pointed out how technologies, legal regulations, societal practices, and

economic priorities are arranged into complex and articulated value chains in which biomaterials like gametes and embryos get transformed into bio-objects that can be standardized, accessed, possessed, valued, and traded across the world (Vermeulen, Tamminen, and Webster 2016). Many "bioconcepts" (Birch and Tyfield 2013) have been introduced, ranging from biovalue (Waldby 2002), biocapital (Franklin and Lock 2003; Rajan 2006), bioeconomics (Rose 2007), and biomedical mode of reproduction (Thompson 2005) to life as surplus (Cooper 2008) in order to make sense of what is perceived as a new phase in contemporary capitalism that feeds on the extraction of surplus vitality from biological tissues and the commodification of biological processes.

Other STS scholars who look at more speculative domains associated with regenerative medicine, experimental biotechnology, and genetic engineering have fundamentally critiqued these theories of biocapital and the bioeconomy for their technoscientific focus on the presumed novelty of the relation between biotechnology and capitalism without paying much attention to neoliberal processes of financialization (Lave, Mirowski, and Randalls 2010; Birch and Tyfield 2013; Goven and Pavone 2015; Birch 2019). Birch and Tyfield (2013), for instance, have problematized the STS "fetishization of biological matter" that assigns agential power to biological tissues such as oocytes, stem cells, and placentas. Following Marx's labor theory of value, they posit that value is realized not only through the embodied labor power of workers but also and especially through how knowledge is applied to nature rather than through any pregiven characteristic of biological matters. As they state: "Value results from the application of knowledge to nature, and the subjection of that knowledge to intellectual property rights, and not from nature itself or from particular biological material (p. 221). In this vision, it is the ability to restrict access to knowledge and inventions that allows patents, intellectual property, monopolies, and immaterial assets in general to generate a flow of income (Zeller 2008; Birch 2019). While oocytes and wombs themselves might not have agency, the providers of those reproductive tissues, organs, and materials clearly do.

However, feminist scholars suggest that women workers and their reproductive biologies, bodies, and labor power tend to "vanish" in political economy debates around bioeconomies (Dickenson 2007; Nahman 2008). With a focus on assisted reproduction, these scholars have conceptualized the reproductive bioeconomy as a deeply technological capitalist project that incorporates the preexisting processes of exploitation of women's reproductive bodies, services, and work. Bringing the labor of biological

reproduction into the debates on social reproduction under capitalism, they have proposed concepts such as reproductive labor (power; Dickenson 2007; Pande 2014; Rudrappa 2015; Namberger 2019; Newman and Nahman 2020; Vertommen and Barbagallo 2021), gestational labor (Vora 2015; Lewis 2019), or clinical/regenerative labor (Cooper and Waldby 2014) to understand women's indispensable role within the reproductive bioeconomy. By framing surrogacy, egg cell provision, or tissue donations as labor that is precarious, un(der)valued, and unrecognized, this perspective looks at the gendered nature of value creation and labor within capitalist economies.

These studies have cast important light on the actual novelties of emerging bioeconomies, on their abilities to reframe social problems into technological issues, on their undergirding labor and property regimes, and on the discriminating and disempowering practices that these economies promote (Helmreich 2008; Pavone and Goven 2017). What is still often missing, however, is an integrative political economy framework that interlinks the analytical and political concerns on seemingly national reproductive bioeconomies with global processes of capital accumulation (Franklin 2011; Birch 2012; Lafuente-Funes 2020). While a political economy framework on the reproductive bioeconomy can motivate a broad set of research questions and agendas (including innovation models and dynamics, organization of fertility markets, processes of financialization and datafication, labor, property regimes, etc.), this paper proposes the concept of "global fertility chains" as a way both to theorize and to empirically map the global reorganization of reproductive processes as coproduced by the changing relations—or "intra-actions"—among capital, labor, nature/biology, technoscience, and their governance mechanisms (Barad 2007).

Global Fertility Chains: A New Political Economy of the Reproductive Bioeconomy

Drawing on the literature on global commodity/value chains (Hopkins and Wallerstein 1986; Gereffi and Korzeniewicz 1994; Bair 2005, 2008; Dunaway 2014; Mezzadri 2017) and production networks (Coe, Dicken, and Hess 2008; Kelly 2009; Rainnie, Herod, and Mcgrath-Champ 2011), on the one hand, and on global care chains, on the other hand (Salazar Parreñas 2001; Ehrenreich and Hochschild 2002; Yeates 2004), we propose a new political economy perspective to analyze the reproductive bioeconomy, centered on the concept of global fertility chains.[3]

While more recent explorations of the political economy of the biotechnology and/or reproductive industry have advanced a technoassemblage framework (Ong and Collier 2010; Knecht, Beck, and Klotz 2012; Müller and Schurr 2016), we argue that the chain or network approach offers valuable analytical, methodological, and political tools to understand both the contingent and structural complexities of value extraction and governance in the global bioeconomy (Castree 2002; L. D. A. Williams 2017). Originating from world-systems theory, Hopkins and Wallerstein (1986, 159) defined commodity chains as "networks of labor and production processes whose end result is a finished commodity." They argued that each step or node in the production process involves inputs, labor power, transportation, distribution, and/or consumption (Gereffi and Korzeniewicz 1994, 2). Although commodity chains are (often) transnational networks of economic organization, it is understood that they are locally integrated and thus socially embedded in a particular time and place (Bair 2005; Coe, Dicken, and Hess 2008).

From a perspective rooted in feminist and sociology literature on migrant labor, the concept of global care chains looks at "the personal links between people across the globe based on the paid or unpaid work of caring" (Hochschild 2000, 131; Salazar Parreñas 2001). Rather than focusing strictly on how surplus value is captured in the global production of commodities, they foregrounded the modes of reproduction and linkages between capitalist accumulation and the mobility of reproductive labor(ers) in care chains of nannies, domestic workers, and nurses (Yeates 2004, 2009). Although feminist scholars have raised important caveats in using the "productivist" framework of commodity chains to analyze reproductive or care industries (Murphy 2014), this approach offers a useful perspective to analyze the dynamic, structural, and relational nature of how reproductive services and commodities are produced, distributed, and consumed (Yeates 2009).

Focusing on global fertility and cross-border reproductive care, Inhorn (2015, 22, 25) describes *reproscapes* and *reproflows*, as dynamic assemblages of "technologies invented in one country, which then flow to others through a variety of commercial means," as "embryos flowing from one country to another through the work of embryo couriers carrying their cryopreservation tanks," and as "men and women flowing across transnational borders in search of reproductive assistance or as reproductive assisters who flow or are flown to other countries in transnational reproductive networks."

Building on these insights, we define fertility chains as a nexus of *intraconnected* practices, operations, and transactions among firms, states, and

households through which a particular reproductive service (such as egg provision or surrogacy), commodity (such as a baby, stem cell line, regenerative drug, or therapy) or data are produced, distributed, and consumed across the globe. The analytical aims of the global fertility chain framework are twofold. First, to map the fertility chain and identify the geography and activities of actors involved in the reproductive bioeconomy. Second, to analyze the value chain and determine the role that dynamic factors (labor/biology networks, institutional governance, technological innovations, colonial histories, and interfirm relationships) play in shaping the development and profitability of fertility services (Frederick 2016).

What is the added value of introducing this global reproduction network framework? Contrary to classic political economy and value chain analysis that tend to focus on commodity production, market dynamics, and interfirm transactions, a global fertility chain analysis foregrounds highly gendered and racialized dynamics that are usually left out, taken for granted, or viewed as external factors in value chain analysis (Moore 2015). For instance, the regulatory role of states and other governance institutions and the appropriation of what Mies (1982, 2014) has termed the "free" gifts of nature/biology, women, and colonized peoples. An "integrative" political economy perspective of the bioeconomy means an insistence on the *coproduction* of capital, nature/biology, and technoscience in the (re)production of babies and medical technologies (Jasanoff 2004). Operationalizing this integrative framework in a way that motivates multisited empirical analysis, we foreground four key analytical components. Global fertility chains consist of (1) multiple sociotechnical actors that are transnationally connected, in which (2) the (supra)national state plays a constitutive governance role in creating the demand, organizing the supply, and accommodating the creation of surplus value. These chains are (3) heavily dependent on women's waged and unwaged reproductive labor and (4) structured by geographies of uneven development. We will further unpack these four features in the following empirical section.

Sociotechnical Nexus of Multiple Actors and Scales

One of the strengths of a chain epistemology is that it offers a decentered understanding of how value is captured and added in the world economy by incorporating multiple actors and scales in the analysis (Kelly 2009). Fertility chains often transcend state borders and connect actors in different localities, countries, and continents. They incorporate a wide spectrum of sociotechnical actors: fertility agencies and brokers; fertility clinics and

hospitals; pharmaceutical and biotechnology companies; start-ups; surrogates; egg providers; reproductive technologies; medicine; therapies; embryos; sperm and egg cells; medical staff including doctors, embryologists, nurses, and genetic counselors; law firms specialized in family law and migration; shipping and logistics companies; scientists; patent offices; technology transfer companies; venture capital firms; feminist and lesbian, gay, bisexual, and transgender organizations; national ministries of health; foreign affairs and justice; intending parents; national embassies; social media groups; patient organizations; nannies; drivers and households; and so on. In this sense, fertility chains complicate the traditional focus of commodity/value chain analysis on the firm and the transnational company as the driving epicenters of value creation (Rainnie et al. 2011). It includes a broad array of human and extrahuman, productive and reproductive, waged and unwaged actors who contribute to making babies, medical therapies, and wealth. But rather than tending toward contingency and usually horizontal (or even flat) ontologies (as would be discerned through an assemblage or even actor–network theory approach), fertility chains entail structural power hierarchies among different actors of any network. Those hierarchies are viewed as central, and the global fertility chains model is intent on identifying systematic logics or "general processes of socionature" (Castree 2002, 134) in current modes of (bio)capitalist accumulation.

Examining the global fertility chain between Israel and Georgia, Vertommen, for instance, maps the different actors by following the reproductive trail of Israeli-intended parents who wish to conceive a baby through transnational commercial surrogacy. She describes how in Israel's pronatalist climate, infertile and dysfertile couples are increasingly contracting surrogacy agencies to make their dreams of genetic parenthood come true. Since Tammuz Surrogacy was founded in 2008, dozens of other surrogacy agencies have surfaced in the Tel Aviv area. These private companies broker the reproductive demands of the intended parents and the availability of overseas egg vendors and surrogate carriers. They also coordinate all the fertility procedures that need to be completed in Israel (IVF, egg retrieval, sperm donation, etc.) and follow up on the legal issues to officialize and regulate the parent–child relationship and the citizenship status of the baby. Although commercial surrogacy is allowed in Israel, its complex bureaucracy and high cost opened the door for a successful transnational surrogacy industry (Eyal and Moreno 2018). After Thailand, India, Nepal, Cambodia, Laos, and Mexico tightened their surrogacy legislation, Israeli surrogacy agencies discovered Georgia, the perfect new "mother" destination, easily reachable via a short direct flight, and having permissive surrogacy

legislation, a deregulated economic architecture, and a low-cost reproductive labor force.

In Georgia, Israeli surrogacy agencies cooperate with a local fertility agency and with a medical clinic. Some Israeli surrogacy brokers contract professional couriers to ship the frozen sperm, egg cells, or embryos to their Georgian counterpart, while others save costs by personally delivering the reproductive materials, transported in carry-on cryopreservation tanks on a regular passenger flight (a practice initiated by Israeli doctors who began the transnational transport of fertilized embryos between Romania and Israel in the early 2000s). The Georgian surrogacy agencies recruit the surrogates and egg vendors through social media or with the help of former surrogates who act as intermediaries, match them with the commissioning parents, and follow up on their medical appointments in the clinics. They also coordinate care and logistics for Israeli commissioning parents, once they arrive in Georgia to pick up their surrogacy babies. This might include arranging accommodation, food, and transportation for the parents and nannies, nurses, and breast milk for the baby. To ensure the smooth "return" of the surrogacy babies to Israel, Georgian agencies need to coordinate with lawyers, notary bureaus, and national embassies to arrange the citizenship status and travel documents of the newly born. Müller and Schurr (2016) and Schurr (2018) argue that the main challenge for surrogacy companies is to create stability amid highly volatile global networks that can easily shift depending on changes in national legislation. For surrogacy companies worldwide, the main business strategy in dealing with the contingent spatiotemporality of global fertility chains has been to circumvent national legislations at the surrogacy frontier (Bergmann 2011).[4] Despite the challenges inherent in adapting fertility services to new contexts, Schurr (2018, 4) posits that this legal volatility is also part of the profitability of surrogacy agencies globally, as "they have a rather immutable, standardized, and uniform business system in which they circulate the very same templates, contracts, and manuals to their branches in different regions of the world."

The Georgian clinics and hospitals are private medical facilities that specialize in fertility treatments. They perform all the medical screenings and treatments for the surrogates and egg providers. When asking one fertility doctor in Tbilisi in 2018 why there are so few governmental regulations and legal restrictions for fertility clinics, she replied: "I don't know, but I know that we are in heaven. I can do everything." The Georgian clinics operate in a highly deregulated economic landscape in which health-care facilities are increasingly privatized and controlled by financial institutions such as the Bank of Georgia and its health-care subsidiary Evex.[5] last entry

February 22, 2019). This follows a growing trend of financialization and consolidation in the global fertility market in which large-scale financial, medical, and biotechnology companies are incorporating IVF clinics around the world as local subsidiaries (van de Wiel 2018). In the next section, we switch our attention to another crucial actor in the transnational surrogacy chain, that is, the reproductive labor force, consisting of surrogate carriers and egg providers.

Women's Waged and Unwaged Reproductive Labor

In her research on migrant reproductive workers, Truong (1996, 47) argued that "no production system can operate without a reproduction system." However, the reproductive realm is often overlooked or minimized in commodity/value chain analysis and in political economy scholarship in general.[6] A global fertility chains approach offers a feminist political economy lens through which to address the gendered and racialized division of labor in capitalist economic processes by putting the quintessential role of women's laboring bodies center stage. It revisits how value is extracted and distributed in commodity circuits, furthering the social reproduction of labor and capital (Bair 2010; Yeates 2009; Dunaway 2014; Mezzadri 2017). Indeed, global fertility chains are highly dependent on the appropriation and exploitation of women's unpaid and paid reproductive labor. However, the sexual division of labor structuring global fertility chains renders the spheres of production and reproduction ontologically separate. The former sphere seemingly produces economic value while the latter "merely" reproduces life (Mies 2014). Recent scholarship argues that it is through these seemingly natural dualisms of production versus reproduction, nature versus society, gift versus commodity, and waged versus unwaged work that fertility industries become viable and lucrative enterprises (Pande 2014; Moore 2015; Waldby and Mitchell 2006; Cooper and Waldby 2014; Parry 2018; Newman and Nahman 2020; Vertommen and Barbagallo 2021).

The sexual division of labor in the bioeconomy is usually characterized by a Cartesian mind–body split, in which only the cognitive labor of the scientist or doctor is valorized while the reproductive labor of (female) oocyte vendors and surrogates is made invisible and presented as natural (Waldby and Mitchell 2006; Cooper and Waldby 2014). Under capitalist modes of accumulation, processes of ovulation, gestation, and parturition are not valued as labor, neither in their unpaid form as motherhood and "natural" pregnancy nor in their commodified form as commercial surrogacy or egg cell provision. In the surrogacy and egg-providing industries we

have researched, where reproductive labor is one of the obvious sources of profit, we witnessed how fertility brokers still use the language of donation, gift-giving, or altruism to promote their services (Ragone 1994; Vertommen and Barbagallo 2021).

Yet for the women providing the oocytes, it is somewhat more ambivalent. In research into migrant women providing eggs in Spain, Nahman questioned women as to whether they viewed it as "work." Ieva, a Latvian two-time oocyte provider interviewed in 2016 and 2017, stated:

> "So maybe for somebody it (donation) is good. For somebody who doesn't have work. Me for example, I am not considering doing that many times. It is not my job. I—my job is different. I prefer . . . Yeah. well. I prefer to work. Before, if you want work, you could always get a job. Maybe not so many hours, or days. But you could do it. But is [egg providing] like a job? No. You can do it (more often) maybe after you have children (. . .)."

For Ieva, egg donation was good to do if you do not have paid employment. But she made the clear distinction between egg providing and a "job," saying "it's not my job," and that she prefers to work in traditional forms of employment. Indicating that she does not see providing eggs as labor.

Meanwhile, Leah, a German seven-time egg provider in Spain who told the interviewer she provided eggs as a "summer job," stated that she does it precisely for the money:

> I asked (to donate) because now that I need the money in the summer—it is nice—the extra. (. . .) It is always a nice extra budget. An easily earned money, so to say.

Contrary to Ieva, Leah likened egg providing to work. In research based in Romania in 2002, Nahman found that egg providers viewed themselves as "selling." One might question what they are selling, whether it is their labor power, or the egg, or the end product of a baby? The ambivalence of egg providers as to whether it is a job or not belies the fact that they are central to the appropriation of value. Meanwhile, in a process that Mies (1982) would term "housewifization," they are schooled to believe their bodies "naturally" produce babies and eggs and therefore this is not seen by them or the brokers as the source of value creation.[7]

There was also ambiguity in how the brokers or recipients viewed the egg provider, whether as laborer or donor, and this ambiguity is what supports classifying her provision of the product (baby/egg) as part of

"nature" and not part of the market. In her research on the transnational oocyte industry between Israel and Romania, Nahman (2013) introduced the concept of "extraction" to describe how the fertility industry appropriates surplus value from women's bodies, from their (racialized) egg cells, embryos, wombs, umbilical cords, fetal tissues in what, similar to mining or fracking, can be called an extractive industry. This form of extraction relied on the unevenly developed geographies (a central feature of how we conceptualize global fertility chains (GFC), discussed further in the next section) of the two states she was researching, Romania and Israel, and the lack of regulation in the providing country. In the case of Romanian egg provision to Israeli clinics, the Israeli Ministry of Health was a key actor negotiating and approving the import of fertilized oocytes to Israel in February 2002, having sent a delegation from the Ministry to inspect the clinic in Romania set up by the Israeli physician and his Romanian-based business partner three years earlier. In this business arrangement, the company used the tagline: "embryos are our babies," where a business focus on embryos, highly skilled clinicians, techniques of oocyte aspiration, technologies for fertilization, and an outcome of babies shift all the attention away from the labor of the woman involved in providing the egg (Duden 1993).

Laura, twenty-two years old, a second-time donor who received US$200 for "donating" between twenty and thirty eggs, was extractable precisely because of the precarious labor market in Romania, where strong trade unions were in place but the economy itself was 80 percent foreign-owned and much employment existed in the unregulated, nonunionized "gray market" (Nahman 2008). Laura highlights the way the uneven development that is inherent to this fertility chain structures her extractability:

> "I don't want to have kids now . . . . Because it's hard to live. Raising kids is complicated and you have to give them education. He must grow in a perfect place. You have to offer him everything. And I cannot do this now. And I think if somebody needs my eggs to have a baby and raise it properly I think it's good that I'm doing it. If I can help other people, why not?"

The amount she received equated to two months' salary. Nevertheless, Laura felt that it was too painful to undergo again, and yet, she added about the egg providing, "it's addictive, like a drug . . . it's a constant need for money. It's something you need, the money. For money you can do almost anything." And when she heard that in the United States women may get

paid a lot more for their eggs, Laura rightly poses her critique of the unequal geographies of global fertility chains: "but how do I get there? It's all about money."

(Post)Colonial Geographies of Uneven Development

As indicated with the example above, the third characteristic of global fertility chains is their embeddedness in global geographies of uneven development. Casting an economic geography perspective on the global fertility market, Schurr (2018) argued that despite the prevalence of transnational flows and interconnected networks, "place continues to matter" in these uneven geographies, referring to the importance of space, scale, territories, localities, mobility, and borders in the reproductive bioeconomy. Indeed, global fertility chains do not exist in a vacuum but materialize in particular institutional, socio-spatial, and cultural environments (Coe, Dicken, and Hess 2008).

One of the most useful insights that commodity chain analysis has generated is the differentiation between core and periphery as socio-spatial processes of transfer of surplus value (Wallerstein 1974; Dunaway 2014). The advantage of a chain-based approach is that it decenters Eurocentric understandings of the global fertility industry by analyzing global reproduction networks as constituted as much by peripheral as core processes (Kelly 2009). Global fertility chains are grounded in expansive and asymmetric geographies in which core, that is, capital- and technology-intensive processes (such as marketing, transport, finance, and diagnostics happen in the Global North) while peripheral, that is, labor-intensive processes (such as gestational labor and tissue extraction) are outsourced to the "frontiers" in the Global South and East.[8] Some crucial exchanges take place in the key areas of the periphery of the Global North. More than half of the IVF cycles with third-party eggs in Europe, for instance, are performed in Spain (Calhaz-Jorge et al. 2017). Furthermore, a few of the core processes take place in countries in the Global South. Assisted reproductive services, including IVF, intracytoplasmic sperm injection, and preimplantation genetic diagnosis are often provided in clinics in the Global South. Many of these local clinics, however, are currently bought up by large-scale health-care corporations and private equity and venture capital companies (van de Wiel 2018). An interesting example of this consolidation trend can be found in the Spanish-born fertility corporation named The Valencian Institute of Infertility (IVI). The IVI was created in 1990 in Valencia, one of the early pioneers of assisted reproduction in Spain. In the past thirty years,

IVI has set up clinics not only in several regions in Spain and across Europe but also in North and South America, with an in-house egg bank that is able to supply several IVI centers at the same time. In 2017, it merged with a leading fertility corporation in the United States, Reproductive Medicine Associates (RMA), to create the IVI-RMA, the largest reproductive medicine group in the world. As we write, IVI-RMA is present in nine countries, with more than sixty-five centers distributed all over the world that welcome patients traveling from more than 180 countries.[9]

Due to an ongoing consolidation trend in the fertility industry through mergers, acquisitions, and joint ventures,[10] much of the surplus capital and profit actually flows back to companies based in the United States, Australia, and Europe and their private shareholders—companies such as Virtus Health, Care Fertility, Monash IVF Group, Medicover Group, IVI-RMA Global, and HealthCare Global Enterprises (E. Williams, Surowiak, and Szymanski 2017; van de Wiel 2018).[11] However, these traditional postcolonial geographies of uneven development between the Global North and South are unsettled by emerging reproductive "subempires" such as India (with Nova Pulse IVF) and Abu Dhabi (with NMC Health) as important examples (Inhorn 2015).[12]

There are nonetheless undeniable historical contingencies to the processes of uneven development in the global fertility industry that relate to both ongoing and past (settler) colonial processes of resource extraction, conquest, slavery, and demographic settlement (Vora 2015; Vertommen 2017; Weinbaum 2019). The division of reproductive labor in the global fertility industry is not only highly gendered but also racialized in ways that are embedded in colonial genealogies (Deomampo 2016; Schurr 2017; Lafuente-Funes 2017). First, there is a wide distribution gap between reproductive workers across the world. A surrogate in Israel, Canada, or the United States is paid double or almost triple the amount of surrogate in Nepal, Mexico, Georgia, or Ukraine. This explains why most of the gestational labor is being outsourced to the Global South or East, where it forms a cheap input for the fertility industry. Even when the purchasing power parity (PPP) is taken into account, and the economic compensations paid in these countries are comparably fair considering the local average salary, the fertility sector makes significant profits selling their services at a high price in developed countries, and little or none of this wealth is shared with the countries where the gestational labor is carried out or where reproductive cells and gametes are harvested.

Second, there is also a racialized division of labor within different types of reproductive services. Oocyte vendors are often recruited on the

basis of the commissioning parents' conceptions of "good genetic motherhood" in terms of intelligence, physical, character, and racialized traits, illustrative of what Schurr (2017) has called postcolonial imaginaries and desires of whiteness. Surrogates, however, are employed as "mere" low-cost gestators whose genetic makeup and racialized characteristics are not primordial (Twine 2011). Fieldwork conducted by Nahman in the fertility chain across Romania and Israel/Palestine found the Romanian egg providers were presented by brokers as desirable primarily for their perceived physiological similarity and "enhancement" of the receiving population. They were presented as having a variety of eye, skin, and hair colors to "match" the Israeli customer base. From the perspective of recipients, the providers' perceived "beauty"—seen as adhering to the popular Western, Northern, and Southern European beauty ideals of light, or light brown skin, blue/green or brown eyes, small nose, not too large lips—was identified by recipients as their preferred feature. The clinic also built upon preexisting cultural ideals and internalized racism among Israeli Jews (their primary client base) and a preference for Northern or Mediterranean appearance as opposed to Arab or African. As such, Romanian donors, viewed in part as white Europeans and in part as poor and willing donors, were seen as the perfect match in these multiple racializing interests of recipients, brokers, and the State, while Palestinian eggs were a taboo, demonstrating a "geography of desirability" (Nahman 2006, 210).

Another important socio-spatial dimension of global commodity chains is their input–output structure, which interlinks various services and products and sequentially adds value to the commodity as it moves through the chain from point of extraction to the final point of consumption (Rainnie et al. 2011). For global fertility chains, the dualism between commodity versus "free gift" does not always uphold, as reproductive tissues often move in and out of the commodity sphere throughout their trajectory in the economic value chain (Waldby and Mitchell 2006; Hoeyer 2013). Kroløkke, Foss, and Pant (2012) describe, for instance, how oocytes have almost no economic value upon extraction from a donor when they are framed as a gift or as "surplus" or "waste" material from fertility clinics. Yet, when sold as "Caucasian Ivy League eggs" by fertility agencies, or turned into patentable stem cell lines by biotech companies, their value increases. The mode of accumulation in the global fertility industry is a dialectic of direct exploitation of waged labor and indirect appropriation of unwaged labor/natures (Federici 2004; Moore 2015; Vertommen and Barbagallo 2021)

A final element to be taken into account in the territorial embeddedness of global fertility chains is their variegated border and mobility regimes. Depending on their ontological and geopolitical status, reproductive tissues, workers, and consumers are subjected to very different mobility and migration regulations (Schurr 2018). Not everyone and everything "flows" with the same ease throughout the chain and across national borders. While in other care chains, such as nursing or domestic work, workers from the Global South are employed as migrant workers in the Global North, this is not necessarily the case for fertility chains.

For instance, when Israeli-intended parents sign a surrogacy agreement with a Georgian surrogacy agency, the surrogate is not brought to Israel to gestate the baby. She remains in Georgia, and once the baby is born, the commissioning parents travel to Georgia to collect the newborn. While it is relatively easy for frozen reproductive tissues (embryos, egg cells, or sperm) of the commissioning parents to be shipped from Israel to Georgia, it is more complicated for the surrogacy baby to travel across national borders. The regulatory line between family making and child trafficking in the surrogacy industry is thin and volatile, as various surrogacy "scandals" in Thailand and Nepal have shown. In theory, the State of Israel does not regulate its citizens' use of surrogate carriers in other countries, thus leaving the practice of transnational surrogacy in a legal liminal space. In practice, however, the Israeli authorities have issued a series of travel and citizenship instructions—the so-called overseas regulation—with which commissioning parents must comply in order to regulate their parental rights and secure the citizenship status of the surrogacy babies (Moreno 2016). Based on these prescriptions, several thousand surrogacy babies have been granted the "right of return" as Israeli citizens, despite the apparent reluctance of the state authorities.

Although in most cases surrogates and egg vendors stay in their home country, there are exceptions in which they travel abroad as (unregulated) migrant reproductive workers (Pande and Moll 2018). In the case of migrant women workers who provide eggs in Spain, their migrant status as resident but not necessarily citizen makes them ideal for being highly extractable for the surplus value of their eggs. As Nahman writes, migrant extractability is one instance where women actively elect to become egg providers, and their migrant status enables them to do so on a greater number of occasions than can be done perhaps by citizens of Spain. Their mobility enables further opportunities for extractability. For instance, Yasmina, a woman from Germany who was studying in Spain and whose sister had also been an egg provider in Spain, stated in an interview in 2017: "In Spain, the maximum

amount of donations is six, but I think, Leah's [her sister] and my clinic in particular is international and has many clinics in various countries, and therefore one can do it more often, I think. Leah has done eight or nine donations."

By capitalizing both on their racial desirability to commissioning parents and clinics as white, Western Europeans, and on their mobility around different oocyte extracting clinics in different countries, they circumvent any particular state law around the maximum number of times they can provide eggs to clinics. Therefore, they maximize their ability to be extractable or produce value from their bodies. In research into Israeli egg receiving from Romania, Nahman (2013) called this process, "reverse traffic," where European Union laws outlawing "trafficking" around human tissues were circumvented by outsourcing the Israeli clinics themselves to another country, and fertilizing the oocytes, since fertilized oocytes were not subject to the same scrutiny as oocytes on their own. The model in that case was Israeli state laws permitting egg donation, in the absence of any Romanian laws at the time, Israeli equipment, clinicians all being transplanted to a Romanian city, with eggs being provided by local Romanian women. After a crisis that made its way to European courts, the Romanian state was obliged to develop policies that both facilitated the industry and controlled it. More recently, the more mobile migrant women, many of whom are Eastern European and experiencing the economic drivers that take them out of their "home" countries ("failing" economies, mass unemployment, budget cuts, and dismantlement of welfare policies), outsource themselves and travel to states where it is possible to make themselves extractable, despite increased policy intervention across the European Union in the form of European Society for Human Reproduction and Embryology and other regulatory and guiding bodies. These examples also highlight the continued centrality of the state in regulating global fertility chains, which brings us to our final section.

ART of the State

Although national and supranational political institutions do not often stand at the center of commodity and value chain research, they actually play a crucial role in the way global fertility chains are arranged and operate. Analytically, part of the problem is due to the role attributed to state and supranational political institutions by the value chain scholarship on governance. The concept of governance was originally devised by Gereffi (1994, 97) to depict the authority and power relationships that coordinate

the division of labor within the commodity chain and determine "how financial, material, and human resources are allocated and flow within a chain." These governance mechanisms mediate the "input–output structure" of each value chain as a sequence of value-adding economic activities (Gereffi, Humphrey, and Sturgeon 2005; Starosta 2010; Rainnie et al. 2011). Initially, Gereffi identified three principle types of governance structures of global value chains: producer-driven, buyer-driven, and Internet-driven. Later, he refined this analysis of governance mechanisms by proposing five governance forms—market, modular, relational, captive, and hierarchical—that were envisioned as a continuum between horizontal coordination and vertical integration of firms (Gereffi, Humphrey, and Sturgeon 2005). Yet, this governance analysis remained quite static and unidimensional in understanding governance almost solely in terms of relationships of power and authority between leading firms and their immediate suppliers rather than incorporating into the analysis other important governance stakeholders such as states, labor unions, nongovernmental organizations, households, or other actors (Rainnie et al. 2011).

Recent scholarship on bioeconomies, (late) capitalism, and neoliberal policies has further reinforced this bias, eventually paving the way to a fierce debate between (on one hand) those who claim that neoliberal capitalism strengthens and globalizes the reach and influence of markets, further reducing the interference of the public institutions in the economy (Biersteker 1990; Weiss 1997; Williamson 1993), and (on the other hand) those who insist that far from having been reduced and marginalized, the competition state is a key feature of neoliberal capitalism (Benner and Löfgren 2007; Mazzucato 2015; Cahill and Konings 2017). As a result of this debate, the state is increasingly recognized as an indispensable and integral governance actor in the chain not only in its role as facilitator (assisting firms) but also as regulator (limiting firms), producer (state-owned firms), or buyer (state purchases output of firm; Coe, Dicken, and Hess 2008; Yeates 2009; Horner 2017). More specifically, some scholars have focused their attention on the issues of public procurement and direct public investments (Benner and Löfgren 2007; Goven and Pavone 2015; Mayer and Philips 2017). This is the case, for instance, of the health bioeconomy, where (publicly funded) innovation strategies and reregulation are used to redistribute public economic resources to the private sector, reduce citizens' overall rights and public services to citizens, and promote new markets (Davis and Abraham 2013; Marelli and Testa 2017; Mitra 2018).

We take these contributions seriously and put national and supranational actors under scrutiny. Although reproductive bioeconomies are often

presented as being managed by private actors and operating through private markets, public institutions play a primary role in coproducing the global fertility chain. Reproductive bioeconomies, in fact, represent just a different variety of state-impulsed (neoliberal) capitalism. Our focus on global fertility chains thus allows an examination of gendered political economy dynamics in an evergrowing world economy in which the flows of technology, capital, patients, donors, doctors, embryos, gametes, and norms set the background to the actual intervention of the national state to promote and steer this economy to select political purposes. This political project may differ from state to state, and it is important to situate the structuring logics of the various bioeconomies in their particular sociohistorical contexts.

In the early days of cross-border egg donation, for example, the Israeli state intervened in a clear fashion to ensure a "crisis" of a lack of eggs. The booming IVF industry was averted by sending a Ministry of Health contingent to Romania in order to ensure the smooth functioning of several private Israeli IVF companies in their cross-border reproduction enterprise. These companies bought human eggs at low cost from Romanian women and sold them at a high profit margin to Israelis and other medical tourists, while the Israeli state facilitated these reproductive bioeconomic flows in an instance of what Nahman (2013) called "banal capitalism." Likewise, for Vertommen (2017), Israel's "reproductive–industrial complex" emerged at the crossroads of ongoing histories of biocapitalism and Zionist settler colonialism, with its interlocking logics of capital accumulation and demographic replacement through the encouraged reproduction of the settler population based on generous state-sponsored fertility treatments.

The Spanish case provides another interesting example. More than half of the egg donation cycles in Europe are performed in Spain, which is also the main exporter of eggs across Europe. A huge number of these egg donation cycles are performed for foreign recipients, who come to Spain for this specific reason (SEF 2020). In an interview with Pavone in 2014, Carmen, the representative of a Spanish fertility clinic, said: "You have to think that one of three patients here are foreigners, and indeed they look for a donor profile we often do not have." As a result, it is not at all strange that some clinics do make an effort to recruit foreign donors. Nuria, a gynecologist, suggested: "Sure, there are indeed clinics who are specialized and work mainly with foreign donors . . . it all depends on how you set the advertisement campaign."

In a country like Spain where the public health system is universal and free, and where the organ donation system is entirely run by public

institutions and reaches a degree of effectiveness and reliability unknown elsewhere (Matesanz et al. 2017), the entire reproductive bioeconomy not only has been dominated by private clinics and actors, including recent commercial egg brokers and egg banks, it has also been nurtured and protected by a technocratic approach to its regulation and a critical lack of funding to public hospitals and social security actors (Pavone and Arias 2012; Adeces 2015). As Marta, a gynecologist, mentioned in an interview in 2015:

> Q: "With the crisis [public hospitals] could not provide economic compensation?"
>
> A: "Yes, and also the social security system does not provide treatments to over forties. They reduced the age limit a bit, so it is not that they do not provide the treatment, for they do, but they have reduced it further, you know?"

Public hospitals, however, tried to react to the lack of resources by setting up an alternative system. Pablo, a gynecologist from a public hospital, said: "In both public and private hospitals the conditions leading to egg donation are the same [. . .]. The difference is that private centers can offer the economic compensation established by the law, and we cannot do the same. This means that we have an imbalance between donors and recipients [. . .] Waiting lists were too long so we switched to crossed donation: if one patient needs to receive eggs she has to bring in a donor, who will donate eggs to another couple who has in the meanwhile also brought in another donor."

Interestingly, while the donation and distribution of all human tissues and organs are regulated and managed by the National Organization of Transplants, the management and distribution of eggs and sperm are (almost) entirely left to private clinics and commercial gametes banks. Access to the reproductive bioeconomy is, thus, not only fundamentally restricted to economically well-off individuals but is also deeply gendered, recruiting young women into a precariously paid and uncontracted laboring practice that effectively sustains and nurtures a burgeoning for-profit reproductive economy.

As a result, the state clearly plays a constitutive role in the reproductive bioeconomy: it operates as a key actor in enabling, regulating, and connecting the local industry to the global fertility chains on which the reproductive bioeconomy is based. In fact, the state in many countries not only has generally contributed to the emergence of a fundamentally market-based economy around ARTs but it also continues to maintain it in the current neoliberal arrangements through the maintenance of multiscalar regulatory

systems, which operate as the architecture of global fertility chains—a selected variety of restrictive measures on access and a carefully designed (dis)engagement.

Conclusion: Moving Forward in/with the Fertility Chain

While a political economy framework for studying the reproductive bioeconomy can motivate a broad set of research questions and agendas, this paper proposed the concept of "global fertility chains." Our intent has been to theorize and empirically map the global reorganization of reproductive processes as coproduced by the changing relations—or "intra-actions"—between capital, labor, nature/biology, and technoscience and their governance mechanisms.

As a multifaceted conceptual framework, global fertility chain analysis proposes an integrative insight into how value is extracted and governed in the reproductive bioeconomy and the capitalist world economy at large. The conceptual, empirical, and political advantages of this relational framework are manifold. First of all, it allows for the inclusion of a wide array of human and extrahuman actors at multiple geographical scales that move beyond the fertility company or clinic. Second, it looks at the central role of (supra)-national state power in governing the demand and supply sides of the fertility chain. Third, it makes visible the essential role of gendered processes of social reproduction in the value chain and the ongoing dialectical relation between women's paid reproductive labor for the market and women and nature/biology's unpaid work for the household. Finally, it recognizes that fertility "flows" are embedded in socio-spatial processes of uneven development and distributed reproduction, which guarantee its profitability.

This conceptual framework develops theoretical abstractions of the reproductive bioeconomy and empirically grounded analyses that can in turn (re)inform the underlying theoretical assumptions. Rather than researching national reproductive markets, or comparing how supposedly disparate reproductive markets operate in different countries, it looks at the networked topography of globally intraconnected practices, operations, and transactions through which reproductive services or commodities are produced, distributed, and consumed across the globe. This requires a methodological approach that transcends the "lone researcher" model, as Coe, Dicken, and Hess (2008) aptly framed it, and encourages a collaborative, multisited research approach that empirically connects different (teams of)

researchers along the fertility chain. In our case, this meant looking at the sociotechnical and political–economic connections among reproductive policies, practices, and markets in our respective fieldwork sites of Israel/Palestine, Romania (egg cell provision), Georgia (surrogacy), and Spain (egg cell provision). We would be keen to see these global fertility chains explored in the manifold other contexts in which they exist.

Finally, as a critical value chain perspective, global fertility chain analysis is meant to identify possible sites of intervention and/or resistance within the global network. Understanding where value is extracted, added, and governed along the chain and how different actors are intraconnected across borders and sectors could enable strategic interventions by unions, civil society/grassroots organizations, and political parties, for example, who strive for a different and more just organization of the reproductive bioeconomy beyond capitalist regimes of exploitation and appropriation.

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Notes

1. In 2013, the director of Tammuz Family was selected in the project "Überpreneur—36 People You Must Meet" as one of the most influential entrepreneurs who are tackling global problems (see Andrews and Fiona Wood 2013).
2. For a critical account of the ongoing histories of (settler)colonialism and slavery in the reproductive bioeconomy, see Weinbaum (2019), Vora (2015), and Vertommen (2017).
3. There are important conceptual nuances and intellectual differences in the literature on globalization and economic development between commodity chain analysis, value chain analysis, and more recently, global production network analysis. However, for the sake of this paper, we grouped together these varied approaches considering they mostly share a common set of assumptions and concerns on the global functioning of the capitalist world economy.
4. After a surrogacy scandal with Israeli couples in Thailand in 2013, Israel's transnational surrogacy market moved to India. When the Indian government prohibited commercial surrogacy for foreign couples, some Israeli surrogacy agencies moved Indian surrogates to Nepal to give birth. After surrogacy was banned in Nepal in 2015, a new surrogacy market was created in Cambodia and in Laos. For now, the South East Asian surrogacy markets are closed, and former Soviet countries are emerging as the more stable surrogacy destinations.
5. (https://evex.ge/en/; last entry February 22, 2019).
6. Fortunately, in the last decades, feminist and gendered analyses have been increasingly incorporated into both mainstream and critical approaches to international political economy (Dalla Costa and James 1972; Federici 2004; Bakker 2007; Steans and Tepe 2010; Mezzadri 2017; Bhattacharya 2017).
7. This argument on the "housewifization" of surrogates and egg cell providers, who consider themselves as "mere" mothers or housewives despite their full incorporation into capitalist markets, has been further developed in Vertommen and Barbagallo (2021).
8. Walker and Moore (2017, 55, 59) defined the commodity frontier as "the process of going beyond the highly capitalized zones of production to secure sources of labour, food, energy and raw materials at below the prevailing average cost." According to this view, the importance of the "frontier" within capitalism's spatially expansive geographies is as much about seeking new sources of cheap materials, energy, food, and workers' bodies as it is about new distribution markets or exporting of surplus capital.

9. (https://www.ivirma.com; last entry September 21, 2020).
10. (https://ivi-fertility.com/notes/ivi-arrives-at-america-hand-in-hand-with-rmanj-and-consolidates-as-the-largest-group-of-assisted-reproduction-in-the-world/; last entry August 20, 2020).
11. https://www.fertilitybridge.com/blog/2018/4/11/battleforivfmarketwallstreetvsprivatePractice; last entry September 20, 2020).
12. Bronwyn Parry introduced the concept of reproductive (sub)empires during the "Colonial Lineages of Global Fertility Chains" workshop (organized at King's College London on March 28–29, 2019) to describe how senior Indian reproductive specialists are further expanding infertility service provision into emerging markets such as Africa, the Middle East, and Latin America (see the forthcoming special issue with Catalyst Journal on "Colonial Lineages of Global Fertility Chains," guest-edited by Sigrid Vertommen, Bronwyn Parry, and Michal Nahman).

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