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Income inequality and the imprint of globalization on U.S. metropolitan areas

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ABSTRACT

Inequality in metropolitan areas is at least partly framed by a paradoxical triangle of competing constituency motives over resources allocation. Chief among these motives is the penchant for urban economic development, leaving ecological sustainability and socioeconomic equity as "subordinate" considerations. For global cities in particular, understanding inequality in such a context highlights the extraordinary intensity of economic development motives in sustaining their worldwide centrality, connectivity and command over the forces of globalization. As a comparative empirical study of 53 large U.S. metropolitan areas, this paper examines economic development within a global city that plausibly explains its propensity for heightened income inequality. It applies an empirical-based path analysis in tracing essential workings of the paradoxical triangle in a global city's ongoing struggle to maintain global eminence. As an exploratory inquiry, it examines heightened income inequality as a function of (a) the global city's assemblage of strategic "cornerstone" resources to sustain global advantage, and (b) the concomitant polarizing effect of such assemblage on metropolitan employment structure.

1. Introduction

Inequality in urban America tends to be couched in a triangle of competing paradigms that juxtapose economic development, ecological sustainability, and socioeconomic equity – the "Three Es" (Saha & Paterson, 2008). Although some argue that "sustainable economic development" has become an achievable outcome (e.g., Burns, 2016; Parkin et al., 2003; Purvis, 2020), "equitable economic development" remains in infancy (Hollander & Kahl, 2010). In the latter, policy makers are more likely to be saddled with insufficient resources, insoluble "wicked problems" and intractable tradeoffs (Rittel & Webber, 1973; Stokan, Deslatte, & Hatch, 2021), often resulting in zero-sum outcomes favoring economic development, and providing a basis for economic inequality to exist.

Furthermore, a precipitous 50-year rise in U.S. income inequality (e.g., Flaherty & Rogowski, 2021; Mahutga & Smith, 2011; Pew Research Center, 2015; Piketty, Saez, & Zucman, 2016) suggests it is coincidental with contemporary globalization, a worldwide integration of economic development activities and emergence of an international division of labor, commencing in the 1970s. Most often, though, globalization and its consequences for inequality are examined with respect to an aggregated nationwide scene and Federal-level policies (e.g., Alden, 2016; Inglehart, 2016; Piketty et al., 2016; Stiglitz, 2016), with subsequently less focus on their comparative consequences promulgated by and occurring within a metropolitan area (MSA).

In combination, the 3-E trichotomous outcomes and globalization's influence may have conspired to influence considerably higher levels of inequality in those metropolitan areas most closely associated with and connected to global economic development matters. Such mutually reinforcing circumstances may represent a significant oversight in the research, especially since MSAs vary according to their internal institutional and infrastructure contexts, and in the connectivity and centrality they have with globalization and global economic networks. One might therefore expect urban economic development, especially those dimensions having consequences for socioeconomic inequality, to at least partially vary according to a metropolitan area's centrality to, preoccupation with and immersion in globalization. Although past research has achieved mixed or inconclusive support for this argument (Timberlake et al., 2012), recent multiple-regression analysis produced significant results showing that distinguishing features of an MSA's "global-city status" may be consequential in aggravating economic inequality at the metropolitan level (Boschken, 2020).

As a follow-on study, this article identifies specific economic-development features within global cities that appear to mediate a causal relationship between global-city status and socioeconomic inequality. The guiding question for the analysis asks: how do a global

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city's economic-development motives become operationalized as endogenous mediating variables in response to their direct and indirect involvement with globalization? Using empirical path analysis to explore plausible causal connections between global-city status (as the independent variable) and economic inequality (as the dependent variable), the study takes a comparative cross-sectional approach involving a sample of 53 large U.S. metropolitan areas. It should be noted that interpretations of all results are limited to this sample and are not meant to be uncritically extended or applied to metropolitan areas worldwide.

Its argument and analysis are developed in four sections. The first outlines theoretical underpinnings of the overarching argument, first, in distinguishing an MSA's global-city status as the independent variable initiating the path analysis, and second, in defining socioeconomic inequality as the dependent variable culminating the path analysis. The second section describes the path-analysis methodology employed to structure linkages between dimensions of global-city status, mediating forces within the MSA, and subsequent impacts on economic inequality. The third section provides the detailed path-analysis results, and is followed by a discussion section focused on interpretation and extensions of results. The conclusion provides essential takeaway points and indicates avenues of further research.

2. Theoretical framework

2.1. Global-city status

Some may argue that "all cities are global," but, in terms of metropolitan character, cultural robustness, cosmopolitan atmosphere, and world connectedness, global cities stand apart on a comparative scale in at least three ways: (1) their vastly greater resource capacities to maintain global advantage, (2) their commanding influence over national and international policy, and (3) their central role as nexus in the "traffic" of global economic, sociocultural and political interaction.

Of special note is the central place global cities hold as world gateways and corporate command platforms, influencing the character and movement of global activity flows. But in addition to commanding the transnational flows of world trade, there are also corresponding magnitudes of interaction within global cities involving multiculturalism, sharing of intellectual capital, world-dominant entertainment stages, multi-national processes among governments, and more. Hence, one can expect multiple causal agents of inequality that have their principal appearance within those urban places most tightly coupled to, interdependent with, and central to globalization.

In its original identification, the "global city" concept is most often attributed to the seminal work of Hall (1966), Friedmann (1986) and Sassen (2001), all of whom argue that the global city refers to a discernible urban habitat, acting as a portal and stage for world connectivity and interaction. Indeed, these foundational works conger up the image of a place that is, at once, contemporary, international, multicultural, "wired", innovative, cosmopolitan, congested, and a gateway for geographically-boundless spheres of human mobility. Hence, by carrying the imprint of globalization, the global city is distinguished from other MSAs in being more than just a large metropolitan area.

While some have adopted this multi-dimensional characterization (e.g., Boschken, 2003, 2008; McDearman, Clark, & Parilla, 2013), much of the post-2000 work has described the distinctiveness of global cities in mono-dimensional terms (e.g., the Global and World Cities Research Network [GaWC], 2021; Derudder & Taylor, 2021; Timberlake et al., 2012). For example, some argue that an MSA's global-city status can be fully accounted for solely by its connectivity to a world network of corporate command and control (Bassens & van Meeteren, 2015; Derudder & Taylor, 2021). Other mono-dimensional proponents see global-city status as mainly characterized by the MSA's position as a world air-passenger gateway (Mahutga, Ma, Smith, & Timberlake, 2010; Timberlake et al., 2012).

By contrast, the research reported in this article describes the global city by a multiple-dimensional construct, based on two types of endogenous urban artifact. First, the global city offers a critical mass of central functions and infrastructure associated with a world-scale assemblage of "parts." Because global cities tend to be large places, they are able to provide thresholds in form and scale which confer agglomeration economies enabling endogenous participants to engage across a place-based matrix of development activities (Giuliano, Kang, & Yuan, 2019; Glaeser, 2010; Porter, 1996). Secondly, the global city infuses the "on-site" cultural, enterprise and political content of globalization by providing an urban milieu characterized by world-centered activities and institutions specifically found within business services, scientific research and education, media and entertainment venues, and multicultural amenities.

Referring to these dual identities of function and content, Nyman (1996, p. 6) describes the global city as both "the city in the world" and "the world in the city." Projecting this dual imagery, the global city appears empirically as a multi-attribute strategic platform of world connectivity manifested in discrete sets of urban institutions and supporting infrastructures that are less characteristic of other metropolitan areas. This is not to say that all aspects of an MSA are global or have "global relevance." As Sassen (2020) points out in distinguishing global cities, "it is not simply the whole city that is global; it is a specific set of vectors."

Given Sassen's observation, the inclusion of relevant dimensions becomes a more focused exercise both conceptually and empirically. Such a delimited effort to identify an MSA's global-city status has been accomplished and reported elsewhere (Boschken, 2008, 2020), where this construct is defined by seven distinguishing dimensions: (1) spatial configuration involving scale and density, (2) a corporate platform for global economic command-and-control, (3) a world research crucible, (4) a center of global entertainment, (5) a nexus of multiculturalism, (6) a gateway for international travel and world trade, and (7) intraurban mobility/access enabled by an MSA's transit infrastructure. As mutually reinforcing components, these quintessential attributes capture the comparative presence of globalization and its holistic influence within those metropolitan areas referred to as global cities.

2.2. Inequality in urban America

The presence of socioeconomic inequality defies a notion that the U.S. is a homogenous society, mostly consisting of "median" individuals and households. Indeed, inequality exists as a relative condition within a societal heterogeneity characterized by differential access to life opportunities, resources, upward mobility, societal stature, cultural centrality, institutional fairness, and other fruits of life. As seen in a voluminous contemporary literature, inequality in the U.S. is multi-dimensional (e.g., Glassman, 2019) with many component parts that share significant overlap in conceptual space. Although some argue to the contrary (e.g., Inglehart & Norris, 2017, p. 446), different forms of inequality are highly interdependent, probably mutually reinforcing, and behave holistically (Duncan & Murnane, 2011; Hacker & Pierson, 2014; Ridgeway, 2014; Stiglitz, 2016; Weininger, Lareau, & Conley, 2015).

Reflecting access barriers and blocked opportunities, inequality may therefore simultaneously manifest in such equity conditions as gender and race discrimination, diminished educational achievement, family heritage of poverty, voter suppression mechanisms, economically-indefensible differentials in employment income and household wealth, and disparate child-rearing patterns. Such access barriers and blocked opportunities also extend to intergenerational mobility (Chetty et al., 2016), and are often spatially observable in the clustering of geographical segregation within metropolitan areas (Hulchanski, 2010), especially involving residential sorting (Bischoff & Reardon, 2013).

Nevertheless, if one dimension stands out in the U.S. as more central or encompassing of others, it would probably be economic inequality. Its

persistent condition also may stand as a useful empirical proxy for other less-quantifiable equality dimensions. As a proxy, however, it can easily be confused with its legitimate existence based on marginal productivity theory (Stiglitz, 2016). In contrast, what makes inequality an equity issue is its "economic unfairness" (Rothwell, 2019; Starmans, Sehskin, & Bloom, 2017). As Stiglitz notes, competition is less than perfect, creating distortions in pay and contribution based on extraordinary market transitions, market externalities, tax policy, monopoly behavior, and such extra-market factors as exploitation and discrimination. Most appear to have become accentuated since the 1970s with the emergence of contemporary globalization.

In comparing global cities with other metropolitan areas, the meaning of economic inequality may be expressed by various indicators, depending on whether one's focus is on (1) income vs. wealth, (2) overall economic inequality, or (3) the economic disparity between very high incomes and those of different slices of the metropolitan employment structure (Glassman, 2016). Hence, the conceptual meaning of economic inequality is evidenced by cache of multiple indicators incorporating different aspects of the concept. Four indicators are used here as the dependent variable and resultant outcome of the path analysis.

3. Methodology

To interpret how global cities (in comparison with other MSAs) might actuate their independent effect on economic inequality, the research employs a simplified non-recursive path analysis, structured to specify a model of mediating or intervening variables within the metropolitan area. Guided by theoretical argument and supported by statistical coefficients, it is deployed as a heuristic or exploratory method for identifying potential causal patterns within a framework of direct and indirect relationships. In this limited application, path analysis is intended only to identify plausible evidence-based relationships that follow a scheme of "causal reasoning" (Stephan, Tentori, Pighin, & Waldmann, 2021; Waldmann & Hagmayer, 2013). Through its pathway framework, it is designed to synthesize and codify a range of ideas from various quarters and show how evidence stacks up to support a clear and precise pathway logic. That said, selecting a deficient list of variables is a problem difficult to overcome in all path analysis (Meehl & Waller, 2002).

Data for pathway variables were compiled for a sample of 53 large U. S. MSAs, the largest of which contains a population of nearly 20 million and the smallest of which is just under a million. The sample includes both MSAs exhibiting high global-city status according to factor values and MSAs having more nominal values. All variables and their pathways are driven by conceptual underpinnings suggestive of their connection to global-city status and their theoretical consequences for inequality. In addition, each variable's effect in passing along or accentuating the influence of global-city status on income equality is empirically shown by non-recursive pathway coefficients (r).

Although every effort is made to be conceptually and empirically precise, alternative interpretations to the study's pathway argumentation remain a possibility. Moreover, pathways and/or their component variables may be incomplete, and those that are, may involve influences exogenous to the path model. For example, such variables external to a metropolitan area might include effects from national economic policy, national social movements, national political unrest, global warming, pandemics, global regime change, and more. Any of these might indirectly alter pathway features and relationships, but attempting to capture and account for these possibilities lies beyond the scope of this inquiry.

3.1. Variable specification

All variable data in the path analysis are interval-scaled and have statistical significance at .01 or .05 levels within their pathway relationships linking global-city status with four measures of economic inequality. Data were acquired from existing publicly-available sources, including the U.S. Census, U.S. Bureau of Labor Statistics, Brookings Institution, Pew Research Center, The Urban Institute, and numerous research papers. Variables were intended to be of the same time period, but corresponding data were not jointly available for a single common year. Hence, the data sample represents proximal years, specifically years 2010 and forward, with the majority of data falling within a time interval between 2015 and 2020.

3.1.1. The independent variable

The initiating variable for the path analysis is "global-city status," which measures the comparative emersion-level of MSAs in globalization. As reported more fully elsewhere (Boschken, 2008, 2020), the variable is identified empirically as a factor value composed of seven principal components which highlight their mutual reinforcement as a multi-dimensional characterization. Specifically, the principal components analysis of the seven components resulted in a single factor, composing 100% of the multi-dimensional variance. As the independent variable, this factor is deployed here as the empirical indicator distinguishing global cities from other MSAs along an interval scale.

3.1.2. Mediating variables

Instead of identifying the myriad of pathway variables here, specification of these variables along with their discrete data are reserved for the path analysis section. Their specification is provided in conjunction with the identification of each variable's place in a pathway under the premise that proximity to and integration with the pathway discussion is a more optimal place for associating their role with empirical validity, and in understanding connections between a variable's use in the pathway and its supporting empirics.

3.1.3. The dependent variables

In this study, economic inequality variables use household income data reflecting both overall inequality in a metropolitan area and the MSA's disparity between income levels. Household income was adopted instead of individual income because it was more commonly used among available MSA data sources. For measuring overall income inequality, the Gini Coefficient Index is the most widely recognized and commonly used indicator (Florida, 2017; Glassman, 2016; Lakner, Negre, Cuesta, & Silwa, 2016). Gini is defined as an index representing skewness of income distribution for the entire working population. Based on a Lorenz Curve model, it is a closed-scale measure of values between 0 (where everyone receives an equal share) and 1 (where only one recipient receives all the income) (U.S. Census Bureau, 2018; Dorsch & Maarek, 2019; Lerman & Yitzhaki, 1984). As an example, in 2018, Gini for the total U.S. working population stood at 0.485, which was among the world's highest for developed countries.

In the case of disparity among income levels, ratios between extremely high-income households (e.g., top 0.01%, 1%, 10%), and lower household percentiles (e.g., lowest 10%, 20%, 50%) are used. Specifically, this study includes (1) the 90–10 income disparity ratio, composed of incomes higher than 90% of all MSA households divided by the incomes of those poorest households (poverty-stricken "underclass") at the 10th percentile (data from the U.S. Bureau of Labor Statistics, 2015); (2) the 95-–20 income disparity ratio, composed of the top 5% of income earners and the lowest quintile of low-wage earners (data from Brookings, specifically Berube, 2018); and (3) a 99–50 disparity ratio, composed of the top 1% of household incomes (i.e., households composed of billionaires, large-corporation CEOs and their associates) divided by median incomes representing "middle class" households (data extracted from U.S. Census Bureau, 2018a, 2018b; Sommeiller & Price, 2018; Pew Research Center, 2018).

4. Path analysis – tracing plausible causal linkage

In other reported research (Boschken, 2020), multiple regression

analysis found that *the more a metropolitan area exhibits the traits of a global city, the greater the level of inequality present*. For example, in the case of overall economic inequality (i.e., Gini Index), the regressions indicated a causal effect of an MSA's global-city status to be statistically significant ($t = 5.53$, signif. = .000). In the case of income disparity between the top 10% and lowest 10% of incomes, global-city status also appeared as a strong causal agent ($t = 5.67$, signif = .000). Remaining unclear, however, is what pathway mechanisms are in play. That is, if the global city is defined as a place-based platform or crucible of institutions and processes enmeshed in the global socioeconomic order, what endogenous mediating variables link such global-city status to inequality?

Drilling down on this question, the path analysis shown in Fig. 1 offers a heuristic method to trace plausible causal pathways initiated by global-city status and culminating in economic inequality. In so doing, the research found two areas that particularly appeared to distinguish the global-city setting from that of other MSAs. The first has to do with the propensity for a global-city's complex of influential actors to establish and maintain cornerstone resources critical for achieving advantage in the global economy. The second has to do with a subsequent polarization of the employment structures in global cities. As a sequence of causal plausibility, each is a part of the pathways to inequality, but in the case of cornerstone resources, impacts on inequality are theorized to occur both directly and indirectly. In the case of a polarized employment structure, only direct effects appear to achieve significance.

4.1. Cornerstone resources for global-advantage

Global cities attract very significant specialized resources that are particularly instrumental to maintaining its connectivity and centrality to globalization. Comparatively, such differentiating resource concentrations are not found in similar magnitude across other metropolitan areas. Although several resources may have relevance, the path analysis identifies three of particular note, each having a significant association with the factor values representing an "umbrella" of global-city status. They include:

Agglomerations of Innovation-Resources (correlation with Global-City Status Factor: r = .80, signif @ .01 level). Despite advantages of internet communications, the spatial agglomeration or clustering of heterogeneous and interdependent tasks provides in-person dynamics and multi-sensory interaction essential to innovative behavior. The result of this mutual proximity creates a decided "competitive advantage" favoring creativity and innovation (Giuliano et al., 2019; Muro & Liu, 2021; Porter, 1996, 1998; Saxenian, 1996). On this point, global cities are acknowledged as both wellsprings of development capital and agglomerations of "Schumpeterian entrepreneurship" [expressed as the theory of "creative destruction"], discovery, and avant-garde invention for the global economy (Adler, Florida, King, & Mellander, 2018; Florida, 2017; Muro & Atkinson, 2020).

Furthermore, through their disproportional concentrations of capital and other advanced producer services, global cities are citadels of local support and infrastructure for innovation. Moretti (2019) argues, for example, that "despite the higher costs" of global cities, inventors and creators prefer such places because they provide greater global economic visibility and access, and better spatially-aggregated support for innovation. Reflecting this symbiotic relationship, data show that between 2005 and 2017, global cities were the principal centers of innovation resources, having both the largest cumulative amounts of venture capital invested and the number of new-firm startups (Florida & Hathaway, 2018; Sarycheva & Muro, 2021).

At the receiving end of this funding and startup activity are agglomerations of individuals, typically having advanced technical and design skills (Muro, 2020), who are engaged in a multidimensional "creative economy" (Florida, 2012). Not to be confused with established or traditional industries, these agglomerations are inter-group collaborations which tend not to conform to conventional industry norms and bureaucratic behavior. Going even further, Clark and Silver (2016) refer to these resource agglomerations as urban "scenes" consisting of atmospheres that "cultivate skills, create ambiances and inculcate commitments" to habits of experimentation and imagination (pp. 111–112).

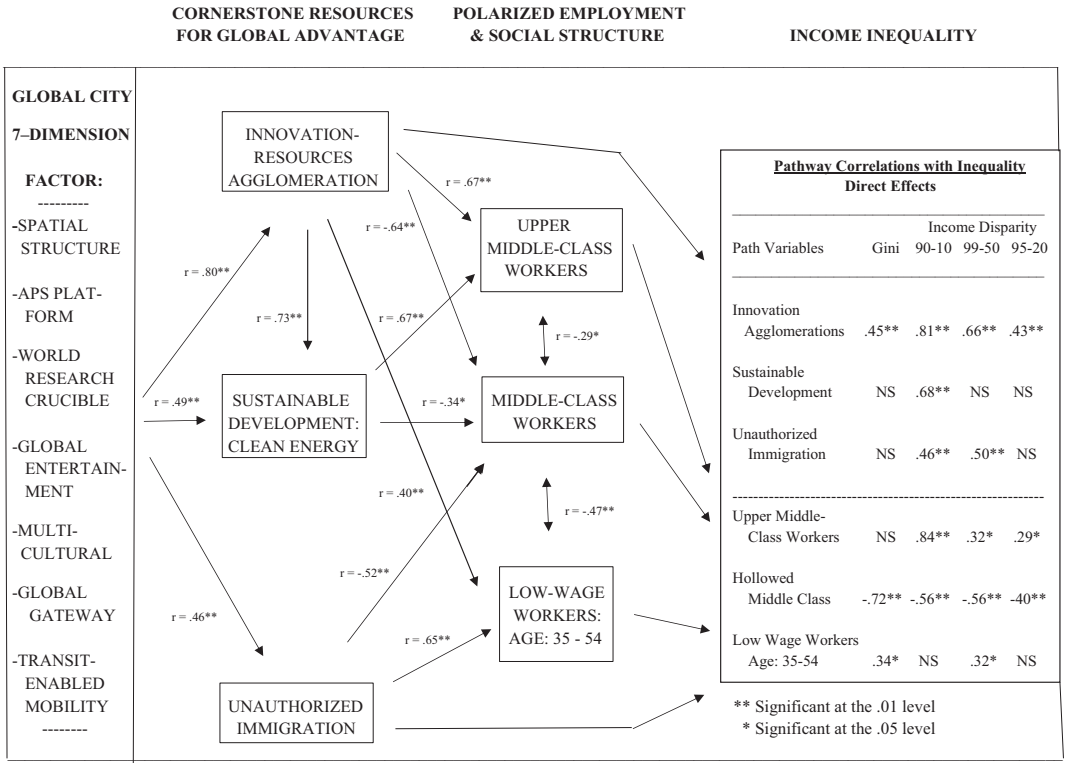

Fig. 1. Inequality: casual pathway components within the global city.

Huggins and Izushi (2009) make an association of such agglomeration of "intellectuals" with a global city's "knowledge competitiveness" worldwide. Speaking to magnitudes of difference among metropolitan areas, a Brookings study shows further that "agglomerations of highly skilled workers and…the innovation sector has…helped spawn a growing gap between the nation's dynamic 'superstar' metropolitan areas and most everywhere else" (Atkinson, Muro, & Whiton, 2019).

Quantifying such agglomerations of innovation resources is done here by use of a single factor, composed of three variables. The first is an estimate of the cumulative dollar investment of venture capital in an MSA between 2005 and 2017 (factor component r = .85). It is a measurement of differential size of innovation resources specific to each MSA in the 53-MSA sample using data from Florida and Hathaway (2018). The second component addresses the MSA's startup ecosystem and is called the "Startup Complexity Index" (component r = .98). The SCI data is from Liu and Parilla (2019), who create the index from an interaction variable combining "startup diversity and startup ubiquity." Diversity represents the variety of technology categories in which startups are engaged, while ubiquity represents their omnipresence in the most advanced innovation industries. The third factor component is a human-resources variable and is defined as the number of employees working in "advanced industries" (component r = .87). Such industries are characterized by Brookings as heavily invested in technological innovation and employing "skilled technical workers to develop, diffuse, and apply new productivity-enhancing technologies" (Muro, Rothwell, Andes, Fikri, & Kulkarni, 2015).

With its comparatively greater presence in global cities (r = .80, signif @ .01), and consistent with its role in providing competitive advantage in the global economy, the agglomeration of innovation resources bears heavily on the endogenous metropolitan culture, economic character, and heterogeneous production mix. That is, in addition to agglomeration nurturing innovation and the entrepreneurial desires of its matrix of contributing inventors and professionals, it also has impact on the overall metropolitan area, most particularly on economic inequality (Flaherty & Rogowski, 2021). While this may happen through multiple pathways, research brings to the surface two avenues of potential occurrence.

In the case of indirect pathway impacts, innovation agglomeration appears to contribute to inequality through its polarizing effects on a global city's employment-structure. Specifically, Fig. 1 shows this collateral effect on overall metropolitan employment to involve (1) the seeding of a concentration of highly-educated, high-income, skill-based, professional upper-middle-class employees (r = .67, signif @ .01), while simultaneously (2) deflating demand for manufacturing-oriented middle-class workers (r = −.64, signif @ .01), and (3) nominally stimulating employment opportunity for low-wage workers (r = .40, signif @.01). To be discussed in the inequality section below, this polarizing effect on MSA employment structure leads to heightened inequality, both overall and for income disparities, even though overall metropolitan poverty levels may remain unaffected.

Consistent with these Fig. 1 correlations, other research found that the innovation agglomeration's penchant for "skill-based technical change" leads to higher metropolitan-wide inequality (Card & DiNardo, 2002; Giannone, 2017). By comparing divergent wage-level experiences among metropolitan areas for both high- and low-skilled workers, that research found that since 1980, technology-driven skill-based technical wage growth was greatest in global cities. At the same time, wages for lesser-skilled manufacturing jobs in the global city had stagnated, in part, because these workers had become peripheral to the needs of an MSA increasingly dominated by innovation clusters.

As the replacement of manufacturing jobs with innovation employment took hold, the "hollowing of the middle" forced many in this category to drift downward to employment opportunities in the low-wage service sector. In short, the indirect route for innovation agglomerations to effect MSA inequality appears to operate in part through multiple paths affecting the configuration of a global city's employment structure. Agglomeration of innovation resources thus appears to be a likely cause of employment polarization, fed by increases in both the top-end and bottom-end of the employment structure.

In the case of a direct pathway effect of innovation agglomeration on inequality, Fig. 1 indicates this mediating variable to be significantly correlated with overall inequality as well as the three disparity ratios (i.e., for Gini, r = .45; for the 90–10 ratio, r = .81; for the 99–50 ratio, r = .66; for the 95–20 ratio, r = .43; all significant at the .01 level). Throwing light on these direct associations, some researchers argue that, by virtue of an urban economy skewed by innovation-sector employment, there may be a greater socio-cultural appreciation in global cities for intellectual property and "technology entrepreneurship", potential new enterprise frontiers, and high-tech worker importance (Liu & Parilla, 2019).

Benner and Feng (2020) argue further that such preferential appreciation for innovation resources encourages acceptance of an edict to "move fast and break things," that willfully creates a "pattern of generating poverty jobs." Compounding this insensitivity or disregard for socioeconomic consequences is a "credentialist prejudice" defined by Sandel (2020) as a "disdain for the less educated" workforce. In short, it might be that many global-city inhabitants (including public policymakers) appear more enamored with and supportive of their MSA's creative scenes and innovation ethic than they may be sympathetic with the plights of those peripheralized in traditional industrial and service employment.

Sustainable-Development Investment (correlation with the Global-City factor: r = .49, signif @ .01 level). The signature marque of a global city is its high-visibility for world-centered economic development. However, all urbanized metropolitan areas are subject to significant confining pressures of a biodiverse ecology. Hence, this combination of economic-development needs and maintaining ecological-system integrity places all such MSAs at the nexus of a complicated sustainability paradox (Boschken, 2013; Marshall, 2005; Turner, Subak, & Adger, 1996).

Faced with such socioecological complexity (Ostrom, 2009), global cities nevertheless have comparatively greater fiscal and technological advantages over other MSAs that likely better enables and disposes them toward investing in high-impact and high-visibility aspects of sustainable development. In addition, a global city's worldwide presence of innovation agglomerations may auger for the application of high-tech solutions to address wicked problems associated with the paradox in highly-visible and publicly-discernable ways.

Many environmental issues are subsumed under sustainable development, but by virtue of being embedded in different ecosystems, MSAs are not subject to the same mix of sustainability factors and therefore do not produce identical socioecological solutions. Moreover, some environmental programs are universal to all MSAs, but consist of a vast array of "apples and oranges" having little management standardization. Municipal solid waste is a case-in-point, in part because it covers a number of "recyclable" and waste categories defined and addressed by MSAs differently. This presents a methodological quagmire for broad inclusion of programs for this research.

Nevertheless, in seeking generalizability to sustainable development, the study identifies a single program germane to all MSAs to illustrate significance of comparative investment in environmental resources. This sustainability program is called "clean energy" (Ribeiro, 2019), and it focuses primarily on energy supply and utilization efficiency in reducing climatic and atmospheric effects of "urban metabolism" (Broto, Allen, & Rapoport, 2012; Cui, 2018; Wolman, 1965). As one of the global city's cornerstone resources for global advantage, sustainable clean energy therefore speaks to a global-city's penchant for command and control over global markets, especially in cases of dependency on foreign resource-suppliers of such essential commodities as fuel.

Data for the variable is from the annual clean-energy "scorecard" produced by the American Council for an Energy-Efficient Economy (Ribeiro, 2019). Consistent with the aims of sustainable development,

the scorecard is an index based upon the assessment of metropolitan area commitments to policies and investment incorporating advanced technologies to address air quality and anthropogenic-caused global warming. It is therefore consistent with the application of technology to ecological systems to produce more economic output with less drawdown on environmental resources. The fact that sustainable clean energy has a larger presence in global cities, where innovation agglomerations are also the most prevalent, suggests opportunities for technology transfer may be feeding local sustainable-energy development (as seen in the Fig. 1 correlation between these two cornerstone resources, r = .73, signif. @ .01).

In addition to indirect effects on inequality, sustainable-resources development also appears to have a limited direct effect. Although not showing significant relationships with the Gini Index and two of the disparity ratios, Fig. 1 does indicate that sustainable development has an effect on the 90–10 ratio which measures the disparity gradient between very affluent income earners and the working poor (r = .68, signif. @ .01 level). Sufficient research is unavailable at this point to identify why this specific direct effect on income disparity exists.

Unauthorized Immigration as Human Resource (correlation with the Global-City Factor: r = .46, signif @ .01 level). Having an industry mix dominated by global platforms of command & control, world-scale research & development, and international entertainment venues, the global city maintains an employment base accentuated by high-skilled technical and professional jobs rather than conventional manufacturing employment. However, attendant to this industry emphasis is a corresponding demand for service-operations workers (both commercial and personal) characterized as low-skilled and unskilled (Sanderson, Derruder, Timberlake, & Witlox, 2015). Many of those filling such demand are unauthorized immigrants, who Benton-Short, et al. characterize as a "powerful example of 'globalization from below'[which] needs to be integrated into our understanding of global city dynamics" (Benton-Short, Price, & Friedman, 2005, p. 945).

In the case of immigration dynamics, this bi-polar employment distinction reveals an important difference between those that are authorized to work in non-farm U.S. jobs and those who are unauthorized. For example, using a "between-groups design" to compare public perceptions of unauthorized vs. authorized immigrants, Murray and Marx (2013), found that those who are unauthorized are typically unskilled, most often limited in professional employment opportunities, and are viewed with greater prejudice than authorized immigrants. Probably not by coincidence, "high concentrations of unauthorized immigrants provide an inexpensive and readily-available supply of workers to fulfill menial employment needs" (Autor, 2019). Examples include office clerical work, delivery services, food and beverage tasks, construction, urban infrastructure maintenance (commercial and residential), housekeeping, and personal services. As such, in a global city's "ecology of jobs" (Timberlake et al., 2012), unauthorized immigrants, pursuing non-agricultural work opportunities, find more plentiful choices provided directly and indirectly by the platforms of global-city economies than available in other MSAs.

Besides the draw from low-skill employment opportunities, unauthorized immigration also may be facilitated by a global city's status as a multi-cultural anchorage where foreigners are able to feel more assimilated. Like authorized immigrants, most unauthorized immigrants come to the U.S. as a family household and have settled in a particular area for long periods of time (Budiman, 2020; Passel & Cohn, 2009). Although most arrive from Mexico and other parts of Latin America, substantial numbers also come from South Asia, Asia, the Middle East and Africa (Budiman, 2020). When settling in the U.S., "unauthorized immigrants tend to live…among lawful immigrants" (Passel & Cohn, 2017), partly as a means of familial support and partly to "blend in."

In terms of location, unauthorized immigrants are significantly more concentrated in fewer places than the overall U.S. population. Contrary to beliefs that most are farm workers, Pew Research found that 60% work and reside in the 20 largest metropolitan areas (Passel & Cohn, 2017). Nearly half of those identified are global cities. With this concentration in global cities, unauthorized immigration appears to be a mediating variable in the path analysis, having both indirect and direct effects on income inequality.

As shown in Fig. 1, indirect effects occur through impacts on two out of the three components of a global-city's employment structure, having a significant negative impact on the size of middle-class employment (r = −.52, signif @ .01) but a significantly positive influence on the number of low-wage workers (r = .65, signif @ .01). These correlations are consistent with the argument that unauthorized immigrants feed an opportunity for employers to substitute more expensive/more skilled workers with lower-wage workers by virtue of an employer's greater bargaining power in dealing with workers having unauthorized status. Concomitantly, this inferior competitive status of unauthorized workers may pose a downward pressure on median and very-low wages generally, thus adding to the disparities seen in the subsequent inequality ratios.

As a direct pathway, unauthorized immigration appears to have a more nuanced impact on inequality. Although lacking significance for overall inequality (as measured by Gini) or the 95–20 disparity ratio, this mediating variable is a significant predictor of both the 99–50 disparity ratio (r = .50, signif @ .01) and the 90–10 disparity ratio (r = .46, signif @ .01). As one explanation of this nuance, the significant correlations limited to only these latter two ratios may point to the role global-city status exerts on inequality by way of unauthorized immigration. For example, as a backdrop encouraging unauthorized immigration, a global city's platform of command and control (second dimension of the global-city status factor) includes a preponderance of high-income corporate non-manufacturing professionals who also exhibit comparatively higher demands for limited-skill personal services, a category predominately served by unauthorized workers. Hence, correlations of unauthorized immigration with the two inequality disparity ratios (i.e., the 99–50 and the 90–10) plausibly may be seen as a result of such global-city demand for unauthorized immigration, which accentuates the particular income disparities seen here.

Moreover, since the concentration of unauthorized immigration would seem to correspond with the global city's metropolitan culture, economic character, and production mix, it is conceivable that this mediating variable's direct correlation with inequality, albeit partial, may be related to racial/class discrimination in employment. For example, Murray and Marx (2013) show that (1) distinctions according to race/class are made in comparisons of authorized and unauthorized immigrants, and (2) discrimination of unauthorized immigrants is more pronounced than for legal immigrants and foreign-born citizens. Hence, the two disparity ratios depicting inequality conceivably are the direct result of unauthorized immigrants being "channeled" by discrimination into lower-wage job opportunities where their employers also take advantage of their unauthorized immigration status.

4.2. *Polarized employment structure*

As the path analysis illustrates, global-city status appears to spawn disproportionately large concentrations of specialized "cornerstone resources" that provide multiple means to enhance worldwide centrality and competitive advantage in globalization. However, these resources may also have a downside in that they appear to induce certain economic conditions of significance to income inequality. The largest of these may be a "polarized employment structure" (Autor, 2019; Hennig, 2021; Jaimovich & Siu, 2018), consisting of an affluent upper middle class of highly educated skilled workers, a "hollowed" middle class, and an enlarged contingent of low-wage workers. Although some contend that no relationship exists between a polarized employment structure and inequality (Hunt & Nunn, 2019), the path analysis here demonstrates a rather significant and complex likely causal effect on inequality. To illustrate, the analysis of employment polarization and its effects on inequality are broken down according to three basic

employment components:

Upper Middle-Class Workers (Fig. 1 correlation with innovation agglomeration, r = .67; signif. @ .01; with sustainable development, r = .67, signif. @ .01; and with unauthorized immigration, not significant). The imagery and high visibility of innovation agglomerations against a backdrop of global command-and-control platforms give global cities a distinct character and presence many find worthy of awe and admiration – distinctions not typically attributed to MSAs short on these global institutions. This esteem, reverence and status are often self-attributed as well as bestowed by others, but either way, refer to powerful trendsetting world-centers of money, technology, institutional control, and political influence.

More importantly, such stature transfers to the persona of their influential urban residents (Thal, 2020), who are viewed as "having institutional connections or titles," being "close to the technology" or employed in activities requiring the systematic application of a relatively complex body of symbolic or conceptual knowledge (Brint, 2001; Reich, 1992). Such a workforce segment may include engineers, scientists, designers, artists, corporate managers, management consultants, investment bankers, marketing gurus, policy wonks, entrepreneurs, and strategic planners. In nearly all cases, they reside at or near the top of the employment structure.

What they most exhibit in common are high annual incomes (>$200,000 in 2019, Census-defined), professional employment, and a college degree. In terms of household characteristics, their socioeconomic presence is magnified by enriched family connections and activities. Combined into a single factor, these characteristics describe a distinct employment segment, often referred to as "upper middle class" (UMC), a genre with enlarged public visibility since the 1970s emergence of globalization (Boschken, 2003; Lineberry & Fowler, 1967). Data for the three factor components are from the U.S. Census Bureau (2018b).

With respect to this employment segment's impacts on inequality, Fig. 1 shows a mixed picture. Although indicating UMC workers have an insignificant influence on overall inequality (the Gini Coefficient), it shows correlations of varying significance across the income disparity ratios (correlations with the 90–10 ratio, r = .84, signif. @ .01; with 99–50 ratio, r = .32, signif. @.05; and with 95–20 ratio, r = .29, signif @ .05). Significance of the 90–10 ratio is the most pronounced and is of particular note because it measures the income disparity closest to a juxtaposition between UMC workers, an employment status most likely to gain from global-city status, and the working poor, with a less-visible more peripheral place in the global-city economy.

Middle-Class Workers (Fig. 1 correlations: with innovation agglomeration, r = −.64; with sustainable development, r = −.34; with unauthorized immigration, r = −.52; all signif @ .01). Although the basis for identifying the middle-class workforce may be according to an amalgam of achieved education-level, skill-sets, work-settings and lifestyles (Autor, 2019; Emmons, Kent, & Ricketts, 2018; Gest, 2016; Hooker & Tillery, 2016; Inglehart, 2016), the most reliable estimates of its size in the employment structure are by household income (Berube, 2018; Pew Research Center, 2018). Data for this measure is taken from the Pew Research Center, which classifies middle class comparatively for MSAs as "the percent of the working population having annual household incomes ranging between 67 percent and 200 percent of the overall median household income" ($45,200 and $135,600 in 2016).

Putting this income level in the context of a polarized employment structure (e.g., Autor, 2019; Autor, Katz, & Kearney, 2006), the middle-class worker represents a shrinking component of total employment numbers. In metropolitan areas, its role in accentuating polarization is derived from what has been called a persistent "hollowing" (Emmons et al., 2018; Jaimovich & Siu, 2018; Pew Research Center, 2015), resulting both from intergenerational upward mobility enabled by a college degree (Chetty et al., 2016), and from persistent declines in employment opportunity for skilled and semi-skilled labor driving workers to low-wage status (Hennig, 2021). The formation of this middle-class employment trough was a post-1970s phenomenon which contrasted markedly from the post-WWII employment structure where a numerically-robust middle class provided a stabilizing influence, bridging rich and poor (Scheidel, 2017, p. 20).

In the path analysis, hollowing of middle-class employment is among the most critical elements distinguishing income inequality in global cities. Indeed, among all the pathways significantly affecting inequality, those linking the global city's cornerstone resources and a middle-class workforce appear as the most powerful. Take, for example, the impact of innovation agglomerations. According to Autor (2019), the dynamic presence of "specific industries and occupations would be expected to have non-neutral impacts on the structure of occupations across metropolitan areas" (p. 8). In the case of a global-city's innovation agglomerations (which are partially populated with clusters of entrepreneurial startups primarily funded by venture capital), the polarizing impacts on the global-city employment structure is substantial, especially on the middle-class component.

As established by other research, (e.g., Autor, 2019; Jaimovich & Siu, 2018; Kochhar, 2018; Florida, Mellander, & King, 2017; Levy & Murnane, 1992), the hollowing effect is an essential ingredient in polarizing the employment structure across all MSAs. However, the path analysis here shows the polarized structure also to be a function of a global city's unique concentration of cornerstone resources, involving an inverse causal effect on the proportion of middle-class workers. In short, even though hollowing of the middle-class is national in scope, the presence of global-city resources, mobilized for global advantage, subsequently perpetrates an even greater decline of the urban middle-class workforce.

Regarding the impact of a hollowed middle-class on economic equity, all the inequality indicators show effects that are substantial and inversely related. Although research often justifiably attributes such inequality outcomes to a wealthy few receiving far greater shares of income than economically warranted (Mishel & Kandra, 2020; Piketty, 2014; Saez, 2015), the effect of middle-class hollowing also appears to be a powerful contributor to inequality (for Gini, r = −.72; for 90–10, r = −.56; for 99–50, r = −56; for 95–20, r = −.40; all signif. @ .01 level).

Low-Wage Workers: Ages 35 to 54 (Fig. 1 correlations: with innovation agglomeration, r = .40, signif. @ .01; with unauthorized immigration, r = .65, signif. at .01; and with sustainable development, not significant). The classification of low-wage workers has no universally agreed-upon construct that provides a precise uncontroversial definition. Instead, a number of partially overlapping alternatives exist, including "low-paid service class", "poverty jobs" and "low-wage workforce" (Benner & Feng, 2020; Florida, Mellander and King, 2017; Ross & Bateman, 2019). Often, differences among them are based on type of work rather than strictly on household income. For example, some associate the low-wage category mostly with service jobs (e.g., office clerks, retail-sales workers, food-preparation workers, nursing assistants, housekeepers, beauticians and barbers). Others focus on heavy physical work (e.g., box boys and fulfilment workers, landscapers and lawn maintenance, some construction work).

Regardless of the type of low-wage work included, global cities, as contrasted with other MSAs, contain the highest proportion of low-wage workers in the employment structure. Moreover, according to Autor (2019), Wilson (1997), and others, many in the low-wage workforce who have entered this employment category since the 1970s have done so as a result of the disappearance of skilled middle-class employment opportunities caused by metropolitan changes brought on by globalization. This disappearance has been an especially harsh reality for those attempting intergenerational mobility (Hennig, 2021).

In the path analysis, data for low-wage workers is from Brookings (Ross & Bateman, 2019) and was adopted because it included all low-wage workers, regardless of job type. Specifically, Brookings defines "low wage" as the percentage of workers in an MSA whose income falls below a "low-wage threshold…of two-thirds of median wages for full-time/full-year workers" (p. 6), where workers in this category rely on "their wages to cover basic living expenses" (p. 12).

In addition to the overall low-wage category, Brookings provides data broken down by age classifications, allowing the opportunity to identify more precisely those low-wage workers most characteristic of long-term exposure to conditions of a polarized employment structure. Since a third of low-wage workers are under age 30, and "less vulnerable" to a polarized employment structure by virtue of being "early in their careers" (p. 12), this age group was excluded. Specifically, low-wage percentage figures classified by an age bracket of 35 to 54 were selected as most representative of the low-wage worker. This is because it focuses on "people in their prime working years [who] are more likely to work full time and raise a family" (p. 7), and "do not have a clear path to higher wages" (p. 12). This age-specific category is also comparable with the age profiles of the other two components of the polarized employment structure, both of which now contain mostly mid-career workers or beyond, and a sparsity of young.

In contributing to the impact on economic inequality, low-wage workers appear to have a significance of impact comparable to the other two employment-structure components. Specifically, Fig. 1 shows low-wage workers to exhibit significant influences on overall inequality (with Gini, r = .53, signif. @ .01) and with two out of the three disparity ratios (the 90–10 ratio, r = .30, signif. @ .05; the 99–50 ratio, r = .59, signif @ .01). Its correlation with the 95–20 ratio does not reach significance, but the other results support the argument that a greater percentage of low-wage workers in the global-city workforce leads to higher economic inequality.

4.3. Composite effects on inequality

The path analysis in Fig. 1 culminates with a summary box containing multiple mediating variables having direct correlations with Gini along with the three disparity ratios. Within the box, they are separated into two categories of causal sources, based on whether they represent a global city's cornerstone resources or its polarized employment structure. As shown, the effects on inequality vary widely, indicating a complex set of often interrelated forces. Some pathway variables appear to have only a nominal effect (especially sustainable development), while others appear to be powerful across the board (e.g., innovation-resource agglomeration, middle-class workforce). Furthermore, except for relationships that do not reach significance for one or more inequality indicators, the correlations are consistent with expectations identified throughout the path analysis.

Nevertheless, a word of caution is in order. The mediating pathways between global-city status and inequality raise many more issues than a single path analysis can effectively explore without inducing heuristic confusion spawned by overcomplexity. Indeed, many pathways leading to inequality beyond those explored here and elsewhere remain unmapped, especially those involving national and other exogenous forces (e.g., federal and state tax policy, differential minimum wage, pandemic effects). Such shortcomings of this path analysis instead serve as fertile ground for future research.

5. Discussion

National or other extra-metropolitan origins of inequality aside, the path analysis has attempted to synthesize and codify a range of ideas from various scholarly quarters to establish plausible connections between global-city status, endogenous mediating variables and socio-economic inequality. The emerging picture from the data appears to reinforce the argument that powerful circumstances exist within the global city which ultimately lead to significant impacts on its overall economic inequality and specific income disparities. Among the most important, the pathway leading from global-city status (7-dimension factor) through the innovation-resources agglomeration illustrates what is also evident in inequality outcomes from the wider set of endogenous global-city pathways. For agglomeration resources, data show global-city status to have a highly influential presence on this cornerstone resource. In turn, the agglomeration resources exert a significant direct effect on the four measures of inequality, and equally significant indirect effects on inequality through the three components of the employment structure.

Regarding indirect effects, the path analysis shows that a global-city's innovation agglomeration produces a positive influence on the proportion of both UMC employment and low-wage workers in the employment structure, but an inverse (negative) effect on the proportion of middle-class workers. In what may be a "triple whammy" effect, these relationships, in combination, identify a plausible cause for a polarized employment structure above and beyond those induced by extra-regional or national-level determinants. Specifically, a global city's higher commitment to innovation agglomerations appears to lead, on the one hand, to higher presences of UMC and low-wage workers, but concomitantly, to a hollowing of middle-class workers.

A triple whammy effect on skewing and polarizing the employment structure also follows through without exception to shaping the inequality measures themselves. In contrast with other work (Hunt & Nunn, 2019), the correlation box in Fig. 1 shows all three components of the employment structure to contribute significantly to higher inequality outcomes. Hence, unlike other metropolitan areas less focused on economic development to maintain global advantage, global cities are more dependent on innovation agglomerations, which in turn, appear to create a polarized and skewed employment structure that leads to defining economic inequality.

These results also reify the efficacy of an analytical approach that may facilitate inquiry into other equity concerns within the global city beyond income inequality alone. For example, in what some see as an inherent extension, income inequality takes on a spatial dimension in the form of "income segregation" (Bischoff & Reardon, 2013), which spatially identifies inequality and often dovetails with racial and cultural segregation (Trounstine, 2020). In its multi-dimensional presentation, inequality is at the root of the most significant American domestic policy issues of the day, including employment status, intergenerational mobility, education, health, systemic racism, political extremism and development opportunity (see, for example, Mensah, 2020; Hennig, 2021; Centers for Disease Control and Prevention, 2020; Schell et al., 2020; Edsall, 2020).

Beyond the path analysis results reported here, there are certain urban-based agents that probably are neither caused by nor the cause of inequality, but which nevertheless compound the impacts on those global-city households most vulnerable to economic hardship. One example in need of further research is the considerably higher living costs incurred by those residing and working in the global-city milieu. Maintaining global-city status incurs additional cost burdens on inhabitants, that for some, enlarge "barriers" to access and participation. Such costs are not only considerably higher in global cities, but the ability to pay and rights of access vary disproportionally across the polarized income scale.

Two such costs in particular are strongly associated with an MSA's globally-competitive cornerstone resources, and include an elevated cost-of-living, and for many, the unaffordable cost of home-ownership/rental. Each is determined by metropolitan demand factors (such as prevailing lifestyles, employment mix, employee attributes, discretionary incomes, status consumption) and supply factors (such as exclusionary pricing, political coalitions against low-cost housing development, and concentration of market power among shelter producers). With respect to home/shelter costs, the design of urban development and land-use control (especially zoning requirements) are also in play to determine housing-stock volume and character. In Table 1, both of these costs are shown to be related to the global city's cornerstone resources for global advantage. For both, correlations with innovation agglomeration and the commitment of resources to sustainable development are strongly significant. Even the draw of unauthorized immigration is significant although less so than the other two cornerstone resources.

Table 1
Access cost correlations with global-city cornerstone resources.

Cornerstone resources	Cost of living	Cost of home
1. Innovation-resources agglomeration	.78	.69
2. Sustainable development	.75	.58
3. Unauthorized immigration	.44	.44

All Significant at the .01 level.

For both cost considerations, a dominant influence is employment mix, which, unlike other MSAs, is heavily skewed in global cities toward a technically-proficient workforce, and financially-connected, internationally-sophisticated corporate and not-for-profit operatives, most of whom enjoy high discretionary incomes. This is particularly evident in the type of employees drawn to the global city's agglomeration of innovation resources and globalization-focused institutions engaged in advanced producer services, multi-national research, and world entertainment venues. It is also apparent in the prevailing trust and optimism in technological solutions expressed by a global-city's comparably higher commitments to sustainable development.

However, the implicit lifestyles of such a workforce also raise specters for the cost of participation in the global-city's supercharged milieu. For those having the necessary high discretionary incomes required for access and proximity to participate, the elevated cost-of-living index and the cost of housing may be acceptable, even desirable. But, with the consequent "polarization of employment" (Autor, 2019), global cities are also places of significant economic inequality that leave many members of metropolitan employment categories without sufficient resources to live and sustain livelihoods in these areas. As a result of income inequality and higher living costs, those economically less fortunate in the workforce are often precluded from wide participation in urban resources as well as often being subjected to long inter-metropolitan commuting to lower cost areas.

6. Conclusion

This research ends where it began with a focus on the urban dilemma of inequality posed by the trichotomous paradigms of economic development, ecological sustainability and socioeconomic equity. As the 3-Es played out through the pathways of Fig. 1, one takeaway seems clear: quite apart from a nationwide origin of factors contributing to inequality, the imprint of globalization directly on specific metropolitan areas appears to exhibit a significant impact on the metrics of economic inequality. In the U.S., it appears to do so specifically through the centrality of global cities acting as institutional platforms in the playing out of world dynamics. Hence, although at variance with the conclusions of some work (e.g., Timberlake et al., 2012), results of this study are consistent with the findings of others (e.g., Bartik, 2019; Florida, 2017; Sassen, 1996; Zhong, Clark, & Sassen, 2007) in the notion that global cities matter in creating the place-based urban circumstances for heightened levels of socioeconomic inequality. It is important to stress, however, that this research shares the common vision of the global city as a geographic site of societal actors and thus is not about the "city" per se as the acting anthropomorphic agent causing social inequities.

In thinking about the various pathways of Fig. 1 and their caustic impacts on inequality, going forward, one should not expect a generic panacea to emerge in alleviating the inequity. Beside the overwhelming penchant for economic development in maintaining global advantage, two things stand in the way of equity. First, in the case of global cities as a metropolitan subtype, an urban-solutions approach is especially fraught with multiple complex issues, operating at different scales and consisting of individually unique circumstances, all compounded by global interdependencies. As Sassen argues, "It involves not just transnational actors in the global city, but also urban infrastructures and buildings containing offices, homes and entertainment facilities that are in play" (Sassen, 2020). Second, there is the question of universal applicability. This research was limited to metropolitan areas in the United States, and replication of pathways found here may not be generalized to global cities worldwide. Indeed, differences in cultures, political economies, prosperity levels, infrastructures and regimes require unique solutions and make universal proposals unfeasible.

Moreover, addressing the wicked problems of policymaking associated with inequality in global cities need to be envisioned as a regional undertaking. That likely will first require metropolitan governance to function more effectively through a redesign of the regional intergovernmental system that simultaneously emphasize better differential articulation of needs and policy integration methods tailored to achieving political equality (Boschken, 2017; Meijers, 2008). This is an especially compelling thought in dealing with a variety of circumstances along the intra-urban causal pathways, and in providing integrated outcomes that account for and draw from the imprint of globalization on metropolitan areas.

Declaration of competing interest

None.

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References

Adler, P., Florida, R., King, K., & Mellander, C. (2018). *Cities, 87*, 121–130.
Alden, E. (2016). *Failure to adjust*. Lanham,MD: Rowan & Littlefield.
Atkinson, R., Muro, M., & Whiton, J. (2019). *The case for growth centers: How to spread tech innovation across America*. Wash. DC: Brookings Institution.
Autor, D. (2019). *"Work of the past, work of the Future", (NBER working paper no 25588)*. Wash DC: National Bureau of Economic Research.
Autor, D., Katz, L., & Kearney, M. (2006). *Polarization of the U.S. labor market*. National Bureau of Economic Research. Working Paper No 11986, January.
Bartik, T. (2019). *Making sense of incentives*. Kalamazoo, MI: Upjohn Institute for Employment Research.
Bassens, D., & van Meeteren, M. (2015). World cities under conditions of financialized globalization: Toward and augmented World City hypothesis. *Progress in Human Geography, 39*(6), 752–775.
Benner, C., & Feng, K. (2020). Elon Musk reflects silicon valley's 'Move Fast and Break Things' culture. In *San Francisco Chronicle*. SFChronicle.com.
Benton-Short, L., Price, M., & Friedman, S. (2005). Globalization from below: The ranking of global immigrant cities. *International Journal of Urban and Regional Research, 29*(4), 945–959.
Berube, A. (2018). *"City and metropolitan income inequality data reveal ups and downs through 2016," Brookings report*. February 5.
Bischoff, K., & Reardon, S. (2013). Residential segregation by income, 1970-2009. In J. Logan (Ed.), *The lost decade? Social change in the U.S. after 2000*. New York: Russell Sage Foundation.
Boschken, H. (2003). Global cities, systemic power, and upper-middle-class influence. *Urban Affairs Review, 38*(6), 808–830.
Boschken, H. (2008). A multiple-perspectives construct of the American global city. *Urban Studies, 45*(1), 3–28.
Boschken, H. (2013). Global cities are coastal cities too: Paradox in sustainability. *Urban Studies, 50*(9), 1760–1778.
Boschken, H. (2017). Aligning a multi-government network with situational context: Metropolitan governance as an organizational systems problem. *American Review of Public Administration, 47*(2), 189–208.
Boschken, H. (2020). *"Global cities and socioeconomic inequality," a conference paper presented at the Annual Meeting of the American Political Science Association, September 9 - 13, San Francisco*.
Brint, S. (2001). Professionals and the 'Knowledge Economy': Rethinking the theory of postindustrial society. *Current Sociology, 49*(4), 101–132.
Broto, V., Allen, A., & Rapoport, E. (2012). Interdisciplinary perspectives on urban metabolism. *Journal of Industrial Ecology, 16*(6), 851–861.
Budiman, A. (2020). Key findings about U.S. immigrants. In *Fact Tank*. Wash DC: Pew Research Center. August.
Burns, T. (2016). Sustainable development: Agents, systems and the environment. *Current Sociology Review, 64*(6), 875–906.
Card, D., & DiNardo, J. (2002). Skill-biased technological change and rising wage inequality: Some problems and puzzles. *Journal of Labor Economics, 20*(4), 733–783.

Centers for Disease Control and Prevention. (2020). *Coronavirus disease-2019: Cases in the U.S.*. online at https://www.cdc.gov/coronavirus/2019-ncov/cases-updates/cases-in-us.html.
Chetty, R., Grusky, D., Hell, M., Hendren, N., Manduca, R., & Narang, J. (Eds.). (2016). *"The fading American dream: Trends in absolute income mobility since 1940", NBER working paper 22910*. Cambridge MA: National Bureau of Economic Research.
Clark, T., & Silver, D. (2016). *Scenescapes: How qualities of place shape social life*. Chicago: The University of Chicago Press.
Cui, X. (2018). How can cities support sustainability: A bibliographic analysis of urban metabolism. *Ecological Indicators, 93*, 704–717.
Derudder, B., & Taylor, P. J. (2021). The GaWC perspective on global-scale urban networks. In *Handbook of cities and networks* (pp. 601–617). London: Elgar Publishing.
Dorsch, M. T., & Maarek, P. (2019). "Democratization and the conditional dynamics of income distribution. *American Political Science Review, 113*, 385–404.
Duncan, G., & Murnane, R. (2011). *Whither opportunity? Rising inequality, schools and children's chances*. New York: Russell Sage Foundation.
Edsall, T. (2020). The resentment that never sleeps. In *New York Times*. December 9.
Emmons, W., Kent, A., & Ricketts, L. (2018). The bigger they are, the harder they fall: The decline of the white working class. In *Essay no. 3, the demographics of wealth: 2018 series*. St Louis: Federal Reserve Bank. September.
Flaherty, T., & Rogowski, R. (2021). Rising inequality as a threat to the liberal international order. *International Organization, 75*, 1–29.
Florida, R. (2012). *The rise of the creative class: And how It's transforming work, leisure community and everyday life - Revisited*. New York: Basic Books.
Florida, R. (2017). *The new urban crisis*. New York: Basic Books.
Florida, R., & Hathaway, I. (2018). *Rise of the global startup city*. New York: NYU Center for American Entrepreneurship. November.
Florida, R., Mellander, C., & King, K. (2017). *Building 65 million good jobs: The geography of low-paid service class jobs and how to begin to upgrade them*. Martin Prosperity Institute, University of Toronto. September.
Friedmann, J. (1986). The World City hypothesis. *Development and Change, 17*, 69–83.
Gest, J. (2016). *The new minority: White working class politics in an age of immigration and inequality*. New York: Oxford University Press.
Giannone, E. (2017). *Skill-based technical change and regional convergence*. online at https://economicdynamics.org/meetpapers/2017/paper_190.pdf.
Giuliano, G., Kang, S., & Yuan, Q. (2019). Agglomeration economies and evolving urban form. *The Annals of Regional Science, 63*, 377–398.
Glaeser, E. (2010). *Agglomeration economics*. Chicago: U. of Chicago Press.
Glassman, B. (2016). *Income inequality metrics and economic well-being in U.S. metropolitan statistical area*. a paper presented at the Western Economic Association Annual Meeting, Portland, OR, July.
Glassman, B. (2019). *"Multidimensional inequality: Measurement and analysis using the American community survey," paper presented at the Eastern Economic Association Annual Conference, February 28 – March 3, 2019*.
Global and World Cities Research Network [GaWC]. (2021). Welcome to GaWC – The leading academic thinktank on cities in globalization. website https://www.lboro.ac.uk/gawc/.
Hacker, J., & Pierson, P. (2014). After the 'Master Theory': Downs, Schattschneider, and the rebirth of policy-focused analysis. *Perspectives on Politics, 12*(3), 643–662.
Hall, P. (1966). *The world cities*. London: Heinemann.
Hennig, J.-L. (2021). *"Labor market polarization and intergenerational mobility: Theory and evidence" a Conference Paper presented at the German Economic Association, provided by ECONSTOR, a service of Leibniz Information Center for Economics*.
Hollander, R., & Kahl, N. (2010). *Engineering, social justice, and sustainable community development*. Wash DC: National Academy Press.
Hooker, J., & Tillery, A. (2016). *The double bind: The politics of racial & class inequalities in the Americas*. Washington DC: American Political Science Association.
Huggins, R., & Izushi, H. (2009). Regional benchmarking in a global context: Knowledge, competitiveness, and economic development. *Economic Development Quarterly, 23*(4), 275–293.
Hulchanski, D. (2010). *The three cities within Toronto: Income polarization among Toronto's neighborhoods, 1970–2005*. Toronto: Cities Centre Press, University of Toronto.
Hunt, J., & Nunn, R. (2019). Is employment polarization informative about wage inequality and is employment really polarizing?. IZA Discussion Papers, No. 12472. Available https://www.econstor.eu/bitstream/10419/202818/1/dp12472.pdf.
Inglehart, R. (2016). *Foreign Affairs, 95*(2), 2–10.
Inglehart, R., & Norris, P. (2017). *Perspectives on Politics, 15*(2), 443–454.
Jaimovich, N., & Siu, H. (2018). *Job polarization and jobless recoveries*. NBER Working Paper No. 18334. National Bureau of Economic Research. November.
Kochhar, R. (2018). *The American middle class is stable in size, but losing ground financially to upper-income families*. September.
Lakner, C., Negre, M., Cuesta, J., & Silwa, A. (2016). Measuring inequality isn't easy or straightforward. http://blogs.worldbank.org/developmenttalk/measuring-inequality-isn-t-easy-or-straightforward-here-s-why.
Lerman, R., & Yitzhaki, S. (1984). A note on the calculation and interpretation of the Gini index. *Economics Letters, 18*, 363–368.
Levy, F., & Murnane, R. (1992). U.S. earnings levels and earnings inequality: A review of recent trends and proposed explanations. *Journal of Economic Literature, 30*(3), 1333–1381.
Lineberry, R., & Fowler, E. (1967). Reformism and public policies in American cities. *American Political Science Review, 61*, 701–716.
Liu, S., & Parilla, J. (2019). *How startups help cities measure their economic development frontier*. October 24.
Mahutga, M., Ma, X., Smith, D., & Timberlake, M. (2010). Economic globalization and the structure of the world city system: The case of airline passenger data. *Urban Studies, 47*(9), 1925–1947.
Mahutga, M., & Smith, D. (2011). Globalization, the structure of the world economy and economic development. *Social Science Research, 40*, 257–272.
Marshall, J. (2005). Megacity, Mega mess. *Nature, 475*, 312–314.
McDearman, B., Clark, G., & Parilla, J. (2013). *The 10 traits of globally fluent metro areas*. Wash DC: Brookings Institution, Metropolitan Policy Program.
Meehl, P., & Waller, N. (2002). The path analysis controversy. *Psychological Methods, 7*(3), 283–300.
Meijers, E. (2008). Measuring polycentricity and its promises. *European Planning Studies, 16*(9), 1313–1323.
Mensah, G. (2020). Black and White disparities: More than just race. *Journal of the American Heart Association, 8*(22). https://doi.org/10.1161/JAHA.119.014272
Mishel, L., & Kandra, J. (2020). CEO compensation surged 14% in 2019 to $21 million. In *Economic policy institute report*. April 14.
Moretti, E. (2019). *The effect of high-tech clusters on the productivity of top inventors*. NBER Working Paper No. 26270. Wash. DC: National Bureau of Economic Research. September.
Muro, M. (2020). No matter which way you look at it, tech jobs are still concentrating in just a few cities. online at https://www.brookings.edu/research/tech-is-still-concentrating/?preview_id=722376.
Muro, M., & Atkinson, R. (2020). *Countering America's regional economic disparities is going to take more than hope*. Wash, DC: American Enterprise Institute. February.
Muro, M., & Liu, S. (2021). *The geography of AI: Which cities will drive the artificial intelligence revolution?* Wash. DC: The Brookings Institution. September.
Muro, M., Rothwell, J., Andes, S., Fikri, K., & Kulkarni, S. (2015). *America's advanced industries: What they are, where they are, and why they are*. Wash, DC: The Brookings Institution. February.
Murray, K., & Marx, D. (2013). Attitudes toward unauthorized immigrants, authorized immigrants and refugees. *Cultural Diversity and Ethnic Minority Psychology, 19*(3), 332–341.
Nyman, J. (1996). Breaking the rules: Miami in the urban hierarchy. *Urban Geography, 17*, 5–22.
Ostrom, E. (2009). A general framework for analyzing sustainability of social-ecological systems. *Science, 325*, 419–422.
Parkin, S., Sommer, F., & Uren, S. (2003). Sustainable development: Understanding the concept and practical challenge, 156. In , *Proceedings of the Institution of Civil Engineers: Vol. ES1. Engineering sustainability* (pp. 19–26). March.
Passel, J. S., & Cohn, D. V. (2009). *A portrait of unauthorized immigrants in the United States*. Wash. DC: Pew Hispanic Center. April 14.
Passel, J. S., & Cohn, D. V. (2017). *20 metro areas are home to six-in-ten unauthorized immigrants in U.S.* Wash., DC: Pew Research Center. February 9.
Pew Research Center. (2015). *The American middle class is losing ground*. December 9 www.pewresearch.org.
Pew Research Center. (2018). *Distribution of adults by income tier in U.S. metropolitan areas, 2016*. an Excel Spreadsheet downloaded at https://www.pewresearch.org/fact-tank/2018/09/06/the-american-middle-class-is-stable-in-size-but-losing-ground-financially-to-upper-income-families/.
Piketty, T. (2014). *Capital in the 21st century*. Cambridge: Harvard University Press.
Piketty, T., Saez, E., & Zucman, G. (2016). *Distributional national accounts: Methods and estimates for the United States."* NBER Working Paper Series, No. 22945 (December).
Porter, M. (1996). Competitive advantage, agglomeration economies, and regional policy. *International Regional Science Review, 19*(1), 85–94.
Porter, M. (1998). Clusters and the new economics of competition. *Harvard Business Review* (Vol. Nov/Dec,, 77–90.
Purvis, B. (2020). *Operationalizing urban sustainability*. PhD Thesis. University of Nottingham. July.
Reich, R. (1992). *The work of nations, preparing ourselves for 21st century capitalism*. New York: Vintage.
Ribeiro, D. (2019). *The 2019 city clean energy scorecard*. PhD Thesis. Wash. DC: The American Council for an Energy-Efficient Economy. July.
Ridgeway, C. (2014). Why status matters for inequality. *American Sociological Review, 79*(1), 1–16.
Rittel, H. W. J., & Webber, M. (1973). Dilemmas in a general theory of planning. *Policy Sciences, 4*(2), 155–169.
Ross, M., & Bateman, N. (2019). Meet the low-wage workforce. In *Metropolitan policy program*. Brookings Institution. November.
Rothwell, J. (2019). *A republic of equals: A manifesto for a just society*. Princeton: Princeton University Press.
Saez, E. (2015). *Striking it richer, the evolution of top incomes in the U.S.* Berkeley, June 25: University of California. unpublished manuscript.
Saha, D., & Paterson, R. (2008). Local government efforts to promote the 'Three Es' of sustainable development. *Journal of Planning Education and Research, 28*, 21–37.
Sandel, M. (2020). Disdain for the less educated is the last acceptable prejudice. In *New York Times*. September 2.
Sanderson, M., Derruder, B., Timberlake, M., & Witlox, F. (2015). Are world cities also world immigrant cities? *International Journal of Comparative Sociology, 56*(3–4), 173–197.
Sarycheva, A., & Muro, M. (2021). *Beyond VC: Financing technology entrepreneurship in the rest of America*. Wash. DC: The Brookings Institution. September 29.
Sassen, S. (1996). Service employment regimes and the new inequality. In E. Mingione (Ed.), *Urban poverty and the underclass: A reader*. Oxford, UK: Blackwell.
Sassen, S. (2001). *The global city*. Princeton, NJ: Princeton University Press.
Sassen, S. (2020). *an email correspondence with Herman Boschken, July 13*.
Saxenian, A. (1996). *Regional advantage*. Cambridge: Harvard University Press.

Scheidel, W. (2017). *The great leveler: Violence and the history of inequality*. Princeton: Princeton University Press.
Schell, C., et al. (2020). The Ecological and Evolutionary Consequences of Systemic Racism in Urban Environments. *Science, 369*(1446), 2–11.
Sommeiller, E., & Price, M. (2018). *The new gilded age*. Washington, DC: Economic Policy Institute.
Starmans, C., Sehskin, M., & Bloom, P. (2017). Why people prefer unequal societies. *Nature Human Behavior, 1*, 1–7.
Stephan, S., Tentori, K., Pighin, S., & Waldmann, M. (2021). Interpolating causal mechanisms. *Journal of Experimental Psychology: General*, 1–28. https://doi.org/10.1037/xge0001016. online, February 1.
Stiglitz, J. (2016). Inequality and economic growth. *The Political Quarterly, 86*(51), 135–155.
Stokan, E., Deslatte, A., & Hatch, M. (2021). *Urban Affairs Review, V57*(4), 1084–1114.
Thal, A. (2020). The desire for social status and economic conservatism among affluent Americans. *American Political Science Review, 114*(2), 426–442.
Timberlake, M., Sanderson, M., Ma, X., Derudder, B., Winitzky, J., & Witlox, F. (2012). Testing a global city hypothesis: An assessment of polarization across US cities. *City & Community, 11*(1), 74–93.
Trounstine, J. (2020). The geography of inequality: How land use regulation produces segregation. *American Political Science Review, 114*(2), 443–455.
Turner, R., Subak, S., & Adger, W. (1996). Pressures, trends and impacts in the coastal zone: Interactions between socio-economic and natural systems. *Environmental Management, 20*, 159–173.
U.S. Bureau of Labor Statistics. (2015). Measuring wage inequality within and across U.S. metropolitan areas, 2003-13. In *Monthly labor review*. September.
U.S. Census Bureau. (2018a). Gini index of income inequality – 5-Year estimates. In *2013-2017 American community survey*.
U.S. Census Bureau. (2018b). "Selected economic characteristics," (Nos S1501 and DP03) 5-year estimates. In *2013-2017 American community survey*.
Waldmann, M., & Hagmayer, Y. (2013). Causal reasoning. In *Oxford handbook of cognitive psychology*. Oxford, UK: Oxford University Press.
Weininger, E., Lareau, A., & Conley, D. (2015). What money doesn't buy: Class resources and children's participation in organized extracurricular activities. *Social Forces, 94*(2), 479–503.
Wilson, W. J. (1997). When work disappears. *Political Science Quarterly, 111*(4), 567–575.
Wolman, A. (1965). The metabolism of cities. *Scientific American, 213*(3), 178–193.
Zhong, X., Clark, T. N., & Sassen, S. (2007). *International Journal of Sociology, 17*(3), 385–391.