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Comparative dynamics in public health spending: Re-conceptualizing delta-convergence to examine how convergence occurs in the OECD and Latin America

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Abstract

Theoretical interest in the effects of globalization and regionalization on national outcomes, coupled with the unprecedented availability of comparable, cross-national data, creates an expanded opportunity for social scientists to test propositions of convergence over time. In this article, we investigate trends and convergence in public health spending in Latin America and the Caribbean (LAC) compared with Organisation for Economic Co-operation and Development (OECD) countries. Public health expenditures represent an important indicator of social protections, especially for the most vulnerable and the poor. In order to assess patterns in public health convergence in the region, we introduce an innovative conceptualization of delta-convergence. While this term has referred to countries' convergence toward an exemplar or an abstract ideal, we retool delta-convergence to examine how countries move toward or away from a regional mean, which is itself allowed to vary over time. We find an upwards trend in public health spending as a percentage of gross domestic product (GDP) in both Latin America and the OECD, and while in OECD there is little evidence of convergence or divergence, our results indicate a period of convergence followed by divergence in Latin America. Our analysis further reveals important regional dynamics at play, and engages with world polity and world systems theory and the literatures on regionalization versus globalization. We conclude by discussing the utility of using delta-convergence analysis to identify group trends, outliers, and country-specific trajectories.

Keywords

Convergence, cross-national analysis, delta-convergence, health policy, Latin America, Organisation for Economic Co-operation and Development, public health expenditure

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Introduction

Public health spending is an increasingly important indicator of social protections (Huber and Stephens, 2012; McGuire, 2010; Mesa-Lago, 2008). This is particularly true for less-developed nations, where health spending is a key indicator of broader development (Weyland, 2005, 2006). In the poor countries of the global South, public health systems and expenditures are critical to health and well-being, particularly among the most vulnerable populations, including the poor, the very young, and the very old. As such, public health expenditure is central not only to population health, but also to reducing social disparities.

Given public health spending's importance for health outcomes, and its centrality as a component of the welfare state, particularly in developing nations, we should be interested in how this spending is changing over time, including the possibility of cross-national convergence (Mechanic, 1975; Mechanic and Rochefort, 1996). Globalization encompasses not only increasing international trade and immigration, but also policy ideas, goals, and priorities, leading scholars to examine how participation in global exchanges affects national behavior: are nations acting in increasingly similar ways? Much of globalization theory addresses whether we witness convergence (Esping-Andersen, 1999; Meyer, 2000) or increased divergence and persistent inequalities across the globe (Chase-Dunn and Hall, 1993). In this way, questions of convergence, stasis, and divergence are at the heart of the study of globalization.

Observed patterns toward cross-national convergence are particularly significant when it comes to the public health systems of poor nations in the global South. Less-developed nations are increasingly global actors, and becoming more and more interdependent with affluent nations, as well as each other. What are the consequences of those international relationships for governments' behavior when it comes to public health spending? Are less-developed nations becoming more similar to each other? To the global North? If so, what do those changes look like? The answers to these questions have profound consequences for world's most vulnerable populations.

Latin American countries are an especially interesting site in which to investigate changes and convergence in public health spending. While as recently as the 1950s, these countries were characterized by largely fragmented and piecemeal approaches to health care (Mesa-Lago, 2008), the time was one of rapid development and interaction with the global stage. What we know about Latin American health spending is largely limited to small-*n* studies of the most extreme health reforms in the region (Noy, 2015). Such research does not account for how health systems and expenditures are changing at the regional level, and whether we are witnessing convergence, divergence, or stasis in public health expenditures.

Our research addresses this gap by examining regional trends in public health expenditures in Latin America in comparative perspective. In doing so, we put theories of convergence, stasis, and divergence such as world polity theory and 'race to the bottom' and neoliberal globalization approaches to the test. Empirically, we use cross-national, current data to examine changes in public health expenditures in Latin America and the Caribbean (LAC) and the Organisation for Economic Co-operation and Development (OECD) countries. Methodologically, we innovate by introducing a novel conceptualization of delta-convergence which allows for regional analyses using a group-specific and changing bar. We argue that this measure advances comparative research, especially in complex policy domains, by allowing researchers to rely not on far away, aspirational exemplars, but on regionally appropriate, shifting trends to examine convergence.

In this article, we investigate whether Latin American countries are converging in their public health spending. As part of our analysis, we look at two different reference points that they could be converging toward: a global exemplar, and a regional mean. As a comparison, we also examine public health expenditure in OECD countries, as these are often the group from which exemplars

in social expenditure are drawn, owing to their status as advanced, rich democracies. We propose a quantitative reconceptualization of delta-convergence, in which convergence is measured as trends in countries' movement toward and away from a group or population mean. In this way, the researcher can examine each country's movement relative to the (shifting) mean of its peers. We propose that such a strategy is especially useful when conducting macro-comparative research and particularly for regional analysis, and in efforts to arbitrate between discussions of globalization and regionalization.

Background

Health sector reform and public health expenditure

Public health expenditure is an increasingly important component of social spending, and represents a telling indicator of the nature of welfare regimes (Huber and Stephens, 2012). As governments in developed countries move to contain the ever-increasing costs of social spending, health has become a particular site of interest. There are many regional studies of OECD countries' spending, in part due to the availability of long time-series and reliable and comparable data for these countries. Overall, existing studies present some evidence of convergence in health systems in OECD countries, focusing on the public–private mix in health expenditures (Barros, 2007; Chen, 2013; Leiter and Theurl, 2012; Schmid et al., 2010).

Public health expenditure takes on even greater significance in less-developed countries. In these nations, health sector reform and the resultant changes in structure and financing warrant additional attention, as population health is a key indicator of broader development. Furthermore, public health expenditure in these nations is linked to better health outcomes, although the relationship is found to be mediated by the quality of governance. Health systems and expenditures are identified as institutional and social determinants of health themselves (Burroway, in press; Gilson et al., 2007; Mackintosh, 2001; Nixon and Ulmann, 2006; Rajkumar and Swaroop, 2008; Ssozi and Amlani, 2015). Public health systems are associated with better population health outcomes, and disproportionately benefit the poor and indigent (Austin et al., 2016; Basu et al., 2012). Altogether, generous, extensive, and robust public health systems are important for improving population health, reducing health disparities and inequalities, and promoting broader growth and development via investment in human capital and social rights and protections.

Regionalization and globalization

Regionalization. Examining cross-national convergence in health spending is useful because any cross-national change in public policy may be, at least in part, due to global forces, especially in recent decades. When a country adopts a new policy, that policy becomes more viable as a solution to policy makers in other countries. These patterns of cross-national learning may be especially evident among nations that are culturally, historically, or geographically close. Stallings (1995) posits that states may work in regional clusters, with some nations acting as leaders and others following their lead. In this way, regions 'refract' how states will respond to global changes such as the end of the Cold War, competition among capitalist powers, the globalization of production and trade, new patterns of development finance, and new ideological currents.

Beckfield (2006) argues that 'regional integration and globalization can be conceptualized as alternative *forms* of international embeddedness' (p. 966). By nature, regional integration is geographically bound. Beckfield notes this is important for income inequality because institutions and human capital should be more similar within regions than between them, thereby creating more

intense labor competition. Applying this insight to policy convergence, similarities within regions regarding political institutions, resources, and human capital should produce a stronger tendency toward convergence especially in domains that are directly linked to human capital: health and education. Empirically, scholars found regional dynamics to be salient in the diffusion of policies and ideas (Weyland, 2006). An investigation of change and possible convergence over time in Latin American public health spending as compared with OECD nations allows an examination of how these countries are responding to globalization and regionalization currents. It may provide evidence of convergence within regions and whether these trends follow regional logics, or whether perhaps, as suggested by world polity theory, Latin American countries are following examples set by richer, OECD nations.

Convergence: world polity theory and neoliberalism. One of the most prominent theories of globalization in sociology, world polity theory, is centrally concerned with processes of globalization and convergence (Barrett and Tsui, 1999; DiMaggio and Powell, 1983; Fourcade-Gourinchas and Babb, 2002; Meyer, 2000; Meyer et al., 1997). Influenced by ideas of institutional isomorphism and mimesis (DiMaggio and Powell, 1983), world polity theory is essentially a cultural argument that states act in ways that will construct and maintain their identities and legitimize their actions (Meyer, 2000; Meyer et al., 1997). Powell and DiMaggio (1991) detail three types of isomorphism: coercive isomorphism, whereby organizations and cultural expectations pressure organizations, formally and informally, to conform to a certain model; mimetic isomorphism, whereby convergence and imitation is a response to uncertainty; and normative isomorphism, which results from professionalization and an attempt by professionals to gain legitimacy and delimit the boundaries of their profession.

World polity theory suggests that international factors are becoming increasingly important to state actions (Ramirez et al., 1997). Policy makers may include calculations regarding the response of the international community when formulating policy stances, with the goals of gaining funding and in-kind assistance, as well as legitimacy (Barrett and Tsui, 1999). States are beholden to realities of a volatile global market, and must adopt policies to adjust to it (Fourcade-Gourinchas and Babb, 2002). Finally, world culture tends to encourage states to become more egalitarian (Ramirez et al., 1997).

Alternatively, a market-essentialist neoliberal approach, characterized by an ideology of competition and privatization, may push countries to reduce public commitments to health and other social sectors. In order to remain competitive, governments may reduce taxes and labor protections in order to attract foreign investment, while pressure from international financial institutions encourages privatization and a reduction in state size and spending, and ultimately smaller public health sectors and expenditures. In contrast, world polity theory suggests that convergence is often positive, and indeed proponents of increased public spending on health and social safety nets in European welfare states often draw on human rights discourses. Understanding the global dynamics of change and possible convergence in public health expenditures is especially important in a context in which OECD and other developed countries may serve as exemplars for less-developed regions, including Latin America.

World polity theory views convergence as positive and progressive, where developing nations become more egalitarian and come to embrace a human rights perspective in their policies, including health and social policies (Ramirez et al., 1997). However, its detractors note that convergence is not always positive, and that especially in the context of capitalism, countries may converge to the lowest common denominator in terms of social and other protections (Noy, 2011; Noy and McManus, 2015). Other scholars point to 'decoupling' whereby countries may espouse progressive policies on paper entirely absent a commitment to the implementation of these policies (Hafner-Burton and

Tsustui, 2005). A focus on expenditures is then particularly valuable as it allows us to establish whether such commitments are translated into public expenditures.

Stasis and divergence: world systems theory and persistent national trajectories. Net of whether convergence is positive or negative, as alternatively suggested by world polity theory and neoliberalism, other research points to the deeply entrenched nature of national policies and systems, which may hinder convergence and possibly lead to divergence. World systems theory points to the deep-seated inequalities in the world system between core nations – rich, industrialized democracies – and peripheral and semi-peripheral – developing – countries (Moore et al., 2006). Like neoliberalism, world systems theory points to capitalist competition as an important driver of inequalities and change (Elling, 1994). Unlike neoliberalism, however, world systems theory does not necessarily predict convergence. Whereas neoliberalism posits that race-to-the-bottom globalization might lead to social cutbacks across the globe, world system posits that core nations will be more likely than semi-peripheral and peripheral countries, such as those in Latin America, to provide social protections for their residents. As such, this inequality is maintained across regions based on their world systems status.

Relatedly, historical institutionalism posits the importance of national legacy in policymaking, which serves to hinder globalization's influence toward convergence (Hall, 1993; Pierson, 2000, 2004). This approach contends that despite pressures of regionalization and globalization, countries' histories and policy legacies may indicate steady levels of difference, or push them even farther apart. This argument is particularly salient for public, rather than private, health expenditures, as individuals may demand increased or different kinds of health services and alter their consumption and spending more immediately than changes in public commitments to health. While this may be less relevant in less-developed regions, many Latin American countries have witnessed high levels of economic growth in the last couple of decades, which may stimulate consumer demand, albeit to a lesser extent, in this region as well (Noy and McManus, 2015).

Public health expenditure is then a particularly interesting site to examine regional dynamics and possible trends, convergence, stasis, or divergence. While no single measure can capture the complexity and multiple dimensions of health-care systems (Wendt et al., 2009), public health expenditures, weighted by the size of the economy, provide important information on governments' commitment to health which is comparable across economies of very different sizes, including developed and developing countries. In addition, as discussed previously, public commitments in health are important for poverty alleviation, development, and health outcomes.

Latin American health systems in comparative perspective

The existing scholarly literature indicates that Latin American health-care spending should change in ways that would tend toward convergence with other nations. Several studies of globalization and national policy change suggest that nations look to each other for cues on how to adopt or change policies and spending. This is especially true in domains characterized by high levels of complexity and uncertainty, such as health (Blyth, 2002; Carpenter, 2012).

What is less clear is *how* we should expect Latin American countries to be converging. Some scholars argue that peer nations may be especially influential on one another, forming small groups adopting similar behaviors (Dobbin et al., 2007; Strang and Chang, 1993). In this formulation, the mechanisms for convergence are social learning from peer countries and/or following exemplary models (Dobbin et al., 2007; Weyland, 2006). Others suggest that the mechanisms are more global, and focus on global organizations. One variant of this argument points to the positive effects of world culture on social rights and protections (Meyer, 2000; Meyer et al., 1997). On the other hand,

some scholars argue this is a vertical, contentious, and power-laden process, with international organizations, particularly neoliberal international financial institutions, exerting pressure, some-times coercively via loans, structural adjustment programs, and conditions to effect change in particular directions (Babb, 2005). If either of these, peer learning or top-down reforms, are the case for Latin America, we should see increasing regional level convergence, which may or may not follow broader worldwide patterns. Yet other contentions, such as historical institutionalism and world systems theory, predict persistent differences across countries, and possible divergence both within and across regions.

Latin America is a particularly interesting region in which to examine recent regional trends and convergence given the similar historical origins of Latin American health systems and more recent developments. Until the 1950s, Latin American countries' health-care systems were in some respects fairly homogeneous, characterized by public health insurance plans for employees in the formal labor market, financed via employer, employee, and sometimes government con-tributions. While these varied and continue to vary in scope given sometimes large differences in the proportion of people employed in the formal labor market across Latin American coun-tries, the structure was similar. The poor had access to public services, and the wealthy paid for private services. Charity organizations, often religious ones, provided supplementary care. The legacy, therefore, was of segmented and fragmented systems. Since then, however, there has been a wide variety of trajectories in health sector reform (Kaufman and Nelson, 2004; Weyland, 2006).

Studies on health sector reform and spending in Latin America have focused on extreme cases, namely Chile and Colombia, which were neoliberal in orientation (Homedes and Ugalde, 2005; Noy, 2015). Several studies have examined the case of Chile, which exemplified neoliberal reform and privatization: in the 1980s, under the rule of Pinochet, medical care delivery was opened to the private sector and decentralized (Barrientos and Lloyd-Sherlock, 2000; Bastías et al., 2008; Unger et al., 2008). In 1993, Colombia, another major site of health-care reform influenced by neoliberal ideas, replaced the public sector system with one in which private and public providers competed for clients, insurance premiums were paid by employers, and the government covered the poor (De Groote et al., 2005; De Vos et al., 2006; Mesa-Lago, 2008).

Overall, existing studies of Latin American health systems highlight the privatization of health care in the region, and the shifting landscape of providers, regulations, and financing. This focus on one or several countries, or particularly extreme cases, provides important insights about the processes and trajectories of these countries' reforms. While these studies enrich our understanding of neoliberal health sector reforms, we have less information about how representative these cases are of broader regional trends. Latin America provides an important opportunity to examine the dynamics of health sector reform and health expenditure in light of these case studies of neoliberal reforms, and given its status as a developing region that has been reconfiguring its social expendi-tures since the 1980s, the so-called 'lost decade' of deep recession and economic crisis. However, these studies may understate or overstate both the direction and extent of these changes. As such, some scholars turned toward examining convergence at the regional level (Noy and McManus, 2015) which allows a broader, more encompassing understanding of changes in health spending in Latin America.

Taken together, these literatures point to a growing interest in regional trends in health systems, and an expectation that health policy should converge cross-nationally over time. In particular, theoretical insights from research on regionalization together with the world polity literature sug-gest the utility of an analytical approach that takes into account movement toward a shared goal or reference point to uncover regional and group trends. Existing analyses of developed nations point toward a regional convergence rather than toward any one particular exemplar, even in a region

with well-established health-care systems. The Latin American literature has focused on countries that saw the most extreme reform rather than identifying an exemplar, regional or otherwise. As such, a comparative analysis of regional convergence in the OECD and Latin America which examines one particular facet of spending, public spending weighted by the size of the economy, stands to provide important information about trends and country-specific as well as regional and group dynamics of convergence. Our study addresses the following questions: (1) Is Latin American public health expenditure converging, diverging, or remaining stable? (2) If it is converging, is it with regional peers, or global leaders? (3) How are different countries behaving relative to regional trends and global exemplars?

Methods

Data and sample

Our data are drawn from the World Development Indicators published by the World Bank (Health Nutrition and Population (HNP) Stats). The measure of public health expenditure consists of 'recurrent and capital spending from government (central and local) budgets, external borrowings and grants (including donations from international agencies and nongovernmental organizations), and social (or compulsory) health insurance funds'. We opt to use a measure of public expenditure weighted by the size of the economy (gross domestic product (GDP)), primarily to facilitate comparability across countries with very different economy sizes.

Drawing data for both OECD and Latin American countries from the same source ensures higher comparability (rather than drawing on regional datasets or country-specific accounts) since the data are standardized to include the same funding sources across countries. We begin our analysis in 1995 since reliable data for LAC are unavailable prior to this date. In 1995, the World Health Organization (WHO) began working with countries in the Americas in an effort to more uniformly capture and report their health spending levels and give them standardized criteria for this reporting. Therefore, while some data are available prior to 1995, it is available for fewer countries and is both less reliable and less reliably comparable across countries.[1]

We utilize data for a total of 56 countries: 27 LAC countries and 29 OECD countries across 20 years – 1995–2014. The LAC countries included in the analysis are Argentina, the Bahamas, Barbados, Belize, Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, El Salvador, Guatemala, Guyana, Haiti, Honduras, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, Suriname, Trinidad and Tobago, Uruguay, and Venezuela. The OECD countries included in the analysis are Australia, Austria, Belgium, Canada, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Luxembourg, Netherlands, New Zealand, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland, the United Kingdom, and the United States. The OECD sample does not include all OECD countries; it is limited to advanced industrialized nations with established systems of social benefits. However, within those parameters, it encompasses a great deal of political, cultural, policy, and economic diversity.

Measuring convergence: substantive and methodological considerations

According to Heichel et al. (2005), researchers conceptualize convergence in at least four ways: (1) sigma-convergence, defined as a decrease in variation; (2) beta-convergence, in which laggards catch up to leaders in regard to a specific policy arena; (3) gamma-convergence, which examines

changes in country rankings with respect to a particular policy; and (4) delta-convergence, which analyzes countries' distance from an exemplary model. Sigma-convergence is by far the most popular measure of convergence used in the literature, and provides a straightforward measure of variation, while delta-convergence is, we argue, well-suited for arbitrating contemporary debates about regionalization and globalization. Below we describe the origins, measurement, and application of sigma- and delta-convergence in turn.

Sigma/σ-convergence: examining variation

Sigma-convergence defines convergence as a decrease in variation and is the most popular measure of convergence (Heichel et al., 2005). Convergence defined as such is often identified by a decrease in the coefficient of variation over time, demonstrating that some aspect of policy is becoming increasingly homogeneous cross-nationally. The coefficient of variation is a scale-invariant measure that allows us to compare dispersion across time periods; it has been cited as the best quantitative measure of homogeneity (Kenworthy, 1999). The coefficient of variation in expenditures is calculated for each year (indicated by the subscript t) in the time-series as the standard deviation in cross-national expenditures divided by the mean

$$CV_t = \frac{\sigma_t}{\mu_t}$$

If the coefficient of variation decreases over time, it is evidence of sigma-convergence. An increase in the coefficient of variation over time suggests that countries are diverging, or becoming less similar. A primary benefit of this measure of convergence is that sigma-convergence is fundamentally consistent with the way we understand convergence: it is a measure of how similar countries, organizations, or other units are to each other. As such, it is a strong quantitative measure of whether convergence is in fact occurring. Sigma-convergence is utilized widely in the scholarly literature, and is particularly well-suited to look at government expenditures and tax rates (Alber and Standing, 2000; Bernauer and Achini, 2000; Bouget, 2003; Gornick and Meyers, 2001; Sanz and Velázquez, 2003; Slemrod, 2004; Wolf, 2002; Wunder, 1999). However, as our discussion of delta-convergence will illustrate, our understanding of convergence need not be limited to decreasing variation, and in fact this measure may obscure some kinds of convergence. For example, countries can remain parallel to one another in their growth toward some outward ideal or standard, thereby holding variation constant while nonetheless increasingly working toward a common goal.

Delta/δ-convergence: examining how convergence occurs

Heichel et al. (2005) coin the term 'delta-convergence' to describe research which analyzes countries' distance from an exemplary model. Originally, delta-convergence referred to the qualitative study of changes in spending and/or policies in a small group of countries (Heichel et al., 2005). Such studies serve to shed light on the ways in which policies change qualitatively over time. However, they are often limited by their sample sizes, examining one, two, or a few countries, rather than providing a regional or larger group overview and comparison.

Existing studies utilizing delta-convergence do not generally employ an explicit measure of distance, but rather tend to be small-n qualitative studies, not necessarily focused on the issue of convergence so much as they are at understanding processes and trajectories. This could involve assessing how similar countries become to a policy frontrunner, or to an abstract set of recommendations made by an international organization, such as studies of Europeanization that look at

convergence of European Union member nations toward European policy models (Hackl, 2001; Harcourt, 2002).

Comparisons to an exemplar: origins in small-n studies and quantitative analyses. Although its origins are in qualitative studies, delta-convergence was also used in quantitative research. Starke, Obinger and Castles (2008) utilized delta-convergence to address the question of whether countries are engaging in a 'race to the bottom' in social spending and welfare policy. However, more traditionally, delta-convergence looked at how each country varies as compared with an ideal type (whether exemplar or policy recommendation) given the outcome of interest. In the below equation, a country's delta score in a given year is the exemplar's expenditure in that country–year subtracted from its own expenditure and divided by the standard deviation of the exemplar's expenditure across the time period

$$delta_{ct} = \frac{expenditure_{ct} - expenditure_{exemplart}}{sd_{exemplar}}$$

Movement relative to a meaningful average: a new perspective on delta-convergence. We argue that it may be more useful to compare country-specific outcomes to a regional or group average – their peers – over time rather than to an exemplar or abstract set of recommendations. Delta-convergence can allow us to examine the extent to which each country's patterns of expenditures over time are similar to or different from the overall group or regional mean. This can be done by examining how each country's spending level in a given year compares with the regional mean using the metric of the standard deviation in that year: that is, the measure is the country's level of spending minus the average regional spending level divided by the standard deviation in regional spending in that year as indicated below

$$delta_{ct} = \frac{expenditure_{ct} - expenditure_{regiont}}{sd_{regiont}}$$

Using a regional average allows researchers to use delta-convergence to address the following questions: which countries are outliers in that they exhibit distinctive patterns of expenditures? Which countries tend to stay close to the typical patterns of expenditures? While convergence by definition describes a relationship, our measure captures each country's individual tendency toward convergence. This is a novel approach, which redefines delta-convergence to refer not to a country's behavior with respect to an abstract ideal or to a policy outlier, but rather to the behavior of other peer countries.

There are several advantages to using this conceptualization of delta-convergence rather than, or in addition to, the previous approaches to convergence. *First*, it more intuitively maps onto what cross-national convergence is, and what comparative scholars are interested in: whether countries are behaving more similarly to one another. *Second*, focusing on individual countries' tendency toward convergence offers more nuance and depth to a broad concept. This measure of convergence allows us to examine how individual countries behave in respect to the mean, revealing changing patterns of leadership, convergence, and underperformance over time. It allows scholars to examine whether countries that appear to be persistent outliers are in fact being influenced by their peers. This is especially important given that there are theoretical reasons to expect, as well as empirical evidence which suggests, that policy makers across countries are looking to their perceived peers rather than exemplars in their choices. *Third*, this approach is potentially more

appropriate for developing countries and regions because it establishes a regionally appropriate bar and point of comparison. Comparing developing countries to developed countries can mask real cross-national movement.

Fundamentally, mapping onto scholarly debates regarding regionalization and globalization, our reconceptualization of delta-convergence calls into question what the reference point should be for scholars examining convergence. Scholars tend to focus on how countries are responding to particular preconceived benchmarks, set by national policy makers, international organizations, or other influential bodies with international or regional significance. However, these presumed reference points may not map onto real patterns of change empirically. Our reconceptualization of delta-convergence can uncover whether, as discussed above, national leaders might instead be responding to international or regional shifts in culture and norms, and looking to multiple countries in their reforms. In particular, looking to an exemplar is not as useful in policy arenas that do not have an agreed-upon leader or where the leader changes over the time period under examination.

While our focus is on the dynamics of convergence in public health spending in LAC countries, we examine the OECD as well, for two primary reasons. First, the literature on public health spending convergence focuses on OECD nations, thereby providing an important precedent for comparison. Second, because the literature primarily examines OECD nations which have, overall, better health outcomes, more resources, and established health systems than those in developing countries, there is reason to believe that Latin American and other developing countries may look to OECD countries as exemplars to emulate. As such, an analysis of two regions offers important information which may help in arbitrating between theories of regionalization, peer learning, and globalization as potentially driving public health expenditure.

Analytic strategy

We begin by presenting the regional averages for OECD and LAC countries, as well as the spending pattern over this time period in the Netherlands, our chosen exemplar in the field of public health spending. We then present sigma-convergence in public health spending. In order to compare our specification of delta-convergence (convergence to a changing regional average) to the traditional measure (convergence to an exemplar) we examine how countries' public health spending as a percentage of GDP compares, first, to the Netherlands spending over this time period and second, how countries compare to their group's (OECD or LAC) spending average each year over this time period. We selected the Netherlands because recent research shows it has the highest level of user (that is, patient) satisfaction (based on the Euro Health Consumer Index 2013, Björnberg, 2013), and it also scores comparatively well on other dimensions that have been highlighted in the literatures on health policies: efficiency, effectiveness, and access, especially since undergoing reform in the mid-2000s (Björnberg, 2013; Rosenau and Lako, 2008; Schäfer et al., 2010; Tawfik-Shukor et al., 2007; Van Der Schee et al., 2007). However, this is not an uncontroversial choice. In some policy arenas, exemplars tend to stand out. Sweden is often held up as a leader in many areas of social policy and spending. The United States might be seen as an outlier or exemplar for neoliberal policies, military spending, or incarceration practices. In health policy, what might make a nation a global exemplar is less obvious, and there is no scholarly consensus on the issue. Indeed, we could not locate a single study that pointed to an exemplar for this measure, regional or otherwise. We chose the Netherlands owing to its top performance in a recent report, based on consumer ratings of health systems in Europe (Björnberg, 2013).

Another plausible candidate might have been France, as it was identified by the WHO (2000) as the top health system. However, that report was hotly debated and so heavily criticized that the

ranking was abandoned in subsequent reports (Anderson and Hussey, 2001; Coyne and Hilsenrath, 2002; Evans et al., 2001; Williams, 2001). Indeed, this is one of the most compelling reasons for our regional average rather than exemplar based measure of delta-convergence. There are many domains in which there is no clear exemplar, or the exemplar may shift over time, especially with long time-series data, with exemplars changing across decades. Therefore, research that chooses an exemplar without clear theoretical guidance or amidst measurements and ranking controversies is open to much (warranted) criticism and may be limited in its utility for our understanding of convergence processes. For the purposes of introducing and comparing our quantitative measure of delta-convergence we chose the Netherlands as our exemplar while recognizing that this choice, and indeed any other choice, is and would be subject to contestation.

We calculated each country's delta score for each year by subtracting the Netherlands' expenditure during that year from that country's expenditure and dividing by the standard deviation of expenditure for the Netherlands between 1995 and 2014

$$delta_{ct} = \frac{expenditure_{ct} - expenditure_{Netherlandst}}{sd_{Netherlands}}$$

We then examined each country's delta score compares to its regional average, dividing up the analysis for LAC and OECD countries. That is, for OECD countries, using the group average

$$delta_{ct} = \frac{expenditure_{ct} - \bar{x}_{OECDt}}{sd_{OECDt}}$$

For LAC countries, using the regional average

$$delta_{ct} = \frac{expenditure_{ct} - \bar{x}_{LACt}}{sd_{LACt}}$$

Results

Sigma and delta-convergence

We first display the regional averages for the two groups in Figure 1. Public health spending as a percentage of GDP is a little less than double in OECD countries than in LAC countries and has increased slightly for both groups of countries – from 5.8 to 7.2 percent in OECD countries and from 3.2 to 4.1 percent in LAC countries.

Interestingly, the trends in public health expenditure are similar, though the level is almost double in the OECD compared to LAC countries. This suggests that there may be global forces that are affecting public health expenditure patterns in these two areas. Both groups – OECD and LAC nations – display an increase in expenditure in 2009 and then a steady, albeit small decline through 2014. This pattern may be due to the global recession, where economies contracted even as public expenditure stayed stable or rose to deal with the aftermath of recession, causing the appearance of an increase at the time of the recession, and a subsequent decline as economies recovered and grew in the aftermath. Overall, both groups display increases in spending over this time period, with the OECD displaying higher absolute increases (1.5% for OECD countries and 1.1% for LAC
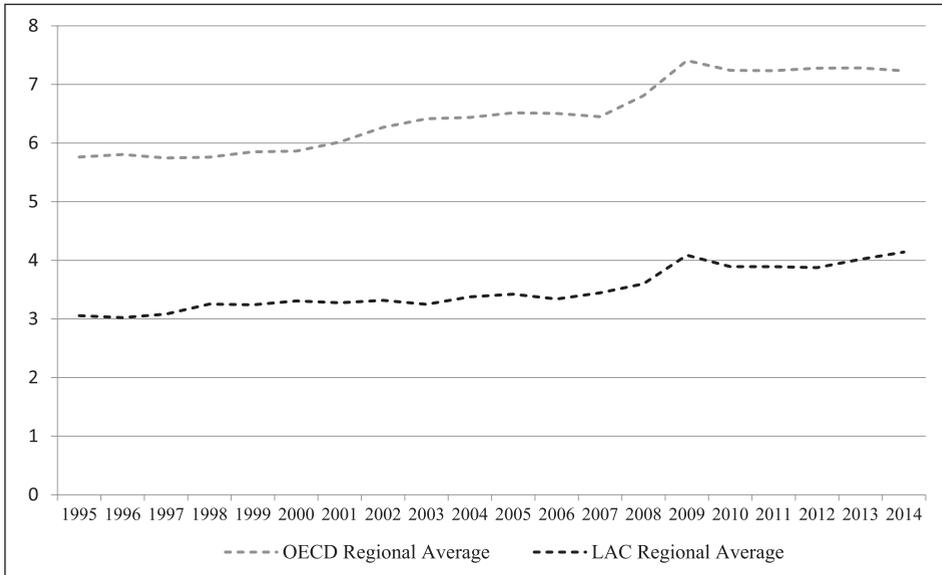
Figure 1. Average public health spending as a percentage of GDP in OECD and Latin American and Caribbean countries.

countries). Figure 1 indicates that while there has been higher growth in public health expenditure as a percentage of GDP in OECD as compared with LAC countries, the percentage difference between spending across these two groups of countries has grown: in 1995, OECD countries' spending was higher than that of LAC countries' by 2.7 percent, whereas in 2014, it was higher by 3.1 percent.

We can also observe convergence or divergence in either LAC or OECD nations. An examination of the coefficients of variation for the OECD reveals relative stability in the variation between countries over time; therefore, there is only little evidence of sigma-divergence for the region as evident in Figure 2. In contrast, in LAC there was an increase in the coefficient of variation from 1995 to 1998, followed by an overall decline through 2004, followed by some variation for a couple of years and then a steady decline from 2008 to 2012, ending with an increasing trend in the last couple of years of the time-series. Therefore, while trends in public health expenditure are similar across LAC and OECD countries (Figure 1) there is evidence of different group dynamics driving these spending increases across the two regions (Figure 2). Overall, national spending habits are significantly more stable over time in OECD countries as compared with LAC countries, likely owing to their long-running democratic regimes, comparatively stable governments economies, and established welfare states.

Each measure of convergence has its own strengths, as detailed in our above review. As Figure 2 demonstrates, sigma-convergence provides a general indication of the variation among countries, and is therefore intuitively appealing. However, delta-convergence offers some important insights that are obscured when simply examining the summary measure of sigma-convergence across the two groups of countries (while each of these measures is useful separately we argue they are most useful when examined together). First, as Heichel et al. (2005) note, countries may be making parallel moves without becoming more similar to each other (see also Heinze and Knill, 2008; Starke et al., 2008). Such movements can be captured by examining country trends relative to an exemplar or a group mean, but are not apparent when examining overall variation, that is, sigma-convergence.
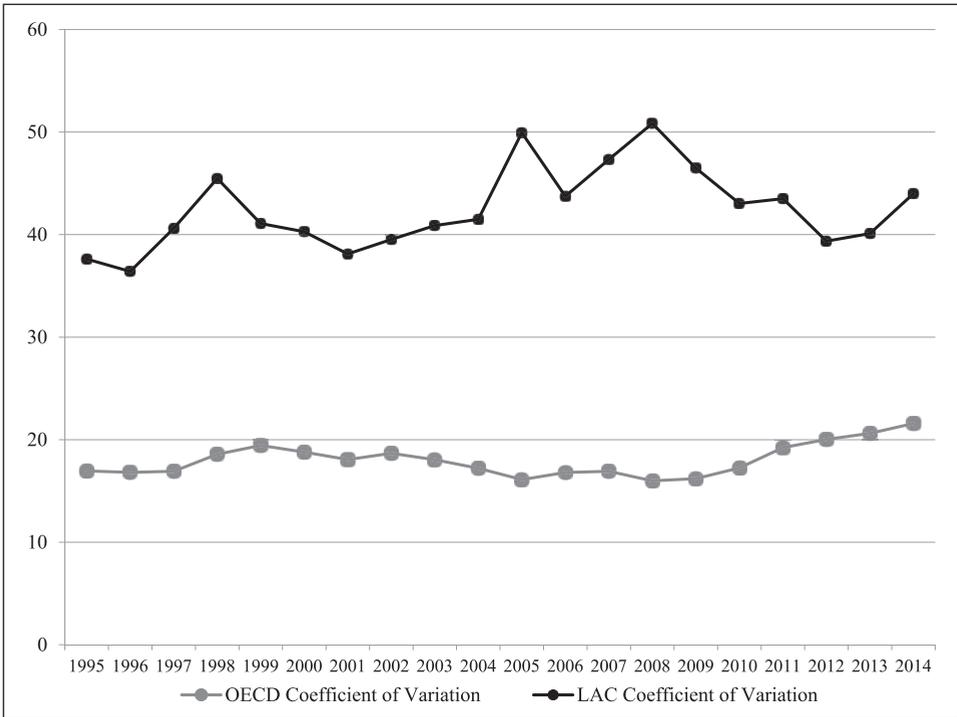
Figure 2. Coefficient of variation for public health spending as a percentage of GDP in OECD and Latin American and Caribbean countries.

Furthermore, our specification of delta-convergence reveals countries' trajectories, offering a view of each individual country's pattern toward convergence (or divergence) over the time period under examination. That is, rather than providing a summary measure, it allows us to examine how countries are behaving in terms of their health expenditure relative to an exemplar or the regional mean over time. Finally, our specification of delta-convergence is particularly well-suited to examine *how* convergence occurs. While the coefficient of variation can inform us about whether there is more or less variation in countries' expenditure, an examination of delta-convergence reveals more about the behavior of countries in ways that allow us to examine groups of countries (which are converging, diverging, and during which years). In particular, it may be that most countries are converging but there remain some stubborn outliers. It is also sensitive to different points of departure, allowing us to see movements toward convergence from different starting points and across unique national contexts (Heinze and Knill, 2008). Researchers interested in dynamics of regionalization and globalization are often interested in country-level responses to larger forces, and examining delta-convergence allows researchers to view country behavior relative to other countries and/or an exemplar over time.

Delta-convergence using an exemplar

Previous research characterized as utilizing delta-convergence sought to examine how countries 'perform' relative to a global or regional exemplar. As discussed above, this approach offers a level of nuance beyond that provided by sigma-convergence because it tracks convergence toward a
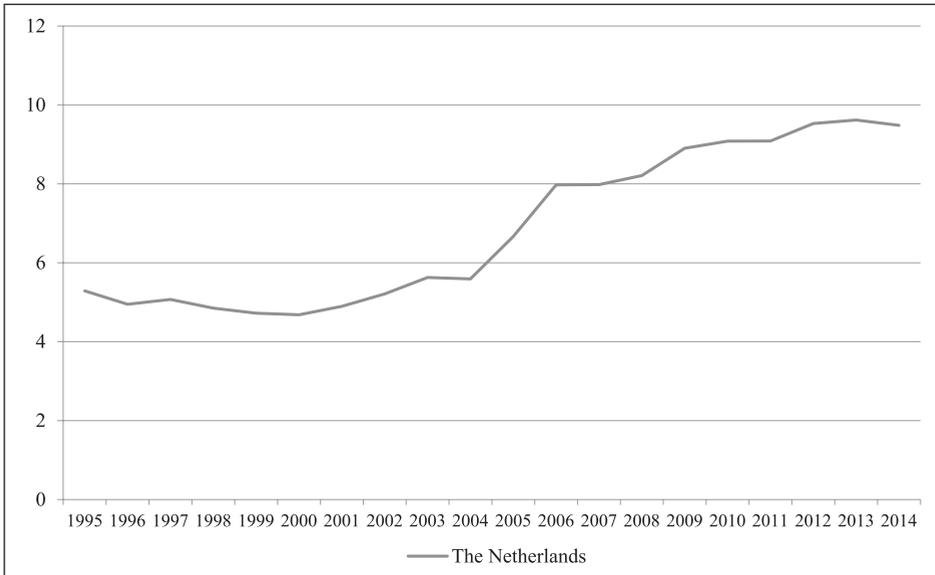
Figure 3. Public health spending as a percentage of GDP in the Netherlands.

common reference point, such as the actions of a regional exemplar or an abstract set of policy recommendations. Some of the challenges of using the traditional delta-convergence, however, is that there are not always easily agreed-upon exemplars, and these may further vary by region. For example, as we discussed earlier, while there is some informal agreement about exemplars for some areas of policy and spending, there is nothing nearing consensus for health expenditure.

While we have chosen the Netherlands as our health spending exemplar, we recognize that this is a controversial choice, which is precisely part of the problem with the traditional delta-convergence approach – in many policy domains, any choice of an exemplar would be contentious. Second, we argue that regardless of the choice of exemplar, that is, even in policy arenas with clear (or clearer) exemplars, our proposed measure of comparing countries to their regional or group mean provides added insights about processes of convergence. Our chosen exemplar, the Netherlands, shows a large increase in public health spending as a percentage of GDP, rising from 5.9 to 10.2 percent between 1995 and 2014 as seen in Figure 3.

In Figure 4, we show four scatter plots that display countries' overall movement relative to the Netherlands and their group's average over the time period between 1995 and 2014. In the scatter plots, the horizontal axis represents the average of the delta score (a country's level of spending over the time period, minus the average spending level, divided by the standard deviation as detailed in the earlier equations) over the time period for each country, and the vertical axis represents the country's time trend in their delta (the slope of a regression of the delta spending measure on time – in this case in years – for each country in the sample). Therefore, countries that have a score of zero on the horizontal axis have, on average for the time period, matched the average regional spending level. Countries that have a score of 1 on the horizontal axis are one standard deviation above the group mean in spending for the time period. Those countries which have a negative score on the vertical axis show a negative slope over the time period in the measure of delta-convergence between 1995 and 2014. Those who have a positive slope increased their delta score on average over this time period.
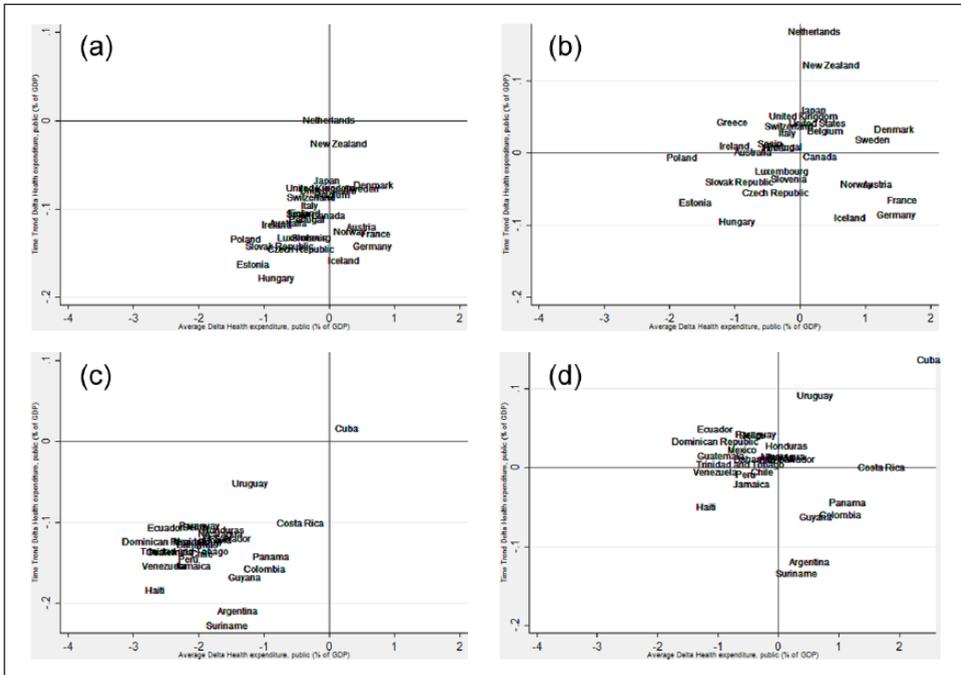
Figure 4. Scatter plots showing average health expenditure and average change in health expenditure between 1995 and 2014 compared to the Netherlands and yearly regional averages: (a) public health expenditure as a percentage of GDP among OECD countries, compared to the Netherlands, (b) public health expenditure as a percentage of GDP among OECD countries, compared to the (moving) regional average, (c) public health expenditure as a percentage of GDP among LAC countries, compared to the Netherlands, and (d) public health expenditure as a percentage of GDP among LAC countries, compared to the (moving) regional average.

When interpreting the scatter plots it is useful to consider the four quadrants in addition to the axes. When comparing to an exemplar, for example, those in the upper left and lower right quadrants are converging toward the exemplar. Countries in the upper left quadrant exhibit lower spending than the exemplar (negative score on the horizontal axis), but increased their spending (positive slope on the vertical axis) – these countries are 'catching up'. On the other hand, countries in the lower right quadrant are converging because they exhibited spending above the exemplar on average over this time period, but reduced their spending relative to the exemplar, and are therefore trending down toward the exemplar. Countries in the upper right and lower left quadrants are moving away from the exemplar over the time period, on average. Countries in the upper right quadrant outspent the exemplar during this time period on average, and increased their spending, therefore further outpacing and diverging from the exemplar. Countries in the lower left quadrant are also diverging, but via a different mechanism, these countries spend on average less than the exemplar over this time period and their spending trajectory over this time period is likewise negative; therefore, these countries are falling even farther behind.

An examination of Figure 4(a) indicates that many OECD countries are spending, on average, at similar levels to the Netherlands over this time period (i.e. are clustered around zero on the horizontal axis). However, Figure 4(a) also demonstrates that some OECD countries (in the lower left quadrant) are spending at lower levels than the Netherlands on average, and over the time period

moved even farther away. Countries in the lower right quadrant had, on average, higher spending levels than the Netherlands but adjusted downwards (or stayed at stable spending levels), while spending in the Netherlands increased over the time period (see Figure 1). That is, Figure 4(a) indicates overall divergence among many OECD countries with some pockets of convergence (Denmark, France, Germany, etc.). No countries 'caught up' to the Netherlands (they would be in the upper left quadrant) nor did any countries diverge 'upwards', that is, outpace the Netherlands in their spending increase (they would be in the upper right quadrant).

On the other hand, Figure 4(c) shows that all LAC countries save Cuba had lower average public expenditure as a percentage of GDP during this time period than the Netherlands. Furthermore, all of these countries moved even farther away from the Netherlands over this time period: that is, while spending in the Netherlands increased, spending in LAC countries, on average, stayed the same or decreased (see Figures 2 and 3). Figure 4(c) indicates that Cuba showed slightly higher levels of public health expenditure as a percentage of GDP compared to the Netherlands and overall, outpaced the Netherlands' public health spending levels over this time period, but not by much – that is, it is near but slightly above zero on both average expenditure and time trend, but not very far away. While this provides a valuable indication of overall trends it does not allow an examination of country-specific trajectories over time, providing a useful, though limited, summary indication of spending patterns in LAC countries.

Comparing countries' overall spending during this time period to the LAC and OECD country groups' averages reveals that countries' positions relative to each other remain the same as when comparing their spending to that of the Netherlands in this (scatter plot) formulation (compare Figure 4(a) to (b) and (c) to (d)). That is, only the reference point, or zero, changes. Our analysis demonstrates the utility of looking at the group average because an exemplar may be (and often is) an outlier, because of high performance. If it is an extreme outlier (as the Netherlands is when compared to LAC countries), it masks real variation by lumping all countries into a low performer category and obscuring some important differences (Figure 4(c)). In addition, group averages are sensitive to the social policy learning context, which is often influenced by countries' peers (Brooks, 2005; Dobbin et al., 2007; Khamfula, 1998; Weyland, 2006). That is, the choice of an exemplar, especially in quantitative research, makes a strong assumption about optimal spending levels and suggests that national policy makers look toward one country as a model, rather than gleaning information from many countries, especially those in close geographic proximity.

Delta-convergence using a (moving) regional average

In order to demonstrate in more detail the utility of using a moving group or regional average, we examine particular country trajectories in comparison to the Netherlands and the OECD and LAC averages. Figure 5 shows how Denmark, the Netherlands, and Spain compare to the Netherlands (Figure 5(a), (c) and (e)) and the OECD average (Figure 5(c), (d) and (f)). Figure 5(d) reveals the Netherlands' behavior relative to the OECD regional average: indicating that it spent less, on average, prior to 2007 when its spending rose quite drastically. Figure 5(c) includes only a constant line at zero as the Netherlands' spending does not deviate from its own spending. Taken together, these two figures underscore how the use of an exemplar obscures the exemplar's own behavior relative to the group mean and how it may be problematic when this exemplar significantly deviates from the group mean, even if only for part of the time period under examination. Exemplars themselves may vary over time. Even in policy arenas in which there is a widely acknowledged leader, countries may transition in and out of leadership as policy and spending may be discontinuous, especially over longer periods of time. Examining an average among a group of peers better represents these variations.
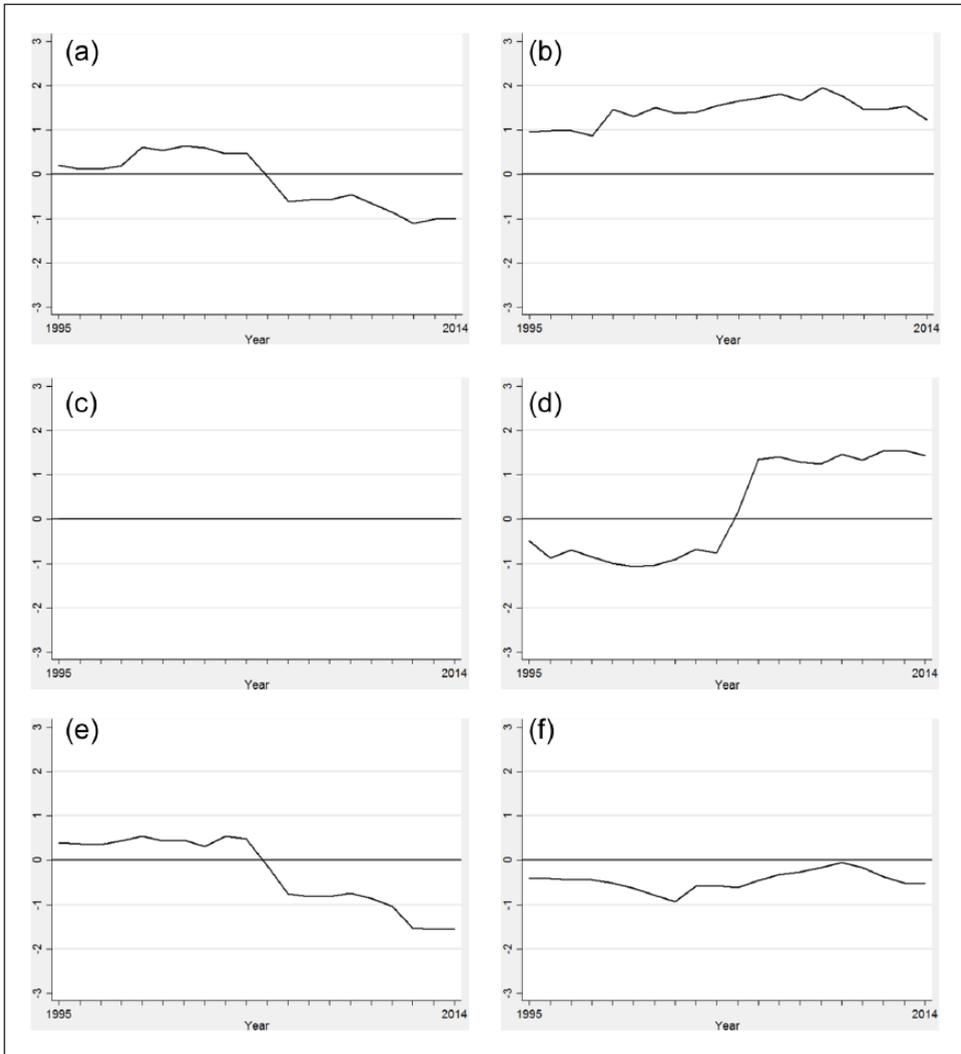
Figure 5. Select OECD countries public health expenditure compared to Netherlands (exemplar) and the OECD regional average: (a) Denmark, compared to the Netherlands, (b) Denmark, compared to the OECD regional average, (c) Netherlands, compared to the Netherlands, (d) Netherlands, compared to the OECD regional average, (e) Spain, compared to the Netherlands, and (f) Spain, compared to the OECD regional average.

A comparison of Figure 5(a) and (b) reveals that Denmark outspent the Netherlands prior to 2007 but spent slightly less after 2007, whereas compared with the regional average it increased its public health spending as a percentage of GDP even more quickly than the regions' overall increase (see Figure 1). That is, it converged to the Netherlands' spending but is actually diverging from the regional mean over this time period. Figure 5(e) and (f) provides information for Spain, where the story is the opposite of that of Denmark: whereas since 2003 Spain is diverging from the Netherlands' spending levels, it is actually converging toward the OECD average. That is, examining countries' trajectories compared to the group average is a more intuitive measure of

convergence: we are examining if countries are behaving more similarly to one another, rather than an (often contested) exemplar.

Figure 6 compares Costa Rica, El Salvador, and Uruguay's spending over time to the Netherlands and the LAC regional average. Figure 4(c) indicates that all countries save Cuba have lower spending than and are diverging from the Netherlands. Figure 6(a) indicates that Costa Rica tracks the Netherlands' spending until about 2003 where it experiences convergence, but then falls below the Netherland's spending through 2014. On the other hand, Figure 6(b) indicates that Costa Rica spends more than other LAC countries, and that this difference has remained relatively stable between 1995 and 2014. El Salvador, on the other hand, tracks the regional average very closely (Figure 6(d)) though is spending even less at the end of the time period than at the beginning compared with the Netherlands (Figure 6(c)). Finally, Uruguay provides an interesting example of divergence compared to the Netherlands (Figure 6(e)) but convergence to the regional LAC mean (Figure 6(f)) over the time period, albeit with high variation over this time period.

Conclusion

Public commitments to health in less-developed countries are a telling indicator of development and social protections. Understanding the dynamics of public health expenditures over time provides important insights into processes of globalization, regionalization, and development. Our study improves our understanding of public health spending in LAC, as well as the OECD, by investigating national and regional trends from 1995 to 2014, with a particular focus on convergence.

To do this, we employed a novel quantitative measure of delta-convergence, which we argue is particularly well-suited to examining less-developed nations, and areas of spending for which there are no obvious exemplars. The term 'delta-convergence' was coined to characterize small-*n* qualitative, comparative studies that tended to focus on the process of convergence in a particular policy arena; more recently, scholars developed quantitative approaches to examining aggregate movement toward some outward exemplar or international benchmark. We introduce an alternative quantitative approach to delta-convergence, which uses as its reference point a moving group mean, rather than an exemplar nation or abstract set of policy recommendations. We examined delta-convergence in public health expenditures in Latin American and OECD nations, demonstrating the different kinds of information yielded when using a qualitative approach, a traditional quantitative approach, and our alternative approach, respectively.

Our proposed delta-convergence measure provides several benefits. *First*, many (perhaps most) domains of cross-national spending and other measures do not have clearly identified and agreed-upon exemplars. Even for those that have less controversial exemplars, the substantive assumption that is embedded in methodologically examining convergence to an exemplar is that governments (or people and organizations, if utilizing this measure at other levels of analysis) seek to emulate. Existing research indicates that this is a problematic assumption: country leaders often look toward their peers and neighbors in particular (Brooks, 2005; Dobbin et al., 2007; Khamfula, 1998), international organizations may recommend particular policies and spending levels that are not embodied by any one country, or countries may be grouped within sub-regions (e.g. Esping-Andersen's, 1990, 1999 typology of welfare state types in Europe and Wendt et al.'s 2009 recent examination of typologies and ideal types in health). *Second*, and related, convergence and divergence are harder to examine in many developing countries, especially in social policy and spending domains. Their welfare systems are less strongly entrenched and show much more variability than in OECD nations. The availability of increasingly longer time-series of comparable data for less-developed countries provides opportunities for examining trends and
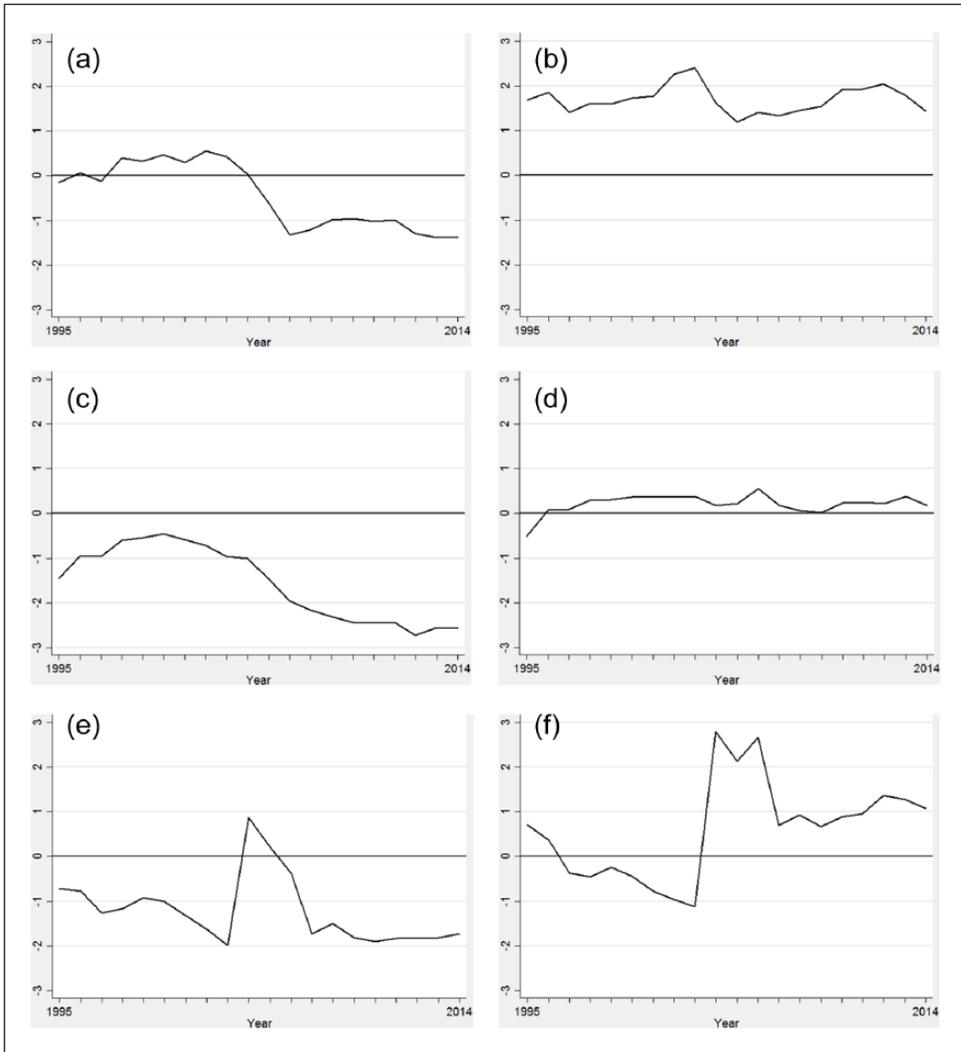
Figure 6. Select LAC countries public health expenditure compared to Netherlands (exemplar) and the LAC regional average: (a) Costa Rica, compared to the Netherlands, (b) Costa Rica, compared to the LAC regional average, (c) El Salvador, compared to the Netherlands, (d) El Salvador, compared to the LAC regional average, (e) Uruguay, compared to the Netherlands, and (f) Uruguay, compared to the LAC regional average.

convergence over time. In the global South, a regionally appropriate measure (like the regional average) can reveal more than established measures of convergence and allows researchers to utilize these data to examine convergence in the absence of a strong prior about an exemplar. *Third*, this measure of delta-convergence allows researchers to most intuitively map what convergence means: whether countries becoming more similar to one another (rather than to a stand-out country or abstract set of recommendations). Importantly, it is not just a summary measure, as is sigma-convergence, but rather allows an examination of each country's trajectory compared to the group mean (as demonstrated in Figures 5 and 6). This delta-convergence measure allows

us to examine *how*, not only whether, convergence happens – for example, distinguishing whether laggards are catching up, or above-average spenders are reducing their spending.

Our results suggest that in Latin America, a period of divergence in public health spending as a percentage of GDP in the late 1990s was followed by some stabilization in the late 1990s and early 2000s, increased divergence in the mid-2000s, followed by convergence until 2012 with some indication of a period of divergence beginning in 2012 (Figure 2). Our analysis of delta-convergence provides insight as to the nature of these changes regionally: while most countries in the region exhibit lower-than-average spending for the region over the time period, they are increasing their spending, but more slowly than countries which spend above-average levels over the time period. These high spenders are, overall, increasing their spending at a faster rate than other Latin American countries, accounting for the overall divergence trend (Figure 4(d)). Our illustrative examples support this: Costa Rica, an above-average spender, shows variation but an overall slight decrease in spending (Figure 6(b)), while Uruguay fluctuates, but appears to be again converging toward the regional mean (Figure 6(e)). Many other countries, including El Salvador, oscillate slightly but stay close to the regional average (Figures 4(d) and 6(d)). Taken together with our analysis of OECD countries this analysis justifies comparison across groups of countries, whether grouped by geography or other peer characteristics.

While we do not find evidence of convergence among OECD countries as a group (Figure 1), country-specific analyses reveal interesting patterns, among them overall convergence in Spain and divergence in Denmark between 1995 and 2014 (Figure 5). That is, while the trends in spending are similar across regions though the levels are different (Figure 1) we find evidence of convergence followed by divergence in Latin America and robust heterogeneity in the OECD in public health expenditure as a percentage of GDP (Figure 2). An analysis of delta-convergence allows us to examine convergers and divergers and identify those countries that are diverging and converging upwards and downwards from the group mean (Figure 4), as well as identify their trajectories (Figures 5 and 6).

Latin American countries, many of which are currently, and sometimes extensively, changing the structure, financing, and scope of their health sectors, deserve particular attention. Our analysis indicates that there is an increase in health spending as a proportion of GDP in the region, which suggests increased public commitment to this sector, beyond tracking economic growth (captured by the denominator: GDP). This runs contrary to assertions of neoliberal pressures evident in reduced social commitments by the state, and provides partial support for contentions of world polity theory. We witness some evidence of convergence, and overall increases in public spending on health. While there is some divergence, albeit with much variation, from 1995 to 2008 there appears to be convergence in the LAC region through 2012, with slight divergence in the last couple of years of the time period (Figure 2).

Our results motivate further research into the determinants of these patterns as increased public spending suggests the strengthening of social protection systems in these countries, contrary to discussions of neoliberal movements in terms of retrenchment of governments' social spending. Indeed, many countries in the region exhibit below-average spending over the period but above-average growth in spending (Figure 4(d), upper-left quadrant). Our findings provide some support for arguments of regionalization, as there appears to have been a period of convergence among traditionally below-average spenders toward the overall mean in Latin America while some above-average spenders are moderating their public health spending (Figure 4(d), upper left and lower right quadrants), but no evidence of convergence toward the Netherlands (Figure 4(c)). At least in terms of public health, we witness important regional dynamics, providing theoretical and empirical motivations of regional and group-specific analyses of these policy domains. Globalization does indeed appear to be refracted at the regional and national levels, despite some likely common

drivers of trends across countries (e.g. the parallelism among OECD and LAC countries in Figure 1). The fact that there is no convergence across regions provides some support for world systems theory's contention of persistent inequalities between core and noncore regions.

Our analysis also points to important outliers that deserve additional examination: not only Cuba, which has a distinctive health and political system, but also Uruguay, which was above-average spending but which is also trending downwards, among others. While we find evidence for complex patterns in the region, there are some trends that can be unpacked, and an examination of delta-convergence regionally provides insights on outliers, convergers, and divergers that researchers may use to trace commonalities in factors responsible for these trajectories. Overall, a careful analysis of delta-convergence sheds important insights about country-specific trajectories, regional trends with implications for our understanding of globalization, regionalization, neoliberalism, and development. Public health spending in particular is an important comparative arena for the study of development as it disproportionately benefits the poor and vulnerable, and those least able to access health otherwise. As such, an investigation of convergence in this policy domain has important implications for health outcomes and disparities, in addition to providing theoretical insights about globalization and development.

Note

1. The World Health Organization (WHO) Global Health Expenditure Database (http://apps.who.int/nha/database/DataExplorerRegime.aspx), part of the National Health Accounts database, collected and systemized health expenditure data only since 1995. The HNP World Bank (WB) data we utilize draw on these data (as both the WHO and the WB are part of the United Nations system).

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