

# Genetics vs History: Competing Explanations of Uneven Development

---

Robert Chernomas and Ian Hudson

*Draft Copy, Please Do Not Cite*

## Abstract

In a 109 page article in the *American Economic Review*, Quamrul Ashraf and Oded Galor (2013) argue that income inequality between nations is caused by differences in genetic diversity of national populations. Low income nations have either too much genetic diversity, which hampers trust, or too little, which hinders innovation, both of which are necessary for economic development. A group of anthropologists has dismissed the study for having incorrect data and creating false connections between genetic diversity, trust and innovation. Beyond this, the Ashraf and Galor genetic hypothesis is problematic because it ignores recent epigenetic research and draws a veil over the international economic causes of global inequality. Ashraf and Galor argue that the winners and losers in national incomes have been chosen by nature rather than political and economic history. In tracing the causes of national inequality to genetics, Ashraf and Galor have naturalized history.

**Keywords:** Economic History; Economic Development; Genetics; Income Inequality

**JEL Classifications:** F54; N00; O10

Portuguese Governor, Hontar: “We must work in the world, your eminence. The world is thus.”

Cardinal Altamirano: No, Señor Hontar. “Thus have we made the world... thus I have made it.”

*The Mission* (1986)

The large gap in living standards between nations has predictably been the subject of much attention and controversy in the economics profession. While the search for a grand explanation for this income disparity has yielded an impressive variety of purported causes, most of them might be usefully categorized into two camps. The first locate the source of the difference in the conditions within nations. The second locate the difference in rich and poor nations’ places within an international system that facilitates the development of some countries while impeding the development of others. The *American Economic Review* has dedicated an impressive 109 pages to “The Out of Africa Hypothesis, Human Genetic Diversity, and Comparative Economic Development” by Quamrul Ashraf and Oded Galor (2013) that, perhaps, develops the most “internal” of all possible explanations for global inequality, arguing that it is caused by differences in genetic diversity of national populations. This theory is problematic because it ignores recent epigenetic research and draws a veil over the international economic causes of global inequality.

## **1. Ashraf and Galor’s Genetic Explanation**

The central theme of the *AER* article is that income differences between nations can be traced to differences in genetic diversity. According to Ashraf and Galor, genetic diversity has conflicting effects on income. On one hand, low levels of genetic diversity are conducive to trust and cooperation that positively impact income. To provide evidence for this

hypothesis the authors find that genetic diversity has a statistically significant impact on trust as measured by how people responded to a question in the World Values Survey: “Generally speaking, would you say that most people can be trusted or that you can’t be too careful in dealing with people?” On the other hand, high levels of genetic diversity are beneficial for technological advancement and innovation since a wider variety of traits could lead to more specialization and there might be a greater variance of those with high cognitive abilities. To support this proposition, the authors demonstrate that genetic diversity has a positive impact on the annual number of published scientific articles per capita, even when years of schooling is included in the regression. If the benefits of both diversity and homogeneity are subject to diminishing marginal returns then there is a Goldilocks style “ideal” amount of genetic diversity, which is not so high that trust is limited or so low that it inhibits innovation, creating the authors’ hypothesized hill shaped relationship between genetic diversity and income.

The authors subject this theory to several tests. First, they use population density as a measure of economic development in the pre 1500 period under the Malthusian claim that higher incomes are only transitory since increased incomes will be literally eaten away by population growth. They analyze this dependent variable in the full paper for 1500 CE (and in the extended appendix for 1000 CE and 1 CE). The independent variable is genetic diversity, which is directly measured through the 53 ethnic groups from the HGDP-CEPH Human Genome Diversity Cell Line that creates a sample of 21 countries. Because this is fairly small, the authors use migratory distance as a proxy for genetic diversity to expand their sample. This extension is based on an application of the serial founder effect that

posits that as subgroups of a population split off to form new settlements, they only take with them a subset of the original genetic diversity of the species originators. It follows, then, that the most genetically diverse populations will be those in the cradle of humanity in Africa, while the least genetically diverse will be those that have travelled the farthest migratory distance, the indigenous populations of North and South America. In models that test both of these forms of genetic diversity two additional control variables are included. First, the timing of the Neolithic Revolution (this is extended in the appendix to include actual biogeographical data such as the size of the continent and the number of species available for domestication) is used to test the Jared Diamond (1997) *Guns, Germs and Steel* hypothesis that Europeans benefited from relatively more favourable biogeographic endowments that facilitated the emergence of agriculture. This allowed the emergence of a non-food producing class that could create advances in the crucial areas of written language, military technology and political nation states. This precontact luck of the biogeographical draw created guns, germs and steel so that in the contest between the colonizers and the indigenous people, there could only be one victor. The second, more easily explainable, control variable is the agricultural productivity of land. All else being equal, societies with better land productivity should be able to host a higher population density.

According to the authors, the impact of genetic diversity on population density in 1500, directly measured in the 21 country sample is: “accounting for the influence of the transition timing and land productivity channels, a 1 percentage point increase in genetic diversity for the most homogenous society in the regression sample would be associated

with a rise in its population density in 1500 CE by 58 percent, whereas a 1 percentage point decrease in diversity for the most diverse society would be associated with a rise in its population density by 23 percent.” (Ashraf & Galor, 2013, p. 21) A similar regression using the proxy of migratory distance from Africa to extend the sample also reveals a significant “hump shaped” relationship between migratory distance and population density in 1500.

In order to bring the analysis up to the present day the authors use the more direct measure of the log of income per capita in 2000 as the dependent variable. Their measure of genetic diversity is now ancestry-adjusted, which the authors claim accounts for diversity arising from subnational ethnic groups, post 1500 population flows, and the original ancestry of the country. In addition to the previous controls for the Neolithic Revolution and agricultural productivity the authors include several other controls designed to take into account of “institutional, cultural, and geographical” factors (social infrastructure, ethnic fractionalization, percentage of population at risk of contracting malaria, percentage of population living in tropical zones, mean distance to nearest waterway, percentage of population of European descent, and years of schooling) that have “received attention in the literature,” some of which are a tip of the hat to Daron Acemoglu, Simon Johnson, and James Robinson’s (Acemoglu, et al., 2001) idea that colonialism hindered private property rights in non settler colonies, negatively impacting economic growth.

Again, the “hump shaped” relationship between genetic diversity and income exists. Importantly, the relationship between genetic diversity and income in 2000 does not

operate through population density in 1500, or the authors' choice of measures that are designed to proxy institutional, cultural and other geographic factors. Nor is it caused by post colonial migration to prosperous countries. Further, the optimal level of diversity has increased compared to 1500 as innovation is increasingly important relative to trust in a technologically advanced economy. The authors even calculate the cost of suboptimal genetic diversity: "increasing the diversity of Bolivia to the level prevalent in the U.S. would increase Bolivia's per capita income by a factor of 5.4, closing the income gap between the two countries from a ratio of 12:1 to 2.2:1." (Ashraf & Galor, 2013, p. 37)

The take home message is that: "While the low degree of diversity among Native American populations and the high degree of diversity among African populations have been a detrimental force in the development of these regions, the intermediate levels of genetic diversity prevalent among European and Asian populations have been conducive for development." (Ashraf & Galor, 2013, p. 42)

## **2. Reaction**

Unsurprisingly, an article that attributes national poverty to the genetic misfortune of being at either end of the diversity scale has elicited a fairly strong response. Most prominently, a group made up primarily, although not exclusively, of Harvard anthropologists has attacked the study as, "seriously flawed on both factual and methodological grounds," (d'Alpoim Guedes, et al., 2013, p. 71) pointing to three specific categories of problems.

First, the relationship between genetic diversity and distance is incorrect. The anthropologists argue that using migratory distance as a proxy for genetic diversity is only accurate on a continental basis. It cannot be used to distinguish between countries on the same continent, which is what Ashraf and Galor have done. Essentially, rather than having over one hundred different data points based on a country's distance, Ashraf and Galor only have data points for Africa, Europe, Asia and the Americas.

Second, their data, especially the population density measure, is full of errors. Crucially, the anthropologists claim that the population estimates do not have, "any connection to reality." (d'Alpoim Guedes, et al., 2013, p. 74) The numbers used for the Americas are far too low, calling into question Ashraf and Galor's negative connection between societies with low genetic diversity and economic success. Similar problems are raised with many of the other variables from the timing of the Neolithic Revolution to the land suitability for agriculture, creating doubts about the accuracy of the control measures.

Third, the twin hypotheses about genetic diversity's influence on innovation and cooperation are at odds with much of the existing literature. According to d'Alpoim Guedes et al., biological kinship does not predict cooperation in animals. Among humans, the size and frequency of food item acquisition explains collaboration much better than genetic relationships. Publication of scientific articles as a proxy for innovation to demonstrate the positive relationship between genetic diversity and innovation is also obviously

problematic. Further, there is little, if any, other evidence of a relationship between genetic diversity and innovation.

Interestingly, Ashraf and Galor's response to the d'Alpoim Guedes et al. critique is that "the measure of intra-population genetic diversity that we employ should be interpreted as a proxy (i.e., a correlated summary measure) for diversity amongst individuals in a myriad of observable and unobservable personal traits that may be physiological, behavioral, socially-constructed, or otherwise." (Ashraf & Galor , n.d., p. 2); (d'Alpoim Guedes, et al., 2013, p. 73) This response is curious because it seems to contradict the fairly straightforward statements in the Ashraf and Galor paper cited above as well as their attempts to control for precisely these other variables in their paper.

Given that d'Alpoim et al.'s unambiguous conclusion is that Ashraf and Galor's work is actually, "false and undesirable," (d'Alpoim Guedes, et al., 2013, p. 77) it is safe to say that the genetic explanation has not been unanimously embraced.

### **3. Transgenerational Economic Impacts and Epigenetics**

While d'Alpoim Guedes, et al. is an important critique of Ashraf and Galor's methods and conclusions, this paper will address two additional and inter-related problems. First, the Ashraf and Galor article does not account for the economic history of the nations that are on the high and low ends of the trust-diversity ideal. Second, the Ashraf and Galor claim about the relationship between genetics, trust and innovation fails to acknowledge recent



research on transgenerational epigenetics. Transgenerational epigenetics research suggests that a person's human development, characteristics, and personality traits, are influenced by the lived environments of previous generations. This suggests a causation that runs from economic development to traits rather than the other way around.

### **3.a. Economic History**

“The conquest of the earth, which means the taking away from those who have a different complexion and slightly flatter noses than ourselves, is not a pretty thing when you look at it too much.”

Joseph Conrad, *Heart of Darkness*, 1902, 13

In attempting to find a truly foundational cause, stretching back beyond Acemoglu et al.'s institutions, beyond even Diamond's biogeographical fortune, to genetics, Ashraf and Galor draw a veil over the economic and political causes of the inequality between nations. Their regressions do include independent variables that proxy what they describe as “institutional, cultural, and geographical” factors. These variables represent what the authors consider to be the non-genetic factors that could influence income in 2000 to ensure that the significance of the genetic variable is not being caused by some other explanatory factor. Many of the geographical factors (orientation of the continental axis and domesticable animals) attempt to control for the Diamond hypothesis. Ashraf and Galor also put in some control variables that could be construed as a tip of the hat to Acemoglu et al.'s lasting extractive institutional legacy of colonialism. They include a social infrastructure variable (that was significant) made up of two components: the government

anti-diversion policy index that includes things like corruption, risk of expropriation and government repudiation of contracts; and an openness index consisting of indicators on trade openness and whether the government is socialist (Ashraf & Galor, 2013, p. xlv). They also include a measure that captures ethnic fractionalization (that was not significant in the full model) in a country, that acknowledges the problematic cut and paste nature of colonially imposed national boundaries. Other control variables, such as education and exposure to malaria in 1994, are as much the result of low incomes as the cause. Yet others, like percentage of population living in tropical zones appear to simply be irrelevant. Indeed, their control variables are something of a grab bag, including some variables that acknowledge, with varying degrees of success, only the economic history of Diamond and Acemoglu et al. while throwing in a couple of extra discretionary indicators.

This is not to suggest that Ashraf and Galor are not dedicated to their empiricism. Authors must always use some discretion in their control variables. Ashraf and Galor's lengthy appendix also includes a battery of robustness checks, like dropping the countries of Sub-Saharan Africa and Latin America and restricting the sample exclusively to countries in Sub-Saharan African and Latin America. They find that their results hold in both of these regressions (Ashraf & Galor, 2013, p. xxxii). However, despite Ashraf and Galor's legitimate efforts at empiricism, their results have been easy to overturn. When another researcher included a dummy variable for Eurasia in an effort to provide what he felt was a better measure of the Diamond thesis, he found that the indicators of genetic diversity were insignificant in explaining levels of economic development (Tang, 2016). The point here is not necessarily that Tang's results unequivocally invalidate those found by Ashraf and

Galor. However, they do demonstrate the caution with which Ashraf and Galor's results should be received. Their surprising explanation for differentials in economic development places a great deal of confidence in the ability of econometric testing to reveal the truth. They may have established a correlation in their model but the jump to causation does not yet appear to be demonstrated, especially given the relatively undeveloped theoretical and historical foundations of their model.

What is particularly missing is what Ashraf and Galor describe, in their summary of Diamond, as "subjugation of less-developed societies through exploitative geopolitical processes like colonization." (2013, p. 9) This is especially important because, while inequality between nations or societies did exist in 1500, it escalated dramatically after that date, despite a decrease in inequality between national mean GDP per capita between 2002 and 2008 (Milanovic, 2013). According to economic historian Angus Madison, in 1500, real GDP per capita in Western Europe was 1.8 times that of Latin America and 1.9 times that of Africa. By 1913 this ratio had increased to 2.3 for Latin America and 6.0 for Africa. By 1998 it had grown to 3.1 for Latin America and 13.1 for Africa, a difference between continental per capita income of \$17,900 in Western Europe, \$5800 in Latin American and \$1370 in Africa ((Maddison, 2001, p. 126) see also (Piketty, 2014, p. 766) for a comparison from 1600 that arrives at similar conclusions). Perhaps not coincidentally, this was also the date at which contact between different societies also increased, with easily identified winners and losers. While these are by no means exhaustive, an explanation that begins to put economics and politics back in to the explanation of why income in Africa and Latin

America lagged behind Europe and North America after 1500 might consider three factors: slavery, colonialism, and neocolonialism.

While the debate about the economic benefits of the Atlantic slave trade for the societies that purchased and owned slaves continues, there can be far less doubt that it was damaging to those who were being sold. As a result of four different slave trades, by far the largest of which was the trans-Atlantic, by 1850 the population of Africa was about half of what it would have been (Manning, 1990, p. 171). Also because it was often groups of the same ethnicities enslaving each other, the detrimental effects spread well beyond the problems of a decimated population. The intergroup conflict created by raiding for slaves increased insecurity and political instability, making organized agriculture very difficult (Rodney, 2012[1972], p. 100). It caused the collapse of pre-existing political structures, like the Kongo, and corrupted many of those that continued. Political structures degenerated into small unstable bands controlled by a warlord. In the fraught environment of slave raids people sought weapons that could be obtained from Europeans in exchange for slaves. Of course, this sets up a vicious cycle where the increased slave raiding to pay for weapons creates more slave raids and greater need for weapons.

The chaos created by the slave trade may have had long term detrimental effects on political structures and economic growth in Africa.<sup>1</sup> According to Nathan Nunn, the countries from which slaves were taken in the greatest number are those that have the worst subsequent record of economic development. What makes this effect stronger is that the most developed regions of Africa were more involved in the slave trade. Nunn argues

that this long term impact was caused by the fractionalization created by slavery, which hindered the development of political structures that would aid growth (Nunn, 2008).<sup>2</sup>

It might be possible for Ashraf and Galor to argue that it was the lack of trust caused by too much genetic diversity that caused Africans to sell each other into slavery. However, this claim would not only require the d'Alpoim Guedes et al. claim about the lack of connection between genetics and trust to be false, but it also ignores the externally created demand for slaves. It was the Europeans in the trans-Atlantic slave trade whose voracious appetite escalated slavery to a phenomenon that emptied a population and intensified slavery related conflicts. In contrast to Ashraf and Galor, Nunn and Leonard Wantchekon trace the low levels of trust in Africa to the legacy of the slave trade as opposed to genetics. They find that the slave trade's negative impact on trust is causal and that it has worked by both weakening political institutions and altered Africans' internal beliefs about trust in a way that persists over time (Nunn & Wantchekon, 2011). What Ashraf and Galor think they have captured as a negative relationship between high diversity, lack of trust and low income is better described as a causal chain of events that runs from the economic destruction caused by slavery, to lack of trust and low incomes.

As was the case with slavery, while the debate about the extent to which a colonial empire was, always and everywhere, beneficial for the colonizer has yet to be conclusively decided (for example, see (Kennedy, 1989); (Vilches, 2010) for the problems of empire and (Pomeranz, 2001) for the benefits of the New World Colonies), a strong case can be made that the economic development of the colonized nations was impeded.<sup>3</sup> According to Mike

Davis, the remarkable growth in inequality between countries in the world in the late 19<sup>th</sup> century was at least partly attributable to the impact of colonialism. Indeed, in addition to the depopulation of many colonized regions through disease, the twin impositions of the market and surplus extraction actively impoverished colonized nations (Davis, 2001). An important part of colonial domination was to introduce the market mechanism where it had no sway previously. Markets did not emerge in the colonies because of the Smithian propensity of people to truck, barter and trade. As Rosa Luxemburg pointed out many years ago, this involved a forceful imposition of markets and the price mechanism against the often fierce resistance of the colonized, whose traditional forms of organization to distribute goods and arrange labour were destroyed by the colonial powers (Luxumburg, 1951). The native populations and their traditional patterns of land ownership were forcibly destroyed where colonizers wanted to use land, and its accompanying resources, as a commodity that could be owned, bought and sold. The population of colonized nations did not volunteer themselves as wage labour on the plantations and mines of the colonies but were forced, most obviously through slavery, but also through a variety of other forms, such as taxation (Graeber, 2011, pp. 307-360); (Beckert, 2014); (Anievas & Nişancioğlu, 2015).

It is also true that the system of trade between the colonized and colonizing nation was designed to extract resources from the colonized nation at very favourable terms for the colonizer. In contrast to Ashraf and Galor's genetic explanation of inequality between nations, economists Daron Acemoglu, Simon Johnson and James Robinson trace the cause to institutions. According to Acemoglu et al., poor nations suffer from extractive

institutions, such as high taxation and arbitrary confiscation of property, that are a continuing legacy of colonial extraction. While extractive institutions certainly existed in today's impoverished nations before the arrival of Europeans, colonizers often created rules designed to dispossess the native population and transfer resources from the colony to the home nation. For Acemoglu et al. there is a crucial distinction between "settler" colonies, which had large European populations, and those where Europeans faced high mortality rates, and would not settle. In settler colonies, like the US, Canada, Australia, and New Zealand, the settlers set up institutions that enforced the rule of law and encouraged investment. Where Europeans could not settle, as was the case in much of Africa and South America, colonizers set up extractive states with the intention of transferring resources rapidly to the colonizing nation. Further, Acemoglu et al. argue that the effects of extractive colonialism can be long lived because the extractive institutions are carried on by the post colonial governments (Acemoglu, et al., 2001; Acemoglu, et al., 2012).

Colonial nations also imposed trade relationships that stripped colonies of their natural resources and stifled any exports that would compete with established industries in the colonizing nation. The Spanish pillaging of gold and other precious metals from Latin America under conditions of indigenous slavery is one example of resource expropriation. So too, would be the rapacious rule of King Leopold, whose brutal extraction of the Congo's rubber resources is estimated to have cost ten million lives (Hochschild, 1999). Britain passed a series of rules, such as the Woolens Act, that were designed to either encourage raw material exports from the colonies or prevent the competition with British industry. When colonial products competed with those from the colonizing nation, they were

“dismantled by war, invasion, opium and a system of one way tariffs.” (Davis, 2000, p. 57)

According to Davis, “Whatever the internal brakes on rapid economic growth in Asia, Latin America, or Africa, it is indisputable that from about 1780 or 1800 onward, every serious attempt by a non-Western society to move over into a fast lane of development or to regulate its terms of trade met a military as well as an economic response from London or a competing imperial capital.” (Davis, 2000, p. 57)

As an example of how the imposition of the market and expropriation caused devastation, Davis argues that in India, China and Brazil colonial relationships contributed to famines that killed between 32 and 61 million people. Although these nations experienced drought conditions that adversely affected their harvests, the colonial imposition of the market, as opposed to more traditional food distribution mechanisms, meant that the food shortage forced prices up and out of the reach of most of the rural population, whose incomes were falling. This problem was exacerbated by the infrastructure developed for the colonial system of extraction. For example, railroads, which were touted as a famine relief mechanism because they could more rapidly move food into stricken areas, were instead used to move food out of famine regions to areas where they could earn a higher price (Davis, 2001). During the colonial period, production in the world became much more concentrated in the colonizing nations of Europe. In 1820 Europe accounted for 27 percent of world GDP. By 1890 it had increased to 40 percent (Maddison, 1998, p. 40).

Colonialism gets more of a mention than slavery in Ashraf and Galor, but they are predominantly concerned with how colonialism might impact the national genetic pool



through migration. They find that colonial migration, “significantly altered the genetic diversity towards the optimal level for development, in the post-1500 time period.” (Ashraf & Galor, 2013, p. 42) In contrast to Acemoglu et al., who stressed the advantages of European institutions for settler colonies, Ashraf and Galor stress the benefits of their levels of genetic diversity.

Of the control variables used by Ashraf and Galor, only ethnic fractionalization could be traced unambiguously to colonialism. The others simply test common perceptions (whether they are correct or not is more open for debate) about good governance, which may or may not trace back to colonial institutions. One could imagine much more direct empirical controls for the issue of colonialism. Acemoglu et al. used settler mortality as his explanatory variable to test for “extractive” colonialism (Acemoglu, et al., 2001). What Ashraf and Galor find to be genetics could also be the negative impact of colonialization.

While Acemoglu et al. focused on the institutional legacy of colonialism to explain current national income disparity, they largely ignore the much more active role that modern institutions have played in hindering the development of former colonies (Chernomas & Hudson, 2016). The idea that there are neocolonial (the use of economic, political, cultural, military or other pressures to control or influence other countries, especially former dependencies) external impediments to the development of poorer nations has a long intellectual history. In an early example, Raul Prebisch, the director of the Economic Commission of Latin America, argued that the terms of trade of the primary products exported by the developing world would tend to fall compared to the industrial products of

the developed world (Prebisch, 1950). This would present a structural obstacle for the developing world if it followed a policy of free trade. Subsequent scholars in what became known as dependency theory (Frank, 1967) and world systems approaches (Wallerstein, 1974; Wallerstein, 1980; Wallerstein, 1989) stressed an unequal relationship between the core, developed nations and the developing periphery. The hallmark of these theories was that the development of the core nations conditioned the development of the periphery, frequently to the detriment of the latter. The mechanism through which this occurs varied depending on the specific theory, ranging from the siphoning of profits by MNCs to rules of international trade agreements that disadvantage the developing world trading partners. Central to these theories is that the economies in the developing periphery were heavily influenced by powerful external forces that at least conditioned, and at most stunted, their development.<sup>4</sup>

Many of the specific neocolonial external mechanisms, from the Washington Consensus policies (an economic reform package forced on debtor nations by institutions like the IMF that consisted of privatization, reductions in government spending, tight monetary policy, deregulation, free trade, and free movement of capital) that restructured developing debtor nations' economies to enable them to maintain their debt payments in order to avoid substantial losses for developed world banks,<sup>5</sup> to free trade institutions (such as the TRIPS and TRIMS provisions of the WTO),<sup>6</sup> have been well documented and familiar to many readers, but it may be helpful to illustrate the general point with one particular example. Léonce Ndikumana and James Boyce's book, *Africa's Odious Debts*, argues that the conventional accounting, in which Africa is considered a debtor to the rest of the world, is

misleadingly incomplete (2011). While it is true that governments in the continent had racked up \$177 billion in external debt by 2008, a more careful calculation would also include net private capital flows. In the thirty-nine years between 1970 and 2008, there was a net capital flight outflow of \$735 billion from the thirty-three Sub Saharan countries for which there is data. If these funds had been invested in assets that earned interest equal to short term US Treasury bills the 2008 value would have been \$944 billion (Ndikumana & Boyce, 2011, p. 54). A later paper extending this method to four North African countries discovered that a further \$450 billion was lost to capital flight between 1970 and 2010, amounting to \$619 billion if foregone interest is included. Combining these two studies yields \$1.56 trillion in capital that could have been invested in the poorest continent as opposed to fleeing offshore (Ndikumana & Boyce , 2012, p. 5). Far from being a net international debtor, capital actually flowed out of the poorest continent to the rest of the world. Ndikumana and Boyce refer to the connection between external debt and capital flight as a “revolving door,” in which loans to African governments are channeled into the corrupt pockets of its leaders and then flow back out of the continent in the form of capital flight (Ndikumana & Boyce, 2011, p. 4).<sup>7</sup> According to their calculations, had the hundreds of billions funnelled out of sub Saharan Africa been spent on public health, it would have prevented “77,000 excess infant deaths per year.” (Ndikumana & Boyce, 2011, pp. 82-83)

It might be possible to interpret this outflow as a purely domestic problem, representing nothing more than modern day pirates (perhaps who lack trust) plundering the nations that they were supposed to be governing. However, the looting of Africa by its rich and powerful was directed, supported and abetted in various ways by those in more affluent

continents. Most obviously, governments, especially in the U.S., imposed or propped up the very people who were funneling money out of Africa, making this less a tale of domestic dysfunction and more one of external interference. In his book *Killing Hope*, William Blum documents a conservative 55 cases in which U.S. military intervention was used to either protect or install governments (Blum, 2004). The main criterion for U.S. support was whether governments were amenable to foreign business, particularly U.S. based MNCs, no matter how rapacious or undemocratic they happened to be. Placing the responsibility with the developing country elite also glosses over the role of MNCs in corruption. As Jeffrey Sachs noted, “the next time you hear about a corruption scandal in Africa or another poor region, ask where it started and who is doing the corrupting ... for it is often the most powerful global companies that have created the problem.” (Sachs, 2011)<sup>8</sup> Further, capital flight from Africa was aided by both the liberalization of international finance and the multinational banks that benefited from the ill-gotten gains of the African elite (Ndikumana & Boyce, 2011, p. 30). As a result, those in power, and the economic policies that they follow are often more the result of neocolonial decisions made in affluent nations than in the capitals of the developing world. Again, low income nations have particularly suffered from the damage of neocolonialism. Ashraf and Galor’s control variables do not appear to control for these types of external impediments.

After 1500, the period in which inequality between nations grew so rapidly that one could speak meaningfully of first and third worlds, these same continents were subject to deliberate and forceful impediments to their growth. It does not appear as though Ashraf and Galor’s control variables account very well for these factors, from slavery to

colonialism to neocolonial interventions, which might be a more accurate explanation of sluggish economic performance of countries on these continents. As a result, what their model ascribes to genetic diversity may actually be the economic history of the damage done to currently poorer nations by their wealthier counterparts.

In their critique of mainstream economics, Yanis Varoufakis, Joseph Halevi and Nicholas Theocarakis assert that it “remains innocent of the logic of capitalism.” (2011, p. 288) They are not alone in this claim. Considerably earlier, Robert Heilbroner and William Milberg lamented the tendency in much of economics scholarship to treat the institutions of modern capitalism — from private ownership to business enterprise and the price system — as “natural, rather than socially constructed” and therefore beyond the scope of inquiry (1995, p. 113). What this means is that, with very few exceptions, economics tends to abstract itself from the real world analysis of the how the actual economy operates. The Ashraf and Galor *AER* article is illustrative of this tendency in the history of economic thought.

Ashraf and Galor’s big picture focus is a naturalized one, leaving the larger structures in which economic development takes place unquestioned and unchallenged. Using a few so-called “institutional, cultural, and geographical,” factors and then concluding that genetics has an important influence on income disparity, while ignoring the negative impact of colonial and neocolonial influence on the development of many poor countries, fits comfortably in Heilbroner and Milberg’s claim that economics abstracts from how the economy actually operates. Philip Mirowski argues that, far from being a coincidence, this

abstraction has been the product of cultural and political struggles that have narrowed the discipline and naturalized the economic system that it purports to study (Mirowski, 2009; Mirowski, 2014).

The impacts of historic structures such as slavery and colonialism or the more recent disadvantages of neocolonialism not only impede the development of nations through economic channels, but, as we shall elaborate in the next section, economic disadvantages in any one generation can be perpetuated through successive generations through epigenetic pathways.

### **3.b. Genes, Epigenetics and Political Economy**

Ashraf and Galor's causal chain runs from genetics to the traits of trust and innovation to economic development. However, hypothesizing a link between genetic diversity and specific personality characteristics demonstrates an overly simplistic understanding of the impact that genes have on traits like trust and innovation. At the very least, research suggests a much more complicated causal chain than the authors suggest. In fact, recent evidence suggests that they might have the causality reversed - that causation actually runs from economic development to human traits. The fact that past economic conditions can have a profound, lasting impact on behaviour that can persist through generations is one of the key discoveries of the emerging science of epigenetics.

Epigenetics is the study of changes in gene expression that occur without any changes to the gene sequence itself, which can play a role in human development. It has become

increasingly clear that the epigenome provides the genes with instructions for what to do. This would explain why identical twins with the same genes (identical DNA) display different developmental outcomes. What the evolving epigenetic science suggests is that there is a distinction between the more direct causal effects of classical genetic inheritance of something like eye colour, and the much more complicated role of genes in determining other traits. Genes are involved in the social inheritance of characteristics from parents to their offspring but only in the sense that it is modified through their environmentally induced epigenetic modification (Francis, 2011, p. 76). As a recent book on the subject claimed, “phenotype, in short drags genotypes behind it, like a cart pulling a horse.” (Mukherjee, 2016, p. 108)

It is well established that the negative impact of childhood exposures to adverse conditions can persist into adult life. It is possible that the epigenome is one mechanism through which this occurs. Moshe Szyf and Michael Meaney, of McGill University, discovered that during periods of stress the offspring of non-nurturing rat mothers show greater increases in blood pressure and stress hormone production than the babies of nurturing mothers. To rule out a genetic cause, nurturing mothers were given the babies of the less nurturing and vice versa. Once again, the less-nurtured pups grew up markedly different. Szyf and Meaney believe that experience itself changes the epigenome. The conclusion is that it is more the behavior of the mother than it is genes that impact the offspring. Even years after the mother had passed on less nurtured rats had epigenetic marks silencing a gene that lowers the level of stress in the blood. Meaney suggested that, “If you grow up in a family that involves abuse, neglect, harsh and inconsistent discipline, then you are statistically

more likely to develop depression, anxiety, drug abuse. And I don't think that surprises anyone. But what is interesting is that you are also more likely to develop diabetes, heart disease and obesity. And the stress hormones actively promote the development of these individual diseases.” (PBS, 2007) A strong relationship between exposure to abuse during childhood “and multiple risk factors for several of the leading causes of death in adults” has long been established in the research literature (Felitti, Nordenberg, Williamson, & et al., 1998).

A stark natural experiment on the relationship between environment and future health was possible courtesy of the Nazi fuel and food blockade that created the Dutch Winter Hunger that lasted from November 1944 until the spring of 1945. The desperate conditions that resulted from the blockade killed some 22,000 and the surviving population experienced conditions of severe malnutrition (Carey, 2012, p. 91). The Dutch penchant for medical records made possible transgenerational studies of the malnourished survivors, providing compelling evidence for the long-term effects of the fetal environment on our health. The result of these Dutch studies suggests that those prenatally exposed to the Dutch famine were more prone to a variety of psychological and physical issues, including schizophrenia, depression, high blood pressure, coronary heart disease and type II diabetes, although the specific condition depended on the trimester of the mother’s malnourishment (Francis, 2011, pp. 3-4). This is evidence that a triggering event continues to have consequences long after the trigger itself has disappeared (Carey, 2012, p. 236) “Their DNA didn’t change (mutate) and yet their life histories altered irrevocably in response to their environments.” (Carey, 2012, p. 2)



A subset of epigenetics is the study of heritable changes in gene expression, which has discovered evidence that the environment can have a multigenerational effect. The precise biological pathways through which this occurs has not yet been conclusively demonstrated, but there is evidence that it exists through epidemiological and animal testing. Michael Skinner's research team at Washington State University exposed rats to chemicals, including substances that lead to diseases in the prostate, kidney, ovaries and immune system. These diseases also showed up in the fourth and fifth-generation offspring of mothers exposed to a chemical. They discovered that methyl molecules altered the functioning of the DNA in future generations, making them susceptible to the same diseases. The phenomenon was so unexpected that it has given rise to a new field, named transgenerational epigenetics (an effect from parent to offspring and beyond), or the study of inherited changes that cannot be explained by traditional genetics (Interlandi, 2013). A recent review article also compiled evidence that suggests that a variety of negative environmental conditions, from parental behaviors like low self-esteem or stress, to toxic chemicals, can affect the way that genes translate into mental health not only for those exposed but for subsequent generations (Bohacek, Gapp, Saab, & Mansuy, 2013).

In humans there is evidence that a famine in one generation might affect descendants a century later, even if they had never experienced a famine themselves. Studies of the descendants of the Dutch Winter Hunger show that some of the negative effects were not only found in the children of famine survivors but were also in the grandchildren of the malnourished woman (Carey, 2012, p. 4). Another study found that the trauma of Holocaust survivors was passed down to their children, who had increased incidence of stress disorders. The authors claim that the parental trauma prior to having children was

associated with epigenetic changes in both those who experienced the trauma and their children, who did not, showing that psychological trauma can be passed down between generations (Yehuda, et al., 2015). If this is the case, it follows that problematic economic or environmental exposures might have a detrimental epigenetic impact on traits and abilities down through several generations.

Damaging physical and socioeconomic conditions that impact different societies or some members of a society have been characterized as traumatogenic (capable of producing a wound or injury) (Hollander & Gutwill, 2006). Ashraf and Galor do not consider the traumatogenic effect of hundreds of years of slavery and colonialism in its many forms on the development of Africa or Native Americans. Maurizio Meloni argues that by “blurring the lines between body and society” epigenetics would destroy any clear division, “between natural and social inequalities in theories of justice and their possible implications for public policy and public health.” (2015)

The epigenetic evidence presented above suggests that causation can run from the state of economic development or the environment in which people exist to human traits like trust or innovativeness. Further, a positive or negative environment can have effects on human traits that can last multiple generations. If poor nations are not sufficiently innovative or trusting, it is possible that this is a result of their economic conditions, not a cause of it. There are powerful reasons to believe the European effect on Africa has been traumatogenic, dramatically affecting its economic growth path. Evaluating the personality

traits of any society requires moving beyond genetics to an understanding not only of current but also past environmental conditions and the economy that produced them.

#### **4. Conclusion: Putting Economics Back in Economics**

In tracing the causes of national inequality to its most basic genetic foundations, Ashraf and Galor have backgrounded economics as a causal factor in economic development. To be a little more precise, Ashraf and Galor's theory is that human traits have genetic roots that contribute to poor economic performance. Nations are poor, in part, because their unfortunate genetic make-up renders them short on either innovation or trust.

This two-step connection has already been criticized by a group of anthropologists. They argue that Ashraf and Galor's data on both genetic diversity and population is inaccurate, leading them to false connections between development and genetics. Further, they claim that there is no evidence that there is a connection between genetics and either trust or innovation.

The Ashraf and Galor genetic theory also downplays centuries of "external" factors that have systematically hindered the development of the poorer nations, from slavery to colonialism to neocolonial economic arrangements. It also neglects the findings of epigenetic research that suggests that the causation between human traits and economic development runs in the opposite direction to that ascribed by Ashraf and Galor. Rather than lack of innovation or trust causing slow development, the transgenerational

epigenetic inheritance of an undesirable economic history may be negative traits like a lack of trust.

In tracing the causes of national inequality to genetics, Ashraf and Galor have naturalized history. Adam Smith attributed the emergence of capitalism to the natural, self-interested human tendency to barter, trade and exchange. Karl Marx argued that what Smith took to be human nature was merely a reflection of the particular traits of a bourgeois shop keeper. According to Marx, Smith's error was to take the economic system to be a natural outcome of human traits, when those traits were actually a product of the economic system (Kellner, 1977, pp. 77-78). Ashraf and Galor have attributed the difference in economic outcomes to personality traits caused by genetic differences. A better case could be made that human traits are a product of the evolution of the economic system. The evidence in support of Ashraf and Galor's genetic explanations for human inequality are theoretically and empirically flawed while the evidence for the lasting detrimental impact of slavery, colonialism and neocolonialism is much more robust.

## Footnotes

1. For a more complete discussion of the African slave trade see Lovejoy, P. 2000. *Transformations in Slavery: A History of Slavery in Africa, Second Edition*, Cambridge, Cambridge University Press
2. For a contrasting view, that argues that it was malaria, not slavery that is the root cause of African underdevelopment see: Bhattacharyya, S. 2009. Root causes of African underdevelopment, *Journal of African Economies*, vol. 18, no. 5, 745-780
3. For a contrasting view, that suggests that colonialism benefitted the colonies see: Ferguson, N. 2004. *Colossus: The Price of America's Empire*, New York, Penguin Press, p. 173
4. For more recent works in this tradition see: Loxley, J. 1998. *Interdependence, Disequilibrium and Growth: Reflections of the Political Economy of North-South Relations at the Turn of the Century*, London, Macmillan and Levitt, K. 2005. *Reclaiming Development: Independent Thought and Caribbean Community*, Kingston, Ian Randle Publishers
5. See, for example: Stiglitz, J. 2002. *Globalization and its Discontents*, New York, Norton, 20; World Bank. 2005. *World Development Report*, Washington, World Bank; Davidson, P. 2004. A post Keynesian view of the Washington Consensus and how to improve it, *Journal of Post Keynesian Economics*, vol. 27, no. 2, 207-227; Gore, C. 2000. The rise and fall of the Washington Consensus as a paradigm for developing countries, *World Development*, vol. 28, no. 5, 798-804. For an early evaluation of the IMF's role in the

- debt crisis of the 1980s see Loxley, J. 1986. *Debt and Disorder: External Financing for Development*, Boulder, CO, Westview Press
6. For example, see, Chang, H-J. 2002. *Kicking Away the Ladder: Development Strategy and Historical Perspective*, London, Anthem Press
  7. For a more general work on capital flight, tax evasion and offshore finance see Naylor, R. 2004. *Hot Money and the Politics of Debt, Third Edition*, Montreal, McGill-Queens University Press
  8. For further evidence on the role of MNCs in corruption that influences the policy environment in their favour see: Kaufmann, D. 2006. Myths and realities of governance and corruption, pp. 81-98 in A. Lopez-Carlos (ed) *Global Competitiveness Report 2005-2006*, Davos, World Economic Forum and Leonard, H. 1980. Multinational corporations and politics in developing countries, *World Politics*, vol. 32, no. 3, 454-483

## References

- Acemoglu, D., Johnson, S. & Robinson, J., 2001. The colonial origins of comparative development: An empirical investigation. *American Economic Review*, 95(1), pp. 1369-1401.
- Acemoglu, D., Johnson, S. & Robinson, J., 2012. The colonial origins of comparative development: an empirical investigation: reply. *American Economic Review*, 102(6), pp. 3077-3110.
- Anievas, A. & Nişancıoğlu, K., 2015. . *How the West Came to Rule: The Geopolitical Origins of Capitalism*. London: Pluto.
- Ashraf, Q. & Galor, O., n.d. *Response to Comments made in a Letter by Guedes et al. on "The Out of Africa Hypothesis, Human Genetic Diversity and Comparative Development"*. [Online] Available at: [http://www.econ.brown.edu/Faculty/Oded\\_Galor/pdf/Ashraf-Galor%20Response.pdf](http://www.econ.brown.edu/Faculty/Oded_Galor/pdf/Ashraf-Galor%20Response.pdf) [Accessed 19 October 2016].
- Ashraf, Q. & Galor, O., 2013. The out of Africa hypothesis, human genetic diversity, and comparative economic development. *American Economic Review*, 103(1), pp. 1-109.
- Beckert, S., 2014. *Empire of Cotton: A Global History*. New York: Alfred A. Knopf.
- Blum, W., 2004. *Killing Hope: US Military and CIA Interventions since World War II*. Monroe, Maine: Common Courage.
- Bohacek, J., Gapp, K., Saab, B. & Mansuy, I., 2013. Transgenerational epigenetic effects on brain functions. *Biological Psychiatry*, 73(4), p. 313 – 320.
- Bollati, V. & Baccarelli, A., 2010. Environmental epigenetics. *Heredity*, 105(1), pp. 105-112.
- Carey, N., 2012. *The Epigenetics Revolution*. New York: Columbia University Press.
- Chernomas, R. & Hudson, I., 2016. *Economics in the 21st Century: A Critical Perspective*. Toronto: University of Toronto Press.
- d'Alpoim Guedes, J. et al., 2013. Is poverty in our genes? A critique of Ashraf and Galor, "The 'out of Africa' hypothesis, human genetic diversity and comparative economic development," *American Economic Review*. *Current Anthropology*, 54(1), pp. 71-79.
- Davis, M., 2000. The Origin of the Third World. *Antipode*, 32(1), pp. 48-89.
- Davis, M., 2001. *Late Victorian Holocausts: El Niño Famines and the Origin of the Third World*. London: Verso.
- Felitti, V., Nordenberg, A., Williamson, D. & et al., 1998. Relationship of childhood abuse and household dysfunction to many of the leading causes of death in adults: the Adverse Childhood Experiences (ACE) Study. *American Journal of Preventative Medicine*, 14(4), pp. 245-258.
- Ferguson, N., 2004. *Colossus: The Price of America's Empire*, New York: The Penguin Press.

- Francis, R., 2011. *Epigenetics: How Environment Shapes Our Genes*. New York: W.W. Norton & Co..
- Frank, A. G., 1967. *Capitalism and Underdevelopment*. New York: Monthly Review Press.
- Graeber, D., 2011. *Debt: The First 5,000 Years*. Brooklyn, NY: Melville House.
- Heilbroner, R. & Milberg, W., 1995. *The Crisis of Vision in Modern Economic Thought*. Cambridge: Cambridge University Press.
- Hochschild, A., 1999. *King Leopold's Ghost: A Story of Greed, Terror, and Heroism in Colonial Africa*. Boston: Houghton Mifflin.
- Hollander, N. & Gutwill, S., 2006. Despair and hope in a culture of denial. In: L. Layton, N. Hollander & S. Gutwill, eds. *Psychoanalysis, Class and Politics: Encounters in the Clinical Setting*. New York: Routledge, p. 81–91.
- Interlandi, J., 2013. *The toxins that affected your great-grandparents could be in your genes*. [Online] Available at: <http://www.smithsonianmag.com/innovation/the-toxins-that-affected-your-great-grandparents-could-be-in-your-genes-180947644/> [Accessed 23 October 2015].
- Kellner, D., 1977. Human nature and capitalism in Adam Smith and Karl Marx. In: J. Schwartz, ed. *The Subtle Anatomy of Capitalism*. Santa Monica, CA: Goodyear Publishing, pp. 66-85.
- Kennedy, P., 1989. *The Rise and Fall of the Great Powers: Economic Change and Military Conflict 1500 to 2000*. New York: Vintage Books.
- Lovejoy, P., 2000. *Transformations in Slavery: A History of Slavery in Africa, Second Edition*. Cambridge, UK: Cambridge University Press.
- Luxumberg, R., 1951. *The Accumulation of Capital*. London: Routledge.
- Maddison, A., 1998. *Chinese Economic Performance in the Long Run*. Paris: OECD.
- Maddison, A., 2001. *The World Economy: A Millennial Perspective*. Paris: OECD.
- Manning, P., 1990. *Slavery and African Life*. Cambridge: Cambridge University Press.
- Meloni, M., 2015. Heredity 2.0: the epigenetics effect. *New Genetics and Society*, 34(2), p. 121.
- Milanovic, B., 2013. Global income inequality in numbers: in history and now. *Global Policy*, 4(2), pp. 198-208.
- Mirowski, P., 2009. *The Road from Mont Pèlerin: The Making of the Neoliberal Thought Collective*. Harvard: Harvard University Press.
- Mirowski, P., 2014. *Never Let a Serious Crisis Go to Waste: How Neoliberalism Survived the Financial Meltdown*. London: Verso.



- Mukherjee, S., 2016. *The Gene: An Intimate History*. New York: Scibner.
- Ndikumana, L. & Boyce, J., 2012. *Capital Flight From North African Countries*, s.l.: University of Massachusetts Amherst: Political Economy Research Institute.
- Ndikumana, L. & Boyce, J., 2011. *Africa's Odious Debts: How Foreign Loans and Capital Flight Bled a Continent*. London: Zed.
- Nunn, N., 2008. The Long-Term Effects of Africa's Slave Trades. *Quarterly Journal of Economics*, 123(1), pp. 139-176.
- Nunn, N. & Wantchekon, L., 2011. The Slave Trade and the Origins of Mistrust in Africa. *American Economic Review*, Volume 101, pp. 3221-3252.
- PBS, 2007. *Ghost in your genes. Nova*. [Online] Available at: [http://www.pbs.org/wgbh/nova/transcripts/3413\\_genes.html](http://www.pbs.org/wgbh/nova/transcripts/3413_genes.html) [Accessed 13 May 2015].
- Piketty, T., 2014. *Capital in the 21st Century*. Cambridge, Mass: Belknap Press.
- Pomeranz, K., 2001. *The Great Divergence: China, Europe, and the Making of the Modern World Economy*. Princeton, NJ: Princeton University Press.
- Prebisch, R., 1950. *The Economic Development of Latin America and Its Principle Problems*, Lake Success, NY: United Nations.
- Rodney, W., 2012[1972]. *How Europe Underdeveloped Africa*. Cape Town: Pambazuka Press.
- Sachs, J., 2011. Corporate crime wave threatens global economy. *Taipei Times*, 03 May.
- Tang, S., 2016. Eurasia advantage not genetic diversity: against Ashraf and Galor's 'genetic diversity' hypothesis. *Historical Social Research*, 41(1), pp. 287-327.
- Varoufakis, Y., Halevi, J. & Theocarakis, N., 2011. *Modern Political Economics*. New York: Routledge.
- Vilches, E., 2010. *New World Gold: Cultural Anxiety and Monetary Disorder in Early Modern Spain*. Chicago: University of Chicago Press.
- Wallerstein, I., 1974. *The Modern World System Vol. 1: Capitalist Agriculture and the Origins of the European World-Economy in the Sixteenth Century*. New York: Academic Press.
- Wallerstein, I., 1980. *The Modern World-System, vol. II: Mercantilism and the Consolidation of the European World-Economy, 1600-1750*. New York: Academic Press.
- Wallerstein, I., 1989. *The Modern World-System, vol. III: The Second Great Expansion of the Capitalist World-Economy, 1730-1840's*. San Diego: Academic Press.
- Yehuda, R. et al., 2015. Holocaust exposure induced intergenerational effects on FKBP5 methylation. *Biological Psychiatry*, p. in press.