Colonialism and Modern Income -- Islands as Natural Experiments

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Draft: September 2007

Using a new database of islands throughout the Atlantic, Pacific and Indian Oceans we find a robust positive relationship between the number of years spent as a European colony and current GDP per capita. We argue that the nature of discovery and colonization of islands provides random variation in the length and type of colonial experience. We instrument for length of colonization using variation in prevailing wind patterns. We argue that wind speed and direction had a significant effect on historical colonial rule but do not have a direct effect on GDP today. The data also suggest that years as a colony after 1700 are more beneficial than earlier years. We also find a discernable pecking order amongst the colonial powers, with years under US, British, French and Dutch rule having more beneficial effects than Spanish or Portuguese rule. Our finding of a strong connection between modern income and years of colonization is conditional on being colonized at all since each of the islands in our dataset spent some time under colonial rule.

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I. Introduction

Understanding the variation in income across countries remains one of the most important research questions in economics. This paper examines one potentially major cause of long term income differences between countries – variation in the nature and length of colonization by Europeans. We use a new dataset of islands in the Pacific, Atlantic, and Indian oceans that were colonized during the Age of Discovery. The main advantage of our new dataset is random variation in the colonial experience. We argue that the finding and colonizing of the islands in our dataset has a large random component and that the colonial experiences of our islands constitute a natural experiment. We test this conjecture by using wind patterns as an instrument. Wind was crucial during the Age of Discovery, but is not relevant to modern travel and therefore provides an ideal instrument for the colonial experience.

The central finding in our paper is that the length of colonial period is strongly positively related to modern outcomes.[2] In order to asses the randomness of the colonial experience (colonizers may settle the best places first and give them up last), we instrument for the year of European discovery and subsequent length of colonial period using data on wind patterns. The IV results are extremely similar to the OLS results, which is consistent with our assertion that much of the variation in the colonization of islands is random. Our finding is quite robust within our islands data set and we show it also holds within the Acemoglu Robinson Johnson [2002] set of continental countries.[3] We also find that the impact of colonial regimes varies by the identity of the colonizer and the timing of colonialism. Pre-enlightenment colonization (i.e. in the 1500 and 1600s) and colonization by Spain and Portugal are found to be less beneficial than later colonization.

We are hardly the first to examine the relationship between colonial rule and modern outcomes. Historians and political scientists have emphasized the long term negative

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[2] This is conditional upon being a colony at all. Since all of our islands had at least a short colonial period, we cannot identify the effect of "never a colony" on modern outcomes.

[3] We define a colonial year as one in which Britain, France, the Netherlands, Germany, Spain, Portugal, Japan, or the US had political control of the island and had officially designated the island to be a colony, territory or protectorate.

consequences of colonial rule including the possible inability of former colonies to transition to a stable form of self government or the possible negative effects of resource extraction.[4] Recent economic work on the importance of institutions has emphasized the colonial legacy. La Porta, Lopez de Silanes, Shleifer and Vishny [1997, 1998] show that former colonies of English common law countries have more developed capital markets than former colonies with French civil law. Banerjee and Iyer [2005] look at the effect of differences in colonial property rights institutions in India. Acemoglu, Johnson and Robinson [2001, 2002] show that the form of colonization (extractive versus heavy settlement by Europeans) tended to determine the type of institutions created in the country and therefore strongly affected modern outcomes. Engerman and Sokoloff [2003, 2005] hypothesize that forms of colonialism which promoted severe inequality hampered the future growth prospects of a colony.

Obviously causality is problematic in considering the effect of institutions on income. The literature has attempted to deal with this reverse causality through the use of instrumental variables, but finding appropriate instruments is difficult. Mauro [1995] uses ethnolinguistic fractionalization to instrument for corruption. Hall and Jones [1999] use the distance from the equator as an instrument, arguing that this determines the degree of European influence. In neither case is it clear that the instrument does not have a direct effect on output. In a paper focusing on Indian states, Iyer [2005] uses the deaths of rulers lacking male heirs as an instrument for the degree of British colonial control. She finds that direct British control had a negative impact on modern outcomes. Acemoglu, Johnson, and Robinson [2001, 2002] argue that the death rates of settlers provide a useful instrument for modern institutions. This approach has not been without critics. McArthur and Sachs [2000] argue that settler mortality is related to the overall disease environment and has a direct effect on output.

We bring two innovations to this debate. First, we have created a new database of 81 islands which contains a large number of additional data points beyond the usual cross section of countries used by growth economists. Of the 136 countries in the Penn World

[4] See for example Rodney [1974], Ashcraft [1973], Brett [1973], Howard [1978].

Tables with GDP data for 1989 only 13 are in our database.[5] Islands provide an interesting experiment in that our sample has more homogenous initial conditions than the Penn World Tables group. Second we argue that variation in the colonial experience of islands was relatively random and therefore constitutes a natural experiment.

We propose and implement a new source of exogenous variation in colonial history – wind patterns. Wind speed and direction were crucial during the age of sail, and have useful variation within each ocean and within given latitudes. Islands located near routes in the prevailing winds made useful stopovers and were more easily revisited and colonized. However, since the beginning of the age of steam began over 100 years ago, the importance of wind patterns has disappeared. We argue that any effect of wind speed on current GDP works only through wind's effect on European settlement.

II. The Random Component to Island Settlement and the Importance of Wind

The exploration and settlement of islands in the Pacific, Atlantic and Indian Oceans entails hundreds of fascinating stories and historical accidents. Most of the Caribbean islands were known to Europeans prior to most of the Pacific Islands. This was a matter of distance from Europe and the incredible vastness of the Pacific.[6] Meanwhile, certain islands in the Pacific (in French Polynesia and the Cook Islands in particular) were not sighted by Europeans until the late 1700s. Patterns of settlement were determined in part by obvious economic factors like distance to the mainland. However, a fair amount of colonization was due to unique historical accidents and due to historical trade routes and wind patterns.

There are almost as many discovery stories as there are islands, particularly in the Pacific. The infamous case of the Mutiny on the Bounty led to the discovery and colonization of

[5] Barbados, Comoros, Dominican Republic, Fiji, Haiti, Jamaica, St. Kitts and Nevis, Mauritius, Philippines, Seychelles, Trinidad and Tobago, Puerto Rico, Vanuatu

[6] For example, Columbus sighted the British Virgin Islands in 1493 and he had already sighted portions of the Bahamas, Hispaniola and Cuba a year before that. Of the 39 Atlantic islands in our database, 24 were first sighted by Columbus during one of his three voyages. By 1685 the Dutch were using St. Thomas (Virgin Islands) as a slave trading post and the island contained large sugar plantations by the mid 1700s.

Rarotonga, Kadavu, Pitcairn, and Norfolk islands.[7] Penrhyn Island was accidentally colonized in 1788 when Captain Sever smashed his ship (the Penryhn) into the shoreline on his way to deliver convicts to Botany Bay. Palmerston was colonized by the British mostly because it was empty when Captain Cook discovered it.[8]

Though random accident played a large role, we will also argue that wind speed and direction were important factors in the pattern of island colonization. Unlike powered boats, sailboats require steady wind to make headway. Islands located in areas where the wind is weak were less likely to be discovered, revisited, and colonized by Europeans. Wind direction is also important. The technology available at the time of the voyage of Columbus only allowed ships to sail about twenty degrees into the wind. This technology improved slowly over time, but sailing into the wind remained difficult until steamships became the norm in the twentieth century.[9]

Consistent downwind routes between useful destinations were therefore well traveled while much of the globe went virtually untouched. Much of the east to west traffic across the Pacific after Magellan's 1521 crossing closely followed his pioneering voyage because his path was the logical and efficient way to cross. Crossing in the opposite direction turned out to be much more difficult due to prevailing wind patterns.[10] At least four Spanish expeditions attempted and failed to establish a west to east route across the Pacific in the wake of Magellan's voyage. It was not until 1565 that a west to east path was found across the Pacific and this required sailing much farther north.

[7] While fleeing Tahiti, the mutineers discovered Rarotonga in the Cook Islands. Captain Bligh discovered Kadavu in Fiji as he sailed his open boat 3,600 miles from the Friendly Islands to Java (without losing a single one of his 18 crewmembers). The mutineers settled on Pitcairn (with their Tahitian wives) precisely because no one lived there and it was not near any land mass of note. The mutineers' descendants became so numerous that the British government then moved some of them to Norfolk Island thereby creating a second new colony.

[8] The first group of settlers took to murdering each other. However the second settlement was more successful; William Marsters moved there in 1862 with his three Polynesian wives and his descendants are still there.

[9] Sailing ships were common for transoceanic voyages long after the introduction of steam powered ships because it was difficult for early steamships to carry enough fuel for long voyages. This was particularly true in the Pacific.

[10] At the middle latitudes where most of our sample is located the prevailing winds are to the west in both the Pacific and the Atlantic.

The net result of this history is that the pattern of colonization is related to the speed and direction of the prevailing winds. Islands like Fefan and Pohnpei in the Federated States of Micronesia have calm winds, were not located near the Spanish trade route and were basically left alone, even after their discovery in the 1680s. At the other extreme, despite also being quite isolated, Guam was directly on the Spaniard's Manila Galleon route due to a favorable combination of wind and currents. Magellan found Guam in 1521 and by the end of the century it was settled as a watering hole for Spanish ships on the Mexico-Philippines route.

Once an island was discovered, the path to European settlement was made more difficult by the crude state of mapping technology. Before the mid eighteenth century the measurement of longitude at sea was extremely imprecise. Sailors had to rely on dead reckoning to measure which became less and less precise the further the ship strayed from known landmarks.[11] There are many cases of islands appearing multiple times on early maps because longitude was estimated differently by separate voyages. Revisiting an island charted by a previous voyage was problematic. The known map of the world at the dawn of the eighteenth century was therefore incomplete and inaccurate. Such was the state of ignorance that many still held out hope of a large undiscovered land mass in the Pacific.[12] The main form of navigation was latitude sailing, which involved sailing directly west along the latitude line of a known landmark.[13] Utilizing this method of navigation, east-west corridors of consistent winds are crucial.

[11] Magellan's voyage was predicated on the hope that the Spice Islands were on the Spanish side of the line described by the Treaty of Tordesillas. This uncertainty was made possible because the precise longitude of the islands was uncertain at the time.

[12] This changed during the latter half of the eighteenth century with the solution of the longitude problem by Harrison. James Cook and others made voyages which filled in the remaining map of the Pacific.

[13] Latitude sailing was the most common form of navigation before the solution to the longitude problem. Suppose you were trying to sail from Europe to a particular island in the Pacific without an accurate measure of longitude. You would head north after rounding Cape Horn until the vessel was at the same latitude as the destination. This was easy and effective because the ship's latitude could be easily and accurately determined by measuring the height of the sun off the horizon at noon. Similarly, the latitude of your destination on charts was well measured even if the longitude was not. Once at the proper latitude, all that was needed to get to the destination was to sail due west until you arrived. In order for this strategy to work, it was important that you arrived at the target latitude to the east of your destination, forcing ships to sail north more rapidly than would be sensible on a direct route. With this style of navigation, east-west corridors with steady winds become more frequently traveled.

This history makes wind speed an ideal instrument for colonization and settlement. Wind was incredibly important during the age of sail, but its importance came to an abrupt halt early in the twentieth century. Within our sample, wind speed should not have a direct effect on an island's current level of GDP, but could have an important effect via the island's history of colonization. The vast majority of our sample is in the westerly trade winds. In a first stage regression, the average speed and variability of the westerly winds are significant determinants of the number of years of colonization.

III. The Nature of Island Colonization

In the Atlantic islands, colonization generally consisted of several hundred or a few thousand Europeans arriving and in some cases being granted large parcels of land for farming. Early Spanish colonialism was governed by the *encomienda* system which essentially introduced feudal institutions to the colonies. The *conquistadors* were given trusteeship over the native peoples. In practice, natives (mostly Arawaks or Caribs) were often enslaved to work on these plantations.

The English and French were more enterprising than the Spaniards in setting up the sugar-slave economy and by 1673 there were 57 plantations in English controlled Barbados. Jamaica was at one point in the 17th century (after the British captured it from the Spaniards) the world's largest producer of sugar (Black [1881]). By 1700, the French had established many sugar plantations on virtually all of their islands, including Martinique, Guadeloupe, Grenada, St. Croix, and Saint-Domingue (present day Haiti).

Colonies in the Pacific Islands tended to involve fewer numbers of Europeans and far less reliance on imported slaves. Missionaries were often the first colonial residents. For example, Guam was first sighted by Magellan in 1521. In 1668 the Spanish installed a group of Jesuit missionaries, a single garrison of soldiers and a colonial governor. The Spanish mission totaled 50 people relative to the 12,000 Chamorros on Guam. (Douglas [1994], Rogers [1995]).

III.A. The Immediate Impact of Colonization: Loss of Native Peoples to Disease and Slavery

One of the most striking and terrible facts about colonization by Europeans is the degree to which native populations on some islands were decimated either by brutal enslavement or by diseases carried by Europeans and their animals (See Diamond [1997]). This is most true in the Atlantic where certain islands lost their entire native population in a short amount of time.[14] The Pacific islanders also faced shocking mortality due to smallpox and other diseases brought by the Europeans.[15] However, unlike in the Atlantic only a few of the islands saw a complete wiping out of the original inhabitants and there are substantial native populations in the Pacific today.[16]

Any discussion of the effects of colonialism on economic output has to acknowledge the devastation of native populations and cultures. Our results show that islands with a longer colonial history (and more settlement by Europeans) have higher income per capita and lower infant mortality than other similar islands. Is it sensible to measure the positive effects on growth from European contact if in fact the original inhabitants are partially or entirely wiped out because of that contact? Is the possibility of no European contact a realistic counterfactual? Even without colonialism proper, any contact still may have wiped out entire populations.

We do not intend to address these questions in this paper. Our results are simply an examination of the standard of living of people currently alive on these islands relative to

[14] For example, the Spaniards began to colonize Puerto Rico in 1505 under the leadership of Ponce de Leon. The native Tainos were enslaved as part of the encomienda system in which land grants to Spaniards included the right to extract tribute or labor from the natives assigned to that land. The original population of Tainos was estimated to have been 60,000. By 1515 this had fallen to 14,400 and by 1530 to 1,500 (Wagenheim [1998]). Prior to the arrival of Europeans, Jamaica was heavily settled and was home to tens of thousands of Arawaks. Not a single one of the natives were alive by the time the British took over from the Spanish in 1655 (Black [1881]).

[15] Venereal disease brought by the Spaniards often lead to sterilization.

[16] Perhaps the worst depopulation occurred in Guam and the Marianas. The number of pure blooded Chamorros on Guam fell from 12,000 in 1668 to 1,576 in 1742. (Rogers [1995]). The Tahitians saw a drop in their population as a result of the introduction of European disease, but this was followed by a partial recovery. One estimate puts the population of Tahiti at 24,000 around the time of Cook's visit but only 9,000-10,000 by 1800. The native population stabilized and remained around 9,500 at the time of the 1848 census. (Newbury [1980]).

the colonial experience. We do, however, recognize that there are other measures of the outcomes from colonialism that may generate different conclusions. It is certainly plausible to argue that the accumulated utility of Pacific Islanders since first encountering Europeans is lower than in the counterfactual even if the current standard of living on these islands is significantly higher because of that contact.

IV. The Long Run Impact of Colonialism on Income

The central finding of our paper is that there is a robust positive relationship between colonial tenure and modern outcomes. The obvious question is why? More intensive involvement with Europeans or longer colonial rule might have left islands with a more stable or better structured government. This theory is most associated with Acemoglu Robinson and Johnson [2001]. Unfortunately, it is not easy to identify which governmental institutions are the most critical, and measuring institutional quality is extremely difficult. Furthermore, even if we had a modern index of say, expropriation risk or corruption for these islands, one might worry that good modern institutions were caused by high incomes rather than the other way around. We offer two partial (and admittedly imperfect) solutions to this conundrum.

In order to examine whether the quality of governmental institutions matters we look at variation in both who did the colonizing and when colonialism occurred. The work of La Porta, Lopez de Silanes, Shleifer and Vishny [1997, 1998] suggests that the identity of the colonizing country has important effects on modern income through the legal system. The historical record also suggests that different countries varied in the manner in which they ruled their holdings. The encomienda system of the Spanish may have had different effects than French or British rule.

We also think that the timing of colonialism (holding colonizer constant) may be related to institutional quality, with the later period representing both better governmental institutions and better intentions on the part of colonizers. There was a distinct change in the attitude of the explorers toward the world between the beginning of the period of exploration and the final filling in of the map of the world. A simple illustration of this point can be seen in the differences between the voyages of Ferdinand Magellan and James Cook.

When Magellan set sail on his famous circumnavigation in 1519 his goal was to find a Spanish route to the Spice Islands. The Treaty of Tordesillas in 1494 split the world between Spain and Portugal at 46°W longitude. The Spanish felt that a westward route would allow them to lay claims on the Spice Islands. The agreement between Spain and Portugal had the blessing of the Pope and along with their rights to these unfound lands came a responsibility to spread Christianity. Magellan's voyage was therefore explicitly commercial with religious overtones.

This stands in stark contrast to the voyages of James Cook between 1768 and 1779. Cook's missions had explicit scientific aims. On all three voyages, Cook brought artists and scientists to record and study all that he found. Unlike Magellan, who was driven to bring Christianity to the natives, Cook had a much more romantic view of the Pacific islanders.

> "We debauch their morals already too prone to vice and we introduce among them wants and perhaps diseases which they never before knew and which serves only to disturb that happy tranquility they and their forefathers have enjoyed … If anyone denies the truth of this assertion let him tell me what the natives of the whole extent of America have gained by the commerce they have had with Europeans."[17]

There is evidence that the more enlightened attitude of the later explorers is correlated with a more enlightened approach to administering colonies. Some of the Pacific Islands were not colonized until the mid-19th Century (for example Tahiti and the Marquesas). No enslavement of the natives took place there and representative local governments were set up within 70 years of colonization.

More generally, many of the institutional features considered to be important for modern outcomes were not well developed in European countries in the earlier period and

[17] Hough [1994].

therefore not available for transfer. The primacy of parliaments, the importance of the rule of law, and the protection of property rights advanced significantly between the sixteenth and eighteenth centuries. To the extent that we find that later colonial years (for example those after 1700) are more beneficial than earlier colonial years (e.g. those before 1700), we take this as another indicator that institutional quality partly explains the colonialism-income connection.

V. Data Description

The data on island colonization, GDP, and infant mortality are assembled from a large number of sources. Our starting point was a database of islands maintained by the UN.[18] This dataset provided us with a comprehensive list of individual islands along with nation, population and area. We sorted the islands by size and investigated islands that satisfied two criteria. First, we only included islands that require open ocean sailing to reach them from Europe. Second, we limited the sample to relatively small landmasses, specifically those less than 150,000 square kilometers.

These selection criteria are intended to generate a sample of islands that fit our story of random variation in colonial experience. We are particularly interested in the randomness associated with the age of exploration. Islands that were unavoidably found as Europeans made their way down the coast of Africa clearly have a less random history than the islands of the Pacific.[19] The size criterion is intended to make the sample as homogeneous as possible. Large landmasses like Australia are fundamentally different than the islands in our sample. Within the group of islands fitting these criteria we researched islands in order of population using any islands for which data were available.

Islands that are part of a group are only included as independent data points if there is some independent information for the individual island. For example, the majority of the islands in the Maldives have an identical colonial history and we only have one GDP data

[18] http://islands.unep.ch/

[19] The islands that make up Indonesia and Papua New Guinea are excluded for this reason: they were found and settled quite early and there was nothing random about this process. Our results are however robust to including these two countries as an additional two data points.

point for the entire group. In this case, there is only one island in the Maldives included in our dataset. On the other hand, the islands of the Netherlands Antilles have heterogeneity of both colonial history and GDP, so the individual islands in the group are included separately. We do, however, recognize that these may not be completely independent data points so all the econometric analysis is clustered at the islands group level.

Where available, we obtained GDP per capita for the year 2000 from the United Nations. Per capita GDP figures were available for 39 island nations covering 61 of the islands in our dataset. Twenty islands are possessions of other countries, for example Guam is a US possession. In those cases we obtained island level income per capita and infant mortality numbers for the island from the statistical agency of the relevant country.[20] In the case of islands that are currently part of an island group (such as the Cook Islands), we disaggregated country level data into the component islands where possible. For example Yap and Pohnpei are both states in the Federated States of Micronesia, but the two islands have different histories, wind patterns, and economic output and are located more than 1,000 miles apart. In some of these cases we were able to obtain separate GDP breakdowns from a series of reports on Pacific island groups produced by the Asian Development Bank.[21]

The colonial and settlement histories for each island come from a myriad of sources. For the Pacific islands we relied heavily in the Pacific Islands Yearbook [Douglas, 1994]. For Atlantic and Indian Ocean islands, we used Encyclopedia Britannica, Wikipedia, and supplemented these sources with the individual island histories listed below in the references section[22]. We collected the entire history of each island, including the first

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[20] In these cases we will be using income per capita as a proxy for GDP per capita. We recognize that this is an imperfect measure. We report robustness checks where we limit ourselves to the GDP data.

[21] We used the breakdowns by island in the following way: The island group level data was used to establish relative income levels. For example, the disaggregated data tells us that Yap in the FSM has twice the per capita income of Moen in the same group. Using the relative income and population data we calculated the per capita income for each island so that the relative income levels were correct and that the population weighted group average was equal to the GDP per capita figure for the group from the UN.

[22] Not all of the references are explicitly cited in the text since many of these references were used to establish colonial histories for individual islands.

European sightings, the first settlements, the extent of such settlements, and the political history of the island's colonization if any.

We define colonialism as those years during which an island is claimed politically by one of the European countries, the US, or Japan. This requires that the colonizing country has not only landed on the island and claimed it, but that the central government of the European power has ratified a law stating that the island is one of its possessions.[23] We take any of the words territory, possession, protectorate or colony to signify an islands status as a colony. Disputes of ownership were relatively short lived and in the case of a dispute we always code as the colonizing the country that power which maintained physical (eg military and administrative) control of the majority of the islands' people.

Wind speeds measured in average knots are from satellite data taken from CERSTAT.[24] The satellites measure wind speeds over water for the entire globe, reported on a one degree longitude latitude grid. The data we utilize are reported monthly and consist of the average wind vector in knots in the north-south direction and the average wind vector in the east-west direction. These two vectors completely describe the average wind speed and direction in a given month. Given monthly average observations on both vectors, we are able to look at the variability of the wind speed as well as the average intensity. Thus the most parsimonious set of instruments is the average of the raw monthly data and its standard deviation. In other words, we have the average annual wind speed to the north and its monthly variability and the average annual wind speed to the east and its monthly variability.

Alternatively the raw data can be transformed into a set of compass directions and wind speeds. In a regression this requires using a set of 4, 8 or 16 compass point dummies and

[23] We also coded New Zealand's ownership of Niue from 1904 to 1974 as colonial years. We did the same for Australia's ownership of Nauru during 1914-1968. We did this following a referee's suggestion, and it makes sense given that New Zealand and Australia were highly developed "neo-Europes" by the twentieth century.

[24] The CERSAT (Centre ERS d'Archivage et de Traitement - French ERS Processing and Archiving Facility) is part of IFREMER (French Research Institute for Exploitation of the Sea. It was created in 1991 as a node of the ESA (European Space Agency) ground segment for the ERS-1 and ERS-2 Earth observation satellites. http://www.ifremer.fr/cersat/

possibly interacting these dummies with the wind speed. We have also tried specifying our instrument in this form and we obtain similar results.

Given the direction of travel from Europe, the east-west component of the wind should be particularly important for sailing voyages and our first stage regressions confirm this. But we report results using a variety of combinations of the instruments.

Table I contains summary statistics for the data. Forty of the eighty one islands are located in the Pacific. Thirty five are in the Atlantic and the remaining islands are in the Indian Ocean. The median population on our islands is about 14,000 people. This ranges from as few as 102 people on Palmerston Island (in the Cook Islands) to more than 11 million people in Cuba. Our results are robust to dropping islands with fewer than 10,000 people. The median land area for the islands is 130 square kilometers. The mean 2000 GDP per capita on the islands in the sample is $8,279 with a high of $53,735 for Bermuda.

The average number of centuries of colonization (using our political definition) is 2.32. But there are many islands with relatively limited colonial experience. Twenty two countries in the sample were a colony for one hundred years or less and eleven for less than fifteen years. In general the Atlantic islands were the first to be colonized by Europeans and some islands including Bonaire, Curacao, and Barbados have 400 years of colonial history.

One possible criticism of our approach is that islands tend to be small and have different natural resources than continental nations and are therefore not "real countries" of interest to macroeconomists. Since many successful islands focus on tourism, one could also make the case that this also makes them different from "real" countries. We have several responses to this. First, the islands in the sample have significant variation in levels of income and industry mix. Appendix Table V shows that agriculture is a large fraction of the economy for islands like Dominica and some of the Federated States of Micronesia like Pohnpei. Bermuda and the Virgin Islands tend to focus on services, though this can mean banking and insurance in addition to tourism. More importantly, even if all the islands in the South Pacific or the Atlantic had beautiful beaches, we still would need to ask why certain islands have a subsistence level of income while others have a standard of living that rivals Sweden and the US. Grand Cayman is a tourist paradise while Hispaniola (Haiti plus the Dominican Republic) is not, despite the fact that both islands have tropical breezes and the beauty of the Caribbean Sea.[25]

VI. Results

Figure 1 shows a scatter plot of log GDP per capita versus number of centuries as a colony. The circles are for islands in the Atlantic. The triangles are for islands in the Pacific and the squares are for islands in the Indian Ocean. The regression line shows a positive relationship between length of colonial period and modern GDP. While there is a large amount of variation around the regression line (we certainly don't think colonial history explains everything), the t-statistic for the slope is 6.1. The coefficient is 0.42 meaning that every additional 100 years of colonial history is associated with a 42 percent increase in GDP. Remarkably the upward slope holds within each of the oceans. The relationship is not driven simply by the fact that Atlantic islands were discovered by Europeans earliest and are the richest.

Table II shows nine different cross sectional regressions with our basic result. For columns (1) through (7) log GDP per capita is the dependent variable. Column (1) shows the basic correlation illustrated in Figure (1). A longer period under colonial rule is associated with higher per capita GDP. Each additional hundred years is associated with GDP per capita that is 42 percent higher.

Column (2) adds additional controls. We include dummies for each ocean and we control for island land area and absolute value of latitude (distance from the Equator). As in Gallup, Sachs and Mellinger [1999] and Sachs [2003], the absolute value of latitude is

[25] We are not claiming that the length and nature of the colonial period explains the Grand Cayman Hispaniola income gap specifically but rather that even within Caribbean islands, there is massive and interesting variation in economic performance.

strongly related to current levels of income. Every 10 degree increase in latitude (i.e. moving roughly 700 miles away from the equator) is associated with a 53 percent increase in GDP. Those authors find that latitude works through the efficiency of agriculture and disease prevalence. Acemoglu et al [2001] provide evidence that latitude's effects work through variation in the nature of European settlements and institutions that were established. Island area is also significant with larger islands doing more poorly than smaller islands. Interestingly, the Pacific and Atlantic Ocean dummies are not significantly different from each other. Including the geographic controls does not substantially alter the results for colonial tenure.

One important possibility is that Europeans simply chose to settle the best islands first and hence the more successful islands have a longer colonial history. In column (3) we instrument for the number of years as a colony using data on prevailing wind patterns. As discussed in a previous section, wind patterns make an appealing instrument because they were incredibly important during 1500-1890 (and determined discovery and settlement), but have little direct effect on GDP today.

Column (3) of Table I shows the second stage of the two stage least squares regression. The results are similar to the OLS results and the coefficient on years of colonization remains very significantly away from zero with a t-statistic of 2.8. Each additional hundred years of colonization is associated with 71 percent larger GDP per capita. Utilizing a Hausman test, one cannot reject the null hypothesis that the OLS and IV results are the same.

The first stage for this regression is contained in Appendix Table I column (1) which uses our preferred set of instruments. We use the east west vector of wind and its standard deviation. Both instruments are significant predictors of centuries of colonialism. As expected stronger westerly winds are associated with more years as a colony. A larger standard deviation is also associated with more years as a colony.

Appendix Table II shows the possible first stages from various combinations of our raw wind data. In all cases the average east-west component is a significant predictor of years as a colony. The variability of the east-west vector adds a modest amount of explanatory power. The north-south components do not seem to matter very much. All combinations of instruments are significant at the 5% level. However, the instrument sets using only east-west information are significant at the 1% level. For this reason all our standard results use the east-west wind speed and standard deviations as instruments. Appendix Table III shows the second stage results for each of the instrument sets. The results are insensitive to the particular combination used. First stages and reduced forms for all of the IV regressions in Table II are included in Appendix Table I.

One objection to our IV strategy is that the instrument is well suited to describing the beginning of colonial rule, but is not a good instrument for the end of colonial rule. In columns (4) and (5) of Table II we switch our key right hand side variable to the first year that an island fell under colonial rule.[26] For this specification, we do not include any regressors describing the end date of colonial rule. Our IV strategy assumes that the instruments affect the beginning of colonial rule through the ability to reach each island during the age of sail. The end dates of colonial rule all fall well after the beginning of the age of steam, so our instrument should not have a direct effect on colonial end date. The results are extremely similar to the length of colonial rule results. Again a Hausman test does not reject the hypothesis that the IV and OLS coefficients are identical.

We also run regressions where we control explicitly for the end date of colonialism in columns (6) and (7) in Table II. We also add a dummy for islands which currently have a colonial relationship with a developed country (e.g. Puerto Rico, Guam, or the Netherlands Antilles). It is possible that current transfers from the colonizing country to these islands are important.[27] Interpretation of these additional controls is difficult since the end point of colonial rule is endogenous. We include these regressions largely to

[26] The first and last year of colonization are divided by 100 to make the coefficients compatible with the centuries of colonial rule coefficients.
[27] Our preferred specification excludes these controls for the end of colonialism since the end or continuation of colonialism is endogenous AND a continuing colonial relationship may be an important part of the overall causal effect of being colonized early.

show that these channels appear to only "explain" a modest portion of our results. Only the initial date of colonialism is instrumented in column (7).

The results in columns (6) and (7) indicate that it is the start date of colonialism that is driving our results, not the end date. The coefficients on the beginning year of colonialism are similar in magnitude (though as expected, opposite in sign) to the coefficients in the previous regressions. The coefficient on the last year of colonialism is not statistically significant. Whether the island was still a colony in 2000, however, is significant and positive. Being a colony in 2000 is associated with 80-95% higher income. The inclusion of this dummy has no significant impact on the coefficient on the first or last year of colonialism, suggesting that our base result is not being driven by current transfers, but that transfers may be incredibly beneficial for a modern island colony's income.[28]

As an additional outcome measure we use infant mortality as the dependent variable in Columns (8) and (9). These results mirror the results for GDP per capita. The number of centuries that an island was a colony is a negative and significant predictor of infant mortality in all the specifications. This result is also robust to our IV strategy.

The regressions in Table III examine whether our results are being driven by sample and data selection. Column (1) repeats our base result. Column (2) excludes islands for which there is no direct GDP data available from the UN. These excluded islands are generally territories of developed countries such Guam and the British Virgin Islands. This column does allow for adjustments to GDP within island groups as described in the data section. Column (3) does not include these adjustments. The results for these three columns are similar, suggesting that our particular sample choices are not driving the results.

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[28] Including a late colonialism dummy alone in any of the earlier columns does not significantly affect the central results.

Columns (4) through (7) show the results of running our base regression on sub samples of islands limited to the Atlantic and Pacific Oceans. Columns (4) and (5) are estimated with OLS. Columns (6) and (7) instrument the number of centuries of colonialism with wind data as described above. The results are fairly similar within each ocean. In the Pacific, where we have the most variation in years of colonization, the coefficient on the number of years of colonialism is statistically significant.[29]

VI.A. Timing and Identity of Colonizing Powers

In Table IV we split out the effects of centuries of colonialism by the identity of the colonizer. The "omitted" category is years spent not as a colony. We wish to examine whether the effects differ across the colonizers. Of course, identification in these regressions is less clear than in the regressions identifying the number of years as a colony; we are not claiming that these regressions are necessarily causal. However, given the previous literature on differences in colonizers we feel that the correlations are interesting. In addition, our earlier results suggest a large degree of randomness in the colonial experiences of islands. If true, the OLS results are informative.

For the OLS results the coefficients on centuries of British, French, and Dutch rule are all in the .5 to .6 range and are statistically indistinguishable. However, centuries of Spanish rule have a statistically significantly lower coefficient (at .20) and the Portuguese coefficient is significantly negative. We find this to be quite consistent with the hypothesis that colonialism's effects on income work through institutional quality. The Spanish and Portuguese legacy may still affect GDP per capita today (Landes [1994]).

The positive coefficient on centuries of US rule is very large. This is not surprising given the direct benefits to Guam, Puerto Rico, the Northern Mariana, the US Virgin Islands and Hawaii of current US ownership and of the ability of these islanders to migrate to the mainland US. The US federal government has invested heavily in these places in infrastructure, schools, and health care systems.

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[29] In the first stage regressions (not reported), the p values for the joint significance of the instruments are .04 in the Pacific regression and .01 in the Atlantic.

In column (2) we add dummies for having ever been colonized by each of the eight colonial powers. In other words, we allow for the possibility that the sets islands ruled by each power may be fundamentally different or that there may be different level effects transmitted by each colonizer irrespective of length of colonial period. The results in column (2) are qualitatively similar to those in column (1) which does not control for the set of colonial power dummies. For instance, the slope on centuries US is still quite large though no longer statistically significant. This makes sense given that there is only modest variation in years of US rule once we condition on having ever been a US colony. The coefficients on years of British, French and Spanish rule remain about the same, though the coefficient on Spanish rule loses statistical significance.

Column (3) and (4) repeat this exercise using IV. The instruments for each country are the east-west speed and standard deviations interacted with a set of country dummies. This leaves us with two instruments for each country measurement. Since our IV strategy is only valid for determining the number of years as a colony, the results are somewhat difficult to interpret. Intuitively, our instruments are allowing wind speed to have different effects for each of the colonizers in the first stage. Given the limited sample size this leads to relatively weak first stage regressions. The results are not significantly away from OLS, but in many cases this is due to much larger standard errors. In column (3) the relative weakness of years of Portuguese rule and the relative strength of years of Dutch rule remains significant. This significance disappears in column (4) once we add to the second stage the dummies for "ever colonized" by each of the eight colonial powers.

In column (3) we ask whether we can detect any difference in incomes among islands that use the British versus French legal system and the answer is no. Incomes in the two types of islands look quite similar.

Table V examines the timing of the colonial experience. Again, this set of regressions is not as well identified as our central result. We feel that the early colonial experience was significantly random and therefore the pre-1700 and post-1700 results are potentially causal. On the other hand, it is clear that the end of colonialism is potentially endogenous. For this reason, the 20th century results should be viewed with caution.

The differences in the effects of pre and post enlightenment colonialism are evident in our data. Column (1) splits the number of years of colonialism into years before 1700 and years after 1700.[30] The results suggest that only the years after 1700 are positively associated with modern outcomes. An additional 100 years of post-1700 colonialism is associated with much higher per capita income (though this includes the very rich places that are still colonies). The coefficient is highly significant and significantly different than the coefficient on pre-1700 colonial years. This suggests that the colonial era of Cook was indeed different from that of Columbus and Magellan. Column (2) instruments the pre and post 1700 colonialism years with the east-west and north-south wind vectors and their standard deviations. The results are very similar with pre and post 1700 years being significantly different.[31]

Column (3) breaks the years into three eras, pre-enlightenment, post-enlightenment, and post 1900. Once again, the pre and post enlightenment years are significantly different from each other. The 20th century years are significantly better than either earlier era. In Column (4) we add a dummy for whether an island was a colony in 2000 in order to isolate the effect of transfers from other mechanisms. With this additional control, years of 20th century colonialism become statistically worse than years between 1700 and 1900. This shows that the positive 20th century result of column (3) is entirely driven by islands which remained colonies at the end of the century. Being a colony at the end of the 20th century remains very positively associated with income. Conditional on making it to the end of the century as a colony, years as a colony in the 20th century are negatively associated with income.

[30] The results are robust to moving the cutoff to 1750.

[31] In the first stage regressions (not reported) the p-values on the F statistics for the joint significance of the instruments are .03 and .025.

VI.B. A Broader Sample of Countries

Our results suggest that the length of colonial experience is positively correlated with per capita GDP in a sample of islands. The IV results further suggest that these results are not being driven by the selective colonization of islands that have features conducive to good modern outcomes. Given the similarity of the IV and OLS results, it may be instructive to check the basic results against a larger more traditional sample of countries. Table VI shows the results from regressing per capita GDP against the number of years a country was a colony for a sample of non-island developing countries. This sample is consistent with the countries included in Acemoglu, Johnson, and Robinson.

The basic results match quite nicely with our island results. Each additional century of colonial tenure is associated with a 40 percent increase in GDP. This is not statistically significantly different from the 42 percent coefficient found in the island sample. Including latitude as a control does not significantly change this coefficient. One advantage of using this sample is that standard measures of modern institutional quality can be included. Column (3) of Table VI includes expropriation risk as an additional regressor. Expropriation risk is significant and negative, as expected. This reduces the point estimate on colonial tenure, but it remains large and significant. In column (4) we include the Acemoglu, Johnson and Robinson measure of log settler mortality with similar results.

While the results from this sample are not as well identified as from the islands sample, they are still instructive. The basic correlation appears to extend beyond our island sample. The results are robust to the inclusion of standard modern institutional measures and geographic controls.

VII. Concluding Remarks

We have argued for an "islands as experiments" approach where random variation in the colonial experiences of islands can be used to think about the long run effects of colonial history on economic performance. The most interesting fact in our sample of island colonies is a robust positive relationship between the years of European colonialism and current levels of income. While some of this relationship could be driven by smart selection of islands by colonizers, we suspect that part of the relationship is causal. When we instrument for colonization and settlement using wind patterns, we obtain coefficients on years of colonization that are identical to our OLS results.

While the basic results suggest that longer European colonial exposure is good for the modern inhabitants of the islands in our sample, we also bring additional facts to bear to think about why. First, quality differences in the colonial experience seem to matter. These findings are consistent with the Acemoglu et al. result that the quality of the colonial experience is important for modern outcomes. There is a discernable pecking order amongst the colonizers. Years under US and Dutch colonial rule are significantly better than years under the Spanish and Portuguese.

Second, later years of colonialism are associated with a much larger increase in modern GDP than years before 1700. It is not difficult to believe that colonialism in the post-enlightenment era led to more efficient and beneficial institution transfer than colonialism under the *encomienda* system and its contemporaries. This is not to say that we find the early colonial years to be detrimental to modern GDP – we do not.

While any attempt to get at root causes of the paper's central fact are partly speculative, we hope that the basic facts and data generated by this examination of islands will further the understanding of long run growth.

References

Acemoglu, Daron, Simon Johnson, and James A. Robinson. 2001. "The Colonial Origins of Comparative Development: An Empirical Investigation," *American Economic Review* 91(5): 1369-401.

Acemoglu, Daron, Simon Johnson, and James A. Robinson. 2002. "Reversal of Fortune: Geography and Development in the Making of the Modern World Income Distribution," *Quarterly Journal of Economics* 117(4), 1231-1294.

Aldrich, Robert, *France and the South Pacific Since 1940*, University of Hawaii Press, Honolulu, 1993.

Ashcraft, Norman, *Colonialism and Underdevelopment: Processes of Political Economic Change in British Honduras*, Teachers College Press, New York, 1973.

Aten, Bettina, Alan Heston and Robert Summers. 2002. *Penn World Tables Version 6.1*. Center for International Comparisons at the University of Pennsylvania (CICUP).

Banerjee, Abhijit, and Lakshmi Iyer, 2005. "History Institutions and Economic Performance: The Legacy of Colonial Land Tenure Systems in India," *American Economic Review* 95(4), 1190-1213.

Beckles, Hilary, *A History of Barbados: From Amerindian Settlement to Nation-State*, Cambridge University Press, Cambridge, 1990.

Black, Clinton V., *The Story of Jamaica from Prehistory to the Present*, Collins Clear-Type Press, London, 1965.

Brett, E. A., *Colonialism and Underdevelopment in East Africa: The Politics of Economic Change 1919-1939*, NOK Publishers, Ltd., New York, 1973.

Campbell, Gwyn, *An Economic History of Imperial Madagascar, 1750-1895: The Rise and Fall of an Island Empire*, Cambridge University Press, New York, NY, 2005.

Campbell, I. C., A *History of the Pacific Islands*, University of California Press, Berkeley, 1989.

Carano, Paul and Pedro C. Sanchez, *A Complete History of Guam*, Charles E. Tuttle Company, Rutland, VT, 1964.

Carrión, Arturo Morales, *Puerto Rico: A Political and Cultural History*, W.W. Norton & Company, Inc., New York, NY, 1983.

Dietz, James L., *Economic History of Puerto Rico: Institutional Change and Capitalist Development*, Princeton University Press, Princeton, New Jersey, 1986.

Diamond, Jared M., *Guns, Germs, And Steel : The Fates Of Human Societies,* New York : Norton, c2005.

Dominican Republic and Haiti: Country Studies, Richard A. Haggerty (ed.), Federal Research Division, Library of Congress, Washington D.C., 1991.

Douglas, Norman and Ngaire Douglas (eds.), *Pacific Islands Yearbook*, 17th ed, Fiji Times Ltd., Fiji, 1994.

Dupay, Alex, *Haiti in the World Economy: Class, Race, and Underdevelopment Since 1700*, Westview Press, Inc., Boulder, Co, 1989.

Engerman, Stanley L, Kenneth L. Sokoloff, "Institutional and Non-Institutional Explanations of Economic Differences," National Bureau of Economic Research, Inc, NBER Working Paper Number 11057, 2003.

Engerman, Stanley L, Kenneth L. Sokoloff, "Colonialism, Inequality, and Long-Run Paths of Development," National Bureau of Economic Research, Inc, NBER Working Paper Number 11057, 2005.

Fieldhouse, D.K., *The West and the Third World: Trade, Colonialism, Dependence and Development*, Blackwell Publishers, Oxford, UK, 1999.

Gallup, John Luke; Sachs, Jeffrey D; Mellinger, Andrew D, "Geography and Economic Development." *International Regional Science Review*, vol. 22, no. 2, August 1999, pp. 179-232.

Glaeser, Edward L., Rafael La Porta, Florencio Lopez-de-Silanes and, Andrei Shleifer, "Do Institutions Cause Growth?," National Bureau of Economic Research Working Paper 10568, June 2004.

Graham, Norman A. and Keith L. Edwards, *The Caribbean Basin to the Year 2000: Demographic, Economic, and Resource-Use Trends in Seventeen Countries*, Westview Press, Boulder, Colorado, 1984.

Hall, Robert E. and Charles I. Jones “Why Do Some Countries Produce So Much More Output Per Worker Than Others,” *Quarterly Journal of Economics,* February 1999, 83-116.

Hezel, Francis X., *Strangers in Their Own Land: A Century of Colonial Rule in the Caroline and Marshall Islands*, University of Hawai’i Press, Honolulu, 1995.

Hope, Kempe Ronald, *Economic Development in the Caribbean,* Praeger Publishers, New York, NY, 1986.

Hough, Richard, *Captain James Cook*, W.W. Norton & Company, Inc., New York, 1994

Howard, Rhoda, *Colonialism and Underdevelopment in Ghana*, Africana Publishing Company, New York, 1978.

Howe, K R, *Where the Waves Fall: A New South Sea Islands History from First Settlement to Colonial Rule*, University of Hawaii Press, Honolulu, 1984.

Huxley, Anthony (ed.), *Standard Encyclopedia of the World's Oceans and Islands*, G.P. Putnam's Sons, New York, NY, 1962.

Indian Ocean: Five Island Countries, Helen Chapin Metz (ed.), Federal Research Division, Library of Congress, Washington D.C., 1995.

Islands of the Commonwealth Caribbean: A Regional Study, Sandra W. Meditz and Dennis M. Hanratty (eds.), Federal Research Division, Library of Congress, Washington D.C., 1989.

Iyer, Lakshmi. "The Long-Term Impact of Colonial Rule: Evidence from India." Harvard Business School Working Paper, No. 05-041, 2005.

Knight, Franklin W., *The Caribbean: The Genesis of a Fragmented Nationalism*, Oxford University Press, New York, 1978.

La Porta, Rafael, Florencio Lopez-de-Silanes, Andrei Shleifer, and Robert Vishny. 1997. "Legal Determinants of External Finance," *Journal of Finance* 52(3), 1131-1150.

La Porta, Rafael, Florencio Lopez-de-Silanes, Andrei Shleifer, and Robert Vishny. 1998. "Law and Finance," *Journal of Political Economy* 106(6), 1113-1155.

Landes, David S., *The Wealth and Poverty of Nations*, W.W. Norton & Company, New York, 1998.

Lyons, Martyn, *The Totem and the Tricolour: A Short History of New Caledonia Since 1774*, New South Wales University Press, Kensington NSW Australia, 1986.

McArthur, John W. and Jeffrey D. Sachs, "Institutions and Geography: Comment on Acemoglu, Johnson and Robinson (2000)," NBER Working Paper No. 8114, 2000.

Malcolm, George A., *The Commonwealth of the Philippines*, D. Appleton-Century Company, Inc., New York, 1936.

Maude, H. E., *Of Islands and Men: Studies in Pacific History*, Oxford University Press, Melbourne, 1969.

Mauro, Paolo. "Corruption and Growth." *Quarterly Journal of Economics*, August 1995, 100:3, 681-712.

Moreira, M. 2002. Tests with Correct Size in the Simultaneous Equations Model. PhD Thesis, UC Berkeley.

Newbury, Colin, *Tahiti Nui: Change and Survival in French Polynesia 1767-1945*, The University Press of Hawaii, Honolulu, 1980.

Pacific Islands, Naval Intelligence Division, Geographical Handbook Series: General Study, Volume I, 1945.

Pacific Islands, Naval Intelligence Division, Geographical Handbook Series: Eastern Pacific, Volume II, 1943.

Pacific Islands, Naval Intelligence Division, Geographical Handbook Series: Western Pacific (Tonga to Solomon Is.), Volume III, 1944.

Pacific Islands, Naval Intelligence Division, Geographical Handbook Series: Western Pacific (New Guinea and Islands Northward), Volume IV, 1945.

Parsons, James J., San *Andrés and Providencia: English-Speaking Islands in the Western Caribbean*, University of California Publications in Geography (Vol. 12), University of California Press, Berkeley, 1956.

Philippines: A Country Study, Frederica M. Bunge (ed.), Federal Research Division, Library of Congress, Washington D.C., 1984.

Pons, Frank Moya, *The Dominican Republic: A National History*, Hispaniola Books, New Rochelle, NY, 1995.

Rodney, Walter, *How Europe Underdeveloped Africa*, Howard University Press, Washington, D. C., 1974.

Rogers, Robert F., *Destiny's Landfall: A History of Guam*, University of Hawai'i Press, Honolulu, 1995.

Sachs, Jeffrey D., "Institutions Don't Rule: Direct Effects of Geography on Per Capita Income," National Bureau of Economic Research, Inc, NBER Working Papers: 9490, 2003.

Wagenheim, Olga Jiménez de, *Puerto Rico: An Interpretive History from Pre-Columbian Times to 1900*, Markus Wiener Publishers, Princeton, NJ, 1998.

Table I
Summary Statistics

These are summary statistics for the variables in the islands database. See the text for details on variable sources and construction.

Variable	Obs	Mean	Std. Dev.	Min	Max
Island's GDP per Capita 2000	81	8,279	9,327	264	53,735
Log (GDP Capita)	81	8.45	1.14	5.58	10.89
Infant Mortality 2002	81	18.53	15.17	4.00	79.00
Number of Centuries as a Colony	81	2.32	1.42	0.61	5.11
First Year a Colony / 100	81	17.43	1.48	14.92	19.16
Last Year a Colony / 100	81	19.85	0.22	19.01	20.05
Remained a Colony in 2000	81	0.46	0.50	0.00	1.00
Easterly Vector of Prevailing Wind	81	-4.20	2.01	-6.88	4.42
Northerly Vector of Prevailing Wind	81	0.17	1.27	-1.55	4.20
Std Dev. Easterly Vector of Wind	81	1.36	0.56	0.58	2.99
Std Dev. Northern Vector of Wind	81	1.34	0.65	0.63	4.02
Number of Centuries British	81	0.98	1.23	0.00	3.95
Number of Centuries French	81	0.44	0.89	0.00	3.70
Number of Centuries Spanish	81	0.38	0.94	0.00	4.05
Ever British	81	0.64	0.48	0.00	1.00
Ever French	81	0.31	0.46	0.00	1.00
Ever Spanish	81	0.25	0.43	0.00	1.00
Absolute Value of Latitude	81	15.73	7.68	0.50	51.92
Island Area (1000s sq km)	81	0.01	0.02	0.00	0.11
Island Population	70	302,720	1,394,832	102	11,000,000
Island is in Pacific	81	0.49	0.50	0.00	1.00
Island is in Atlantic	81	0.43	0.50	0.00	1.00
Island is in Indian	81	0.07	0.26	0.00	1.00

Table II
Outcomes Regressed on Years of Colonization

We regress Log GDP per capita and infant mortality on the number of years the island spent as a colony of a European power. Columns (1), (2), (4), (6) and (8) are OLS. Columns (3), (5) , (7) and (9) are two stage least squares where we instrument for centuries of colonial rule or the first year as a colony using the 12 month average and standard deviation of the east-west wind speed for each island. In the IV columns, we do not instrument for final year a colony or "remained a colony" in 2000. Similar IV results obtain when we use LIML rather than two stage least squares.

	(1) Log GDP Capita	(2) Log GDP Capita	(3) Log GDP Capita - IV	(4) Log GDP Capita	(5) Log GDP Capita- IV	(6) Log GDP Capita	(7) Log GDP Capita- IV	(8) Infant Mortality Per 1000	(9) Infant Mortality Per 1000- IV
Number of Centuries a Colony	0.42	0.491	0.712					-3.885	-13.47
	(0.076)**	(0.110)**	(0.253)**					(1.472)*	(5.434)*
First Year a Colony				-0.456	-0.883	-0.342	-0.626		
				(0.112)**	(0.354)*	(0.108)**	(0.304)*		
Final Year A Colony						0.409	0.527		
						(0.755)	(0.874)		
Remained A Colony in 2000						0.954	0.81		
						(0.311)**	(0.373)*		
Abs(Latitude)		0.053	0.054	0.06	0.068	0.038	0.046	-0.797	-0.841
		(0.012)**	(0.011)**	(0.012)**	(0.016)**	(0.012)**	(0.015)**	(0.207)**	(0.225)**
Area in millions of sq km		-20.374	-21.738	-26.34	-34.764	-15.071	-20.769	266.288	325.479
		(3.894)**	(3.970)**	(5.142)**	(8.252)**	(5.383)**	(7.148)**	(147.186)+	(138.716)*
Island is in Pacific		0.752	1.018	0.782	1.364	0.664	1.043	-8.476	-20.036
		(0.464)	(0.559)+	(0.510)	(0.762)+	(0.491)	(0.641)	(9.329)	(14.379)
Island is in Atlantic		0.425	0.188	0.471	0.019	0.319	0.043	-5.161	5.14
		(0.395)	(0.477)	(0.396)	(0.568)	(0.383)	(0.481)	(8.540)	(8.501)
Constant	7.472	6.033	5.484	15.026	22.302	4.879	7.406	44.914	68.754
	(0.205)**	(0.552)**	(0.834)**	(1.872)**	(5.894)**	(15.218)	(17.308)	(11.085)**	(21.610)**
Observations	81	81	81	81	81	81	81	81	81
R-squared	0.273	0.527	0.498	0.488	0.396	0.655	0.616	0.371	0.063

Robust standard errors in parentheses. We cluster at the island group level since several of the islands (e.g. the Cook Islands and the Federated States of Micronesia) are used as separate observations from a cluster of politically related yet geographically distinct islands.

+ significant at 10%; * significant at 5%; ** significant at 1%

Table III
Comparison of different Samples

Column (1) is the base sample used in the rest of the paper. Column (2) uses only GDP figures obtained from the UN, but includes disaggregation of islands that are part of a group. Column (3) uses only the raw UN GDP data. Columns (4) and (5) limit the sample to the Pacific and Atlantic Oceans. Columns (6) and (7) are two stage least squares for each ocean where we instrument for centuries of colonial rule using the 12 month average and standard deviation of the east-west wind vector for each island.

	(1) Log GDP per Capita	(2) Log GDP per Capita	(3) Log GDP per Capita	(4) Log GDP per Capita	(5) Log GDP per Capita	(6) Log GDP per Capita	(7) Log GDP per Capita
Sample	Base	UN data - disaggregated groups	UN data	Pacific	Atlantic	Pacific - IV	Atlantic-IV
Number of centuries a colony	0.491	0.636	0.503	0.599	0.268	0.652	0.754
	(0.110)**	(0.174)**	(0.148)**	(0.129)**	(0.191)	(0.294)*	(0.281)*
Abs(Latitude)	0.053	0.062	0.067	0.069	0.042	0.068	0.054
	(0.012)**	(0.016)**	(0.020)**	(0.021)**	(0.017)*	(0.019)**	(0.014)**
Area in millions of sq km	-20.374	-20.966	-21.838	-19.471	-21.549	-20.208	-22.178
	(3.894)**	(3.992)**	(3.845)**	(3.506)**	(6.715)**	(4.763)**	(6.286)**
Island is in Pacific	0.752	0.957	1.086				
	(0.464)	(0.702)	(0.575)+				
Island is in Atlantic	0.425	0.216	0.177				
	(0.395)	(0.559)	(0.527)				
Constant	6.033	5.526	5.535	6.437	7.471	6.389	5.532
	(0.552)**	(0.803)**	(0.643)**	(0.272)**	(0.709)**	(0.416)**	(1.118)**
Observations	81	62	62	40	35	40	35
R-squared	0.527	0.563	0.509	0.492	0.398	0.49	0.211

Robust standard errors in parentheses. Standard errors are clustered at the island group level.
+ significant at 10%; * significant at 5%; ** significant at 1%

Table IV
The Effect of Colonialism by Colonizing Countries

Columns (1), (2), and (5) are OLS. Years under British, French, and German legal systems are constructed by categorizing the colonizers legal system using the definitions in LaPorta et al (1997). Columns (3), (4) and (6) are instrumental variables regressions in which the instruments are the interactions between dummies for having ever been colonized by the US, Dutch, British, French, Spanish, Portuguese, Germans, or Japanese interacted with easterly wind speed and standard deviation of easterly wind. We interact the 8 country dummies with each of the two wind variables. Column (3) includes the eight country dummies in the OLS regression. Column (4) includes the eight dummies in the first and second stages of the IV regression.

	(1) Log GDP per Capita	(2) Log GDP per Capita	(3) Log GDP per Capita IV	(4) Log GDP per Capita IV	(5) Log GDP per Capita	(6) Log GDP per Capita IV
Centuries US	2.145	1.959	1.320	5.641		
	(0.394)**	(1.352)	(0.842)	(10.135)		
Centuries Dutch	0.660	0.442	0.483	0.874		
	(0.117)**	(0.304)	(0.245)+	(1.433)		
Centuries British	0.512	0.579	0.096	0.163		
	(0.155)**	(0.214)**	(0.294)	(1.240)		
Centuries French	0.586	0.547	0.324	0.177		
	(0.144)**	(0.188)**	(0.263)	(0.632)		
Centuries Spanish	0.204	0.157	-0.006	0.425		
	(0.089)*	(0.130)	(0.178)	(0.877)		
Centuries Portuguese	-0.813	-1.237	-0.575	-0.348		
	(0.169)**	(0.737)+	(0.226)*	(1.391)		
Centuries German	1.332	-3.788	-3.181	-23.81		
	(1.199)	(1.581)*	(4.814)	(28.012)		
Centuries Japanese	-1.170	-7.113	1.536	-8.691		
	(0.781)	(4.014)+	(2.705)	(42.118)		
Centuries British Legal					0.255	-0.190
					(0.192)	(0.204)
Centuries French Legal					0.392	0.214
					(0.141)**	(0.143)
Centuries German Legal					0.406	-0.017
					(0.629)	(0.776)
Abs(Latitude)	0.054	0.048	0.052	0.053	0.055	0.056
	(0.013)**	(0.016)**	(0.018)**	(0.029)+	(0.014)**	(0.017)**
Area in millions of sq km	-13.940	-15.128	-13.184	16.814	-22.117	-24.496
	(5.851)*	(8.578)+	(4.975)*	(76.659)	(4.054)**	(5.303)**
Island is in Pacific	0.703	1.025	0.488	0.401	0.626	0.431
	(0.530)	(0.723)	(0.610)	(1.145)	(0.539)	(0.634)
Island is in Atlantic	0.472	0.666	0.893	0.826	0.738	1.216
	(0.444)	(0.686)	(0.538)	(1.984)	(0.493)	(0.558)*
Constant	5.849	5.952	6.574	6.488	6.348	6.948
	(0.636)**	(0.873)**	(1.000)**	(1.622)**	(0.654)**	(0.765)**
Dummies for Identity of Colonizers?	NO	YES	NO	YES	NO	NO
Observations	81	81	81	81	81	81
R-squared	0.645	0.685	0.539	0.456	0.497	0.413

Robust standard errors in parentheses. Standard errors are clustered at the island group level.

+ significant at 10%; * significant at 5%; ** significant at 1%

Table V
The Timing of Colonialism

Columns (1), (3) and (4) are OLS. Column (2) instruments for Centuries a Colony before and after 1700 using the east and north vectors of wind and their standard deviations.

	(1) Log GDP per Capita	(2) Log GDP per Capita IV	(3) Log GDP per Capita	(4) Log GDP per Capita
Centuries a Colony before 1700	-0.152	-1.338	-0.020	-0.097
	(0.177)	(0.810)	(0.210)	(0.221)
Centuries a Colony after 1700	1.146	1.915		
	(0.163)**	(0.604)**		
Centuries a Colony 1700-1900			0.840	0.875
			(0.244)**	(0.233)**
Centuries a Colony after 1900			2.246	-0.354
			(0.536)**	(0.975)
Remained a Colony in 2000				1.070
				(0.346)**
Abs(Latitude)	0.049	0.032	0.044	0.036
	(0.011)**	(0.018)+	(0.011)**	(0.011)**
Area in millions of sq km	-14.990	0.660	-6.892	-17.582
	(6.370)*	(16.164)	(7.547)	(6.425)**
Island is in Pacific	1.295	1.709	1.005	1.090
	(0.391)**	(0.618)**	(0.429)*	(0.415)*
Island is in Atlantic	0.316	0.455	0.310	0.304
	(0.337)	(0.573)	(0.336)	(0.338)
Constant	4.843	3.827	4.353	6.218
	(0.493)**	(1.174)**	(0.580)**	(0.759)**
Observations	81	81	81	81
R-squared	0.638	0.385	0.663	0.693

Robust standard errors in parentheses. Standard errors are clustered at the island group level.
+ significant at 10%; * significant at 5%; ** significant at 1%

Table VI
GDP and Colonialism within Non-island Developing Countries

We started with the Acemoglu-Robinson-Johnson [2001] database and added our own measure of length of colonial period. We dropped the three island countries that were in AJR and our islands database.

	(1) Log GDP Per Capita	(2) Log GDP Per Capita	(3) Log GDP Per Capita	(4) Log GDP Per Capita
Number of Centuries a Colony	0.401	0.358	0.287	0.232
	(0.097)**	(0.090)**	(0.072)**	(0.084)**
Abs(Latitude)		2.952	1.406	1.825
		(0.883)**	(0.746)+	(0.822)*
Mean Temperature		-0.023	-0.013	0.005
		(0.023)	(0.019)	(0.021)
Expropriation Risk			0.404	
			(0.067)**	
Log Settler Mortality (AJR)				-0.403
				(0.093)**
Constant	7.276	7.344	4.873	9.034
	(0.215)**	(0.686)**	(0.682)**	(0.728)**
Observations	64	64	64	60
R-squared	0.22	0.40	0.63	0.56

Robust standard errors in parentheses. + significant at 10%; * significant at 5%; ** significant at 1%

Appendix Table I
IV First Stage and Reduced Form Regressions

Columns (1), (3) and (5) are the first stage regressions corresponding to columns (3), (5), and (7) in Table II. Columns (2), (4), (6), and (7) are the reduced forms for columns (3), (5), (7), and (9) in Table II. Table II Column (9) has the same first stage as Table II column (3). F-Statistics in the first stage columns are for the instruments alone. Similar IV results obtain when we use LIML rather than two stage least squares.

	(1) Number Centuries A Colony	(2) Log GDP Per Capita	(3) First Year A Colony	(4) Log GDP Per Capita	(5) First Year A Colony	(6) Log GDP Per Capita	(7) Infant Mortality Per 1000
East-West Vector Of Wind	-0.236	-0.167	0.184	-0.167	0.173	-0.11	3.198
	(0.070)**	(0.071)*	(0.073)*	(0.071)*	(0.069)*	(0.062)+	(0.884)**
Monthly StDev of East-West Vector	0.508	0.395	-0.273	0.395	-0.258	0.193	-6.296
	(0.238)*	(0.271)	(0.208)	(0.271)	(0.222)	(0.246)	(3.444)+
Final Year a Colony					0.615	0.083	
					(1.370)	(0.991)	
Remained A Colony After 2000					-0.472	1.122	
					(0.532)	(0.381)**	
Abs(Latitude)	0.015	0.064	0.002	0.064	0.009	0.04	-1.045
	(0.013)	(0.014)**	(0.015)	(0.014)**	(0.016)	(0.014)**	(0.189)**
Area in millions of sq km	8.532	-15.606	-21.322	-15.606	-19.914	-8.544	211.544
	(4.671)+	(4.664)**	(4.251)**	(4.664)**	(8.585)*	(5.757)	(150.690)
Island is in Pacific	-1.494	-0.033	1.625	-0.033	1.579	0.063	0.292
	(0.354)**	(0.524)	(0.422)**	(0.524)	(0.420)**	(0.498)	(8.445)
Island is in Atlantic	0.782	0.778	-0.716	0.778	-0.678	0.494	-4.836
	(0.362)*	(0.553)	(0.409)+	(0.553)	(0.427)	(0.531)	(8.572)
Constant	0.756	5.968	18.172	5.968	6.008	4.746	57.651
	(0.833)	(0.913)**	(0.926)**	(0.913)**	(27.032)	(19.224)	(14.206)**
Observations	81	81	81	81	81	81	81
R-Squared	0.681	0.435	0.737	0.435	0.744	0.62	0.425
F Statistic for Instruments	5.81	3.06	3.18	3.06	3.15	1.61	6.75
p-value	.005	.055	.049	.055	.050	0.208	.002

Robust standard errors in parentheses. Standard errors are clustered at the island group level.
+ significant at 10%; * significant at 5%; ** significant at 1%

Appendix Table II
First Stages Regressions for Alternative Sets of Wind Based Instruments

These are the first stage regressions for various combinations of the raw wind data. A positive number for wind blowing on the east (north) vector is blowing TOWARDS the east (north).

	(1) number of centuries a colony	(2) number of centuries a colony	(3) number of centuries a colony	(4) number of centuries a colony
East-West Vector of Wind	-0.172	-0.236	-0.192	-0.24
	(0.060)**	(0.070)**	(0.068)**	(0.087)**
East-West Standard Dev.		0.508		0.453
		(0.238)*		(0.238)+
North-South Vector of Wind			-0.116	-0.069
			(0.115)	(0.118)
North-South Standard Dev.				-0.01
				(0.286)
Abs(Latitude)	0.013	0.015	0.019	0.018
	(0.014)	(0.013)	(0.015)	(0.016)
Area in millions of sq km	7.157	8.532	6.416	8.01
	(5.129)	(4.671)+	(4.880)	(5.058)
Island Is In Pacific Ocean	-1.526	-1.494	-1.708	-1.616
	(0.375)**	(0.354)**	(0.405)**	(0.504)**
Island Is In Atlantic Ocean	0.526	0.782	0.255	0.58
	(0.374)	(0.362)*	(0.496)	(0.590)
Constant	1.884	0.756	1.926	0.934
	(0.598)**	(0.833)	(0.593)**	(1.251)
Observations	81	81	81	81
R-Squared	0.659	0.681	0.668	0.683
F statistic for instruments	8.2	5.81	4.11	3.58
p-value	0.006	0.005	0.022	0.011

Appendix Table III
IV Results Using Alternative Sets of Wind Based Instruments

These are the second stage results based on the 4 different instrument sets from Appendix Table I. Instruments used are as follows: (1) East-West vector of wind, (2) East-West vector and standard deviation, (3) East-West vector of wind and North-South vector of wind, (4) East-West vector of wind and North-South vector of wind plus their standard deviations.

	(1) Log GDP Capita (2SLS)	(2) Log GDP Capita (2SLS)	(3) Log GDP Capita (2SLS)	(4) Log GDP Capita (2SLS)
Number Centuries a Colony	0.681	0.712	0.853	0.786
	(0.291)*	(0.253)**	(0.304)**	(0.262)**
Abs(Latitude)	0.054	0.054	0.055	0.055
	(0.011)**	(0.011)**	(0.011)**	(0.011)**
Area in millions of sq km	-21.55	-21.738	-22.612	-22.196
	(4.019)**	(3.970)**	(4.284)**	(4.065)**
Island is in Pacific	0.982	1.018	1.189	1.108
	(0.594)	(0.559)+	(0.611)+	(0.570)+
Island is in Atlantic	0.22	0.188	0.036	0.108
	(0.460)	(0.477)	(0.493)	(0.488)
Constant	5.559	5.484	5.131	5.299
	(0.891)**	(0.834)**	(0.953)**	(0.864)**
Observations	81	81	81	81
R-squared	0.505	0.498	0.449	0.475

Robust standard errors in parentheses
+ significant at 10%; * significant at 5%; ** significant at 1%

Appendix Table IV
List of Islands in Our Dataset

Island	Island Group	Country	First Year Colony	Last Year Colony	Number Years Colony	GDP Capita 2000
Aitutaki	Cook Islands	Cook Islands	1888	1965	77	2,814
Andros, North	Bahamas	Bahamas	1494	1973	479	14,296
Anguilla	Anguilla	United Kingdom - Anguilla	1650	2004	354	9,617
Antigua	Antigua and Barbuda	Antigua and Barbuda	1632	1981	349	7,653
Ascension	Ascension	United Kingdom - Ascension Island	1501	2004	189	2,500
Atiu	Cook Islands	Cook Islands	1888	1965	77	1,930
Barbados	Barbados	Barbados	1500	1961	384	9,739
Bermuda	Bermuda	Bermuda	1609	2004	395	53,735
Bonaire	Netherlands Antilles	Netherlands - Netherlands Antilles	1526	2004	478	15,931
Cuba	Cuba	Cuba	1511	1901	389	2,535
Curacao	Netherlands Antilles	Netherlands - Netherlands Antilles	1527	2004	492	15,931
Dominica	Dominica	Dominica	1763	2004	246	3,484
East Falkland	East Falkland	Falkland Islands (United Kingdom)	1764	2004	231	25,000
Efate	Vanuatu	Vanuatu	1887	1980	186	1,164
Fefan	Federated States of Micronesia	Federated States of Micronesia	1885	1986	101	1,335
Funafuti	Tuvalu	Tuvalu	1916	1978	62	1,204
Futuna	Futuna	France - Wallis and Futuna	1888	2005	117	3,700
Grand Cayman	Grand Cayman	United Kingdom - Cayman Islands	1635	2004	369	34,173
Grande Comore	Comoros	Comoros	1886	1974	88	264
Grande Terre	Guadeloupe	France - Guadeloupe	1635	2004	376	7,900
Grenada	Grenada	Grenada	1650	1974	344	3,440
Guam	Guam	United States - Guam	1565	2005	443	21,000
Hawaii	hawaii	United States	1900	2005	105	34,364
Hispaniola DOM	Dominican Republic	Dominican Republic	1495	1924	313	3,029
Hispaniola HTI	Hispaniola	Haiti	1492	1934	331	485
Huvadu	Huvadu	Maldives	1558	1965	335	2,151

Appendix IV
List of Islands in Our Dataset (continued)

Jamaica	Jamaica	Jamaica	1494	1962	468	3,056
Kadavu	Fiji	Fiji	1875	1970	95	2,031
Kosrae	Federated States of Micronesia	Federated States of Micronesia	1885	1986	101	2,751
Lifou	Loyalty Islands	France - Loyalty Islands	1774	2005	231	12,455
Luzon	Philippines	Philippines	1565	1945	297	1,002
Mahe	Seychelles	Seychelles	1756	1976	220	7,764
Majuro	Marshall Islands	Marshall Islands	1886	1986	100	1,896
Malaita	Solomon Islands	Solomon Islands	1893	1978	86	791
Mangaia	Cook Islands	Cook Islands	1888	1965	77	2,171
Mangareva	Gambier Is	France - French Polynesia - Gambier Is.	1881	2005	124	13,955
Manihiki	Cook Islands	Cook Islands	1888	1965	77	2,895
Martinique	Martinique	France -Martinique	1635	2005	371	14,400
Mauke	Cook Islands	Cook Islands	1888	1965	77	2,493
Mauritius	Mauritius	Mauritius	1638	1968	319	3,839
Mayotte	Mayotte	France - Mayotte	1843	2004	161	2,600
Mitiaro	Cook Islands	Cook Islands	1888	1965	77	2,734
Moen	Federated States of Micronesia	Federated States of Micronesia	1899	1986	87	1,335
Montserrat	Montserrat	United Kingdom -Montserrat	1632	2004	372	8,919
Nauru	Nauru	Nauru	1888	1968	78	2,702
New Britain	Papua New Guinea	Papua New Guinea	1870	1945	61	729
New Caledonia	New Caledonia	France - New Caledonia	1774	2005	231	12,455
Niue	Niue	Niue	1901	1974	73	3,600
North Caicos	Turks and Caicos Islands	United Kingdom - Turks and Caicos Is.	1766	2004	238	9,600
Oreor	Palau	Palau	1885	2005	120	6,076
Palmerston	Cook Islands	Cook Islands	1888	1965	77	2,493
Penrhyn	Cook Islands	Cook Islands	1888	1965	77	989
Pohnpei	Federated States of Micronesia	Federated States of Micronesia	1885	1986	101	2,711
Puerto Rico	Puerto Rico	United States - Puerto Rico	1493	2004	511	18,047
Pukapuka	Cook Islands	Cook Islands	1888	1965	77	724
Rakahanga	Cook Islands	Cook Islands	1888	1965	77	1,528

Appendix IV
List of Islands in Our Dataset (continued)

Rarotonga	Cook Islands	Cook Islands	1888	1965	77	6,433
Reunion	Reunion	France - Reunion	1663	2004	341	6,200
Rurutu	Austral Is	France - French Polynesia - Austral Is.	1889	2005	116	13,955
Saba	Netherlands Antilles	Netherlands - Netherlands Antilles	1632	2004	372	15,931
Saipan	Northern Mariana Islands	United States – Northern Mariana Islands	1565	2005	440	12,500
Sint Maartin	Netherlands Antilles	Netherlands - Netherlands Antilles	1648	2004	356	16,000
St Croix	US Virgin Islands	United States - Virgin Islands	1666	2004	250	11,868
St Eustatius	Netherlands Antilles	Netherlands - Netherlands Antilles	1632	2004	375	15,931
St Helena	St Helena	United Kingdom - St Helena	1502	2004	494	2,500
St John	US Virgin Islands	United States - Virgin Islands	1666	2004	250	18,012
St Kitts	St. Kitts and Nevis	St. Kitts and Nevis	1623	1983	360	8,132
St Lucia	St Lucia	St Lucia	1650	1967	481	4,424
St Martin	Netherlands Antilles	Netherlands - Netherlands Antilles	1648	2004	356	9,200
St Thomas	US Virgin Islands	United States - Virgin Islands	1666	2004	250	14,061
St Vincent	St Vincent	St Vincent	1680	1979	299	2,891
Tahiti	Society Is	France - French Polynesia - Society Is.	1843	2005	162	13,955
Tahuata	Marquesas	France - French Polynesia -Marquesas Is	1842	2005	163	13,955
Tarawa	Kiribati - Line Islands	Kiribati	1896	1979	85	538
Tol	Federated States of Micronesia	Federated States of Micronesia	1885	1986	101	1,335
Tongatapu	Tonga	Tonga	1900	1970	70	1,430
Tortola	British Virgin Islands	United Kingdom - British Virgin Islands	1648	2004	356	33,671
Trinidad TTO	Trinidad and Tobago	Trinidad and Tobago	1687	1976	289	6,347
Tristan da Cunha	Tristan da Cunha & Gouh	United Kingdom - Tristan da Cunha	1816	2004	188	2,500
Tutuila	American Samoa	United States - American Samoa	1900	2005	105	8,000
Yap	Federated States of Micronesia	Federated States of Micronesia	1885	1986	101	2,751

Appendix V
GDP by Sector

This is for a subsample of islands in the database. Source is CIA World Factbook 2002, which in turn uses both UN Data and national government statistics from the relevant countries.

island	**ocean**	**GDP**	**Agriculture**	**Industry**	**Services**
Bermuda	Atlantic	36 B	1%	10%	89%
Grand Cayman	Atlantic	1.27 B.	1%	3%	95%
Jamaica	Atlantic	10.21 B.	6%	24%	70%
Anguilla	Atlantic	104 Mill	4%	18%	78%
New Britain	Pacific	11.4 B.	32%	36%	32%
Majuro	Pacific	115 Mill	14%	16%	70%
Mauritius	Indian	13.85 B.	6%	33%	61%
US Virgin Islands	Atlantic	2.4 B.	1%	19%	80%
Tongatapu	Pacific	236 Mill	26%	12%	62%
Pohnpei	Pacific	277 Mill	50%	4%	46%
Montserrat	Atlantic	29 Mill	5%	14%	81%
New Caledonia	Pacific	3.158 B.	5%	30%	65%
Guam	Pacific	3.2 B.	7%	15%	78%
Cuba	Atlantic	31.59 B.	8%	35%	58%
British Virgin Islands	Atlantic	320 Mill	2%	6%	92%
St Vincent	Atlantic	339 Mill	10%	26%	64%
Dominica	Atlantic	380 Mill	18%	24%	58%
Barbados	Atlantic	4.496 B.	6%	16%	78%
Grenada	Atlantic	440 Mill	8%	24%	68%
Kadavu	Pacific	5.007 B.	17%	22%	61%
Martinique	Atlantic	6.117 B.	6%	11%	83%
Puerto Rico	Atlantic	65.28 B.	1%	42%	57%
Antigua	Atlantic	750 Mill	4%	19%	77%
Tarawa	Pacific	79 Mill	30%	7%	63%
Malaita	Pacific	800 Mill	42%	11%	47%
St Lucia	Atlantic	866 Mill	7%	20%	73%
Reunion	Indian	9.387 B.	8%	19%	73%

Figure 1
GDP Per Capita versus Years of Colonialism

Circles represent islands in the Atlantic, triangles are islands in the Pacific and squares are islands in the Indian Ocean.

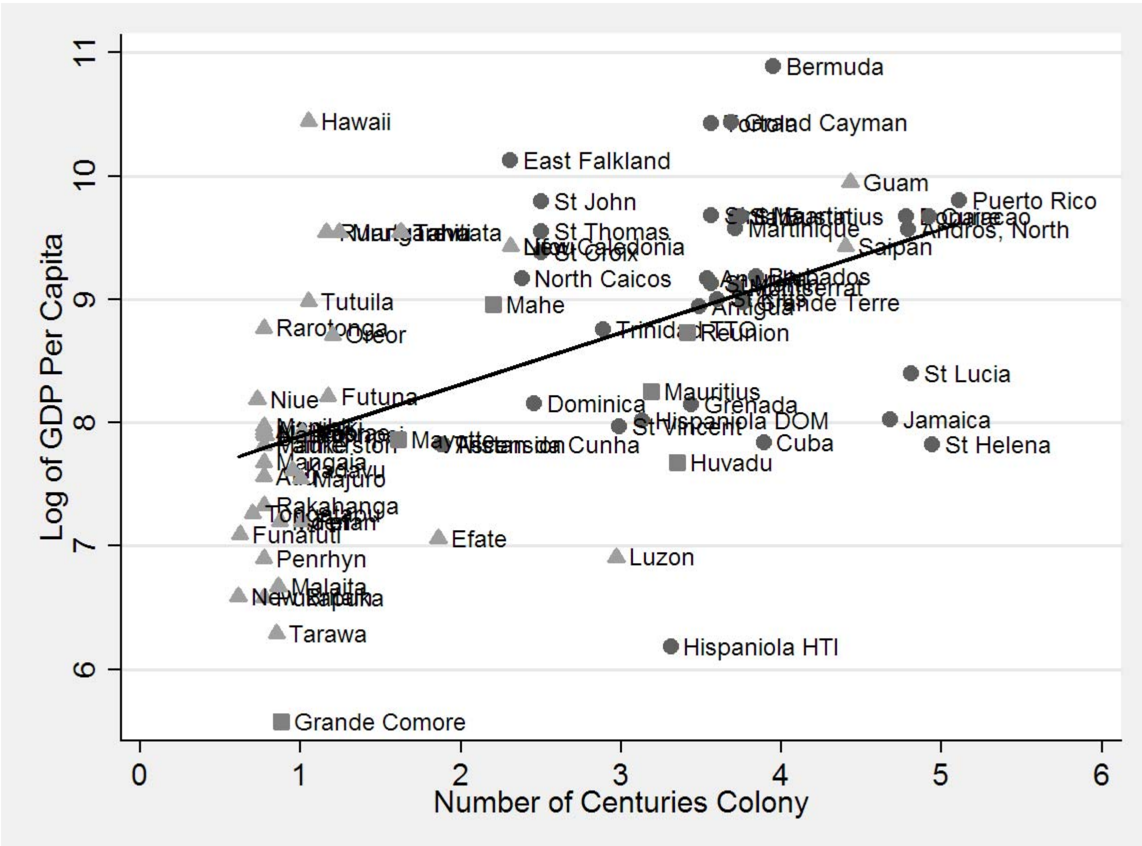

Figure 2
Years of Colonialism Versus Easterly Vector of Wind

Circles represent islands in the Atlantic, triangles are islands in the Pacific and squares are islands in the Indian Ocean.