The Global Economic Impact of Open Borders (DRAFT)

By Nathan Smith

Before World War I, open borders was near to being a fact. Most of the world's jurisdictions regulated migration lightly if at all. Migration was constrained less by policy than by (a) the expense and slow speed of long-distance transportation, and (b) racism, but these factors did not prevent tens of millions from migrating, transforming forever the human geography of large regions of the world. Since 1914, there has been a complete revolution in migration policy worldwide, so that today, in spite of enormous international wage differences that should motivate far larger migrations even than occurred in the decades before 1914, migrants are a small fraction of the world's population. The decline of migration relative to late 19th- and early 20th-century rates does not reflect a lack of desire to migrate, but rather, that legal visas are available only to a small fraction of potential migrants, and the rest are prevented by force.

Many writers have attacked migration restrictions, and advocated open borders, from an ethical standpoint, including Joseph Carens in *The Ethics of Immigration*, Teresa Hayte in *Open Borders: The Case Against Immigration Controls*, and myself in *Principles of a Free Society*. What I propose to do here is different, namely, to describe as best I can what a world of open borders would look like. Because current policy is very far from open borders, constructing such an estimate involves large feats of extrapolation, and a heavy reliance on economic theory to sort these out. It is well-known that international migrants can enjoy very large increases in wages and living standards. One of the best contributions to this literature, "The Place Premium: Wage Differences for Identical Workers across the US Border," by Michael Clements, Claudio E. Montenegro, and Lant Pritchett (December 2008), finds, for selected developing countries, that the "place premium"—the ratio of what workers could earn at home relative to the US—ranges from 1.99 in the Dominican Republic, to 6.25 for India, to 11.92 for Egypt, to 14.85 for Nigeria, to 15.45 for Yemen. But these results apply *at the margin* and *under the status quo*. They cannot legitimately be interpreted as indicative of what would happen to *all* Egyptians, or Nigerians, if controls on migration were removed worldwide. An educated guess about that can only be made in the context of a comprehensive theory of how the world economy works, fitted to the data as well as possible, but able to be solved for equilibrium when policy is changed. Several academic papers attempt to do this. Naturally, my opinions about the best approach differ from those of other authors. For example, I think Klein and Ventura (2007) underestimate international human capital differences, I dislike the *ad hoc* procedure by which Kennan (2012) incorporates cultural constraints on migration into his model, and I think Bradford (2012) uses an indefensibly high estimate of the direct costs of migration. Apart from these differences of method, however, these authors simply do not describe a world of open borders in sufficient *detail* to help readers much in imagining what a world of open borders would be like. This paper presents a much more detailed (though of course, let it be borne in mind, quite tentative, speculative, and fallible) simulation of how open borders would change the world.

Although I am a long-time advocate of open borders, this article should be understood as a contribution to *positive*, rather than *normative*, economics. I offer some evaluative judgments along the way, mainly to avoid making the prose too dry to be easily readable, though to a lesser extent also to influence sympathetic readers. But the factual description of what a world of open borders would be like might be

accepted by someone whose evaluative judgments of that world are very different from my own. Indeed, I will give critics of immigration plenty of ammunition along the way, if they are not afraid of giving me credibility by borrowing it. I invite them to do so. For example, the model predicts that unskilled, non-homeowning workers in most of the developed democracies of the West will see their incomes and living standards fall sharply under open borders. There are idiosyncracies in the way I model open borders, involving technical choices about how to reconcile the peculiar constraints inherent in the art of theoretical construction with patchy and imperfect data about how the world really works. These idiosyncracies have little or nothing to do with my ethical and policy views. Careful and astute readers may be able to appreciate how much my creativity and cunning were needed simply in order to design an abstract description of the world, suitable as a platform for extrapolation, which at the same time fit tolerably with the data, and how little I had to spare for "rigging" the results to favor open borders. Where my predictions can be compared to those of other economic models of open borders, the results are similar. Of course, the model could be adjusted to be either more or less favorable to open borders. In fact, for reasons I will mention in the conclusion, I believe these results, though sufficiently positive to stoke the enthusiasm of open borders advocates, are actually too pessimistic, and that the global economic impact of open borders would be even more favorable than what I describe here. But the results will involve the West absorbing billions of immigrants without collapsing, so it will not satisfy those who believe this is not possible.

Like other authors estimating the impact of big policy changes, my instinct is to resist reporting big summary statistics, which I know are fraught with an inevitable arbitrariness and are vulnerable to distortion by data anomalies, and to direct readers' attention to "sensitivity analysis," to subtle points about the elasticity of outcomes with respect to certain difficult-to-observe variables. But most readers will prefer to read and quote a few hard numbers. As a compromise, I will present two "scenarios." Scenario 1 represents, if you want to put it so, "the" predictions of "the model." Here I have deliberately minimized my scope for discretion: I simply enter the best available data and solve for equilibrium. The results of this exercise are, in my view, interesting and instructive but unrealistic in certain quite clear, albeit difficult to quantify, respects. Readers may regard Scenario 1 as the predictions of "pure theory," a useful baseline, but not a plausible world. In Scenario 2, I make some adjustments which I think are crucial to the realism of the model, but which have to be performed in a rather arbitrary fashion, as neither theory nor data provide much guidance or constraint. The results are closer to being "my best guess" about what open borders would "really" look like. Those who find Scenario 2 "unrealistic" should recall that it was constructed by altering Scenario 1 in the direction of greater realism. To defend their doubts may be more difficult than they suppose.

Under Scenario 1, over five and a half billion people would migrate to another country, and world GDP would rise by 80%. Urbanization would be greatly accelerated, and the population-weighted median settlement size would rise two orders of magnitude, from under 5,000 to over 400,000. Almost three billion people would live in cities with populations over 1 million. The living standards of unskilled workers worldwide would converge to 23% of the US level, rising in the world's worst-off countries, but falling not only in the developed West but in many developing countries. Most unskilled workers would see their money wages rise, but not enough to compensate them for moving to cities and facing higher costs of living. But the human capital premium would rise almost everywhere, converging to $66,535 per annum for human capital equivalent to that of the average American. Countries under Scenario 1 could be classified as Countries of Reinforced Dominance like the USA, Austria and Switzerland, developed

countries which would attract population and human capital and see enormous increases in GDP; New Settler Societies like Botswana, South Africa, and East Timor, developing countries which would be transformed by massive migration into peers of today's developed countries; Corridor Countries like Germany, the UK and France, which would see net immigration of population but net emigration of human capital; Countries of Emigration like China, India, Brazil, and Russia, which would experience massive emigration but retain enough to remain viable societies; and Ghost Nations like North Korea, Zimbabwe, and the Democratic Republic of the Congo, where an almost universal exodus calls into question whether these countries could survive as sovereign states at all. The global capital stock would more than double, yet the capital stock in most countries would decline. The world economy would become much more concentrated in a few dominant countries. The average native of *every* country in the world would see a rise in labor income, but the median native might not.

Under Scenario 2, open borders induces a 50% rise in the global human capital stock, improving both the opportunities and the incentives for people from developing countries to acquire education and skills. Also, by promoting remittances, trade links, saving by sojourners, and better institutions, open borders increases the availability of capital in developing countries, cutting risk premia in half. Finally, TFP adjusts downward somewhat in countries swamped by immigration from poorer countries, but rises in countries that send large numbers of countries to more developed places. Total migration would be at least 3.14 billion, making rates of international migration under Scenario 2 comparable to rates of interstate migration in the contemporary USA. World GDP would rise 69%, and the global capital stock, by 88%. The living standards of unskilled labor worldwide would converge to 44% of the current US level. The human capital premium would converge to $41,336, rising for upwards of 95% of the world population, with only the USA and a few small countries seeing it fall. Urbanization would be much less pronounced than under Scenario 1, with the population-weighted median settlement size rising only to just over 40,000. Within the West, country experiences would vary less than under Scenario 1. All the Western countries except New Zealand would see population growth of more than 50%, and all but the USA would see average human capital fall. New settler societies would emerge in East Timor, South Africa, Botswana, and other places, as in Scenario 1, but their rise would be much less extreme. Likewise, most developing countries would see emigration on a large scale, but less extreme than Scenario 1. The worst-off countries would be "rescued" by the benign influence of a large diaspora and see average capital rise even as their populations fell sharply. In general, the distributive consequences of open borders under Scenario 2 would be highly desirable, with huge income gains for billions at the bottom of the development ladder, but the transition might be painful for US natives, who would see their money wages fall by 10% even as their cities became more congested and expensive, though many would be buoyed up by soaring housing prices, and maybe some by transfers from their government, which would enjoy a burgeoning tax base.

The global economic impact of open borders would be so radical that other reforms and initiatives that have been advocated with great energy, including microfinance, welfare reform, school vouchers, carbon taxes, and free trade, would at this juncture in history seem too unimportant to afford a comparison. It can be compared only to the Industrial Revolution itself, which in some ways it would resemble. As the Industrial Revolution involved large migrations from rural to urban areas, open borders would lead to large migrations from developing to developed countries. The Industrial Revolution raised living standards dramatically in the long run, but to people living through it, this was far from clear. On the contrary, it seemed to many that industrialization was exacerbating the misery of the working class. Open

borders would raise median living standards sharply while reducing global inequality, but would also lead to more visible poverty in the streets of cities in the rich world. Any utilitarian test or cost-benefit analysis would yield a resounding yes, and the reform has the added merit of reducing, rather than increasing, the burden of government coercion. That some may feel a certain trepidation about embracing the cause of open borders is nonetheless understandable.

I. THE MODEL

To imagine a world without migration restrictions involves great feats of extrapolation, and taking many things into account. These difficulties amply justify resorting to economic theory, and to the device of solving for equilibrium. But the cost of this is that Section I will be inscrutable to non-economist readers, who may pick their way through the argument, gleaning what they may, or skip to Section II, but either way, must take it on faith that the results, derived as they are from the model presented here, have some validity.

Just what sort of validity these results claim is subtle. The model predicts the global economic impact of open borders, *ceteris paribus*. Yet the transition dynamics involved would surely take decades to play out, and much else would doubtless change in the meantime. When a microeconomist argues that a higher price induces a greater quantity supplied, *ceteris paribus*, or when a macroeconomist argues that monetary expansion will induce a temporary surge in real growth, *ceteris paribus*, epistemic clarification about what is being claimed may sometimes be appropriate, and indeed is rather difficult, yet the metaphysical status of these claims is not especially odd. But a claim such as that which I will make in Scenario 2, that open borders would raise the US population to over 1 billion, *ceteris paribus*, really does have a rather odd meaning. I do not mean that, if open borders were instituted tomorrow, the US population would instantly rise to 1 billion. It would take decades at the least for the new equilibrium to be reached. Nor do I mean that, if open borders were instituted tomorrow, Scenario 2 represents what the world economy will look like several decades hence. For many other changes will occur in the meantime. What Scenario 2 really purports to describe is what *today's* world would look like, if open borders were instituted, and the resulting process of equilibration, but none of the other changes in the world economy, were magically fast-forwarded by some decades. This approach is preferable to projecting other changes already underway and superimposing the effects of open borders on them, because there is no consensus about what the other changes will be.

The crucial step in the model involves solving for equilibrium in the labor and human capital markets. The difference between the status quo and open borders lies in whether these markets clear *nationally* (the status quo) or *globally* (open borders). But it was necessary to depart in one respect from the traditional assumption of "competitive" factor markets. The reason for this is that the phenomenon being studied, migration, is *spatial* in nature. *The Spatial Economy*, by Paul Krugman, Masahisa Fujita, and Anthony Venables, gives a good account of why spatial economics has to depart from the usual equilibrium assumptions. The spatial model developed here starts from three principles:

1. There are economies of concentration, arising from the benefits of division of labor, specialization and (local) trade.

2. But concentration also creates congestion disutilities, most obviously by driving up land prices.

3. There are also inherent differences in the desirability of different places.

Abridging a larger argument, these three principles are not only evidently true, but are necessary and sufficient to explain key stylized facts about how real human populations are spatially distributed themselves. Principle 1, by itself, would predict that everyone would live in one large city. Principle 2, by itself, would predict that people would spread out evenly over the land. Principles 1 and 3, without Principle 2, would predict that one large city would be established in the most desirable location. Principles 1 and 2, without Principle 3, would predict that people would generally be fairly evenly spread out, but with higher population densities where the land was inherently more desirable. This prediction is superficially plausible, yet upon reflection it seems clear that many thriving cities are built at sites not much better than nearby sites that are uninhabited or thinly inhabited, and that people concentrate not so much because of the quality of a given site, but because concentration *per se* is beneficial. Finally, Principles 1 and 2, without Principle 3, would tend to predict that all cities would be the same size, namely, the size at which economies of concentration are just offset by congestion disutilities. But Principles 1, 2, and 3 together predict what we see: that people live somewhat concentrated, but also somewhat spread out, and that cities differ in size.

Let Principle 1 be expressed in a city-level production function with increasing returns, as shown in Equation 1:

(1) $\quad Y_i = A_i K_i^{\alpha} H_i^{\beta} N_i^{\gamma}, \alpha + \beta + \gamma > 1$

Where Y_i is the GDP of city i, K_i is the physical capital stock of city i, H_i is the human capital stock of city i, N_i is the population of city i, A_i is the "total factor productivity" of city i, and α, β, and γ are Cobb-Douglas exponents. That these exponents sum to more than one implies that the elasticity of output with respect to all inputs is greater than one, i.e., increasing returns. Specifically, the results will be based on the assumption that $\alpha=0.33$, $\beta=0.44$, and $\gamma=0.25$. To assign $\alpha=0.33$ is traditional, and is sometimes treated as a stylized fact. But how what we observe as the returns to labor should be distributed among human capital and "raw" or unskilled labor is less pinned down by convention. Krueger (1999) estimates raw labor's share of national income in the USA as having varied within a few percentage points of 10%. But in the model here being developed, cities use market power in a way that will cause raw labor's income share to understate its Cobb-Douglas exponent. For this reason, and more generally because I think the lowest wages observed tend to reflect poor negotiating positions, and/or the choice of pleasant work as a form of consumption, as much as low productivity, I have assigned a higher value to raw labor's Cobb-Douglas exponent than its income share would imply in a competitive equilibrium framework.

A_i is the least intuitive quantity in equation (1), and needs further explanation. Free gifts of nature like climate, soil, and beautiful views—the last of these would raise land rents and therefore measured GDP, even if they do not "produce" anything but pleasure in contemplation—are part of A_i. Also included in A_i are advantages related to transportation, such as access to rivers or the sea, or conduciveness to road construction. Physical structures are generally excluded from A_i and included in physical capital instead, but only to the extent that they are replaceable. Physical structures that cannot be replaced because they get special value from their historic interest or the contributions of unique genius, or even structures which are simply worth less than it would cost to replace them and whose depreciation rate is negligible,

may be included in A_i. In general, the history of a place is part of A_i to the extent that it affects people's willingness to pay for living there. Finally, *quality of institutions*, the most fashionable interpretation of total factor productivity generally, is part of local TFP as well. This might seem to imply too great a role for local relative to national institutions. In fact, it implies nothing about the relative importance of local versus national institutions. Better national institutions would simply be reflected in *all* a country's values of A_i being higher. Together, the values of A_i for all cities in a country amount to a kind of "national endowment," that includes the country's desirable geographic features as well as the legacy of its history. The values of A_i are not observable, and must be imputed on the basis of other data.

The increasing returns in Equation (1) are inconsistent with competitive markets, because where there are increasing returns, the total product is insufficient to pay all factors of production their marginal product. So my model starts with a workaround that may be regarded as clever or clumsy, according to taste. I treat *cities* as economic agents which hire the factors of production, in order to maximize rents, where rents mean city GDP minus payments to the factors of production. City rents are most easily interpreted as accruing to landowners, which makes city governments look like conspiracies of landlords for their own gain. Some may find this interpretation excessively cynical, but I see it, if anything, as excessively optimistic. City governments seem to me to serve, not so much incumbent residents' real interests, as their arbitrary, impractical, and excessively conservative sentiments, and the interests of mankind would be much better served if city governments did operate merely as the instruments of rational landowner greed. Be that as it may, the issue turns out to be of minor importance here. The assumption of the rent-maximizing city is adopted merely as an analytical device to escape the special problems of modeling increasing returns. The city's problem is shown in Equation (2).

(2) $\max R_i = Y_i - rK_i - \pi H_i - w_0 N_i^{1+\sigma}$

Where K_i, H_i, and N_i have the same meaning as in Equation (1), R_i represents the rents accruing to city i, r represents the market-determined rental price of physical capital, π represents the price of one "unit" (arbitrarily defined) of human capital, w_0 represents the "base wage" that the city must pay in order to recruit one worker, and σ is a factor that characterizes how the congestion disutilities of city living are affected by the population of the city. The wage actually paid to any given worker depends on his human capital h and the population of the city in which he lives, N. Specifically, he will earn $\pi h + w_0 N^{\sigma}$.

The results reported in Sections II through IV will be based on an assumption that $\sigma=0.6$. Such a high value for σ may seem difficult to justify, since it would superficially imply that a completely unskilled worker living in a city of 10 million would have to be paid 1,000 times more than the same worker would earn in a village of 100 people, in order to make him indifferent between the two locations. As Tim Harford reports in *The Logic of Life,* observed wage differences between large cities and small towns are much smaller than that. On the other hand, a study of land values might even justify claims that $\sigma>0.6$. A perusal of the urban economics literature did not uncover any estimates of the elasticity of land prices with respect to city size. This is an understandable lacuna, since such a question must sound very crude and misspecified to any urban economist. Should land cost the same in Detroit and San Francisco, simply because those (legally defined) cities have similar populations? Yet a quick internet search reveals that farmland in Iowa recently cost $3,000 per acre, whereas house prices in the Georgetown neighborhood of Washington, DC suggest underlying land values of $30 million per acre. If we take the first figure as representative of land prices in a village of 100 people, and the latter as representative of land prices in a

city of 10 million, that implies an elasticity of land prices with respect to city sizes of 0.8. Unless unskilled workers have Leontief utility functions, it would be indefensible to set the value of σ equal to the elasticity of land prices with respect to city sizes. Manufactured goods are little more expensive, if at all, in big cities compared to small towns, and surely more manufactured goods can compensate workers, at least to some extent, for making do with smaller (or without) backyards. But if the marginal rate of substitution of manufactured goods for land is rather low, then σ=0.6 looks plausible. It may still be asked, however, why, if congestion disutilities are as important as σ=0.6 implies, there are so many people in cities willing to work for wages not much higher than those prevailing in rural areas. To this, there are several answers.

First, I have chosen to treat congestion disutilities as affecting only the wage of raw labor, not the human capital premium. Only for a completely unskilled worker, whatever that means, does the wage need to be 1,000 times higher in a metropolis than in a village. What educated people earn is attributable mostly to their human capital rather than their raw labor, so while they should earn more in cities, the ratio of what they would earn in a metropolis to what they would earn in a village would be much less than 1,000, and maybe not much above 1. The assumption that only raw wages and not human capital premia must be higher in cities is analytically convenient, but it is also motivated by evidence that skilled people tend to concentrate in cities. [GET THIS CITATION] This is probably partly because some of what cities have to offer—art museums, for example—requires human capital to be enjoyed, and partly because much of what cities have to offer has a luxury character and is disproportionately demanded by people with more disposable income.

Second, as Tim Harford reports, people's earnings rise faster when they live in cities. People accept lower living standards to live in cities, because they expect a faster rise in earnings, including if they move to less populous places later on.

Third, demand for city living seems to vary greatly over the life cycle. To simplify, young singles like cities, young families do not. Central Park may be far preferable to a backyard for an independent adult, who has no fear of being kidnapped or getting lost or running into the road in front of a car, but much inferior for a parent, who can let a child play unsupervised in the backyard, but not in Central Park, while he cooks dinner. Urban employers might find plenty of young singles willing to work in New York for wages that will only pay rent on a bunk bed, yet have to pay exorbitant wages to make young families live there. In that case, σ=0.6 might yield a reasonable description of people's spatial behavior over the life cycle, even if some subpopulations deviate from it sharply.

Fourth, many low-wage urban workers are secondary earners. A New York teenager working for $10/hour might not be able to live on his wages, but does fine while Mom and Dad provide free room and board.

Fifth, some urban workers may accept low wages, not because they are just as happy with them as with suburban or rural alternatives, but because they have no other options. There was a widespread perception during the Industrial Revolution that the industrial proletariat was being reduced to a novel and horrific form of human misery, and in hindsight, even if Marxist theories of "exploitation" make little sense, it seems quite plausible that Malthusian population pressures may have driven people off the land who would have been happier in the peasant lives of their forefathers. By the same token, it seems likely that many people in America's inner cities do not so much choose to remain there, as not know how to get out.

Sixth, the welfare state, agricultural supports, minimum wage laws, and other public policies may prevent the natural urban/rural wage gap from asserting itself.

If this defense of σ=0.6 is deemed sufficient, we can proceed to solve the city's problem. For a given population, the rent maximizing demand for physical and human capital is calculated by setting the partial derivatives of rent with respect to physical capital equal to zero and solving, which yields:

(3) $\quad H_i = \left(\left(\frac{\alpha}{r}\right)^\alpha \left(\frac{\beta}{\pi}\right)^{1-\alpha}\right)^{\varepsilon_1} A_i{}^{\varepsilon_1} N_i{}^{\gamma\varepsilon_1}$

(4) $\quad K_i = \left(\left(\frac{\alpha}{r}\right)^{1-\beta} \left(\frac{\beta}{\pi}\right)^{\beta}\right)^{\varepsilon_1} A_i{}^{\varepsilon_1} N_i{}^{\gamma\varepsilon_1}$

Where, for convenience, we define $\varepsilon_1 = \frac{1}{1-\alpha-\beta} > 1$. The city's GDP, stated as a function of population, is:

(5) $\quad Y_i = \left(\left(\frac{\alpha}{r}\right)^\alpha \left(\frac{\beta}{\pi}\right)^{\beta}\right)^{\varepsilon_1} A_i{}^{\varepsilon_1} N_i{}^{\gamma\varepsilon_1}$

Substituting (3) and (4) into (5) yields city rent as a function of population:

(6) $\quad R_i = r^{-\alpha\varepsilon_1}\pi^{-\beta\varepsilon_1}\left(\left(\alpha^\alpha\beta^\beta\right)^{\varepsilon_1} - \left(\alpha^{1-\beta}\beta^\beta\right)^{\varepsilon_1} - \left(\alpha^\alpha\beta^{1-\alpha}\right)^{\varepsilon_1}\right)A_i{}^{\varepsilon_1}N_i{}^{\gamma\varepsilon_1} - w_0 N_i{}^{1+\sigma}$

It will be convenient henceforth to define $\theta = \left(\left(\alpha^\alpha\beta^\beta\right)^{\varepsilon_1} - (\beta^{1-\alpha}\alpha^\alpha)^{\varepsilon_1} - \left(\alpha^{1-\beta}\beta^\beta\right)^{\varepsilon_1}\right)$. City population is not exogenous but chosen by the city to maximize rents, and the rent maximizing population, found by setting the derivative of R_i with respect to N_i equal to zero, is:

(7) $\quad N_i = \left(\frac{\theta\gamma\varepsilon_1}{w_0(1+\sigma)}\right)^{\varepsilon_2} \pi^{-\beta\varepsilon_3} r^{-\alpha\varepsilon_3} A_i{}^{\varepsilon_3}$

Where it is convenient to define $\varepsilon_2 = \frac{1}{1+\sigma-\gamma\varepsilon_1} > 0$ and $\varepsilon_3 = \varepsilon_1\varepsilon_2 = \frac{1}{(1+\sigma)(1-\alpha-\beta)-\gamma} > 0$. ($\varepsilon_2 < 0$ and $\varepsilon_2 < 0$ are possible for some otherwise plausible parameter values but lead to absurd results. For the parameter values we have assigned, the model is well behaved.) Having solved the city's problem in terms of the factor prices, we must consider how factor prices are determined in national or international markets.

The price of physical capital is treated as an exogenous variable which differs across countries. The main justification for treating the price of physical capital as exogenous at the national level is that investment capital is internationally mobile. The main justification for treating the price of physical capital as exogenous at the global level is that the world is in a Solow steady state. Differences in the cost of capital across countries reflect institutional factors, such as risk of expropriation, and perhaps also differences in the age structure of the population and the cultural propensity to save, along with imperfect international capital mobility, for example due to exchange rate risk. It will turn out to be convenient to distinguish a "world" rate of return on capital from "risk premia" associated with particular countries. I will assume the "world" rate of return on capital is 7%, based on the long-run average returns of US stocks.

Two policy regimes will be considered, closed borders or the status quo, under which international movements of labor and human capital are prohibited, and open borders, in which labor and human capital may cross borders freely. Obviously, to equate the status quo with closed borders is a simplification, but it is a reasonable approximation, since migration flows are a small fraction of the demand for migration as revealed by international polls, and an even smaller fraction of the demand for migration predicted by several economic models, including this one. Under the status quo, labor and human capital markets clear separately in each country. Under open borders, the markets for labor and human capital clear at the global level.

Focusing first on the status quo, the labor and human capital markets are cleared when the conditions in Equations (8) and (9), respectively, are met:

(8) $\qquad \sum_{i \in C} N_i(w_0, \pi) = N_C$

(9) $\qquad \sum_{i \in C} H_i(w_0, \pi) = H_C$

Where N_C is the total population of the country, and H_C is its total stock of human capital. After substituting (3) and (7) into (8) and (9), we can solve (after a lot of algebra) for w_0 and π as functions of r, N_C, H_C and all the local TFPs A_i. They are shown in Equations (10) and (11).

(10) $\qquad \pi_C = r^{\frac{-\alpha}{1-\alpha}} \alpha^{\frac{\alpha}{1-\alpha}} \beta \left(\frac{\sum_{i \in C} A_i^{(1+\sigma)\varepsilon_3}}{H_C} \right)^{\frac{1-\alpha-\beta}{1-\alpha}} \left(\frac{\sum_{i \in C} A_i^{\varepsilon_3}}{N_C} \right)^{\frac{-\gamma}{1-\alpha}}$

(11) $\qquad w_{0,C} = \left(\frac{\theta \gamma \varepsilon_1}{1+\sigma} \right) r^{\frac{-\alpha}{1-\alpha}} \alpha^{\frac{-\alpha\beta\varepsilon_1}{1-\alpha}} \beta^{-\beta\varepsilon_1} \left(\frac{\sum_{i \in C} A_i^{(1+\sigma)\varepsilon_3}}{H_C} \right)^{\frac{-\beta}{1-\alpha}} \left(\frac{\sum_{i \in C} A_i^{\varepsilon_3}}{N_C} \right)^{1+\sigma-\frac{\gamma}{1-\alpha}}$

Where the subscript C has been added as a reminder that these values for the raw wage and human capital premium are applicable to a particular country C, not the world as a whole.

From Equations (10) and (11), we can derive many elasticities. First, the human capital premium is a decreasing function of the human capital stock, with elasticity $\frac{1-\alpha-\beta}{\alpha-1} < 0$, and an increasing function of the raw labor supply, with elasticity $\frac{\gamma}{1-\alpha} > 0$. If average human capital is held constant, then the elasticity of the human capital premium with respect to the population is $\frac{1-\alpha-\beta-\gamma}{\alpha-1}$, which will be positive if there are increasing returns. The base wage w_0 is an increasing function of the human capital stock with elasticity $\frac{\beta}{1-\alpha} > 0$, and a decreasing function of the raw labor supply, with elasticity $\frac{\gamma}{1-\alpha} - 1 - \sigma$, which is less than zero except in the unlikely case where a proportional increase in physical capital and raw labor alone, with no increase in human capital, will lead to a more than proportional increase in output. If average human capital is held constant, the elasticity of the base wage with respect to population is $\frac{1-\alpha-\beta-\gamma}{\alpha-1} - \sigma < 0$. Both the base wage and the human capital premium are decreasing functions of the return on capital, with elasticity $\frac{-\alpha}{1-\alpha}$.

To discuss how the base wage and human capital premium are affected by total factor productivity is complicated by the fact that TFP is a local variable. However, if *all* the local TFPs in a country increase by a given factor, determining the elasticity of the base wage and the human capital premium with respect

to this factor is straightforward. Both the human capital premium and the base wage are increasing functions of TFP, with elasticities of $\frac{1}{1-\alpha}$. The base wage and the human capital premium rise more than proportionally with TFP, because higher TFP not only directly raises the marginal products of human capital and raw labor, but also attracts internationally mobile investment capital and/or encourages higher savings rates (the latter causal channel is plausible but not explicitly modeled), leading to a higher physical capital stock.

Turning now to the open borders case, the only tricky part is that instead of assuming a single cost of capital, we want to allow the cost of capital to differ across countries even as wages and human capital premia converge. After all, there is little reason to think open migration borders would eliminate exchange rate risk, or institutional differences in expropriation risk. It is plausible that open migration borders would facilitate capital flows and *mitigate* international differences in the cost of capital, and that will be considered in Section IV. But we want to allow the rate of human capital. It turns out that if we distinguish the rate of return r_i that prevails in a given city (or country) from a "world" rate of return r_w, which can be interpreted as the rate of return on capital that prevails in developed countries, we can rewrite Equations (3) and (5) as:

(12) $H_i = \left(\left(\frac{\alpha}{r_w} \right)^\alpha \left(\frac{\beta}{\pi} \right)^{1-\alpha} \right)^{\varepsilon_1} ((r_i/r_w)^{-\alpha} A_i)^{\varepsilon_1} N_i^{\gamma \varepsilon_1}$

(13) $Y_i = \left(\left(\frac{\alpha}{r_w} \right)^\alpha \left(\frac{\beta}{\pi} \right)^\beta \right)^{\varepsilon_1} ((r_i/r_w)^{-\alpha} A_i)^{\varepsilon_1} N_i^{\gamma \varepsilon_1}$

Where $(r_i/r_w)^{-\alpha} A_i$ becomes, in effect, local TFP adjusted for the risk premium. The worldwide human capital premium under open borders then turns out to be:

(14) $\pi = r_w^{\frac{-\alpha}{1-\alpha}} \alpha^{\frac{\alpha}{1-\alpha}} \beta \left(\frac{\sum_{i \in W}((r_i/r_w)^{-\alpha} A_i)^{(1+\sigma)\varepsilon_3}}{H_C} \right)^{\frac{1-\alpha-\beta}{1-\alpha}} \left(\frac{\sum_{i \in W}((r_i/r_w)^{-\alpha} A_i)^{\varepsilon_3}}{N_C} \right)^{\frac{-\gamma}{1-\alpha}}$

Where W is the set of all the cities in the world. And the worldwide base wage under open borders is

(15) $w_0 = \left(\frac{\theta \gamma \varepsilon_1}{1+\sigma} \right) r_w^{\frac{-\alpha}{1-\alpha}} \alpha^{\frac{-\alpha \beta \varepsilon_1}{1-\alpha}} \beta^{-\beta \varepsilon_1} \left(\frac{\sum_{i \in C}((r_i/r_w)^{-\alpha} A_i)^{(1+\sigma)\varepsilon_3}}{H_C} \right)^{\frac{-\beta}{1-\alpha}} \left(\frac{\sum_{i \in C}(r_i/r_w)^{-\alpha} A_i^{\varepsilon_3}}{N_C} \right)^{1+\sigma-\frac{\gamma}{1-\alpha}}$

It remains to explain how values of A_i can be imputed on the basis of real world data. First, if we call the local TFP of the largest city A_L, and if we have imputed a value to that, then A_i for all other cities will be:

(16) $A_i = \left(\frac{N_i}{N_L} \right)^{\frac{1}{\varepsilon_3}} A_L$

Substituting (10) and (16) into (5), taking a summation over all cities in country C, and simplifying, we get:

(17) $Y_C = r^{\frac{-\alpha}{1-\alpha}} \alpha^{\frac{\alpha}{1-\alpha}} \left(\sum_{i \in C} N_i^{1+\sigma} \right)^{\frac{1-\alpha-\beta}{1-\alpha}} H_C^{\frac{\beta}{1-\alpha}} A_L^{\frac{1}{1-\alpha}} N_L^{\frac{-1}{(1-\alpha)\varepsilon_3}}$

And solving (17) for A_L yields:

(18) $\quad A_L = Y_C{}^{1-\alpha} H_C{}^{-\beta} r^\alpha \alpha^{-\alpha} \left(\sum_{i \in C} N_i{}^{1+\sigma}\right)^{\alpha+\beta-1} N_L{}^{(1+\sigma)(1-\alpha-\beta)-\gamma}$

Where N_L is the population of the country's largest city. If, therefore, we know national population for each country, per capita GDP for each country, average human capital for each country, the world rate of return on capital, risk premia for each country, and the populations of all the world's human settlements under the status quo, we can plug these values into (18) and (16) to determine the local TFPs of the world's cities, then into (14) and (15) to determine the new equilibrium base wage and human capital premium under open borders, then into (7) to determine global migration patterns under open borders, and (5) to determine the impact of open borders on global GDP, and so on. To these tasks we now turn.

II. THE STATUS QUO

To construct a description of the world under the status quo, data on national populations and GDP per capita was taken from the CIA World Factbook; on urbanization rates, from the UN Population Division; on human capital, from the UN Development Program's Human Development Index; on national capital stocks, from the Penn World Tables; and on risk premia affecting the returns on investment capital, from a dataset published by Aswath Damodaran of NYU's Stern School of Business. Less importantly, data on oil exports (valued at $100/barrel and subtracted from GDP) were taken from NationMaster.com, and data on the largest cities in each country were taken from the website Quandl.com.

While the UN's HDI is a good human capital measure, to treat it as a *linear* input into a production function would be ill-motivated. Instead, from a per worker production function $y = k^\alpha h^\beta$, I formed a crude estimate of human capital as $h = (y/k^\alpha)^{1/\beta}$, with α=0.33 and β=0.44 as specified above, using the Heston-Summers estimates of capital stocks. Then I ran a robust, population-weighted regression of the log of this residual against the HDI. The fit was remarkably good, with an R^2 of 96.5%. This surprisingly strong correlation suggests that the HDI seems to be a remarkably accurate indicator of the productive human capital of a country, provided it is interpreted as a log rather than a linear indicator, and I abandoned a plan to include Barro-Lee years of education in constructing a human capital estimate, because the HDI, in which performed so well. But the implied dispersion of average human capital is absurdly wide, with the 90th-percentile country's average human capital exceeding that of the 10th percentile almost by five orders of magnitude, which shows again the well-known truth that international income differences cannot plausibly be accounted for by factor endowments alone. So I took my naïve human capital estimate to the power of 0.3 (effectively assuming that 30% of GDP per capita differences are explained by human capital, the rest by TFP), before replacing it with a predicted value on the basis of a regression against the HDI. Average human capital was therefore assigned to all but eight countries on the basis of the HDI, by the formula:

(19) $\quad \ln h = CONSTANT + 7.13 HDI$

For the countries for which an HDI was not reported—Taiwan, Macao, Somalia, Western Sahara, North Korea, Puerto Rico, Kosovo, and South Sudan—it was imputed by regressing average human capital against log GDP per capita for the rest of the sample, then predicting it from log GDP per capita for those eight countries.

Aswath Damodaran's country risk premia were missing for 67 countries. To impute the missing data, I regressed the cost of capital against log GDP per capita, yielding $r_i = .301 - .0196 \ln GDP_i$, and used this result to impute r to all countries. At this point, estimates of the cost of capital ranged from 8% (the USA and other developed nations) to over 20% (Ecuador), with a population-weighted median of 11%.

To construct a distribution of the world's population among human settlements, I took advantage of a stylized fact about the distribution of city sizes, namely, that (to simplify considerably) a city's size tends to be inversely proportional to its rank. I first assumed that the urban population of each country was distributed among cities averaging 20,000 in population. The largest city's population was assigned from real data, where available, otherwise imputed on the basis of a regression. All other cities' shares of the urban population were imputed such that the ratio of any city a's population share to that of any city b, was equal to the ratio of city b's rank to that of city a. For the rural population, each village's share was a uniformly distributed random variable. This exercise resulted in a distribution of the world's population among just over 1.8 million settlements. In four countries for which the urban share of the population was not available, it was imputed on the basis of a regression of urban share against log per capita GDP.

TFP was then calculated for all settlements on the basis of Equations (17) and (18). However, this procedure imputed implausibly high, or low, TFP values in some cases, so I added a process for adjusting imputed TFP when the average TFP of a country was over 167%, or under 60%, of the population-weighted world average TFP. I then defined a variable Q_C, such that $Q_C = \left(\bar{A}_C/(1.67\bar{A}_W)\right)^{-0.85}$, where $\bar{A}_C$ is a country's average TFP and $\bar{A}_W$ is the world's average TFP, if a country's average TFP is deemed too high, and $Q_C = \left(\bar{A}_C/(0.6\bar{A}_W)\right)^{-0.85}$ if a country's average TFP is deemed too low. Then, for each city in country C, I would substitute: $\hat{y} = yQ^{\frac{0.3}{1-\alpha}}$, where y is GDP per capita as reported in real data, and $\hat{y}$ is the GDP per capita I impute to a country; $\hat{h} = hQ^{\frac{0.4}{-\beta}}$, where h is an estimate of average human capital in a country based on available data sources and $\hat{h}$ is the average human capital I impute to a country; and $\hat{r} = rQ^{\frac{0.3}{\alpha}}$, where r is the world return on capital plus the risk premium as otherwise reported or imputed, and $\hat{r}$ is the cost of capital I impute to a country. In effect, I assume that when a country appears to have anomalously high (low) TFP, 15% of this is because it really does have anomalously high (low) TFP. Of the rest, 30% reflects measured GDP being too high (low), 40% reflects lower (higher) human capital than could be seen in available data, and 30% reflects a higher (lower) cost of capital than is otherwise observable. The burden of anomalies is distributed across various possible sources of error.

The countries with anomalously high TFP were Qatar, East Timor, Luxembourg, Macao, Switzerland, Botswana, Ireland, Swaziland, Austria, Gabon, Oman, Bhutan, Belgium, Cyprus, Bahrain, Hong Kong, Singapore, and Suriname. The countries with anomalously low TFP were Libya, Zimbabwe, Democratic Republic of the Congo, Madagascar, Afghanistan, and Bangladesh. After these TFP adjustments:

- Average human capital ranges from 1.3% (the DRC) to 188% (Macao) of the US level.
- TFP in human settlements ranges from 6% (a village in the DRC) to 100% of the level of New York.
- The required rate of return on investment capital ranges from 4.5% (Qatar) to 22.0% (Zimbabwe).

The description of the status quo that results from the data exercise described above is a dataset with 1.8 million observations, each representing one human settlement, with estimates of population and TFP for

(not every country but) every *settlement*, and estimates of average human capital and the required rate of return on investment capital for every country. Table 1 summarizes these results for the world's most populous countries and largest economies.

Table 1: Leading and least developed countries, key statistics

Country	Population	Largest city	GDP per capita	Rate of return on capital	Average human capital (US=1)	Population weighted average TFP (New York=1)
Leading countries						
United States of America	318,892,103	19,544,000	$52,580	7.0%	1.000	0.584
China	1,355,692,576	17,315,000	$9,787	8.1%	0.249	0.335
India	1,236,344,631	23,363,000	$3,976	10.0%	0.096	0.297
Japan	127,103,388	36,898,000	$36,995	8.1%	0.845	0.505
Germany	80,996,685	3,470,000	$39,288	7.0%	0.984	0.521
Brazil	202,656,788	20,781,000	$11,974	9.6%	0.297	0.412
France	66,259,012	10,683,000	$35,432	7.0%	0.811	0.498
United Kingdom	63,742,977	8,670,000	$36,550	7.0%	0.855	0.509
Russia	142,470,272	10,597,000	$16,230	9.3%	0.380	0.454
Mexico	120,286,655	19,853,000	$15,142	9.3%	0.324	0.445
Indonesia	253,609,643	9,501,000	$5,142	10.0%	0.194	0.281
Pakistan	196,174,380	13,442,000	$3,094	16.0%	0.068	0.352
Nigeria	177,155,754	10,954,000	$2,367	13.9%	0.054	0.322
Bangladesh	166,280,712	15,825,000	$2,104	11.9%	0.079	0.221
Philippines	107,668,231	11,811,000	$4,680	11.1%	0.163	0.279
Least developed countries						
Democratic Republic of the Congo	77,433,744	9,491,000	$436	21.3%	0.013	0.212
Somalia	10,428,043	1,611,000	$596	16.6%	0.020	0.226
Burundi	10,395,931	455,000	$600	16.6%	0.024	0.248
Zimbabwe	13,771,721	1,700,000	$688	22.0%	0.037	0.209
Liberia	4,092,310	737,000	$700	16.3%	0.028	0.232

The dataset underlying Table 1 contains, in effect, a theory of why some nations are so rich and others are so poor. Contrary to what has become the conventional wisdom, factor endowments do most of the work. In leading countries, investment capital is cheap, and human capital is abundant. In the least developed countries, investment capital is almost three times as expensive, probably due to political risk and underdeveloped financial intermediation. More importantly, the average native of the least developed countries has only a tiny fraction of the human capital of the average native of leading developed countries. Finally, some of the explanatory burden does fall on TFP, or in other words, is not formally explained. But TFP dispersion is small compared to that of average human capital, with the most productive countries in the world excelling the least productive by roughly 3:1.

Next, we can calculate, for each country, the equilibrium "base wage," w_0 in the model, and the human capital premium, as well as the money wage for each settlement. These are shown in Table 2. The data in Table 2 are *not* based on empirical studies of labor earnings. Rather, they are the values which would

equilibrate the raw labor and human capital markets, given the way these economies are described in our other data. They could not be straightforwardly checked against real data, because neither "unskilled labor" nor "human capital" are straightforwardly observable phenomena. However, they look strikingly plausible.

Table 2: Equilibrium wages and human capital premia

Country	Average human capital	Living standard of unskilled workers (US=1)	Average annual wage of raw labor[1]	Annual salary for one unit of human capital
Largest economies				
United States of America	1.000	1.000	$16,431	$46,271
China	0.249	0.221	$3,058	$34,546
India	0.096	0.165	$1,242	$36,342
Japan	0.845	0.272	$11,561	$38,540
Germany	0.984	1.704	$12,278	$35,146
Brazil	0.297	0.204	$3,742	$35,471
France	0.811	0.776	$11,072	$38,461
United Kingdom	0.855	0.929	$11,422	$37,634
Russia	0.380	0.454	$5,072	$37,543
Mexico	0.324	0.236	$4,732	$41,118
Highest living standards for unskilled workers (population over 5 million)				
Switzerland	1.108	3.754	$16,479	$41,884
Norway	1.237	2.839	$12,482	$28,404
Sweden	0.893	2.467	$12,496	$39,422
Netherlands	1.011	2.439	$12,267	$34,168
Austria	0.793	2.301	$13,249	$47,056
Lowest living standards for unskilled workers (population over 5 million)				
Democratic Republic of the Congo	0.013	0.016	$136	$28,544
Somalia	0.020	0.048	$186	$25,677
Haiti	0.043	0.060	$406	$26,864
Togo	0.043	0.061	$344	$22,468
Cote d'Ivoire	0.037	0.062	$527	$40,047
Highest salary for human capital (population over 5 million)				
Chad	0.021	0.384	$666	$89,309
South Africa	0.161	0.583	$3,581	$62,653
Sierra Leone	0.021	0.136	$437	$57,736
Burkina Faso	0.024	0.123	$469	$56,074
Papua New Guinea	0.049	1.049	$892	$51,142
Lowest salary for human capital (population over 5 million)				
Libya	0.352	0.217	$1,052	$8,408
Zimbabwe	0.037	0.065	$215	$16,244
Kyrgyzstan	0.130	0.274	$777	$16,871
Jordan	0.301	0.399	$1,906	$17,836
Tajikistan	0.112	0.413	$718	$18,027

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[1] The average wage and human capital premium, as reported here, represent *twice* the prices that would clear the market if everyone worked. The rationale for this is that only around half the population typically participates in the labor force.

Several patterns should be noted in Table 2 (and the dataset underlying it), all of which are quite realistic even though the data are somewhat artificial. First, there is far more dispersion in the wage of raw labor than in the human capital premium. The living standards of unskilled workers vary across countries by more than two orders of magnitude, whereas the 90th percentile human capital salary exceeds the 10th percentile by less than 2:1. Second, the living standards of unskilled workers show a strong tendency to rise with the general level of development as indicated by GDP per capita, but the human capital premium does not. This is because higher GDP per capita is associated with *both* higher TFP, which raises the human capital premium, *and* higher average human capital, which reduces it. Third, unskilled workers' living standards do not show the same pattern as money wages, because countries differ in their degree of urbanization. The median American worker lives in a larger city than the median German or Swiss, and faces higher housing costs and congestion disutilities.

The impressive evidence about the "place premium" offered by Clemens, Montenegro, and Pritchett (2009) does not attempt to distinguish a place premium for raw labor from a place premium for human capital. According to Table 2, the place premium for raw labor is even larger than Clemens et al. allege, but the place premium for human capital is rather slight. If this is true, an empirical analysis that assumed a single place premium for all types of labor might well yield results similar to those found by Clemens et al. Other research, e.g., Clemens' impressive study of computer programmers from India [GET CITATION] have found that skilled workers, too, can, in particular cases, see dramatic salary increases by international migration, so there is room for controversy here.

In my view, however, Amy Chua's *World on Fire* provides overwhelming evidence that people with high levels of human capital regularly enjoy high living standards in the midst of some of the world's poorest countries. I observed this phenomenon myself during an extended stay in Malawi on mission with the World Bank. All manner of resident foreigners, European, Indian, Arab and even Chinese, enjoyed living standards comparable to those of the West. They had different consumption bundles, with more domestic servants and land, but fewer ready-made goods from the hardware store. But many American suburbanites might have been glad to trade places with them. The reason for their affluence was certainly not political privilege, for the government was run by black Africans. It was precisely and solely that they knew how to run businesses in a way that the Africans did not. To put the same point more abstractly, their living standards represented the return to human capital. The experience of the overseas Chinese in Southeast Asia is another example of the same phenomenon.

III. THE GLOBAL ECONOMIC IMPACT OF OPEN BORDERS, SCENARIO 1

Having sufficiently described the status quo, we can now present, in two scenarios, how open borders will change the world. Scenario 1 takes no liberties, over and above those that have already been taken in describing the status quo. All local TFPs are fixed. All country risk premia are fixed. The world population is fixed. The world supply of human capital is fixed. Only one thing changes: markets for raw labor and human capital clear, not at the national level, but at the global level. Scenario 1 is, as I said above, rather unrealistic, but useful for illustrating the pure economics of open borders. Here are some of the main results.

First, under Scenario 1, world GDP would rise from an estimated $85 trillion to a projected $154 trillion, an 80% increase.

Second, under Scenario 1, at least 5.48 billion people would migrate to another country. This is definitely an *under*estimate of total migration under Scenario 1, because it is only a sum of net population changes (i.e., total net immigration *or* total net emigration). But as we will see, some countries of net immigration must be experiencing emigration too, because their total human capital stocks fall.

Third, urbanization under Scenario 1 undergoes a striking acceleration. Under the status quo, the median individual lives in a settlement of about 5,000 people. Under Scenario 1, the median individual will live in a city of over 400,000 people. The largest city in the world under the status quo is Tokyo, with 37 million. Under Scenario 1, it will be New York, with 90 million, and the top eight urban agglomerations will all be larger than contemporary Tokyo. In the Status quo, there are 400 cities with over 1 million people, with a combined population of 1.34 billion. Under Scenario 1, there will be 827 such cities, with a combined population of 3.01 billion.

Fourth, though all local TFPs remain fixed under Scenario 1, yet a substantial rise in population weighted average TFP occurs, simply because the typical individual moves from a place with lower TFP to a place with higher TFP. Population weighted median TFP under the status quo (New York=1) is 0.299. Under Scenario 1, it almost doubles, to 0.551. Skilled workers do not enjoy as much of a rise in TFP because they are currently less likely to be trapped in unproductive places. But human capital weighted average TFP rises from 0.690 to 0.822.

Fifth, under Scenario 1, the living standards of unskilled workers globally would converge to 23% of the current US level. Globally, the median living standard afforded by the wages paid to raw labor would rise, but only slightly, by 3%. But the raw wage falls in 122 countries, including not only developed countries but relatively poor countries like the Gaza Strip, Mexico, Azerbaijan and even Ghana. The intuition here is that open borders increases the effective supply of raw labor, by moving unskilled workers to more productive places. The effective global supply of human capital increases too, but not as much, so its terms of trade improve. The median money wage of unskilled labor rises sharply, from $233 to $1,993. But rather than raising living standards, this just suffices to compensate the median worker for moving to a larger city. Why do they move, if they will not see their living standards rise? Because the towns and villages they came from are vanishing. The settlement of 5,000 of which the median worker is a native will be left with just 1,050 people under open borders. But some of the most wretched members of the human race will see their wages rise by an order of magnitude or more.

Sixth, Scenario 1 would see the human capital premium rise almost everywhere in the world. The human capital of the average American will now command a $66,535 salary, over and above the wages of raw labor. Only in three countries, Swaziland, Chad, and East Timor, does the model suggest that human capital earns more than this under the status quo. Worldwide, people with human capital would see their earnings premiums (over raw labor) roughly double as open borders increased the demand for skills.

Seventh, the global supply of physical capital would more than double under open borders, from $338 trillion to almost $800 trillion.

The experiences of particular countries may be elucidated by the following typology.

Countries of Reinforced Dominance already had high average human capital (at least 40% of that of the average American) under the status quo. Under open borders, they see an increase in their total human capital, as well as in population and GDP.

New Settler Societies had low average human capital under the status quo (less than 40% of that of the average American), but thanks to high TFP, they become magnets for immigration, and see their total human capital increase. Like the settler societies of the 19th century, many experience a huge influx of immigrants with higher average human capital than the natives.

Corridor Countries see their populations rise, but their total human capital decrease. This is possible because while these countries experience net immigration, they also see some of the natives depart, and the natives who emigrate have higher average human capital than the foreigners who immigrate.

Countries of Net Emigration see their populations fall under open borders, but they retain at least 2% of their populations.

Ghost Nations, to borrow an evocative phrase from Paul Collier, see 98% or more of their populations emigrate, calling into question whether they could remain viable societies at all.

Table 3 uses this typology to elucidate the impact of open borders under Scenario 1.

Table 3

Country	Population		Total GDP		Share of world human capital stock	
	Status quo	Scenario 1	Status quo	Scenario 1	Status quo	Scenario 1
Countries of Reinforced Dominance (USA, Qatar, Switzerland, Austria, Luxembourg, Sweden, Netherlands, Taiwan, Belgium, Oman, Ireland, Slovakia, Finland, Macao, Slovenia, Denmark, Bahrain, Lithuania, Cyprus)	431 million	3.53 billion	$21.1 trillion	$109 trillion	20.2%	70.7%
New Settler Societies (East Timor, South Africa, Botswana, Swaziland, Chad, Trinidad and Tobago, Mauritius, Papua New Guinea, Bhutan, Namibia, Guyana, Equatorial Guinea, Gabon, Solomon Islands, Albania, Suriname)	84 million	1.51 billion	$792 billion	$26.5 trillion	0.6%	17.3%
Corridor Countries (Germany, Italy, Canada, UK, Poland, France, Malaysia, Spain, Czech Republic, Australia, Norway, Romania, Hungary, Portugal, Croatia, Turkmenistan, Tunisia, Israel, Serbia, Bulgaria, Estonia, Puerto Rico, Latvia, Bosnia and Herzegovina, Panama, Macedonia, Jamaica, Montenegro)	567 million	1.52 billion	$17.0 trillion	$16.3 trillion	20.4%	10.6%

Countries of Emigration (China, India, Brazil, Pakistan, Nigeria, Russia, Japan, Mexico, Ethiopia, Vietnam, Egypt, Turkey, Iran, Thailand, Tanzania, South Korea, Colombia, Ukraine, Argentina, Algeria, Uganda, Sudan, Morocco, Iraq, Peru, Uzbekistan, Venezuela, Saudi Arabia, Yemen, Ghana, Mozambique, Cameroon, Sri Lanka, Burkina Faso, Kazakhstan, Niger, Malawi, Chile, Ecuador, Cambodia, Guatemala, Senegal, South Sudan, Guinea, Cuba, Greece, Bolivia, Dominican Republic, Benin, Azerbaijan, Belarus, Honduras, Tajikistan, Jordan, Hong Kong, Laos, Paraguay, Eritrea, El Salvador, Lebanon, Nicaragua, Sierra Leone, UAE, Singapore, Georgia, Costa Rica, Congo, New Zealand, Moldova, Mauritania, Uruguay, Armenia, Mongolia, Lesotho, The Gambia, Kosovo, Guinea-Bissau, Fiji Islands, Djibouti, Comoros, Western Sahara, Cape Verde)	5.1 billion	599 million	$43.2 trillion	$2.2 trillion	53.4%	1.4%
Ghost Nations (Indonesia, Bangladesh, Philippines, Democratic Republic of the Congo, Burma, Kenya, Afghanistan, Nepal, North Korea, Madagascar, Cote d'Ivoire, Angola, Syria, Mali, Zambia, Zimbabwe, Rwanda, Somalia, Burundi, Haiti, Togo, Libya, Kyrgyzstan, Central African Republic, Liberia, Kuwait, West Bank, Gaza Strip)	1.0 billion	9.4 million	$2.9 trillion	$3.7 billion	5.3%	0.0%

Together, the countries of Reinforced Dominance see their populations increase more than eight-fold, and their GDPs, more than five-fold. Their share of total global human capital rises from 20% to 70%. Half the world's population ends up living in these countries. The New Settler Societies see even more dramatic growth. With only 84 million people under the status quo, see their populations surge to 1.5 billion, an 18-fold increase. Their share of global human capital rises even more, from 0.6% to 17.8%, a 30-fold rise. The Corridor Countries, which include the large countries of western Europe, were home to 567 million under the status quo. They see their joint population rise to 1.5 billion, but their share of global human capital falls by almost half, to 10.8%. Total GDP rises in some, falls in others, and falls slightly in the Corridor Countries taken together.

The countries classified as Countries of Emigration are home to over 5 billion people under the status quo. Under Scenario 1, they see their joint population fall to 602 million, as their GDP and their share of global human capital plummet. In spite of this vast exodus, however, enough people remain that the societies might remain viable. Lastly, the Ghost Nations are virtually evacuated. A billion people live in them under the status quo, but less than 10 million would choose to live there under open borders. Their share of global GDP and human capital would be even more negligible than their share of the world population.

Table 4 illustrates the typology by showing a few countries of each type and offering more detail about their experiences under Scenario 1.

Table 4

Country	Ave-rage TFP	Population (millions)		GDP per capita		Average human capital (US=1)		Labor earnings of average native	
		Status quo	Scenario 1	Status quo	Scenario 1	Status quo	Scenario 1	Status quo	Scenario 1
Countries of reinforced dominance									
United States of America	0.584	318.9	1475.7	$52,580	$29,985	1.000	0.397	$62,702	$75,906
Qatar	0.682	2.1	391.4	$64,321	$61,640	1.100	0.815	$76,703	$92,627
Switzerland	0.622	8.1	339.7	$52,737	$30,138	1.110	0.399	$62,889	$83,120
Austria	0.609	8.2	205.6	$42,396	$28,914	0.793	0.382	$50,557	$61,788
Luxembourg	0.668	0.5	190.7	$62,569	$48,750	1.230	0.645	$74,614	$97,276
New settler societies									
East Timor	0.661	1.2	477.6	$15,511	$32,919	0.182	0.435	$18,497	$22,378
South Africa	0.537	48.4	242.0	$11,459	$11,749	0.161	0.155	$13,664	$14,380
Botswana	0.629	2.2	211.7	$15,378	$19,702	0.220	0.261	$18,338	$20,801
Swaziland	0.624	1.4	137.8	$5,457	$8,420	0.071	0.111	$6,507	$7,344
Chad	0.532	11.4	95.4	$2,132	$4,504	0.021	0.060	$2,543	$2,805
Corridor countries									
Germany	0.521	81.0	379.8	$39,288	$13,254	0.984	0.175	$46,851	$69,594
Italy	0.521	61.7	208.2	$29,287	$9,402	0.741	0.124	$34,925	$52,268
Canada	0.543	34.8	135.1	$41,078	$16,920	0.919	0.224	$48,985	$66,411
United Kingdom	0.509	63.7	118.3	$36,550	$12,966	0.855	0.171	$43,586	$60,917
Poland	0.477	38.3	115.7	$21,052	$5,945	0.567	0.079	$25,105	$39,582
France	0.497	66.3	93.9	$35,432	$12,799	0.811	0.169	$42,252	$57,939
Malaysia	0.510	30.1	92.6	$16,717	$7,027	0.366	0.093	$19,935	$26,552
Spain	0.546	47.7	81.7	$29,916	$9,810	0.726	0.130	$35,675	$51,385
Czech Republic	0.522	10.6	55.7	$26,212	$8,158	0.688	0.108	$31,258	$48,328
Australia	0.516	22.5	43.5	$42,493	$11,543	1.140	0.153	$50,673	$79,760
Norway	0.513	5.1	29.5	$39,943	$9,124	1.240	0.121	$47,632	$85,188
Countries of emigration									
China	0.335	1355.7	111.6	$9,787	$2,248	0.249	0.030	$11,671	$17,290
India	0.297	1236.3	69.4	$3,976	$973	0.096	0.013	$4,741	$6,709
Brazil	0.412	202.7	15.7	$11,974	$2,878	0.297	0.038	$14,279	$20,665
Pakistan	0.352	196.2	9.7	$3,094	$908	0.068	0.012	$3,690	$4,792
Nigeria	0.322	177.2	4.6	$2,367	$616	0.054	0.008	$2,823	$3,758
Russia	0.454	142.5	64.8	$16,230	$5,072	0.380	0.067	$19,354	$26,896
Japan	0.505	127.1	23.6	$36,995	$11,243	0.845	0.149	$44,116	$59,716
Ghost nations									
Indonesia	0.281	253.6	4.2	$5,142	$482	0.194	0.006	$6,132	$13,089
Bangladesh	0.221	166.3	0.4	$2,104	$170	0.079	0.002	$2,509	$5,280
Philippines	0.279	107.7	1.4	$4,680	$502	0.163	0.007	$5,580	$11,002
Democratic Republic of the Congo	0.212	77.4	0.0	$436	$42	0.013	0.001	$520	$907
Burma	0.254	55.7	0.4	$1,700	$159	0.062	0.002	$2,027	$4,159
Afghanistan	0.221	31.8	0.1	$1,100	$85	0.042	0.001	$1,312	$2,789

Under Scenario 1, the population of the USA would rise almost five-fold, to almost 1.5 billion. A few other migration meccas would see their populations rise much more, with the populations of Qatar and

Luxembourg rising over 100-fold. This reflects their high TFP, but of course it strains credibility that these small territories could physically accommodate high populations. Yet the model incorporates congestion disutilities, which are reflected in the high average human capital of Qatar and Luxembourg under Scenario 1, though it would still fall relative to the status quo. One is forced to imagine a vast, clever population—and their myriad servants—packed into a super-productive hub of soaring skyscrapers. Even though the USA will enjoy reinforced dominance in the world economy, it will suffer a dramatic dilution of its human capital, with the average falling to 40% of its current level, and GDP per capita will be nearly cut in half.

Botswana, Chad, and South Africa under Scenario 1 bear some resemblance to the thriving settler societies of the 19th century. South Africa with 242 million people, Botswana with 212 million, and Chad with 95 million, would still be much less crowded countries than the UK is today. However, water scarcity might make such populations difficult to sustain in these semi-arid countries. East Timor, tropical and mountains, with plenty of coastline, is another story altogether. Scenario 1 seems to project the emergence of dozens of Singapores on the territory of this recently-created state, whose population would rise to a staggering 478 million. This would be a new kind of settler society, but suitable, perhaps, for an urbanizing world with over a billion Indian and Chinese emigrants looking for a home. It is to be hoped that these settler societies would treat the natives better than 19th-century settler societies did. If settlers respected the pre-existing property rights of natives, land-owning inhabitants of Botswana, Chad, South Africa, East Timor, and Swaziland would get very rich. But their countries would be transformed beyond recognition.

While a few places of Europe would thrive under open borders, Scenario 1 foresees the large European countries experiencing a net loss of human capital and in some cases of GDP, as many natives, especially the best and brightest, emigrate, and are replaced by larger numbers of less-skilled foreigners. Western Europe's largest countries, Germany, Italy, the UK, Poland, France, and Spain, would experience an even sharper fall in GDP per capita than the USA, and average human capital would fall to only a fraction of its present level. *Ex post*, most residents of these countries would be immigrants from developing countries. Canada's average human capital under open borders would be similar to contemporary Ecuador and Botswana; Germany's, Britain's and France's, to contemporary Bolivia; and Spain's, Italy's, and Norway's, to Honduras and Morocco. Yet they would not become poor, but rather, middle-income countries, thanks to their high TFP.

There is a recent fashion to talk about "the BRICs," for Brazil, Russia, India, and China, though these countries have little in common except that they are large economies outside the developed world. Under Scenario 1, they would have something else in common: massive depopulation. China, India, and Brazil would lose more than 90% of their current populations, Russia a little over half. Japan, too, would be a massive population loser, which seems odd until you consider how crowded Japan is. While the BRICs would decline dramatically *as polities*, Brazilian, Russian, Indian and Chinese *culture* might become more influential, as emigrants brought those cultures with them all over the world. Emigration would reverse centuries of population growth, reducing India's population, for example, to far below its level in the last years of the British Raj. The current developing world would become the source of most of the world's emigrants.

While it is strange to think of a country being almost completely depopulated, countries like Burma, Afghanistan, and the Democratic Republic of the Congo are so notoriously wretched as to make it readily believable that virtually no one would live there if they had a choice. The exodus from Indonesia, Bangladesh, and the Philippines is a more surprising consequence. The Ghost Nations would see not only plummeting populations, but also sharp declines in average human capital from already low levels. What the numbers seem to suggest is a few half-mad beggars wandering among deserted shantytowns. It is hard to imagine how most of these places could survive as sovereign states at all. Could less than 20,000 people, with less than one-tenth of 1% of the human capital of the average US native, run an independent regime in the Democratic Republic of the Congo?

Countries possess a vague collective sense of their "national interests," and for perhaps no country in the world would the "national interest" be well-served by open borders. Yet the irony is that *the average native of every country in the world would see a rise in his or her labor earnings,* as may be seen in the last two columns of Table 4. It follows, as well, that the natives of every country in the world would collectively benefit. This result surprised me at first, but upon reflection, it should not have, for it is simply the principle of comparative advantage at work. Even without the increases in effective average TFP that come from workers moving to more productive places, open borders give the average native access to extra gains from trade.

Individual income gains would take different forms in different types of countries. In countries of Reinforced Dominance, natives would see their human capital rise in value as it becomes relatively scarcer. Professionals would have more clients, managers more employees, and personal drivers and domestic servants would become more affordable. In the New Settler Societies, vastly outnumbered neighbors would be caught up in a rising tide lifting all boats. In the Corridor Countries, natives would earn more for their human capital, either by emigrating, or else at home, where they would become an elite minority, like the whites in contemporary South Africa. In the Countries of Emigration, the average native would go abroad and earn more there, but even those who stayed behind would see their standards of living rise as emigration reduced pressure on the land and made skills scarcer and pricier. And people unfortunate enough to have been born in what would become the Ghost Nations, would get better lives by leaving them behind.

It remains to describe the effects of open borders on owners of the other two factors of production, capital and land. Landowners under Scenario 1 would have widely divergent experiences. At one extreme, landowners in some New Settler Societies would see their rents rise over 100-fold, or over 850-fold in East Timor. At the other extreme, land in the Ghost Nations would become worthless. In the Countries of Emigration, land would retain only a small fraction of its value. Landowners in some Corridor Countries, such as Germany and Canada, would see their rents rise, while in others, such as Britain, France, and Australia, they would fall. US landowners would see their assets rise by 167%, while those in Sweden, Ireland, Austria, and the Netherlands would enjoy larger gains. As for capitalists, it was part of the definition of equilibrium that the owner of $1 of capital in any given country would earn the same as under the status quo. But during the transition to equilibrium, capitalists' earnings would be higher. Moreover, while the *rate* of return on capital would be the same as before, there would be far *more* capital in the world, and total returns would be correspondingly higher.

In a word, then, the global economic impact of open borders, as forecast by Scenario 1, would be bad for countries but good for people. But as with free trade, there would be winners and losers. An important caveat is that while the *average* native of every country would enjoy gains, the same does not necessarily hold for the *median* native, who, because of the way human capital distributions are skewed, would have less human capital than the average. In the US, for example, the median native might experience a fall in labor income, offset, for homeowners, by a sharp rise in net worth due to higher home values.

SECTION IV. THE GLOBAL IMPACT OF OPEN BORDERS, SCENARIO 2

Scenario 1 will doubtless strike readers unrealistic, but why, exactly? A common objection will be that the model leaves out of account people's attachment to blood, culture, and soil. These attachments could be accommodated to some extent without modifying either the model or the results. Thus, if East Timor, Botswana, and Luxembourg are both to become booming settler societies, we might suppose that Botswana will attract its working classes disproportionately from neighboring African nations, East Timor's settlers will come mainly from India and/or China, and Luxembourg will become disproportionately a mecca for white migration. I also tend to think the strength of this attachment is overestimated because it is encouraged by nationalist propaganda promoted by governments. Tens of millions of immigrants to the USA in the 19th and early 20th centuries assimilated without too much difficulty in a generation or so. In today's era of cultural globalization, the transition would, if anything, be easier. One of the stylized facts about migration, best explained in Paul Collier's *Exodus*, may be called "diaspora dynamics." Most people are reluctant to go to places where almost none of their countrymen live. So migration begins with a few pioneers, then accelerates as a diaspora forms, making it possible, for example, to enjoy the strong economy and political freedom of New York, while still living in a Greek community. I am inclined to think that once one has understood diaspora dynamics and its role in the transition to a new equilibrium, the importance of attachments to culture, blood, and soil for migration patterns has largely been exhausted. At any rate, to incorporate this factor into the model is more than what I will attempt at present. Three other respects in which Scenario 1's realism may be criticized are easier for an economist to understand, and addressing them motivates the changes to the model which form the basis of Scenario 2.

First, Scenario 1 allows the stock of physical capital to expand under open borders, but holds the stock of human capital fixed. While this is partly justified, inasmuch as human capital sometimes consists in moral and cultural habits built up over generations or even centuries, it is unrealistic to suppose that the supply of human capital would not respond *at all* to the opportunities and incentives open borders creates. Under Scenario 1, open borders raised the price of human capital sharply in almost all countries. Rational people would respond with more willingness to learn and study. Lenders should be willing to finance it, and in any case, a rise in the global median raw wage will increase many people's ability to self-finance their education. So for Scenario 2, I assume that **natives of every country will close 20% of the human capital gap with the US**. This should be thought of as the effect of several processes working at once. Some children in Zambia or Bhutan will study harder because they want to emigrate to America or Qatar. Some, after moving from an African village to a Chicago slum, will be made more savvy about technology and the complexity of modern life simply by the influence of their surroundings. Some will take advantage of opportunities to study abroad that visa regimes previously put out of reach. Some will

get better educations in their villages in India or China because adventurous spirits from better-educated countries, no longer impeded by visa regimes, will have settled there and set up schools. Some will come from Congo or Egypt to Paris or Rome, have their minds stimulated by their new environments, and come home with new ideas, a broader perspective, and all manner of useful know-how. As a result of this process, the average native of Niger will be like the average native of Indonesia; the average native of Indonesia, like the average native of Russia; the average native of Russia, like the average native of Portugal; and the average native of Portugal, like the average native of Cyprus. Open borders will educate the world. For the sake of applying the rule even-handedly, a few elite nations, with average human capital higher than the US, will see it fall slightly.

Second, Scenario 1 holds country risk premia fixed, but as it seems likely that open migration borders would facilitate international capital flows, I assume for Scenario 2 that **country risk premia under open borders will fall by 50%**. Two reasons for this are (a) remittances, and (b) institutions. Migrants tend to send money home to relatives, and some of it finances capital formation. They may also return home, bringing savings with them. Migrants, and especially return migrants, will also tend to spread the institutional norms of the countries they have sojourned in. Their influence would reduce expropriation risk. Continuing population flows across borders might also stabilize foreign exchange markets, by increasing fundamental, as opposed to speculative, demand for any given currency in exchange for other currencies.

Third, and perhaps most importantly, congestible public goods probably constitute a large part of what we observe in the data as TFP. To the extent that this is so, immigration should reduce TFP, and emigration should raise TFP. Natural resources, in particular, problematize TFP. A country with oil or diamonds will look richer than its human capital and risk premium would predict, but its diamond or oil resources cannot remain constant on a per capita basis as the population grows. An asset like the rainy, temperate climate of the eastern United States is more extensible across an increased population, and good institutions are arguably the most extensible resource of all. As the US population rose from under 4 million in 1789 to 99 million in 1914, absorbing tens of millions of immigrants in addition to natural increase, its constitutional order of democracy and limited government remained intact. Still, it is plausibly suggested that rich countries could not sustain further large increases in their populations without some institutional degradation. On the other hand, that migrants exert an institutional influence backwards on the countries they come from is well attested by the history of Europe during and since the age of the great migration to the US, and has been shown in more recent studies as well [GET CITATIONS FROM COLLIER]. That there may be congestible public goods was incorporated into the model from the beginning, as congestion disutilities, but perhaps it was insufficiently accounted for.

I therefore implement, in the design of Scenario 2, a process of TFP adjustment aimed at satisfying two principles: (a) no country's TFP, under open borders, should be greater than a weighted average of its status quo TFP and the TFPs, under open borders, of the countries its immigrants come from, and (b) no country's TFP, under open borders, should be less than a weighted average of its status quo TFP and the TFPs, under open borders, of the countries its immigrants go to. Rule (a) applies to countries of net immigration, and the TFPs are weighted by population, but with natives given five times the weight of immigrants, to reflect their inherent advantages, as founders of the community, in determining its character and institutions, and with immigrants assumed to come from all countries of emigration in proportion to their share of global emigration. Rule (b) applies to countries of net emigration, and the

TFPs are again weighted by population, this time with continuing residents given five times the weight of emigrants, and emigrants assumed to be distributed among countries of immigration in proportion to the shares of global immigration they receive. I seek to realize the two principles by an iterative process, in which each iteration consists of solving for equilibrium, calculating "maximum allowable TFP" and "minimum allowable TFP" for all countries, and reducing or increasing TFPs that are anomalously high or low by 20% of the gap between the incumbent value of TFP and its allowable level. After six iterations, the two criteria, which are to some extent moving targets, are not perfectly satisfied, but anomalous TFPs have been tamed to an important extent. The results of the process are best understood by looking at how selected countries' average TFPs change under the impact of immigration and emigration.

Table 5: Population changes and TFP adjustment

Country	TFP, status quo (New York=1)	TFP, Scenario 2	Population, status quo	Population, Scenario 2	Population growth
Population gainers					
United States of America	0.584	0.534	318,892,081	1,078,097,690	238%
Germany	0.521	0.482	80,996,687	311,431,511	284%
Italy	0.521	0.483	61,680,119	232,223,890	276%
South Africa	0.537	0.486	48,375,646	219,682,895	354%
Russia	0.454	0.457	142,470,265	154,337,258	8%
Poland	0.478	0.452	38,346,278	146,925,787	283%
United Kingdom	0.509	0.493	63,742,971	141,578,788	122%
Spain	0.546	0.517	47,737,942	127,032,109	166%
France	0.498	0.488	66,259,011	124,325,268	88%
Canada	0.543	0.505	34,834,842	114,700,982	229%
Malaysia	0.510	0.476	30,073,351	109,882,615	265%
Chad	0.532	0.459	11,412,107	96,641,346	747%
Turkey	0.478	0.478	81,619,389	95,629,481	17%
Switzerland	0.622	0.499	8,061,516	73,320,449	810%
Papua New Guinea	0.478	0.429	6,552,730	63,093,356	863%
Austria	0.609	0.501	8,223,062	62,494,220	660%
Slovakia	0.539	0.469	5,443,583	38,453,354	606%
Population losers					
India	0.298	0.347	1,236,344,631	621,531,075	-50%
China	0.337	0.381	1,355,692,548	598,987,208	-56%
Pakistan	0.353	0.391	196,174,365	90,606,088	-54%
Indonesia	0.284	0.362	253,609,632	80,540,031	-68%
Brazil	0.414	0.445	202,656,784	68,526,989	-66%
Mexico	0.445	0.459	120,286,655	63,685,352	-47%
Nigeria	0.327	0.385	177,155,745	63,072,182	-64%
Ethiopia	0.307	0.342	96,633,453	61,644,394	-36%
Iran	0.426	0.438	80,840,712	56,718,350	-30%
Thailand	0.372	0.387	67,741,398	52,826,238	-22%
Japan	0.507	0.515	127,103,389	51,177,980	-60%
Bangladesh	0.223	0.342	166,280,697	41,231,524	-75%
Democratic Republic of the Congo	0.259	0.455	77,433,741	10,334,950	-87%
Zimbabwe	0.216	0.363	13,771,720	2,560,203	-81%
Haiti	0.270	0.385	9,996,731	1,893,621	-81%

Libya	0.224	0.384	6,244,174	909,917	-85%
Kuwait	0.405	0.466	2,742,711	297,622	-89%

As Table 5 shows, Scenario 2 has the average TFP of major population gainers falling substantially, while average TFP rises in population losers. The USA, Germany, Italy, Canada, Poland, South Africa and Malaysia all see their average TFP fall by 6-10% as their populations rise by more than 200%. The UK and France experience smaller TFP drops as their populations roughly double. A few countries that experience enormous population growth—Switzerland, Austria, Slovakia, and Papua New Guinea are the ones shown in Table 5—see average TFP drop by 10-15% or more. Interestingly, Russia and Turkey see TFP rise, because they are population losers in the early stage of the TFP adjustment process, even though they ultimately gain population slightly under Scenario 2. The best interpretation of this seems to be that Russia and Turkey would experience some emigration, and their institutions would improve under the influence of emigrants, even as they also attract enough immigrants to see their total populations rise.

At the other end of the spectrum, the largest increases in TFP are experienced by what are at present some of the world's most desperate and dysfunctional countries. The Democratic Republic of the Congo sees almost 90% of its population emigrate, but the influence of this large diaspora on its culture, institutions, and trade links, as well as the rise in the per capita value of natural resources caused by emigration, raises its TFP from 26% to 46% of the level of contemporary New York. Libya experiences over 80% emigration and an increase in TFP of over 70%, and Zimbabwe, Haiti, and Bangladesh also experience large TFP increases. Largest developing countries like India, China, Indonesia, Pakistan, and Nigeria all see substantial, though smaller, TFP gains and emigration of roughly half to two-thirds of their populations. Brazil and Mexico see smaller TFP gains but similar population drops.

The biggest effect of these modifications of the model is to reduce total migration, which, under Scenario 2, is 3.14 billion, a large number to be sure, but much less than under Scenario 1. About 44% of the human race would migrate to another country under Scenario 2. Lifetime international mobility under Scenario 2 looks fairly similar to current lifetime mobility among US states. In most US states, about 30% to 70% of the residents were born there. A rate of international migration comparable to the rate of interstate migration in the US might be judged implausibly high, since US states are much more culturally and institutionally similar to one another than the world's countries are, making domestic migration easier than international migration, quite apart from any laws and policies. Against this, however, economic opportunity differs much more across the world's countries than it does across US states, so economic incentives to migrate internationally would tend to be stronger than the incentives for domestic migration.

In some respects, what is striking about Scenario 2 is how little it differs from Scenario 1. Total capital and GDP rise somewhat less under Scenario 2 than under Scenario 1. The global capital stock rises from $338 trillion to $636 trillion, an 88% increase. World GDP rises from $85 trillion to $144 trillion, a 69% increase. That world GDP and the global capital stock rise by less under Scenario 2 than under Scenario1 may be surprising, considering that *both* of the other modifications of the model tend to increase capital and GDP. The reduction of risk premia encourages the accumulation of capital. The partial closing of human capital gaps increases world GDP directly, and also encourages the accumulation of (complementary) physical capital. And downward TFP adjustments at the high end are offset by upward TFP adjustments at the low end. Under Scenario 1, so much of the world population concentrates in the most productive places that the fate of today's poor countries hardly matters for aggregate figures. Under

Scenario 2, gains in global income are reduced slightly because of the reduction of high-end TFP, even though all other factors favor more global growth. But the differences are minor, and what is really notable is that world GDP growth almost as large as in Scenario 1 can be achieved with substantially less migration.

The distribution of income evolves differently under Scenario 2 than under Scenario 1. Mainly because the global stock of human capital rises by 50%, unskilled workers fare much better. The living standard afforded by the wages of raw labor would converge to 44% of the current US level. Most developed countries would still see unskilled workers' wages fall sharply, but eighty-six countries, home to 5.7 billion people under the status quo, would see the living standards of unskilled workers rise under Scenario 2, relative to the status quo. Human capital premiums, by contrast, rise less sharply. If the human capital of the average American is one unit, the median unit of human capital under the status quo would earn $34,666 under the status quo, rising to $41,336 under Scenario 2, a 19% rise. The human capital premium would rise in 141 countries, home to 6.6 billion under the status quo. Countries where the human capital premium would *fall* under Scenario 2 include South Africa and several other African countries where human capital is relatively scarce, as well as the United States, Singapore, Hong Kong, Qatar, Switzerland, Luxembourg, and Austria.

Under Scenario 2, open borders would accelerate urbanization, but substantially less than under Scenario 2. The size of the settlement in which the median human being lives would rise by one order of magnitude rather than two, from just under 5,000 to just over 42,000. The number of cities over 1 million people would rise from 400 to 523, and their total population, from 1.34 billion to 1.74 billion. Instead of Tokyo with 37 million, the world's largest city would be New York, with 66 million.

A new typology is useful for thinking about different country experiences under Scenario 2. **New Settler Societies**, like 19th-century settler societies, experience strong population growth (>50%), and also see average human capital increase. **Host Nations** experience strong population growth (>50%), but see average human capital fall. A more educated population plays host to less educated immigrants. **Corridor Countries** experience both emigration and immigration, resulting in less total human capital, even as the population grows. However, this category turns out to be rather unimportant. **Upgrader** countries' populations remain relatively stable (between -40% and +50% growth), but see both average and total human capital increase. **Maintainers** are a middle category, where the population is relatively stable (between -40% and +50% growth), and total human capital changes by less than the population does. **Decliners** see both population and average human capital fall. Finally, **Rescue** countries are rescued by global freedom of migration, in the sense that they experience substantial (at least 40%) drops in population, yet their interactions with the rest of the world through migration lead to an overall rise in average human capital. This typology is summarized in Table 6, with the more important classifications shown in boldface.

Table 6

| | Total human capital rises | | Total human capital falls | |
	Average human capital rises	Average human capital falls	Average human capital rises	Average human capital falls
Population rises by 50% or more	*New Settler Societies*	*Host Nations*		*Corridor Countries*

Population grows, but by less than 50%	*Upgraders*	*Maintainers*		*Corridor Countries*
Population shrinks, but by less than 40%	*Upgraders*		*Maintainers*	**Decliners**
Population shrinks by more than 40%	***Rescue***		***Rescue***	**Decliners**

In Table 7, this typology is used to summarize the experience of all the world's countries. Almost all the countries of the West become "host nations" in Scenario 2, with the striking exception of the USA, which is the largest of the "new settler societies." The scarcity of "corridor countries" reflects the worldwide rise in human capital, which makes it rare for a country to see its total human capital fall if it is attracting immigrants, a striking contrast to Scenario 1, where this category was large. Yet "upgraders," with relatively stable populations but rising average human capital, are also rare, and the large number of "decliners" shows that what is sometimes called "brain drain" would still be likely to occur under open borders, even if the global human capital stock rises. More than half the world's population, however, lives in "rescue" countries, which, under open borders (Scenario 2), would see major emigration, but not (net) brain drain. The average resident in the much-reduced populations of these countries would have more human capital than under the status quo.

Table 7

Country classification, and which countries fall into each classification	Population (millions)	
	Status quo	Scenario 2
New settler societies USA, South Africa, Chad, Taiwan, Papua New Guinea, East Timor, Botswana, Swaziland, Ecuador, Namibia, Lebanon, Bhutan, Guyana, Gabon, Equatorial Guinea, Panama, Solomon Islands, Lesotho, Suriname	448	1,777
Host nations Germany, Italy, Poland, UK, Spain, France, Canada, Malaysia, Netherlands, Switzerland, Austria, Sweden, Romania, Australia, Czech Republic, Belgium, Slovakia, Ireland, Trinidad and Tobago, Portugal, Hungary, Finland, Tunisia, Qatar, Oman, Denmark, Norway, Turkmenistan, Slovenia, Lithuania, Belarus, Croatia, Mauritius, Greece, Serbia, Albania, Israel, Bulgaria, Bosnia and Herzegovina, Bahrain, Luxembourg, Puerto Rico, Cyprus, Jamaica, Latvia, Macedonia, Macao, Estonia, Montenegro	678	2,406
Corridor countries Kazakhstan, Sri Lanka, Kosovo	42	73
Upgraders Turkey, Dominican Republic, Eritrea, El Salvador, The Gambia, Western Sahara	107	127
Maintainers Russia, Ethiopia, South Korea, Saudi Arabia, Morocco, Guatemala, Mozambique, Burkina Faso, Niger, Honduras, New Zealand, Singapore, Sierra Leone, Costa Rica, Uruguay, Guinea-Bissau, Cape Verde	458	435
Decliners Indonesia, Brazil, Iran, Thailand, Japan, Vietnam, Egypt, Philippines, Uganda, Venezuela, Ukraine, Argentina, Kenya, Nepal, Uzbekistan, Algeria, South Sudan, Peru, Cambodia, Chile, Madagascar, Laos, Nicaragua, Syria, Rwanda, North Korea, Bolivia, Azerbaijan, Burundi, Zambia, Tajikistan, Cuba, Hong Kong, Paraguay, UAE, Zimbabwe, Jordan, Kyrgyzstan, Georgia, Moldova, Mongolia, Armenia, West Bank, Libya, Gaza Strip, Comoros, Fiji Islands, Kuwait	1,622	671

Rescue India, China, Pakistan, Mexico, Nigeria, Bangladesh, Colombia, Tanzania, Burma, Sudan, Yemen, Ghana, Cameroon, Democratic Republic of the Congo, Malawi, Iraq, Afghanistan, Mali, Cote d'Ivoire, Angola, Benin, Senegal, Guinea, Somalia, Mauritania, Central African Republic, Haiti, Congo, Togo, Liberia, Djibouti	3,813	1,680

One of the most surprising results of Scenario 2 is that average human capital in the USA *increases* under open borders, by just over 4%. This is not because US natives' human capital increases: it does not. Rather, the USA is a powerful magnet for human capital from all over the world. Immigrants attracted to the USA under Scenario 2 are not only numerous—over 700 million—but also disproportionately talented. From 15.7% under the status quo, the USA's share of global human capital would rise to 36.6% of a larger total. There would be an enormous building boom, increasing the USA's capital stock more than three-fold, and total GDP would also rise more than three-fold.

Other new settler societies would see even larger proportional growth in population than the USA, but, when it was done, would still be home to only about one-tenth of the human race. East Timor's population would increase more than 35-fold, rising to almost 43 million, but this is less than one-tenth of what its population would be under Scenario 1. Botswana's population would rise almost 17-fold, to 36 million, less than contemporary South Africa. With South Africa's population rising to 220 million, and Swaziland's to 35 million, temperate southern Africa would see its importance in the world increase, especially since average human capital in these countries would more than double. Chad's population would rise more than eight-fold, and its GDP almost 40-fold. Bhutan would be home to 12 million people. But while the emergence of new settler societies (other than the USA) remains a striking feature of an open borders future, Scenario 2's modified assumptions tame it, so that these surprising migrant meccas have limited impact on the world economy as a whole.

Aside from the USA, and also New Zealand, all Western nations would see immigration increase their populations by at least 50%, while lowering average human capital. This is a familiar scenario, in which a more skilled and educated citizenry plays host to a population of less-skilled migrants, except that it would occur on a far larger scale than the contemporary world is accustomed to. Germany's population would rise to 311 million, Italy's to 232 million, Poland's to 147 million, the UK's to 142 million, Spain's to 127 million, and France's to 124 million. Population growth would be particularly dramatic in Sweden (a 6-fold increase), Ireland (more than 6-fold), Slovakia (7-fold), Austria (more than 7-fold), and Switzerland (9-fold). Some non-Western countries would also function as host nations, including Belarus, most of the former Yugoslav countries, Albania, Mauritius, Macao, Jamaica, Qatar, Tunisia, and Oman would also function as host nations.

Under the new equilibrium that arises under open borders, the new settler societies and the host nations, together, would be home to a majority of mankind, their populations having risen from 1.1 billion to 4.2 billion people, and would produce almost four-fifths of global GDP. Most of these immigrants would come from the "decliners" and the "rescue" countries, home to 5.4 billion people under the status quo but only 2.3 billion under open borders. The last category is perhaps the most interesting, because it illustrates the benefits of open borders so nicely. It includes the world's two great giants, India and China, other very large developing countries like Pakistan, Bangladesh, and Nigeria, and most of the world's worst-off countries, such as the DRC, Iraq, Afghanistan, Somalia, Burma, and Sudan. Together, these countries are

home to 3.8 billion people, more than half the world's population, under the status quo. Under Scenario 2, more than half of these people would emigrate, but there would be no Ghost Nations. Massive emigration would not only improve the lot of the emigrants themselves, but transform the countries they came from, raising productivity, spreading human capital, and providing capital investment. All of the rescue countries would see GDP per capita rise substantially, generally more than doubling in the poorest countries.

Important countries in the "decliner" category, such as Indonesia, Brazil, Vietnam, Egypt, the Philippines, Uganda, Argentina, Kenya, South Sudan, Peru, Nicaragua, North Korea, Syria and Zimbabwe would actually see GDP per capita rise. Disproportionate emigration of skilled workers would more than offset increases in the human capital of natives of these countries, causing average human capital to fall, but higher productivity and lower costs of investment capital would cause GDP per capita to rise anyway. These countries look somewhat like the "rescue" countries, experiencing a major exodus of people but kept afloat by falling risk premiums and rising TFP. Others would see GDP per capita fall, usually slightly, but steeply in post-Soviet countries like Georgia, Armenia, Azerbaijan, Moldova, and Tajikistan, as well as Chile, the UAE, and the Palestinian territories of Gaza and the West Bank. These countries tend to be places where human capital is relatively high compared to TFP, so that the primary effect of open borders is to disperse it to more productive places.

"Maintainer" countries experience relatively small changes in population and human capital under Scenario 2, suggesting that open borders might not affect them that much. A small increase in both population and total human capital in Russia, for example, might be interpreted as a combination of disproportionately educated emigration to the West, with a larger influx of somewhat less skilled immigrants from Central Asia, similar, in fact, what is already happening in Russia today, only on a larger scale. The most unchanged country under Scenario 2 is Singapore, which would see virtually no change in its population or average human capital, and only a slight drop in its GDP per capita. Ethiopia and South Korea would see more change—in Ethiopia, a 36% population drop and a significant rise in average human capital; in South Korea, a 24% increase in population and a significant drop in average human capital—but much less than in other types of countries.

Global changes may also be summarized with the help of more recognizable regional categories, as shown in Table 8. Developing countries are sorted into regions according to the World Bank's regional classifications, while developed countries are mostly classified as "the West," with some obvious exceptions. Japan, South Korea, Taiwan, Singapore, Hong Kong, and Macao are assigned to East Asia and the Pacific. Israel, Oman, and Qatar are assigned to the Middle East and North Africa. All EU countries are included in "the West" except the most recent additions, Romania and Bulgaria.

Table 8

Region	Population (millions)		GDP (billions)		GDP per capita		Share of world human capital	
	Status quo	Scenario 2	Status quo	Scenario 2	Status quo	Scenario 2	Status quo	Scenario 2
The West	872	3,008	$35,538	$95,621	$40,767	$31,790	38.0%	66.4%
East Asia	2,236	1,276	$24,744	$18,634	$11,066	$14,599	31.2%	12.9%
Eastern Europe & Central Asia	417	529	$5,229	$6,857	$12,546	$12,971	6.6%	4.8%

Latin America/Caribbean	609	387	$7,487	$4,925	$12,294	$12,730	9.0%	3.4%
MENA	403	315	$3,720	$3,943	$9,238	$12,536	5.2%	2.7%
South Asia	1,684	822	$6,101	$5,501	$3,622	$6,694	7.6%	3.8%
Sub-Saharan Africa	948	832	$2,131	$8,422	$2,248	$10,122	2.3%	5.9%

Table 8 tends to understate global migration under Scenario 2, since intra-regional migration is not visible. This is most misleading in the case of sub-Saharan Africa, where net emigration of just over 100 million masks enormous *im*migration to new settler societies like South Africa, Botswana, Swaziland and Chad, partially offsetting enormous *e*migration from most of the other countries on the continent. In the Middle East and North Africa, too, Qatar and Oman absorb tens of millions of immigrants, while tens of millions emigrate from Egypt. In the Eastern Europe & Central Asia region, populations would shift substantially from east to west within the region.

Still, Table 8 makes clear the main way that open borders alters human geography under Scenario 2, namely, it vastly increases the population of the West, which absorbs billions of immigrants, mainly from East and South Asia, but with 200 million or so from Latin America as well, and a few tens of millions from the Middle East and North Africa. Open borders would bring about a kind of ironic encore of colonialism. Whereas Westerners in the Victorian era claimed to be spreading the benefits of civilization by subjecting much of the world to Western rule, under open borders, much of the world would voluntarily subject itself to Western rule by emigrating to the West. Western countries would become home to almost half of mankind, and almost two-thirds of global human capital. These immigrants would fuel enormous economic growth in the West, raising its GDP by 167%, and two-thirds of the world's GDP would be generated in the West. East Asia, the major civilizational alternative to the West, would see its population and GDP decline, as brain drain sent most of its human capital elsewhere. Latin America, the Middle East and North Africa, and South Asia would also see their share of the global human capital stock fall by (almost) 50% or more. Even the rise of sub-Saharan Africa would in a sense reinforce Western dominance, since South Africa is a kind of Western offshoot.

In many countries, open borders would exacerbate inequality, driving up the return to human capital even as the wage of unskilled labor falls. Yet globally, the impact of open borders would be impressively egalitarian. This is visible to some extent in Table 8, which shows GDP per capita in the West falling 22%, from $40,767 to $31,790, even as it rises substantially in every other region. But national averages and regional aggregates are a poor guide to the impact of open borders on *individuals*, since the distribution of individuals among regions changes so much. It is more instructive to look at the impact of open borders on the average native of each country, as is done for selected countries in Table 9.

Table 9

Country	TFP (New York=1)		Population (millions)		Average labor income		
	Status quo	Scena-rio 2	Status quo	Scena-rio 2	Status quo	Scenario 2	Change
Democratic Republic of the Congo	0.259	0.455	77	10	$520	$9,882	1801%
Ethiopia	0.307	0.342	97	62	$1,550	$10,055	549%

Burma	0.257	0.348	56	17	$2,027	$11,303	458%
Tanzania	0.291	0.352	50	21	$2,027	$10,865	436%
Kenya	0.256	0.340	45	16	$2,139	$11,408	433%
Bangladesh	0.223	0.342	166	41	$2,509	$12,640	404%
Nigeria	0.327	0.385	177	63	$2,823	$11,874	321%
Pakistan	0.353	0.391	196	91	$3,690	$12,645	243%
Vietnam	0.294	0.352	93	40	$4,641	$14,220	206%
India	0.298	0.347	1,236	622	$4,741	$13,680	189%
Philippines	0.282	0.363	108	33	$5,580	$15,726	182%
Indonesia	0.284	0.362	254	81	$6,132	$16,451	168%
Egypt	0.356	0.400	87	35	$7,789	$17,187	121%
China	0.337	0.381	1,356	599	$11,671	$20,301	74%
Thailand	0.372	0.387	68	53	$11,633	$19,595	68%
Colombia	0.433	0.448	46	26	$12,860	$20,537	60%
Iran	0.426	0.438	81	57	$13,907	$21,947	58%
Brazil	0.414	0.445	203	69	$14,279	$22,371	57%
South Africa	0.537	0.486	48	220	$13,664	$20,408	49%
Turkey	0.478	0.478	82	96	$18,209	$25,349	39%
Mexico	0.445	0.459	120	64	$18,057	$25,111	39%
Russia	0.454	0.457	142	154	$19,354	$26,097	35%
South Korea	0.490	0.489	49	61	$38,786	$44,141	14%
Spain	0.546	0.517	48	127	$35,675	$40,145	13%
Italy	0.521	0.483	62	232	$34,925	$38,958	12%
Japan	0.507	0.515	127	51	$44,116	$47,208	7%
France	0.498	0.488	66	124	$42,252	$44,393	5%
United Kingdom	0.509	0.493	64	142	$43,586	$45,412	4%
Germany	0.521	0.482	81	311	$46,851	$48,034	3%
United States of America	0.584	0.534	319	1,078	$62,702	$56,612	-10%

Unlike under Scenario 1, open borders under Scenario 2 does not cause average labor income to rise in *every* country. The principle of comparative advantage no longer ensures this, because of changes in risk premia and the human capital stock, and especially because of TFP adjustments. Nonetheless, average labor income does rise in *almost* every country. It rises very dramatically for natives of the world's poorest countries, places like the Democratic Republic of the Congo, which see the largest human capital gains, the largest TFP increases, and a massive exodus to richer countries. Natives of the DRC see their incomes rise 19-fold under open borders. Natives of India see their labor incomes almost triple, while natives of China see their labor incomes rise 74%. Natives of Turkey, Mexico, and Russia see substantial rises in income, too. As we move up the development ladder to South Korea, Spain, Italy, Japan, France, the UK and Germany, income increases are smaller, but even the average German would see his or her labor income rise, because a significant fall in TFP would be more than offset by the gains from trade this relatively skilled individual would enjoy with less-skilled immigrants. Of course, the previously mentioned caveat about average versus median workers applies here as well. While the average German earns a little more, the median worker may earn a little less.

But when it comes to the USA, even the average worker sees his or her income fall by 10%. Since both the raw wage and the human capital premium fall in the USA, *all* Americans would see their labor incomes fall. In reality, this result may depend on too simplistic a view of human capital, for even an American with no specialized training relevant to any paying job has certain cultural and linguistic abilities that foreigners would be hard put to acquire. This might allow Americans to do better than the

model predicts. Still, the irony remains, that while open borders, under Scenario 2, would vastly reinforce the global dominance of the USA as a polity, it would be a setback for many US natives. Natives of Canada, Belgium, Sweden, Austria, Switzerland, Hong Kong, Singapore, Finland, Ireland, Qatar, Macao, and Luxembourg (in descending order of population) would also see their average labor incomes fall, in some cases slightly but in others substantially, under open borders.

Americans would see their labor incomes fall, but US homeowners would see the value of their real estate rise sharply. Total rents in the US would rise by the same proportion as US GDP, namely 214%, and housing prices could be expected to rise in roughly the same proportion. Also, open borders would lead to an enormous expansion in the tax base. The money wages of raw labor in the USA would fall only slightly, from $2.62 trillion under the status quo to $2.42 trillion under Scenario 2. The $200 billion needed to compensate US natives for this loss of wages would be a small expense in an economy annually generating almost $53 trillion of GDP. This $200 billion would fail to compensate natives for congestion disutilities and a higher cost of living, but the figure that would, $2.8 trillion, is still affordable relative to a US economy enormously expanded by immigration. A social safety net only for native-born Americans, or perhaps for natives plus a minority of immigrants who had undergone a lengthy and expensive naturalization process, might be politically unsustainable if open borders meant open voting, but why should it? To suggest that it is morally permissible to exclude foreigners by force from both residency and the vote, but morally impermissible to exclude them from voting but permit them residency, would be an exercise in self-parody. Still, if Scenario 2 need not describe an unpleasant fate for US natives, it would be an ironic one. US living standards might be preserved, but at the cost of Americans becoming a landed aristocracy and/or dependent on the government.

To a lesser extent, the same logic applies elsewhere in the developed world. Unlike Americans, most Western workers would see returns to their human capital rise, which for the average worker, though not necessarily the median, would more than offset the fall in living standards afforded by the wage of raw labor alone, even before any windfall gains to owners of real estate, or increased government assistance, are taken into account. Moreover, unlike under Scenario 1, all the nations of the West would see large increases in national GDP under Scenario 2, generally far in excess of what would be needed to compensate natives for any lost labor income, though of course tax-and-transfer schemes tend to create deadweight losses. All landowners in the West, moreover, would see their assets rise in value, usually by 50% or more. So many to most Westerners would gain merely from the free market consequences of open borders, and policymakers could, in principle, use the expanding tax base to make all Western natives benefit. But without such policy interventions, open borders would redistribute income among Westerners in important and perhaps unwelcome ways, enriching landowners, yielding higher returns for capitalists in the short run, and in most cases raising the salaries of skilled and educated people, while the West's most vulnerable class, unskilled workers with no assets, would see their incomes fall sharply in the face of steep competition from immigrants.

But if the redistributive consequences of open borders within the West look unappealing, the redistributive consequences at the global level look very, very desirable, at least for anyone whose ethical horizons do not stop at the water's edge, but extend to all mankind. For the vast majority of mankind not lucky enough to be born in the West, open borders would yield huge income gains, both directly, as billions of the world's poor went to places where they could earn more, and indirectly, through rising investment in human capital, facilitation of international investment flows, and the spread of good ideas

by sojourners who encounter better institutions and techniques and bring them home. At the same time, open borders would increase the global dominance of the West vis-à-vis other civilizations.

CONCLUSION

Far from being overly optimistic, the description in Scenario 2 of a world of open borders, in my view, *under*states the benefits in certain respects. Most importantly, it seems almost certain that open borders would accelerate the progress of technology. Economic historians have lately begun to recognize the enormous importance of the Second Industrial Revolution, which coincided, not accidentally, with the great age of open borders. Alexander J. Field has shown that US productivity growth peaked in the 1920s and 1930s, but the technologies whose absorption and application drove that growth—electricity and mass production of the automobile were the most important—were born in the Second Industrial Revolution and the age of open borders. Now as then, immigrants are disproportionately entrepreneurial and inventive. When people move, they circulate ideas, and ideas interact to inspire new ideas. Open borders would accelerate urbanization, and cities generate more ideas. Open borders would accelerate the growth of human capital, and skilled and educated people generate more ideas. A New York of 66 million people, drawn from all the world and more educated, on average, even than today's New Yorkers, could not but be a blazing hub of ideation. Meanwhile, open borders would grow the world economy, making bigger markets for new products. Open borders would double the global capital supply, and new capital goods tend to embody new ideas and improvements in design.

Perhaps almost as importantly, open borders would give rise to global Tiebout competition, as different jurisdictions would compete with each other to offer attractive combinations of local taxes and public goods. This is especially important at a time of more than usual uncertainty about how the regulatory environment should adapt to new technologies. How should cities be built, how should taxis and food service and land use and intellectual property be regulated, in an age when smartphones enable unprecedented sharing, and driverless cars and drones are poised to revolutionize transport? The USA played an enormous role in bringing the Second Industrial Revolution to its fullest development in large part because it had the advantage of being a settler society. Whereas the legacy cities of Europe had to remain, so to speak, backwards-compatible with the walking- and riding-based medieval and early modern worlds for which their chief cities had been built, new US cities in the Midwest and the West were built from the beginning for an age of trains and automobiles. Thanks partly to the advantage of starting from nothing, though of course the world wars were important too, the USA by 1945 was decades ahead of Europe, while Europe, in turn, had the advantage of seeing the future play out in America, and picking and choosing what elements of that future to embrace, and to avoid. We might see the same pattern with new settler societies in East Timor, Botswana, South Africa, or Chad. Societies undergoing vast population growth, and building new cities from the ground up, would plan for the future, thinking through the best ways to make a 21st-century city, and trying them out. More established societies, with legacy infrastructure and law to deal with, would watch these futuristic cities develop, and decide which of their features to embrace, and which to avoid.

There is another reason why a projection of this kind must tend to underestimate the benefits of open borders, which is the same as the reason why official figures tend to overestimate inflation, namely, that any monetization of human welfare has difficulty coping with *new* goods, services, opportunities, etc. As

long as the set of goods available, and their relative prices, remains the same, an increased income simply buys "more," meaning more of everything, perhaps, or maybe more of some things (normal goods) and less of others (inferior goods), but at any rate, consumption bundles now available that were previously beyond the consumer's means. If a person's income doubles, *ceteris paribus*, it is even for some purposes an innocuous mathematical convention, though by no means a psychological reality, to say that he is "twice" as well-off as before. If incomes *and* relative prices change, we can be confident that he is better-off only if his new income could still buy his old consumption bundle under the new prices, or that he is worse-off if his old income could have bought his new consumption bundle under the old prices. It may be that neither of these conditions holds, and that his old consumption bundle has become unaffordable for him, yet his new consumption bundle was out of reach before. In that case, we cannot be sure whether he is better off. Technological change routinely offers people new goods, or new qualities and features in goods, that no one could previously have bought for any money. This is a problem for measuring inflation, because "revealed preference" sheds light only on the *marginal* utility consumers get from these goods, whereas the *total* utility has been added to consumers' living standards. It may be that people in the 1990s would have paid $40,000 for today's smartphones, had they been available. If so, ubiquitous smartphones represent a far greater enrichment than GDP data suggest. But now that smartphones are available for a few hundred dollars, there is no way to make people reveal these preferences.

Open borders, like technological change, would vastly increase people's opportunities, yielding benefits which money cannot properly measure, because they are not on offer *at all* today, so markets do not, at present, reveal people's willingness to pay for them. How much income would some Americans sacrifice to live, all their lives or for a few years of youth, in cultural meccas like Paris and Rome? What incomes would some Palestinians be willing to live on, for the chance to exchange the scorching desert of Gaza for the green forests of the US East Coast? Under the status quo, we simply do not know. For the most part, Americans are *not allowed* to make their livings in Paris or Rome, nor Palestinians to settle in New York or Virginia. Open borders would greatly increase people's scope for exploration and adventure, to find the place ideally suited to their notions of beauty, to live out their dreams. Expanding people's *options* in this way would have a value that is not, and cannot be, captured in estimates of dollar income, but is certainly positive, and perhaps very large.

Against this, I should probably caution readers not to be lulled into complacency by the easy and effortless sound of the word "equilibrium." Like economic equilibria generally, those described in my open borders scenarios would arise out of people's efforts. The transition would have its pleasant sides, such as a few decades of elevated returns on investment capital (pleasant for lenders at least), but also its wrenching aspects. While it would be wrong to hold the human race hostage to the interests of a small, privileged set known as the Western working class, that open borders would cause, at least according to this analysis, a painful downward jolt in their living standards, is a troubling consequence that must be taken into account. The world's poor would reap large gains, but for many, these would come at the cost of long migrations, difficult adjustments to new cultures, and hard work in school and on the job. Early, pioneer migrants would see their wages undercut by later waves of migrants. The transition to a post-white West might be psychologically difficult for white Westerners who, though they have superficially disavowed racism, are still accustomed to being in the racial majority in their home countries. But while the transition would involve hard work, it would lead to a much better world.