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Dustin Sump

Date

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# China's Incomplete Property Rights and Their Effects

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Dustin Sump

Department of Economics  
Rhodes College  
Memphis, Tennessee

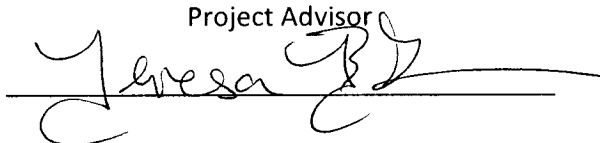
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Submitted in partial fulfillment of the requirements for the Bachelor of Arts degree with  
Honors in Economics

This Honors Paper by Dustin Sump has been read and approved for honors in Economics.

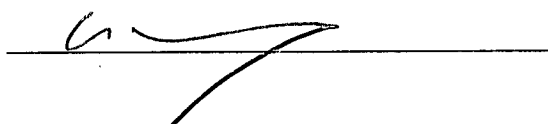
Dr. Theresa Beckham Gramm

Project Advisor

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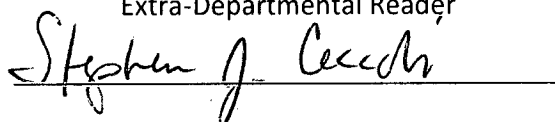
Dr. Nicholas McKinney

Second Reader

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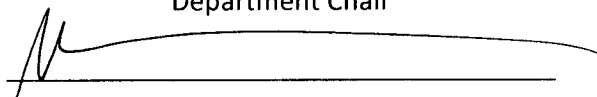
Dr. Stephen Ceccoli

Extra-Departmental Reader

A handwritten signature in cursive script, reading "Stephen J. Ceccoli", written over a horizontal line.

Dr. Marshall Gramm

Department Chair

A handwritten signature in cursive script, reading "Marshall Gramm", written over a horizontal line.

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## ABSTRACT

## China's Incomplete Property Rights and their Effects

By

Dustin Sump

Over the last thirty years mainland China has experienced world transforming growth and lifted hundreds of millions out of poverty. Originally most of the growth occurred in rural areas as farmers were given control over the management of their plots. Overall inequality throughout China decreased as rural incomes rose due to higher agricultural outputs. However by the mid-nineteen eighties the government shifted its reform focus towards the urban areas, particularly the coastal port cities. Rural reform slowed considerably and the central government issued stopgap measures to keep rural land usage contracts from expiring without introducing any significant market reforms. The Chinese government's refusal to secure rural property rights has a role in reducing agricultural production growth due to less financing and investment. This could also have a long run effect of reducing rural to urban migration, which slows urban-rural inequality predicted reductions. Using international panel data I measure the importance of property rights and institutions on agricultural productivity. I also attempt see how increased agricultural productivity affects migration and the urban rural wage gap.

There is much literature that suggests clearly defined and well-protected property rights are a needed component for an efficient, growing market economy. However, in rural China since 1978, “fuzzy” property rights have been the norm with the state legally owning all rural land, while perpetually leasing land to farmers with various terms and restrictions that have changed slightly over time. Yet despite the weak property rights and the persistent corruption that follows, China’s agricultural sector has grown increasingly productive and allowed hundreds of millions of people to migrate to the cities to labor in what has become the world’s workshop. By moving to the city, migrants achieve significantly higher wages. In fact, recently the income disparities between the booming Chinese cities and the sleepy countryside have become a serious concern. This paper studies how China’s peculiar land institutions and general apprehension towards rural reform among the governing elite have hindered rural residents’ potential migration to the cities, which slows the closing of the urban-rural income gap. However, such reforms remove a source of power from the ruling elite. Local government and party leaders lose income, power and prestige if the land they now own and lease out were privatized in an effective manner. These political interests are the main obstacle for the policy prescriptions recommended by this paper. The paper does not attempt to address how to remove the political barriers to economic and legal reform, but it acknowledges that they exist.

#### Historical Background:

The amount of arable land available per capita in China is well below the world average. The area of farmable land per person in China is only about one third of the world average or about .10 hectare per household (about .25 acres).<sup>1</sup> Furthermore, almost no land is available to be converted into agricultural use. To the contrary, growing cities and the expanding Gobi

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<sup>1</sup> Peter Ho, *Institutions in Transition: Land Ownership, Property Rights, and Social Conflict in China* (New York: Oxford University Press, 2005), 6, 19.

desert are reducing arable land. According to some Chinese press reports, up to one in five homes purchased in Beijing are officially classified as rural land but have illegally entered the urban lease market. This indicates the prevalence of urban encroachment on agricultural land.<sup>2</sup> Also the government has reported that the various deserts in China have been expanding at a rate of 3,800 square miles a year.<sup>3</sup>

Traditional economic logic would dictate that a relatively land poor and labor rich nation like China should become a net food importer from relatively land rich nations such as the United States and Brazil and instead exploit their comparative advantage in labor intensive goods (which has happened to a large degree over the past two decades). Yet in the agricultural sector the Chinese government insists on self-sufficiency. In 2006 China's government "decreed that 120m hectares must be preserved as arable land to ensure food security," forbidding other perhaps more productive uses of the land.<sup>4</sup> This decree prohibits the transfer of land from agricultural use to urban use without official approval. However, due to the higher value for use of urban land, local officials in rural collectives bordering booming urban centers have a huge monetary incentive to "redistribute" land. Local government bodies called collectives have the authority to redistribute land and essentially have a "*de facto* monopoly on the supply of new land [for] non-agricultural usages."<sup>5</sup> The results of these policies are that numerous opportunities for corruption and rent seeking have been created by keeping land from the

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<sup>2</sup> *The Economist*, "This Land is My Land," February 14, 2008.

<sup>3</sup> Howard W. French, "Billions of Trees Planted, and Nary a Dent in the Desert," *The New York Times*, April 11, 2004.

<sup>4</sup> *The Economist*, "Land Reform in China: Promises, Promises," October 16, 2008.

<sup>5</sup> Klaus Deininger and Songqing Jin, *Securing Property Rights in Transition: Lessons from Implementation of China's Rural Land Contracting Law* (Washington, DC: World Bank, 2008), 7.

market system. Ultimately the corruption and inefficient methods of land allocation serve to worsen China's inequalities as richer, more politically connected urban interests can take land at below market rates.

While food security is the official reason China maintains a rigid government-controlled land distribution system, there are also more deeply rooted reasons for maintaining the status quo. The reasons that China, or perhaps more accurately, the Chinese leadership, retains ill-defined collective ownership of land is partially the result of a painful history of serfdom, the remnants of a Cold War Communist ideology, and the current fear that faster change will bring about social upheaval. China's socialist past and its current goal to be a "socialist market economy" explain part of the reluctance to reform land ownership. State or collective ownership of land is one of the core legacies of the communist revolution in 1949, as before Mao's ascendance, land was concentrated in the hands of landlords who are now remembered only as cruel slave drivers by much of the Chinese population. The fear is that large scale consolidation will occur in rural land if free trade and mortgages are allowed, thereby dividing the countryside into landlords and peasants again. A corollary to this concern is that many of the newly landless farmers will descend on the cities in droves to compete for limited jobs perhaps creating further social unrest.<sup>6</sup> As a result of these fears, the Chinese government has maintained a complex yet vague and incomplete legal system to allocate and administer rural land, often in an inefficient and political manner.

#### Legal Situation:

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<sup>6</sup> "Thirty Years of China's Reforms: The Second Long March," *The Economist*, December 11, 2008.



Legally all land in China is either owned by the central state or by rural collectives as defined by the Chinese Constitution although a 1998 amendment (that took effect in 1999) states "land use can be transacted according to the law."<sup>7</sup> The current law gives the collective or local government the authority to allocate land within some centrally issued guidelines, essentially making the transaction of land a local political decision. Thus, while the price of most labor and capital are now determined by market forces in modern China, rural land is still allocated administratively and politically. In general, the central state owns urban land, forest, grassland, and wasteland, while the vaguely defined "collective" owns rural arable land, unless otherwise specified.<sup>8</sup> Use rights are leased out to private parties, usually a family unit. The collective leases rural use rights for up to thirty years, after which the lessee has a renewal option.<sup>9</sup> With the passage of the 2007 Land Law these plots can now be subleased to third parties, but in practice little subleasing has occurred.<sup>10</sup> Land use rights normally only change with government decree. Because the lease is a meaningless piece of paper rather than a serious contract, government ordered redistribution is quite common in response to demographic change, migration and politically connected developers.<sup>11</sup>

One major flaw with the current land system is that the law is very unclear about what the rural collective actually is and what it actually owns. Prior to the de-collectivization in the

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<sup>7</sup> "First Amendment to the Constitution of The People's Republic of China" (Beijing: <http://english.peopledaily.com.cn/constitution/constitution.html>, December 4, 1982).

<sup>8</sup> Ho, *Institutions in Transition*, 26.

<sup>9</sup> Ho, *Institutions in Transition*, 7.

<sup>10</sup> Wang Zhaoguo, "Explanation on the Draft Property Law of The People's Republic of China," *Fifth Session of the Tenth National People's Congress* (Beijing 2007).

<sup>11</sup> Peter Ho, "Who Owns China's Land? Policies, Property Rights, and Deliberate Institutional Ambiguity." *The China Quarterly*, 2001, 397.

late seventies and early eighties the collective was composed of three levels of diminishing size: the commune, the production brigade, and the production team, with the production team holding ownership of land.<sup>12</sup> By the mid-eighties the commune unit had become the township, the production brigade became the administrative village, and the production team became the natural villages. The de-collectivization reforms did not establish what institution was the new owner of arable land and administer use rights.<sup>13</sup> According to a 1997 survey by China's Central Policy Research Office, 60.5 percent of the land was leased out by the administrative villages and 32.3 percent by the natural village and the rest to other entities.<sup>14</sup> Since 1997 there has been no law clarifying this ambiguity of "collective" ownership. The lack of a comprehensive land registry makes even assigning ownership to the correct government body a difficult and expensive problem.

Another serious result of the lack of real private land is that a functioning mortgage market cannot truly exist because farmers cannot offer their land use leases as collateral to a potential lender. In order for a poor farmers to gain credit they must offer up something that they clearly own. Hernando De Soto, a prominent proponent of legally traceable property rights argues that "to create credit and generate investment, what people [need] are not the physical assets themselves, but their property representations – the recorded titles and share – governed by rules that can be enforced nationwide."<sup>15</sup> The formation of an efficient mortgage market would the increase the supply of loanable funds as farmers could mortgage their land

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<sup>12</sup> Ho, *Institutions in Transition*. 27.

<sup>13</sup> Ho, *Institutions in Transition*. 27.

<sup>14</sup> Ho, *Institutions in Transition*. 31.

<sup>15</sup> Hernando De Soto, *The Mystery of Capital: Why Capitalism Triumphs in the West and Fails Everywhere Else* (New York: Basic Books, 2000), 64.

and reinvest the money into productivity enhancing capital, such as tractors and fertilizer. This in turn would be an essential component to give economic power to farmers and raise the level of agricultural capital investment, thus output and living standards. Well directed investment allows fewer people to complete more work and output, which would raise income in the short run and support increased specialization and innovation in the long run.<sup>16</sup> However, creating the conditions for a mortgage market would also require local governments both to invest in accurately measuring land boundaries and creating a deed system as well as to give up their power to allocate land. This is no small price for local cadres.

China ambiguous land ownership system, the lack of ownership for perpetuity and the inability to mortgage land creates a deficiency of secure property rights which modern economics regards as a crucial institution for economic growth and prosperity. Generally, private property implies that owners are in control of a “bundle of rights” where “the owner is free to exercise the rights over his or her property” and “others are forbidden to interfere with the owner’s exercise of his rights.”<sup>17</sup> In the developed world this institutional framework in conjunction with a well developed real estate and mortgage markets have led to relatively low cost transactions in agricultural land allowing ownership of the land to go to the highest valued user. However, for former communist countries, economists have significant disagreements on *how* to develop private property.

#### Theoretical Literature Review:

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<sup>16</sup> De Soto, 209.

<sup>17</sup> Robert Cooter and Thomas Ulen, *Law and Economics, 4<sup>th</sup> Edition* (New York: Pearson, Addison-Wesley, 2008).

Economists' views on China's incomplete property rights fall into two general categories. First, standard neoclassical theory posits that clear, well-defined and well-enforced property rights that leave little room for corruption or non-market bargaining are essential in providing the correct incentives for investment and development of resources, much like what is currently practiced in the property markets of developed countries. The alternative view is that China's institutions and culture are not yet well adapted enough for true property rights to work efficiently. The lack of well functioning mortgage and credit markets, a socialist political tradition, and a culture that focuses on social harmony would make a faster transition to property rights harmful to agricultural output, as well as economic and political stability. While a consensus view agrees that China is in a dynamic state and will eventually need to develop the institutions to support property rights, the debate centers on how and how fast.

In neoclassical economic theory property rights "encourage production, discourage theft, and reduce the costs of protecting goods."<sup>18</sup> Economist Robert Solow theorized that capital and labor were the two fundamental short run inputs for production and wealth (with technological innovation being a long run input).<sup>19</sup> However, since economic welfare is measured on a per capita basis, Solow's theory posits that capital is the input needed to improve living standard and development level. De Soto also claims that "the more capital that accumulates, more specialization is possible, and the higher a society's productivity [will] be."<sup>20</sup> While there is a point at which capital experiences diminishing returns to a given level of labor,

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<sup>18</sup> Robert Cooter and Thomas Ulen, *Law and Economics*, 4th (New York: Pearson, Addison-Wesley, 2008): 84.

<sup>19</sup> Robert Solow, "A Contribution to the Theory of Economic Growth," *The Journal of Quarterly Economics*, Vol. 70 No.1 (Feb. 1956): 68.

<sup>20</sup> De Soto, 41.

China and the developing world in general have capital levels far below the point of sharply diminishing returns. According to standard neo-classical economic theory, China's farms would benefit from better property rights and the increased investment such rights would spur. The increased productivity would then raise the per capita living standards in both the short and long run. [GRAPH 1: Solow Growth Model]

The empirical evidence bears out the theory that better property rights lead to increased investment which leads to economic growth and development. Until China's long, haphazard, and gradual transition from a socialist state to a market economy, traditional economic theory was generally validated such that economists observed that countries that protected property enjoyed much higher levels of economic development. On the other hand, countries that did not recognize private property or protect it had much lower levels of economic development. Maoist China, prior to the establishment of land use rights, was one of the poorest places on Earth, where all but the political elite lived at subsistence or even starvation levels. Evidence from post communist Eastern Europe has borne out the belief that stronger property rights are correlated with wealth and growth. Mainstream neoclassical economists have found that "country level studies consistently [show] that less secure property rights are correlated with lower aggregate investment and slower economic growth."<sup>21</sup> In Eastern Europe, Johnson, McMillan, and Woodruff found that entrepreneurs who believed their property was most secure reinvested 56 percent of their profits while those that thought their

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<sup>21</sup> Simon Johnson, John McMillan and Christopher Woodruff, "Property Rights and Finance," *The American Economic Review* (2002): 1335.

property rights were the least secure only reinvested 32 percent of profits.<sup>22</sup> Seth Norton found that “well-specified property rights enhance the well-being of the world’s poorest inhabitants” in a cross country analysis of over a hundred countries.<sup>23</sup> Even in China, a World Bank study found that provinces with lease rights more similar to true ownership in terms of transferability had higher levels of investment.<sup>24</sup>

Some studies also show microeconomic evidence from other developing nations that secure property rights are necessary to stimulate agricultural investment in particular. A case-study of two provinces in Ghana displayed evidence that was “quite supportive of the idea that better land rights facilitate investment” particularly in the province where the average land holdings were larger. A similar case-study in three provinces in Thailand found that increased tenure security in the form of a title induced greater investment through better access to credit.<sup>25</sup> These studies further suggest that better land rights improve investment and agricultural productivity to varying degrees depending on the local conditions.

However, there has also been considerable criticism of the transition from publicly owned property to private property rights in several nations. The failure of Russia to effectively privatize its economy in the early 1990’s contrasted with China’s booming economy. After this event many scholars began to more convincingly argue that public to private property system

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<sup>22</sup> Johnson, McMillan and Woodruff, 1354.

<sup>23</sup> Norton, Seth, “Poverty, Property Rights, and Human Well-Being: A Cross-National Study.” *Cato Journal* Vol. 18 No.2 (Fall 2008): 243.

<sup>24</sup> Kenneth Dam, *The Law Growth Nexus: The Rule of Law and Economic Development* (Washington D.C.: Brookings Institution Press, 2006), 145.

<sup>25</sup> Gershon Feder and Tongroj Onchan. “Land Ownership Security and Farm Investment in Thailand.” *American Journal of Agricultural Economics*, Vol. 69, No. 2. (May 1987): 318.

transitions should be treated with greater caution. Many economists and other social scientists rejected the “one-size-fits-all” model in favor of treating each nation separately by taking into account individual national histories and cultures as well as accounting for the importance of institutions, both formal and informal.

Douglass North was one of the first economists to identify the importance of country specific institutions to economic development, which previous neoclassical economic modeling had failed to account for. Building off of Ronald Coase’s “Problem of Social Cost” North noted that prosperous societies tended to have institutions which lowered transaction costs and fostered trade, while societies which lacked these institutions tended to be much poorer. He noted that modern rich nations “devised formal contracts, bonding of participants, guarantees, brand names, elaborate monitoring systems and effective enforcement mechanisms.”<sup>26</sup> All of these abstract concepts are part of the notion of property rights and imply that property rights are an elaborate and complex social structure. The development of such rights is not as simple as an aid agency enforcing certain conditions or a top-down government edict. True property rights require a fundamental social shift that takes a good deal of time and slow evolution. “While the rules may change overnight, individual responses will be much more complex and slow to adapt.”<sup>27</sup> For a society to truly develop property rights a change in the law or the constitution is not sufficient. The Western system of property rights did not develop overnight. Rather Western ideas of property, contract, impartial and apolitical courts, all took form over

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<sup>26</sup> Douglass North, “Institutions, Transaction Costs and Economic Growth,” *Economic Inquiry*, (1987): 421.

<sup>27</sup> North, 422.

several centuries.<sup>28</sup> That traditional neoclassical economic models often assume that simply imposing Western property rights institutions onto other societies will yield economic growth ignores the fact that these institutions were developed over centuries in a society with different underlying cultural values and traditions. In China several economists have developed similar theories emphasizing the role that China's unique history and informal cultural institutions have in shaping the development of a modern property rights system.

One interesting example regarding a China-specific informal cultural institution that has worked well without a Western style independent judicial enforced property right was the concept of *guanxi*. Roughly translated this means "connections" in Chinese. Martin Weitzman and Chenggang Xu argue that the Chinese informal level of social cooperativeness has allowed China to pursue a different privatization path, one they dubbed the "Chinese model" that emphasized a "more gradualist strategy of allowing market oriented enterprises to develop from within the interstices of the economy."<sup>29</sup> *Guanxi* is the Chinese concept for this social cooperativeness which economist Gregory Chow defines as an informal "network of human relationships which sets the rules of behavior among the parties concerned."<sup>30</sup> Weitzman and Xu quantify this informal cooperativeness by the Greek letter *lambda* which may take a value from 0 and 1 to capture the key missing element in traditional property rights theory: "the ability of a group to solve potential conflicts internally, without explicit rules, laws, rights,

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<sup>28</sup> North, 426.

<sup>29</sup> Martin Weitzman and Chenggang Xu, "Chinese Township-Village Enterprises as Vaguely Defined Cooperatives," *Journal of Comparative Economics*, (1994): 122.

<sup>30</sup> Gregory Chow, "Challenges of China's Economic System for Economic Theory," *The American Economic Review*, Vol. 87 No. 4 (1997): 322.



procedures and so forth.”<sup>31</sup> Then using a repeated non-cooperative prisoner’s dilemma model they theorize that high *lambda* societies end up at a cooperative outcome without the need for well defined legal rights. They theorize that Western societies tended to be characterized by low uncooperative informal institutions and tended to have a low *lambda* value. East Asian cultures with Confucian traditions tended to have high *lambda* societies. Their theory argues that Europe and the West needed to evolve a system of courts and government because the overall culture did not emphasize cooperative solutions and personal reputations to the extent that Confucian cultures did.

Weitzman and Xu apply their “Chinese model” to China’s Township-Village Enterprises that arose throughout the eighties as the successor to collective controlled rural industries.<sup>32</sup> The Township-Village Enterprises were technically owned by the collective but managers controlled the use rights and resource allocation decisions. In short, as with rural land today, the Township-Village Enterprises were characterized by “fuzzy” property rights. Weitzman and Xu describe them as a “vaguely defined cooperative” and “ill defined from the capitalist perspective” appearing to “go almost completely against the grain of standard property rights theory.”<sup>33</sup> Furthermore, defying neoclassical assumptions of the importance of property rights, the TVE’s outperformed the private sector during the early nineties throughout rural China despite the lack of well defined property rights.<sup>34</sup>

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<sup>31</sup> Weitzman and Xu, 137.

<sup>32</sup> Weitzman and Xu, 123.

<sup>33</sup> Weitzman and Xu, 123.

<sup>34</sup> Weitzman and Xu, 135.

However, neither Weitzman and Xu's cultural substitute's theory, nor the "Chinese model" attempted to empirically derive the cultural cooperativeness factor and its quantitative effects on economic investment and growth. They treated the *lambda* as a given and did not attempt to measure or test it. It may also be the case that the Confucian sort of social cooperativeness is falling in China as the country becomes more globalized and more exposed to Western values and the competitive market system. The influx of migrants into the cities from rural villages also has reduced the importance of social connections that substituted for formal property rights as well. So while the idea of social cooperativeness or *lambda* may have been a suitable cultural substitute for property rights, as the country becomes more urban and capitalist so that people, including farmers, have more impersonal deals and contracts, personal reputations and social trust are becoming less important relative to formal legal contracts. Historically the TVE's began to decrease in importance in 1996 following national level government attempts to further privatize industry which makes the model somewhat less convincing as an applicable explanation for the success of China's gradualist process today.<sup>35</sup> As China becomes more integrated in the complex global economy, close social networks will tend to become less important as economic actors must deal more with distant partners where there is no existing family or cultural connection.

Along similar lines, some scholars argue that China's institutions and political atmosphere are still unsuited to privatizing land. Peter Ho argues that political redistribution of land is still a popular procedure in China and that the leftist bloc of leaders view collectively owned rural

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<sup>35</sup> Russell Smith, Jiangguo Wang, and Quek Lee Kiang, "Efficiency Performance and Changing Corporate Governance in China's Township-Village Enterprises since the 1990's," *Asian-Pacific Economic Literature*, Vol. 15 No. 1 (May 2001): 37.

property as a central tenet of the official party line of "Socialism with Chinese Characteristics."<sup>36</sup> He argues that the current system in most of China is also politically popular as "the majority of farmers [favor] redistribution in response to changes in family size" according to China's statistics.<sup>37</sup> Peter Ho hypothesizes that property rights in China are still evolving but may be approaching the point at where rights need to be clarified as economic growth accelerates and the market becomes more and more embedded in rural China.

Joseph Stiglitz is one of the strongest and most prominent critics of neoclassical "big bang" privatization. Instead, Stiglitz advocates gradual institutional reform to allow evolution of market institutions and norms. Stiglitz notes that during the decade from 1989 to 1999 former communist countries' growth patterns diverged significantly. "China's GDP nearly doubled [while] Russia's GDP nearly halved."<sup>38</sup> Stiglitz postulates that the reasons for Russia's economic collapse were the IMF and neoclassical economists' misguided advice with "excessive reliance on textbook models of economics."<sup>39</sup> Similar to Ho and North, he believes that "privatization prior to establishing the appropriate institutional infrastructure may not lead to wealth creation."<sup>40</sup>

According to Stiglitz, neoclassical economics requires both competition and private

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<sup>36</sup> Peter Ho, "Who Owns China's Land? Policies, Property Rights, and Deliberate Institutional Ambiguity," *The China Quarterly*, (2001): 397.

<sup>37</sup> Peter Ho, "Who Owns China's Land? Policies, Property Rights, and Deliberate Institutional Ambiguity," *The China Quarterly*, (2001): 397.

<sup>38</sup> Joseph Stiglitz, "Whither Reform? Ten Years of Transition." Annual Bank Conference on Development Economics. 1999. 1.

<sup>39</sup> Joseph Stiglitz, "Whither Reform? Ten Years of Transition." 3.

<sup>40</sup> Joseph Stiglitz and David Ellerman, "Not Poles Apart: 'Whither Reform?' and 'Whence Reform?'," *Journal of Policy Reform*, (2001): 327.

property or “the Siamese twins of efficient wealth creation.”<sup>41</sup> The Russian transition proceeded without the development of a competitive environment and focused on simply turning state assets into private assets. The fundamental problem with the Russian process was that the state enterprises were not privatized in a competitive manner. Rather, as Stiglitz notes, it was rather easy for new Russian politicians to “simply give away state assets” to politically connected friends, political donors, or those who simply bribed them.<sup>42</sup> Thus, within Russia, rapid “big bang” type privatization led to newly privatized assets ending up in the hands of a few politically connected managers, now known as the Russian oligarchs.<sup>43</sup> The new status quo was a system in which the new oligarchy’s interests restricted the development of good institutions and efficient competition by using their ill-begotten wealth to protect their interests and further “undermine the social order, through corruption and regulatory capture.”<sup>44</sup> By 1999, 75 percent of firms in Russia, Kyrgyzstan, Moldova, and the Ukraine were not “confident that the legal system [would] uphold [their] contract and property rights in disputes.”<sup>45</sup> To further decimate the former Soviet economy the oligarchs exploited their wealth and the lack of strong legal institutions to “strip” Russian firms of their assets and safely move the wealth abroad to Western banks.<sup>46</sup> The Russian experience was an enlightening economic experience, definitely proving that private property alone is not sufficient for economic prosperity. Russia shows us

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<sup>41</sup> Joseph Stiglitz, “Whither Reform? Ten Years of Transition.” 5.

<sup>42</sup> Joseph Stiglitz, “Whither Reform? Ten Years of Transition.” 5.

<sup>43</sup> Joseph Stiglitz and David Ellerman, “Not Poles Apart: ‘Whither Reform?’ and ‘Whence Reform?’” 330.

<sup>44</sup> Joseph Stiglitz, “Whither Reform? Ten Years of Transition.” 5.

<sup>45</sup> Karla Hoff and Joseph Stiglitz, “After the Big Bang? Obstacles to the Emergence of Rule of Law in Post-Communist Societies,” *The American Economic Review*, (June 2004): 755.

<sup>46</sup> Joseph Stiglitz, “Whither Reform? Ten Years of Transition.” 6.

that institutions and the privatization processes matter greatly, if not more than simply defined private property rights.

Well-structured privatization according to Stiglitz means “ultimately pushing economic decision-making down to the level where the stakeholders can protect their own interests without presupposing elaborate legal machinery that will take much longer to evolve.”<sup>47</sup> Stiglitz strongly advocates very slow and gradual institutional change over the course of decades. This entails the development of several institutions including well run banks, implicit and explicit property norms, well structured corporate structures, bankruptcy proceedings, and other complex free market institutions which have all developed over several centuries in the West.

Stiglitz’s arguments are a general criticism of rapid privatization of formerly state owned property and not specifically directed towards agricultural reform. However, in the case of Chinese rural land rights, Stiglitz’s theories may be lacking since it is difficult to see small farmers stripping agricultural assets which consist mainly of limited machinery, irrigation systems that cannot be transferred, and other limited forms of capital. Furthermore, after three decades of incremental reform towards a capitalist system China seems to have done exactly what Stiglitz advocated.

There is a greater consensus in the economic literature on the effect that economic development has on migration patterns. The Harris-Todaro Migration Model, a generally accepted migration model, simplifies the economy into urban formal, urban informal and rural/agricultural sectors where laborers are rational and there few are information barriers. The model holds that “migration proceeds in response to urban-rural differences in expected

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<sup>47</sup> Joseph Stiglitz, “Whither Reform? Ten Years of Transition.” Abstract.

earnings,” meaning that people migrate when the expected wage is higher elsewhere.<sup>48</sup> It is important to clarify that “expected earnings” means the urban wage multiplied with the probability that a particular worker will secure a job in the city minus the costs of moving. Harris and Todaro note that rural to urban migration increases the supply of labor in the city which drives down expected earnings until equilibrium is reached where the expected urban income is equal to the agricultural or rural income.<sup>49</sup> As applied to developing countries where most of the population works in low productivity agriculture, the marginal product of agricultural labor is quite low, which in leads to large inflows into urban areas in hope of getting a formal sector job. This leads to high urban unemployment and the creation of the informal urban sector, which are essentially below minimum wage urban jobs but still better than agricultural alternatives. The Harris-Todaro Model definitely holds in the case of China as we have seen the extreme growth in the cities where wages are significantly higher than in the countryside [Table 1]. Given that currently official urban incomes are about three times higher than rural incomes, we should expect rural to urban migration to continue at a rapid pace, unless agricultural productivity rises greatly or urban expected wages fall greatly.<sup>50</sup> [GRAPH 2: Harris-Todaro Migration Model]

#### Hypothesis:

The current literature regarding transition economies implies that property rights and the underlying institutions are needed for a vibrant market economy, but the reform process

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<sup>48</sup> John Harris and Michael Todaro, “Migration, Unemployment and Development: A Two Sector Analysis,” *The American Economic Review*. Vol. 60. Iss. 1 (1970). 126.

<sup>49</sup> Harris and Todaro, 137.

<sup>50</sup> China Statistical Yearbook, 2005.

will determine whether real property rights will truly develop and help create a vibrant market as opposed to a fire sale of nation's resources by a small group of well connected people and stagnation in productive investment. The example of Russia and that nation's painful experience of rapid, "big bang" type reform discredited many neoclassical economists' simple privatization models. However, research still shows that property security is a requirement for economic growth and development. Given that well defined and protected private property is essential and that institutions need to evolve to create well defined and protected property, the biggest question is not whether to privatize, but rather how to privatize and at what pace.

Over the last thirty years China has taken the gradual, evolutionary path to the development of property rights and their institutions advocated by Stiglitz and North. This process has served the Chinese people quite well up to this point with vast reductions in poverty and stunning economic progress, particularly evident in the eastern cities. But the process is still not complete and in both the short run and the long run further privatization would benefit the Chinese people and help the country become wealthier and more equal.

In the short run, privatizing rural land or making leases permanent and legally binding contracts would allow China to come closer to reaching its production possibilities frontier and specifically raise the living standards of farmers and agriculture workers closer to their urban counterparts. The reason behind this is the previously discussed concept that better ownership rights gives firms (farmers) reason to believe that the profits or the capital itself from investment will not be taken without due process. This security lowers the farmers expected cost of investment and leads to more capital improvements in agricultural machinery, land, and

other agricultural inputs. Furthermore, by privatizing and clearly delineating landholdings, China would create conditions for a mortgage market to develop, thereby increasing the accessibility of loans to farmers whose only asset is their land. By releasing this dead capital, the supply of loanable funds would increase. The investment demand curve would shift to the right and the investment supply curve would shift down resulting in a new equilibrium where increased investment in agricultural inputs would lead to higher yields and increase the marginal productivity of agricultural labor [GRAPHS 3 & 4]. As a result agricultural incomes would then rise because of the increased marginal productivity [GRAPH 5]. In the short run this would raise the living standard of farmers in both absolute terms and relative to urban workers. Migration would still occur, since urban incomes are so much higher than rural incomes and it would continue to rise as China develops, but property protection is a first step towards income convergence.

In the long run the better property rights would also help raise rural incomes, further development, and reduce inequalities through migration and shifts in labor supply. As investment increased because of property rights security and more availability of capital (mortgages), capital would begin to substitute for labor [GRAPH 6]. Eventually this would allow less productive agricultural laborers whose labor has been made relatively redundant by new capital to migrate to the city where their potential incomes are higher. Migration to the city would increase the urban labor supply and more workers would compete for jobs driving down the price of labor (wages) in the city. Meanwhile the migration would reduce the rural labor supply, thereby raising the average incomes of agricultural workers who did not migrate [GRAPH 7]. Eventually as this process continues and the countryside loses its surplus labor, urban and



rural wages would converge, and rural to urban migration would largely halt. If other developed countries are any guide, this equilibrium would result with the majority of the Chinese population living in urban or suburban areas.

The time for further land reform in China is now, as the problems created by the ill-defined ownership of Chinese farmland have become too big to ignore. At this point in time, urban growth and restrictions on the transformation of agricultural land to urban land has created a huge incentive for land appropriation and re-designation by local officials, especially in areas that are near major urban centers.<sup>51</sup> This in turn leads to corruption. Near the rapidly expanding cities where land is valued more highly, local officials stand to make a profit by taking peasants' land by paying them based on average crop production, which is relatively low, while selling to urban developers at market value, which is relatively high. This undermines the incentives of these villagers to make long term investments or commitment.

In conclusion, China's government should abandon its desire for self-sufficiency in food production and its antiquated land allocation and ownership system. Instead, it should initiate an ambitious program to first delineate and record the millions of rural land plots and determine what particular government entity is leasing out these plots. Once current government ownership is determined, the central government should gradually begin convincing these local governments to begin the handover of legally recognized property deeds to the current farmers. This paper is not recommending a specific process on how to disperse land to current farmers, but the way in which of privatization program is implemented will have a great effect on

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<sup>51</sup> Klaus Deininger and Songqing Jin, *Securing Property Rights in Transition: Lessons from Implementation of China's Rural Land Contracting Law* (Washington, DC, 2008).

whether the program succeeds. The greatest hurdles the government will face are institutional resistance from local cadres who have a vested interest in the current system that they currently control and to ensure that land ownership will end up in the hands of the true farmers who have the knowledge, experience and incentive to efficiently and productively farm.

#### Empirical Analysis:

Empirically, this paper intends to look at the effect that property rights have on investment in agriculture. Then, to study the migration implications of agricultural investment, it looks at whether increased agricultural capital investment has a significant effect on the percentage of the population that lives in a rural area. Ideally, straightforward, China-specific indicators measuring the security of land property rights, such as the frequency that the government reallocates land, the amount of land that is sub-leased, or the number of court cases involving land disputes, would have been used in this paper to create a cross-provincial panel dataset of property rights. But these statistics do not exist or are not publically available in the case of China.

Since the direct measurements for property rights within China were unavailable, the Heritage Foundation's *Economic Freedom Index* and the Fraser Institute's *Economic Freedom of the World* indexes were used as substitute measures. These indexes are suitable substitutes because they measure a large variety of institutions that North and Stiglitz found as necessary for functioning property rights. Furthermore there is not enough variation in the economic freedom indexes with regard to China in the period since the indexes were regularly implemented (1995) to discover any statistically significant patterns or relationships. Thus, in

order to discover the importance of property rights for farmer investment and productivity, this paper models the effects of property rights on the international level, and then extrapolates those results to the current situation in China. Because, the model covers thirty-two different countries with thirty-two different and unique histories the results are less directly applicable to China in particular. Yet, the results of the international model combined with the economic theory emphasizing the importance of private property in land for development do suggest that well developed land rights are an essential for China's continued development even without a China-specific empirical model. Because the data set consisted of a random cross section of thirty-two countries [Appendix 2] between 1995 and 2005, the empirical technique implemented was a fixed effects estimation model. The fixed-effects model is selected over a random effects model because several independent variables such as average rainfall and geography do not change significantly over time within countries. This is important to adjust for the fact that a dry nation or cold nation, such as Kazakhstan or Russia, will naturally have lower agricultural output than a major agricultural exporter like Brazil. Furthermore, a Hausman statistical test confirmed that using fixed effects over random effects was consistent with limitations in the data set.

There are actually four separate regressions with an agricultural input as the dependent variable. The first uses a fixed effects regression and the 32 country data set with the Frasier *Economic Freedom of the World* index, the proportion of irrigated arable land, tractors per hectare, a time trend variable, as independent variables and fertilizer applied per hectare as the dependent variable [Regression 1]. The second regression is identical, except Heritage's *Economic Freedom Index* replaces the Fraser index [Regression 2].

Regression 1: Fraser Institution Ranking's Estimated Effect on Fertilizer Inputs [Table 3]

*Fertilizer per Hectare = F( Tractors per Hectare, Percent of Arable Land Irrigated, Fraser Economic Freedom Rating, Time Trend )*

Regression 2: Heritage Economic Freedom Ranking's Estimated Effect on Fertilizer Inputs [Table 3]

*Fertilizer per Hectare = F( Tractors per Hectare, Percent of Arable Land Irrigated, Heritage Economic Freedom Rating, Time Trend )*

These two regressions would capture short run effects of better property rights on agriculture investment. The two freedom indexes are proxies for property rights and the variable of interest. Theory suggests that higher scores in the indexes should predict greater investment in fertilizer. Tractors, irrigated land and the time trend are included in the regressions to capture the effect that the economic freedom indicators have holding all else constant. The time trend is simply the effect that each additional year passing has on the investment in fertilizer, which may capture advances in technology and other hard to measure variables that are assumed to change over time. The time trend is defined as the distance from the year 1995, the first year in our data.

Regression 3: Fraser Institution Ranking's Estimated Effect on Tractor Inputs [Table 4]

*Tractors per Hectare = F( Fertilizer per Hectare, Percent of Arable Land Irrigated, Fraser Economic Freedom Rating, Time Trend )*

Regression 4: Heritage Economic Freedom Ranking's Estimated Effect on Tractor Inputs [Table 4]

*Tractors per Hectare = F( Fertilizer per Hectare, Percent of Arable Land Irrigated, Heritage Economic Freedom Rating, Time Trend )*

The third and fourth regressions estimate the effect that the same independent variables (one with Fraser and one with Heritage) have on tractors per acre as the dependent variable, the variable of interest which is expected to be a significant and positive predictor [Regressions 3 & 4]. Again the irrigation, fertilizer and time trend variables are included to isolate the effect that economic freedom has holding all else constant. Irrigation is excluded as a dependent variable in the models because irrigation systems are very long run investments, where the expected returns accumulate over decades, which reduces the robustness of our ten year dataset. Furthermore, because irrigation infrastructure is so durable, the percent of land that is irrigated currently may not at all be related with the current institutional situation in a nation. However, it is still important to include as a dependent variable because access to water may influence a farmer's decision to invest in other agricultural inputs, and to isolate the economic freedom effect this must be accounted for.

Regression 5: Agricultural Investment's Estimated Effect on Cereal Yields per Hectare [Table 5]

*Cereal Yield per Hectare (kg) = F( Fertilizer per Hectare, Tractors per Hectare, Percent of Arable Land Irrigated, Time Trend )*

Cereal yield per hectare is the dependent variable but the variables of interest are investment in agriculture (tractors and fertilizer) and the predicted effect of them on agricultural output [Regression 5]. Again irrigated land and the time trend are included to more accurately account for the effect that investment in tractors and fertilizer alone have on output.

Regression 6: Agricultural Investment's Estimated Effect on Value Added Per Worker [Table 6]

*Value Added per Agricultural Worker (2000 US Dollars) = F( Fertilizer per agricultural worker, Tractors per agricultural worker, Percent of Arable Land Irrigated, Time Trend )*

The sixth regression estimates the effects that agricultural investment has on the World Bank's agricultural value added per agricultural worker [Regression 6]. Value added is the value that a particular worker adds to a product and a good predictor of incomes, particularly for a primary good such as grains. Again, the values of fertilizer and tractor are expected to have a predicted positive effect on worker productivity.

Regression 7: Agricultural Investment's Estimated Effect on Change in Rural Percentage of the Population [Table 7]

*Percent Change in Rural Population = F( Fertilizer per Hectare, Tractors per Hectare, Percent of Arable Land Irrigated, Time Trend )*

The final regression in the model includes a regression of agricultural inputs as independent variables and the proportion of the population that lives in rural areas as the dependent variable to determine the direct effect that agricultural investment has on migration [Regression 7]. This final regression is an attempt to measure the long run effects that more capital intensive farming has on the urban-rural population balance and their labor supply markets. The hypothesis predicts that greater investment in tractors and fertilizer will predict more migration to the city. Again, with all the models, a time trend is included in order to capture changes that we cannot measure that occur over time, such as improving technology.

The institutional and legal quality independent variables came from the Frasier Institute and the Heritage Foundation. The data set incorporates the Frasier Institute's *Economic Freedom of the World Index's* Legal Structure and Security of Property Rights rating which is made up of seven subcategories including judicial independence, judicial impartiality, property rights protection, the level of military interference, and the degree of rule of law and integrity of the legal system. In 2005 the level of legal enforcement of contracts and the level of property regulations were incorporated into this rating. Much of this data is based upon survey results in the *Global Competitiveness Report*, the *International Country Risk Guide*, and the World Bank's *Doing Business* estimates. These reports and the aggregate variable were derived mainly from survey data in which respondents were asked to rank how independent and impartial they felt the courts were or how secure they felt their property was protected. It also incorporates empirical data such as the average time and money required to settle contract disputes in court and the amount of time and money required to sell or buy land. All of these approximate the ability for private citizens to freely buy, sell, and own their own resources and devote more energy to production rather than protection. It is important to note that for the years 1996-1999 the Frasier Institute did not publish an *Economic Freedom of the World Index* and there are no data points for those years.

More general economic freedom measures came from the Heritage Foundation's *Index of Economic Freedom*. This index's ranking is made up of business, trade, fiscal, monetary, investment, and financial freedom, as well as freedom from corruption, property rights protection, and government size rankings. The overall economic freedom variable incorporates the average from all the sub-categories. This index and independent variable should capture the

quality of property rights institutions in numerous sectors, including finance, trade, land, and intellectual property, which measures in turn the broad institutional development important for functioning land markets. These indexes and the Overall Heritage Index measure various indicators such as the average amount of time and money it takes to start or close a business, inflation rates, tariff rates, freedom to invest, the bureaucratic hurdles businesses must overcome, the degree that courts enforce contracts, the perception of corruption and other variables. Many of these measures, such as the inflation are not directly related to the farmers' right to own land, but taken together the index captures a government's ability to arbitrarily intervene in private business which proxies the true security of one's property rights. The individual property rights variable showed too little variation over the ten year period measured, so the regressions incorporating the *Heritage Index of Economic Freedom* as an independent variable are restricted to the overall economic freedom variable.

The World Bank indicators selected include agricultural inputs, agricultural outputs, proxy variables for relative agricultural income, and control variables. Selected agricultural input variables include tractors per hectare of arable land, amount of chemical fertilizer applied per hectare of arable land, and percent of arable land irrigated. Arable land is defined as land planted by annual crops (double-cropped areas are counted once), temporary meadows for mowing or for pasture, land under market or kitchen gardens, and land temporarily fallow. Chemical fertilizer excludes traditional manure fertilizers, while irrigated land is defined as land where water is purposely applied to crops whether through permanent irrigation systems or purposeful flooding. The agricultural outputs include cereal yield (kilograms of wheat, rice, maize, barley, oats, rye, millet, sorghum, buckwheat, and mixed grains) per hectare. The



proportion of the rural population as a percentage of the total was used to measure the rural to urban migration. The summary statistics of the international panel data set are reported in table 2 in the appendix.

Outside of the World Bank, the control variable for latitude came from the CIA World Factbook defined as the “approximate geographic center of an entity” or the latitude at the very center of the country. This crudely captures the climate of nation as higher latitudes are less suited to growing crops. Water resources or the number of cubic meters per person per year in 2006 was collected from the Food and Agriculture Organization of the United Nations. In reality, however, this number is probably too high as much of the water is in many cases is inaccessible. Yet for the model’s purposes, it should capture climate rainfall effects. In the model these nation specific variables are controlled for as the fixed effects and are not reported in the results.

Unfortunately there was not an international level data set measuring the disparity between urban and rural incomes within countries so the paper cannot test the long run effects that agricultural investment and migration patterns have on urban-rural wage differentials.

### The Results:

The Fraser Institute’s *Economic Freedom of the World* index’s Legal Structure and Security of Property Rights rating did not yield any statistically significant relationships with investment in agriculture, either in fertilizer or tractors. The significance of the results with the Fraser Institute data set is hindered by the fact that up until 2000 the Fraser Institute only produced their index every five years. Since the dataset time range runs from 1995 to 2005 the

sample size is significantly smaller than the Heritage dataset's sample size. Compared with Heritage's *Index of Economic Freedom* the Fraser dataset has 139 less observations. Future studies however may yield more significant results as now the Fraser Institute ranks countries on the quality of legal and property institutions annually [Tables 3 & 4].

The Heritage Foundation's *Economic Freedom Index* yielded more statistically significant results, probably due to the larger sample size. Economic freedom was a significant and positive factor for predicting agricultural investment in both tractors and fertilizer. A one point increase on the 0-100 index predicts about an additional kilogram of fertilizer for each hectare holding the amount of irrigation, the number of tractors, and the time trend constant. A one point increase in economic freedom also predicts 1.61 additional tractors to be used for each hectare. Tractors and fertilizer appear to be economic substitutes as they both have a negative coefficient as the independent variable when the other is the dependent variable. The predicted effect on the proportion of irrigated land is insignificantly affected by economic freedom increases. The passage of time was significant and positive with regards to tractors but not fertilizer. This may be an indicator of technological advance in tractor production in China between 1995 and 2005 driving up the availability of quality tractors for farmers [Tables 3 & 4].

The estimated effects of fertilizer on cereal yields were statistically significant while, the estimated effects of tractors were not. Because a fixed effects model was used, country specific components such as climate are controlled for. Each additional 100 grams of fertilizer increases the predicted cereal output of a hectare by about 0.22 kilograms. Each percentage point increase in arable land that is irrigated increase the predicted yield per hectare by 19.53 which

show that irrigation is vitally important to output. However, given that in China most of the irrigation has been in place for over two millennia, the model excluded it as a dependent variable in the first stage property rights regressions. Tractors do not have a significant effect on yield, probably because they are a labor saving input, not an output enhancing input. Time is extremely significant with a predicted 39.75 kilogram increase in cereal output per hectare with each passing year [Table 5].

Increased agricultural inputs per capita predicted a very significant and positive effect on value added per agricultural worker (in 2000 US constant dollars), which is a fairly accurate indicator of wages. An increase of 100 grams of fertilizer for an agricultural worker predicts an additional \$1,610 in value created. Tractors were even more significant. Each additional tractor per farmer predicts an additional \$8,875 in value added for each agricultural worker. For example, if a country had ten farmers and no tractors, adding a tractor would yield an estimated additional \$8,875 in output. The percentage of irrigated land actually had a negative predicted effect on value added per worker with each percentage point increase in arable land irrigated reducing the predicted value added per agricultural worker by \$224. The regression predicts that by increasing the percentage of a nation's arable land that is irrigated by 1% farmers in a nation will be predicted to produce \$224 less than they would without irrigation. Such a relationship does not make sense until you consider that the regression may be picking up the correlation that irrigation has with low value crops. Irrigation may be more prevalent in nations where rice cultivation is the main cereal crop. Given that rice is generally one of the lowest value agricultural commodities, its prevalence would reduce the per worker value added estimate. The time trend is also significant as each additional year passing predicts another

\$359 in value creation per worker. For each additional year past 1995, agricultural workers are predicted to produce about \$350 more than they had the year before. The higher outputs indicate the availability of better technology in agriculture. For example genetically modified crops have become more prevalent in recent years boosting agricultural production per worker [Table 6].

The long run effects of increased agricultural investment on migration within the model had results that were statistically insignificant. There is a strong possibility that the regression may be picking up short-run effects from higher outputs and incomes as a result of investment rather than capturing the long-run effects where more investment makes agricultural workers redundant allowing them to migrate to the city while maintaining output levels. The two effects would increase the variation of the data and render the model statistically insignificant [Table 7].

There is no regression studying the effect that increased migration to the cities would have on urban rural wage disparity because there is not a consistent international urban-rural wage dataset. Constructing such an international dataset would be problematic since developing countries tend to have incomplete wage data. As a result I am not able to empirically test the effect that better property rights and higher economic freedom have on urban-rural wage gaps.

#### Conclusion:

On the international level, the data indicates that better property rights and institutional quality leads to more investment in agriculture. While this relationship may not be the case in

China as every nation has unique backgrounds, histories, and cultures but the evidence from previous studies and accepted economic theory indicate that better institutions promote productive investment across the globe. The second part of the model which predicts that increased investment leads to greater rural to urban migration is not robustly supported by the 32 country dataset used. This does not conclusively disprove the theory better property rights and more investment lead to greater migration. Unfortunately the model does not account average urban wages, which was a key component of the Harris-Todaro model. Furthermore it may be the case that our model with a limited time period may only be picking up the short-run effects of increased investment on agriculture: the increases in rural incomes as a result of more capital investment, particularly chemical fertilizer. However, the historical experience of America and Europe suggests that as agricultural investment in mechanical and chemical inputs increases there tends to be more labor available to work in urban industry. There does not seem to be any indication that this pattern of development would be any different in China as the migration levels over the past two decades resemble the nineteenth century West. Furthermore, if that is indeed the case then the new migrants would put downward pressure on urban wages while the reduction in the agricultural workforce would put upward pressure on rural wages.

These results indicate that more research needs to be done. Furthermore, in light of the recent economic downturn demand for urban labor has diminished greatly reducing the growth of urban wages and employment. The relative attractiveness of the agricultural sector may be higher now as a result, which would reduce both expected migration and demand for capital to substitute for labor.

In conclusion, the theoretical research and the empirical results of a medium cross country sample over ten years show that better property rights predict higher rates of agricultural investment in tractors and fertilizer. Furthermore, this investment increased yields and worker productivity. Thus our results would suggest that China's agricultural workers would benefit from a well developed transition to more property rights and economic freedom. However the data was either not available or robust enough to show a relationship between rural property rights and migration or urban rural inequality.

### Tables

Table 1: Summary Statistics: China Wage Data

Variable	Number of Observations	Mean	Standard Deviation	Minimum	Maximum
Average Rural Income (1995)	30	1680.61	778.26	880.34	4245.61
Average Urban Income (1995)	29	4278.08	1181.88	2873.94	7445.10
Average Rural Income (2005)	31	3511.55	1601.348	1876.96	8247.77
Average Urban Income (2005)	31	11003.53	3323.74	8385.08	20602.90

Table 2: Summary Statistics: International Panel Data (32 nations)

Variable	Number of Observations	Mean	Standard Deviation	Minimum	Maximum
Cereal Yield Per Hectare	352	3351.74	1757.00	130.15	7539.46
Value Added per Agricultural Worker (2000 US\$)	341	7790.49	11376.68	235.86	47494.01
Tractors Per Hectare	288	372.75	822.13	3.22	4707.97
Fertilizer Per Hectare (100 grams)	340	1571.73	1590.75	.00	9817.97
Arable Land as percentage of Total Land	352	19.34	15.81	.61	62.10
Irrigated Land as Percent of Arable Land	292	16.28	14.47	.26	56.10
Agricultural Workers as Percent of Workforce Work	256	20.76	19.43	.60	85.80
Rural Population	352	72,133,916.18	182,955,438.00	783,945	826,530,530
Rural Population as Percent of Total	352	42.60	23.33	7.70	85.4
Rural Population Density	352	331.83	320.90	4.87	1432.37

Rural Population Percentage Change	352	-0.02	1.19	-4.87	2.69
GDP Per Capita (PPP)	352	10,801.59	10730.96	426.69	41813.18
Geographic Center Latitude	352	26.59	16.84	1	60
2006 Water Resources (Cubic meters (m <sup>3</sup> ) per person per year)	352	15,094.32	15695.46	874.5	55059.40
Heritage Economic Freedom	345	40.50	23.98	4.00	98.00

Table 3: Economic Freedom Indexes' Estimated Effect on Fertilizer Inputs

Independent Variable	Fraser Institute Index	Heritage Foundation Index
Constant	2102.35** (480.173)	0.621** (341.804)
Tractors per Hectare	-1.23 (.621)	52.193** (.328)
Percent Arable Land Irrigated	-12.07 (15.449)	15.449 (11.855)
Fraser Legal and Property Rating	-3.88 (52.193)	9.581** (4.923)
Time Trend	12.89** (9.581)	480.173 (6.147)
Observations	131	270
Countries	29	32
R <sup>2</sup>	.3548	.3548

Notes: \*-Significant @ 5% level, \*\*-Significant @ 10% level

Table 4: Economic Freedom Indexes' Estimated Effect on Tractor Inputs

Independent Variable	Fraser Institute Index	Heritage Foundation Index
Constant	509.48** (102.82)	396.13** (56.181)
100 g Fertilizer per Hectare	-0.09 (0.088)	-0.08** (0.034)
Percent Arable Land Irrigated	-1.41 (2.46)	1.50 (1.553)



<b>Economic Freedom Rating</b>	6.62 (10.60)	1.61* (0.946)
<b>Time Trend</b>	5.41 (4.04)	3.96** (1.685)
<b>Observations</b>	131	270
<b>Countries</b>	29	31
<b>R<sup>2</sup></b>	.3010	.0881

Notes: \*-Significant @ 5% level, \*\*-Significant @ 10% level

Table 5: Economic Freedom Indexes' Estimated Effect on Cereal Yield per Hectare

<b>Independent Variable</b>	<b>Cereal Yield per Hectare (Kg. per hectare)</b>
<b>Constant</b>	2491.21** (295.836)
<b>100 g Fertilizer per Hectare</b>	0.22** (0.090)
<b>Tractors per Hectare</b>	-0.047 (0.486)
<b>Percent Arable Land Irrigated</b>	19.53** (9.229)
<b>Time Trend</b>	39.75** (7.192)
<b>Observations</b>	277
<b>Countries</b>	32
<b>R<sup>2</sup></b>	.3068

Notes: \*-Significant @ 5% level, \*\*-Significant @ 10% level

Table 6: Economic Freedom Indexes' Estimated Effect on Value Added per Worker

<b>Independent Variable</b>	<b>Value Adder per Agricultural Worker (2000 US Dollars)</b>
<b>Constant</b>	7675.94** (1459.24)
<b>100 g Fertilizer per Worker</b>	1610.29* (855.95)
<b>Tractors per Worker</b>	8875.81** (3833.89)
<b>Percent Arable Land Irrigated</b>	-224.74** (6764.64)
<b>Time Trend</b>	359.02** (55.43)

<b>Observations</b>	208
<b>Countries</b>	31
<b>R<sup>2</sup></b>	.2497

Notes: \*-Significant @ 5% level, \*\*-Significant @ 10% level

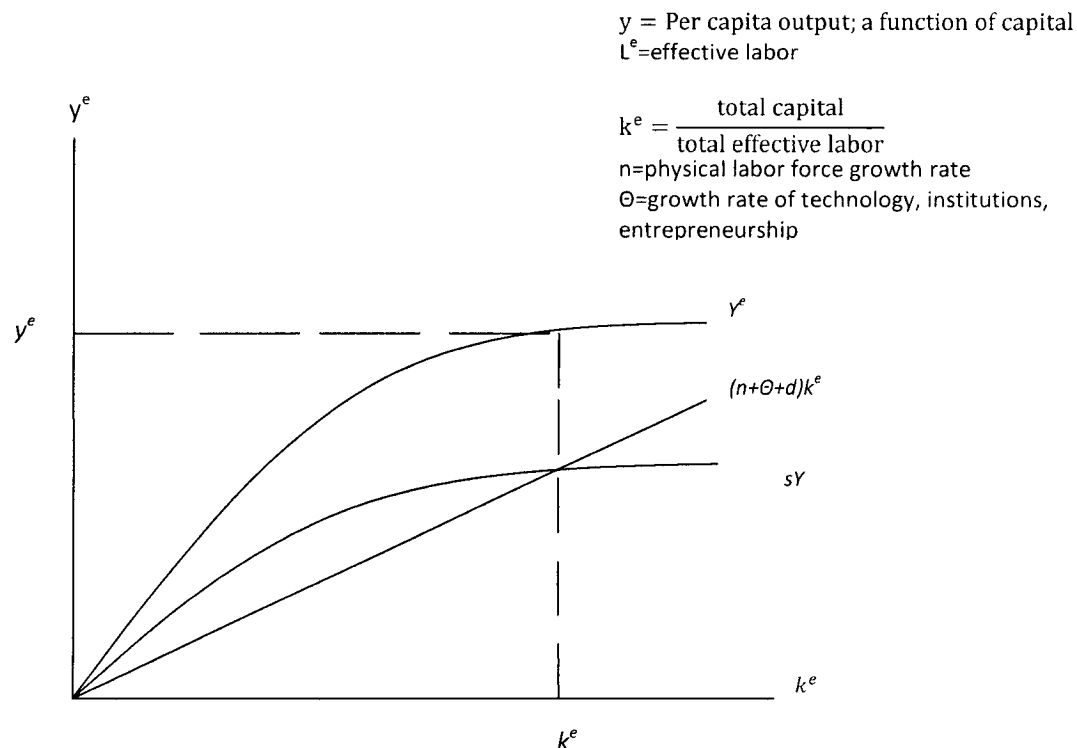
Table 7: Economic Freedom Indexes' Estimated Effect on Migration

<b>Independent Variable</b>	<b>Change in Percent Rural Population of Total</b>
<b>Constant</b>	45.31** (0.908)
<b>100 g Fertilizer per Hectare</b>	-0.00052 (0.000354)
<b>Tractors per Hectare</b>	-0.0003 (0.000945)
<b>Percent Arable Land Irrigated</b>	0.0017 (0.0235)
<b>Time Trend</b>	-0.37** (0.0292)
<b>Observations</b>	277
<b>Countries</b>	32
<b>R<sup>2</sup></b>	.0362

Notes: \*-Significant @ 5% level, \*\*-Significant @ 10% level

## GRAPHS

GRAPH 1: Solow Growth Model:

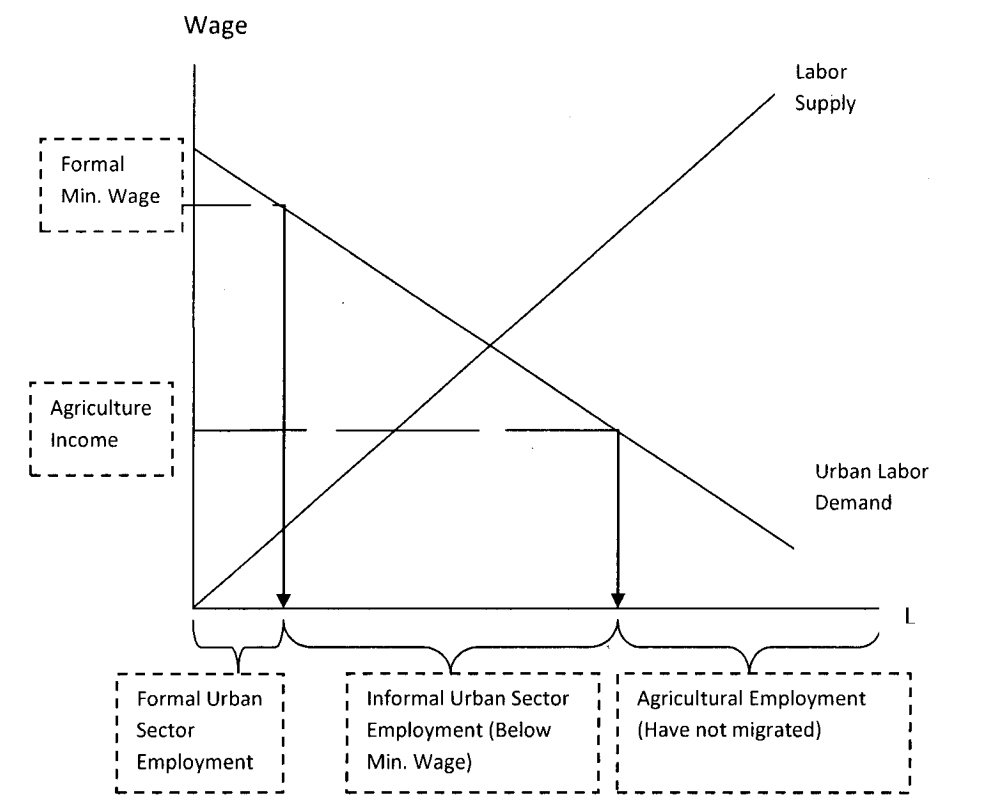


-The Solow Model posits that economic well being (per capita income) is a function of capital investment in the short-run. In the long run, harder to measure variables such as technological advancement, institutions, and entrepreneurial culture ( $\Theta$ ) increase the supply of what is called effective labor. In other words, effective labor is the number of workers that would have been required for a level of production without the long run inputs ( $\Theta$ ) but is done with fewer actual laborers. The actual laborers' incomes increase as a result since there is more production for fewer people. Changes in the long run inputs or savings rates cause the curves to shift, but the model predicts the economy will adjust to the new parameters and attain the new steady state where  $(s) \cdot (Y) = (n + \Theta + d)k^e$  and that per capita output is a function of this new state.<sup>52</sup>

-Better property rights and institutions in China would increase the long run input ( $\Theta$ ) and increase the amount of effective labor, thus living standards. More capital investment would be required for the steady state equilibrium as the  $(n + \Theta + d)k^e$  curve would pivot up and left.

<sup>52</sup> Dwight Perkins, Steven Radelet and David Lindauer, *Economics of Development*, (New York: W.W. Norton & Company, 2006), 123.

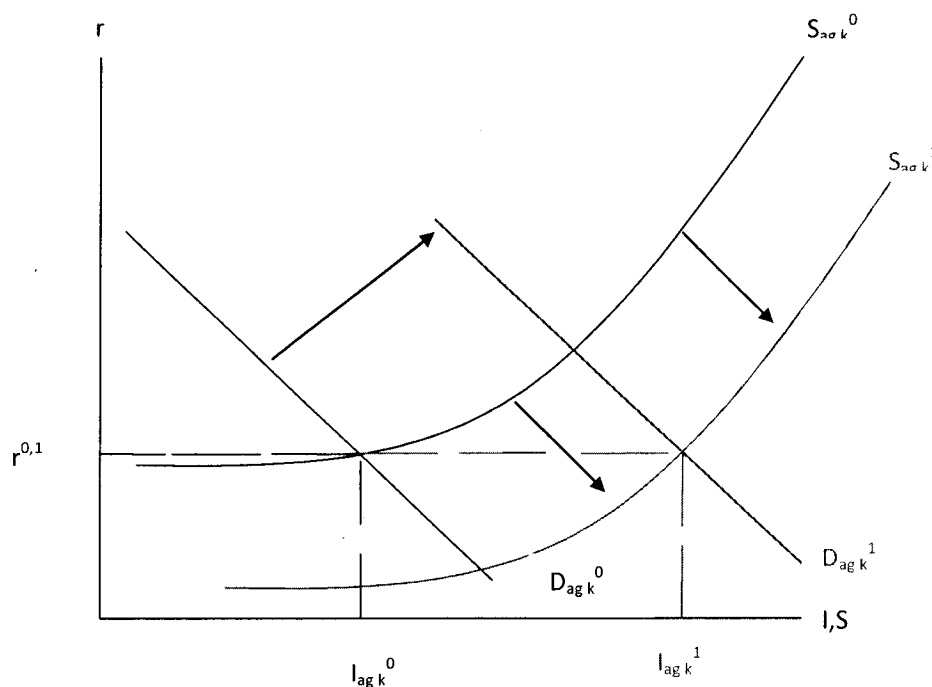
GRAPH 2: Harris-Todaro Migration Model:



-The greater the difference between the formal minimum wage and the prevailing agricultural income the more “technically” unemployed workers are working in the informal urban sector. Over the past two decades China has experienced a major upward shift in the labor demand curve, bringing up the expected urban wage (the formal wage time the probability of ending up in the informal sector) which caused rural to urban migration and a fall in agricultural unemployment.<sup>53</sup>

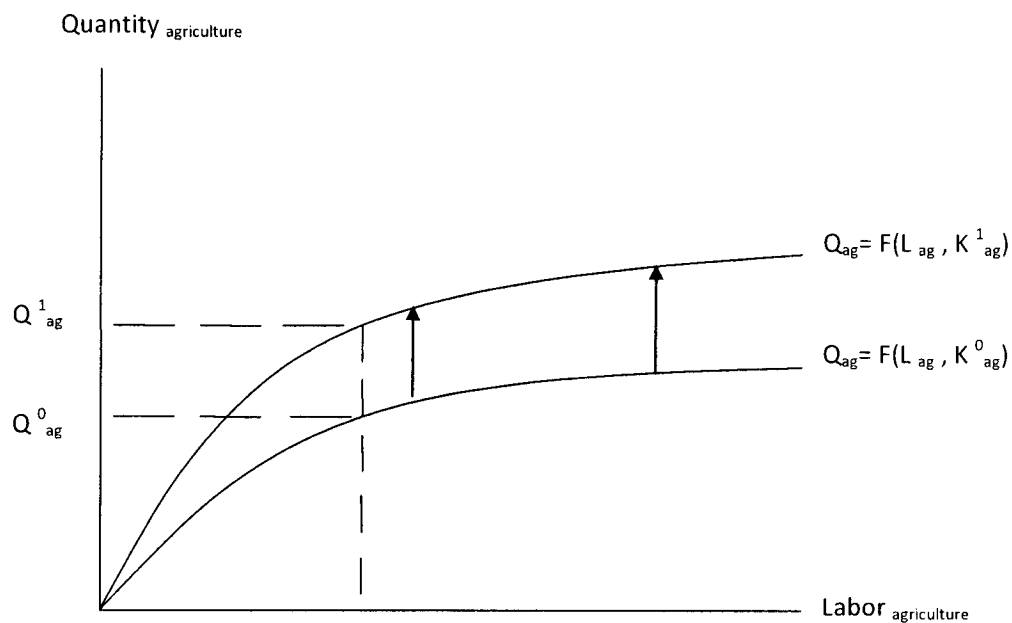
-Increased investment in agricultural capital would raise agricultural incomes and reduce the urban-rural wage gap in the short run, thereby reducing both migration and urban rural inequalities in the short run.

<sup>53</sup> Harris and Tadaro. 132.

GRAPH 3: Agricultural Investment Market:

Private property rights for farmers would shift both the supply of loanable funds and the demand for investment. Private property and plots with legally honored deeds allow a mortgage market to develop increasing the amount of capital that a farmer could borrow to invest in their land. This effect would shift out the investment supply curve. On the demand side, well protected property reduce owners' costs of investment since the probability they would lose the land is reduced, thus demand for investment increases. Ultimately the agricultural sector ends up with a much higher steady state of investment which has short run effects on agricultural incomes and long run effects on migration and incomes.

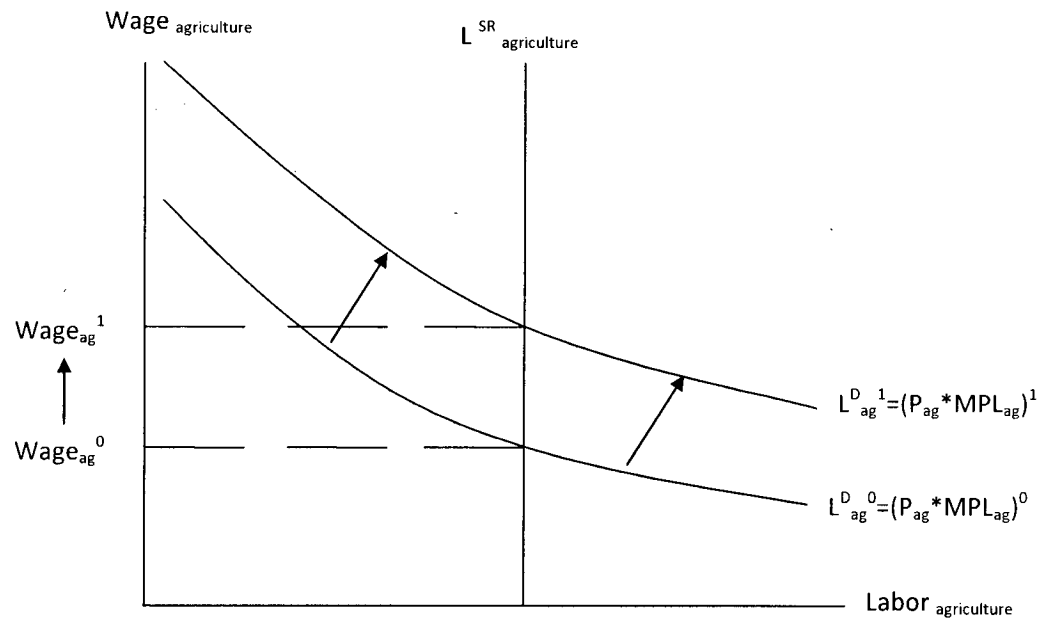
GRAPH 4: Short-Run Agriculture Output:



This model shows a simple Cobb-Douglas Production function where better land property rights and institutions increase the amount of capital investment in the rural section ( $K^0 \rightarrow K^1$ ). Since output is a function of labor and capital, the predicted agricultural output increases ( $Q_{ag}^0 \rightarrow Q_{ag}^1$ ) in the short run.<sup>54</sup>

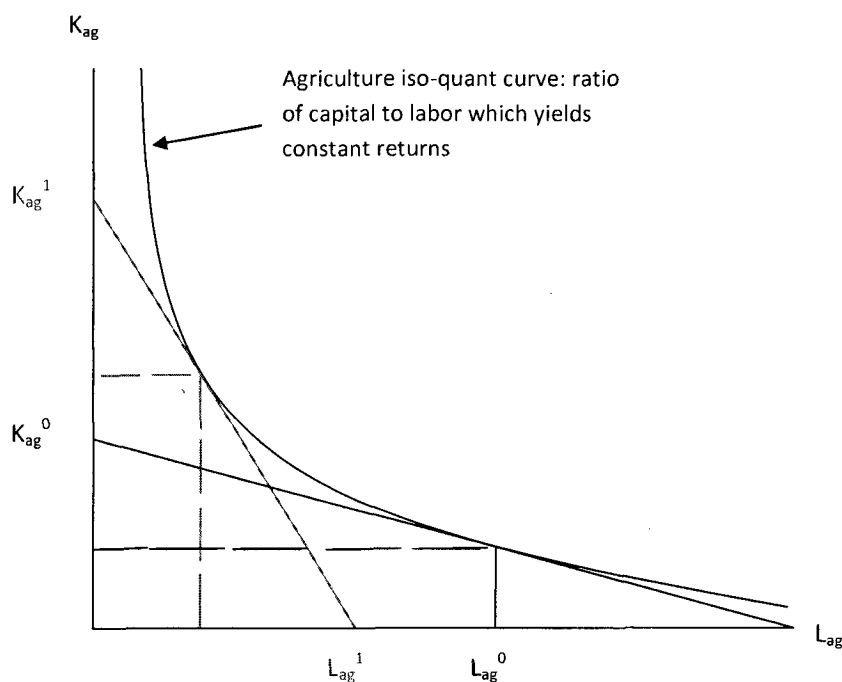
<sup>54</sup> Dwight Perkins, Steven Radelet and David Lindauer, *Economics of Development*, (New York: W.W. Norton & Company, 2006), 66.

GRAPH 5: Short-Run Agriculture Labor Market:



-In the short run, the supply of labor is fixed in agriculture (migration is a longer run phenomenon) so agricultural investment, which increases the marginal product of agricultural labor ( $MPL_{ag}$ ), would increase the average incomes in rural areas.

GRAPH 6: Long-Run Agriculture Input Market:

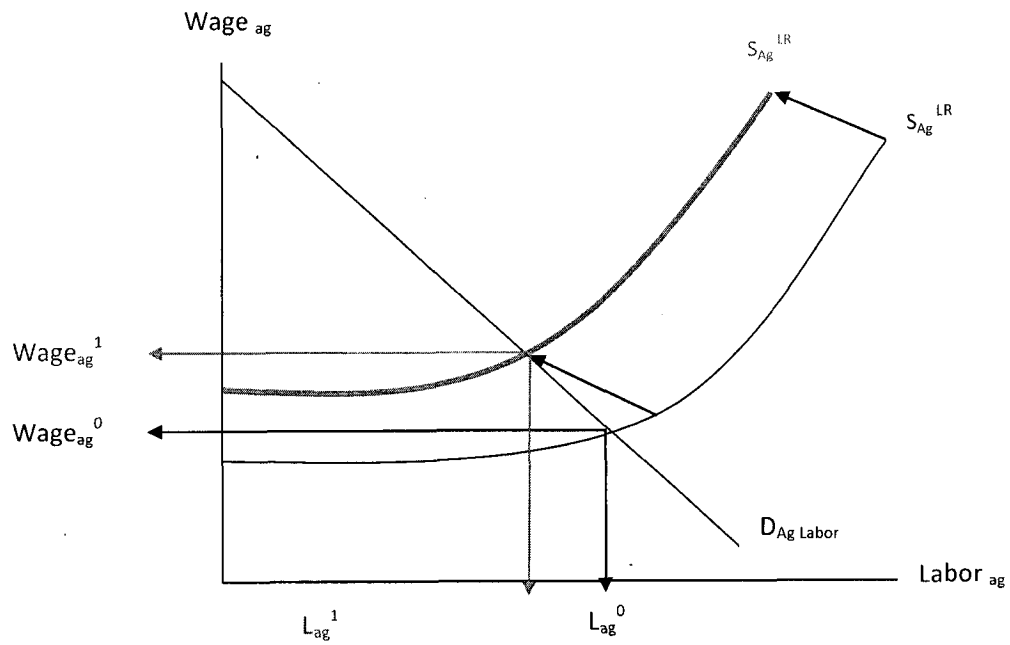


In the long run, the increased investment brought about by better property rights institutions will essentially substitute agricultural capital for labor. This model shows that less labor ( $L_{ag}^0 \rightarrow L_{ag}^1$ ) but more capital ( $K_{ag}^0 \rightarrow K_{ag}^1$ ) will yield the same output. The reduction in labor employed in agriculture allows for migration to the cities.<sup>55</sup>

<sup>55</sup> Dwight Perkins, Steven Radelet and David Lindauer, *Economics of Development*, (New York: W.W. Norton & Company, 2006), 119



GRAPH 7: Long-Run Agricultural Labor Market



-The migration caused by the redundancy of labor explained in Graph 4 causes the agricultural labor supply to drop. This in turn increases scarcity and raises the agricultural income in the long run.

## **APPENDIX 1: DATA SOURCES**

**Fraser Institute's Economic Freedom of the World Index:** *Legal Structure and Security of Property Rights measure is an aggregate composed of the following:*

### Judicial Independence:

This component is from the *Global Competitiveness Report's* survey question: "Is the judiciary in your country independent from political influences of members of government, citizens, or firms? No—heavily influenced (= 1) or Yes—entirely independent (= 7)." The question's wording has varied slightly over the years. All variables from the *Global Competitiveness Report* were converted from the original 1-to-7 scale to a 0-to-10 scale using this formula:  $EFW_i = ((GCR_i - 1) / 6) \times 10$ . v Source World Economic Forum, *Global Competitiveness Report*

### Impartial courts

This component is from the *Global Competitiveness Report's* survey question: "The legal framework in your country for private businesses to settle disputes and challenge the legality of government actions and/or regulations is inefficient and subject to manipulation (= 1) or is efficient and follows a clear, neutral process (= 7)." The question's wording has varied slightly over the years. v Note The "Rule of Law" ratings from the World Bank's Governance Indicators Project have been used to fill in omitted countries in the primary data source since 1995. Sources: World Economic Forum, *Global Competitiveness Report*

### Protection of property rights

This component is from the *Global Competitiveness Report's* survey question: "Property rights, including over financial assets are poorly defined and not protected by law (= 1) or are clearly defined and well protected by law (= 7). Source: World Economic Forum, *Global Competitiveness Report*

### Military interference in rule of law and the political process

This component is based on the *International Country Risk Guides* Political Risk Component G: Military in Politics: "A measure of the military's involvement in politics. Since the military is not elected, involvement, even at a peripheral level, diminishes democratic accountability. Military involvement might stem from an external or internal threat, be symptomatic of underlying difficulties, or be a full-scale military takeover. Over the long term, a system of military government will almost certainly diminish effective governmental functioning, become corrupt, and create an uneasy environment for foreign businesses." Note The "Political Stability and Absence of Violence" ratings from the World Bank's *Governance Indicators* Project have been used to fill in omitted countries in the primary data source since 1995. Sources: PRS Group, *International Country Risk Guide*

### Integrity of the legal system

This component is based on the *International Country Risk Guide's* Political Risk Component I for Law and Order: "Two measures comprising one risk component. Each sub-component equals half of the total. The 'law' sub-component assesses the strength and impartiality of the legal system, and the 'order' sub-component assesses popular observance of the law." Source: PRS Group, *International Country Risk Guide*.

### Legal enforcement of contracts

This component is based on the World Bank's *Doing Business* estimates for the time and money required to collect a clear-cut debt. The debt is assumed to equal 200% of the country's per-capita income where

the plaintiff has complied with the contract and judicial judgment is rendered in his favor. Zero-to-10 ratings were constructed for (1) the time cost (measured in number of calendar days required from the moment the lawsuit is filed until payment) and (2) the monetary cost of the case (measured as a percentage of the debt). These two ratings were then averaged to arrive at the final rating for this sub-component. The formula used to calculate the zero-to-10 ratings was:  $(V_{\max} - V_i) / (V_{\max} - V_{\min})$  multiplied by 10.  $V_i$  represents the time or money cost value. The values for  $V_{\max}$  and  $V_{\min}$  were set at 725 days and 82.3% (1.5 standard deviations above average) and 62 days (1.5 standard deviations below average) and 0%, respectively. Countries with values outside of the  $V_{\max}$  and  $V_{\min}$  range received ratings of either zero or ten accordingly. Source: World Bank, *Doing Business*.

#### Regulatory restrictions on the sale of real property

This sub-component is based on the World Bank's *Doing Business* data on the time and monetary costs required to transfer ownership of property that includes land and a warehouse. Zero-to-10 ratings were constructed for (1) the time cost (measured in number of calendar days required to transfer ownership) and (2) the monetary cost of transferring ownership (measured as a percentage of the property value). These two ratings were then averaged to arrive at the final rating for this sub-component. The formula used to calculate the zero-to-10 ratings was:  $(V_{\max} - V_i) / (V_{\max} - V_{\min})$  multiplied by 10.  $V_i$  represents the time or money cost value. The values for  $V_{\max}$  and  $V_{\min}$  were set at 265 days and 15% (1.5 standard deviations above average) and 0 days and 0%, respectively. Countries with values outside of the  $V_{\max}$  and  $V_{\min}$  range received ratings of either zero or ten accordingly. Source: World Bank, *Doing Business*

#### **Heritage Foundation's Economic Freedom Index:**

##### Freedom #1: Business Freedom

Business freedom is a quantitative measure of the ability to start, operate, and close a business that represents the overall burden of regulation, as well as the efficiency of government in the regulatory process. The business freedom score for each country is a number between 0 and 100, with 100 equaling the freest business environment. The score is based on 10 factors, all weighted equally, using data from the World Bank's *Doing Business* study:

- Starting a business—procedures (number);
- Starting a business—time (days);
- Starting a business—cost (% of income per capita);
- Starting a business—minimum capital (% of income per capita);
- Obtaining a license—procedures (number);
- Obtaining a license—time (days);
- Obtaining a license—cost (% of income per capita);
- Closing a business—time (years);
- Closing a business—cost (% of estate); and
- Closing a business—recovery rate (cents on the dollar).<sup>1</sup>

Each of these raw factors is converted to a scale of 0 to 100, after which the average of the converted values is computed. The result represents the country's business freedom score. For example, even if a country requires the highest number of procedures for starting a business, which yields a score of zero in that factor, it could still receive a score as high as 90 based on scores in the other nine factors. Singapore, for instance, receives scores of 100 in nine of the 10 factors, the exception being the 11 licensing procedures required by the government, which equates to a score of 83.1 for that factor. Each factor is converted to a 0 to 100 scale using the following equation:

Factor Score =  $50 \times \text{factor}_{\text{average}} / \text{factor}_i$

which is based on the ratio of the country data for each factor relative to the world average, multiplied

by 50. For example, on average worldwide, it takes 18.3 procedures to get necessary licenses. Singapore's 11 licensing procedures is a factor value better than the average, resulting in a ratio of 1.66. That ratio multiplied by 50 equals the final factor score of 83. For the nine countries that are not covered by the World Bank's *Doing Business* study, business freedom is scored by looking into business regulations based on qualitative information from reliable and internationally recognized sources.

**Sources.** Unless otherwise noted, the authors used the following sources in determining business freedom scores, in order of priority: World Bank, *Doing Business 2009*; Economist Intelligence Unit, *Country Report, Country Commerce*, and *Country Profile*, 2005–2008; U.S. Department of Commerce, *Country Commercial Guide*, 2005–2008; and official government publications of each country.

## Freedom #2: Trade Freedom

Trade freedom is a composite measure of the absence of tariff and non-tariff barriers that affect imports and exports of goods and services. The trade freedom score is based on two inputs:

- The trade-weighted average tariff rate and
- Non-tariff barriers (NTBs).

Different imports entering a country can, and often do, face different tariffs. The weighted average tariff uses weights for each tariff based on the share of imports for each good. Weighted average tariffs are a purely quantitative measure and account for the basic calculation of the score using the following equation:  $\text{Trade Freedom}_i = (((\text{Tariff}_{\max} - \text{Tariff}_i) / (\text{Tariff}_{\max} - \text{Tariff}_{\min})) * 100) - \text{NTB}_i$ , where  $\text{Trade Freedom}_i$  represents the trade freedom in country  $i$ ,  $\text{Tariff}_{\max}$  and  $\text{Tariff}_{\min}$  represent the upper and lower bounds for tariff rates (%), and  $\text{Tariff}_i$  represents the weighted average tariff rate (%) in country  $i$ . The minimum tariff is naturally zero percent, and the upper bound was set as 50 percent. An NTB penalty is then subtracted from the base score. The penalty of 5, 10, 15, or 20 points is assigned according to the following scale:

- **20**—NTBs are used extensively across many goods and services and/or act to effectively impede a significant amount of international trade.
- **15**—NTBs are widespread across many goods and services and/or act to impede a majority of potential international trade.
- **10**—NTBs are used to protect certain goods and services and impede some international trade.
- **5**—NTBs are uncommon, protecting few goods and services, and/or have very limited impact on international trade.
- **0**—NTBs are not used to limit international trade.

We determine the extent of NTBs in a country's trade policy regime using both qualitative and quantitative information. Restrictive rules that hinder trade vary widely, and their overlapping and shifting nature makes their complexity difficult to gauge. The categories of NTBs considered in our penalty include:

- **Quantity restrictions**—import quotas; export limitations; voluntary export restraints; import–export embargoes and bans; countertrade, etc.
- **Price restrictions**—antidumping duties; countervailing duties; border tax adjustments; variable levies/tariff rate quotas.
- **Regulatory restrictions**—licensing; domestic content and mixing requirements; sanitary and phytosanitary standards (SPSs); safety and industrial standards regulations; packaging, labeling, and trademark regulations; advertising and media regulations.
- **Investment restrictions**—exchange and other financial controls.
- **Customs restrictions**—advance deposit requirements; customs valuation procedures; customs

classification procedures; customs clearance procedures.

• **Direct government intervention**—subsidies and other aid; government industrial policy and regional development measures; government-financed research and other technology policies; national taxes and social insurance; competition policies; immigration policies; government procurement policies; state trading, government monopolies, and exclusive franchises.

**Sources.** Unless otherwise noted, the authors used the following sources to determine scores for trade policy, in order of priority: World Bank, *World Development Indicators 2008* and *Data on Trade and Import Barriers: Trends in Average Applied Tariff Rates in Developing and Industrial Countries, 1981–2006*; World Trade Organization, *Trade Policy Review, 1995–2008*; Office of the U.S. Trade Representative, *2008 National Trade Estimate Report on Foreign Trade Barriers*; World Bank, *Doing Business 2008* and *Doing Business 2009*; U.S. Department of Commerce, *Country Commercial Guide, 2004–2008*; Economist Intelligence Unit, *Country Report, Country Profile, and Country Commerce, 2004–2008*; and official government publications of each country.

#### Freedom #4: Government Size

This component considers the level of government expenditures as a percentage of GDP. Government expenditures—including consumption and transfers—account for the entire score.

Some level of government expenditures represents true public goods, implying an ideal level greater than zero. However, identifying that ideal level seems too arbitrary, static, and difficult to apply universally. For these reasons, the methodology treats zero government spending as the benchmark. Moreover, governments that have no public goods will be penalized by lower scores in the other factors (such as property rights and financial freedom).

The scale for scoring government size is non-linear, which means that government spending that is close to zero is lightly penalized, while levels of government exceeding 30 percent of GDP receive much worse scores in a quadratic fashion (e.g., doubling spending yields four times less freedom), so that only really large governments receive very low scores.

The expenditure equation used is:

$$GE_i = 100 - \alpha \times (\text{Expenditures}_i)^2$$

where  $GE_i$  represents the government expenditure score in country  $i$ ;  $\text{Expenditures}_i$  represents the total amount of government spending at all levels as a portion of GDP (between 0 and 100); and  $\alpha$  is a coefficient to control for variation among scores (set at 0.03). The minimum component score is zero. In most cases, general government expenditure data include all levels of government such as federal, state, and local. In cases where general government spending data are not available, data on central government expenditure are used instead.

**Sources.** Unless otherwise noted, the authors used the following sources for information on government intervention in the economy, in order of priority: Official government publications of each country; Economist Intelligence Unit, *Country Report* and *Country Profile, 2004–2007*; Organization for Economic Co-operation and Development data; Eurostat; African Development Bank and Organization for Economic Co-operation and Development, *African Economic Outlook 2008*; African Development Bank, *Selected Statistics on African Countries 2008*; International Monetary Fund, *Staff Country Report, “Selected Issues and Statistical Appendix,” 2004–2008*; and Asian Development Bank, *Key Indicators 2007–2008*.

#### Freedom #5: Monetary Freedom

Monetary freedom combines a measure of price stability with an assessment of price controls. Both inflation and price controls distort market activity. Price stability without microeconomic intervention is the ideal state for the free market.

The score for the monetary freedom factor is based on two factors:

- The weighted average inflation rate for the most recent three years and
- Price controls.

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The weighted average inflation rate for the most recent three years serves as the primary input into an equation that generates the base score for monetary freedom. The extent of price controls is then assessed as a penalty of up to 20 points subtracted from the base score. The two equations used to convert inflation rates into the monetary freedom score are:

$$\text{Weighted Avg. Inflation}_i = \theta_1 \times \text{Inflation}_{it} + \theta_2 \times \text{Inflation}_{it-1} + \theta_3 \times \text{Inflation}_{it-2}$$

$\text{Monetary Freedom}_i = 100 - \alpha \times \sqrt{\text{Weighted Avg. Inflation}_i} - \text{PC penalty}_i$ , where  $\theta_1$  through  $\theta_3$  (thetas 1–3) represent three numbers that sum to 1 and are exponentially smaller in sequence (in this case, values of 0.665, 0.245, and 0.090, respectively);  $\text{Inflation}_{it}$  is the absolute value of the annual inflation rate in country  $i$  during year  $t$  as measured by the consumer price index;  $\alpha$  represents a coefficient that stabilizes the variance of scores; and the price control (PC) penalty is an assigned value of 0–20 points based on the extent of price controls. The convex (square root) functional form was chosen to create separation among countries with low inflation rates. A concave functional form would essentially treat all hyperinflations as equally bad, whether they were 100 percent price increases annually or 100,000 percent, whereas the square root provides much more gradation. The  $\alpha$  coefficient is set to equal 6.333, which converts a 10 percent inflation rate into a freedom score of 80.0 and a 2 percent inflation rate into a score of 91.0.

**Sources.** Unless otherwise noted, the authors used the following sources for data on monetary policy, in order of priority: International Monetary Fund, *International Financial Statistics Online*; International Monetary Fund, *2008 World Economic Outlook*; and Economist Intelligence Unit, *Country Report*, 1999–2008, and *Country Profile*, 2004–2008.

#### Freedom #6: Investment Freedom

This component scrutinizes each country's policies toward the free flow of investment capital (foreign investment as well as internal capital flows) in order to determine its overall investment climate. The authors assess all countries using the same rubric. Questions examined include whether there is a foreign investment code that defines the country's investment laws and procedures; whether the government encourages foreign investment through fair and equitable treatment of investors; whether there are restrictions on access to foreign exchange; whether foreign firms are treated the same as domestic firms under the law; whether the government imposes restrictions on payments, transfers, and capital transactions; and whether specific industries are closed to foreign investment.

The following criteria are used in determining a country's score for this component:

- **100**—Foreign investment (FI) is encouraged and treated the same as domestic investment, with a simple and transparent FI code and a professional, efficient bureaucracy. There are no restrictions in sectors related to national security or real estate. No expropriation is allowed. Both residents and non-residents have access to foreign exchange and may conduct international payments. Transfers or capital transactions face no restrictions.
- **90**—Same as above with the following exceptions: There are very few restrictions on FI in sectors related to national security. There are legal guarantees against expropriation of property. Transfers or capital transactions are subject to virtually no restrictions.
- **80**—Same as above with the following exceptions: A transparent FI code is subject to minimal bureaucratic or other informal impediments. There are very few restrictions on foreign exchange. Transfers or capital transactions are subject to very few restrictions.
- **70**—Same as above with the following exceptions: There are some restrictions on FI through general rules or in a few sectors such as utilities, natural resources, or national security. There are a few restrictions on access to foreign exchange or the ability to conduct international payments.

- **60**—Same as above with the following exceptions: FI is generally encouraged but may not receive equal treatment in a few sectors. The FI code is somewhat non-transparent, and/or FI faces bureaucratic impediments. Expropriation of property is highly unlikely, and the government guarantees compensation. Transfers or capital transactions are subject to some restrictions.
- **50**—Same as above with the following exceptions: Foreign investors face restrictions on their ability to purchase real estate. All investors face bureaucratic impediments and corruption. Residents and/or non-residents face some restrictions on access to foreign exchange or their ability to conduct international payments. Transfers or capital transactions are subject to obvious restrictions.
- **40**—Same as above with the following exceptions: FI is somewhat restricted, the FI code is somewhat discriminatory, and FI is restricted outright in some sectors. Expropriation of property is rare. Transfers and capital transactions are subject to significant restrictions.
- **30**—Same as above with the following exceptions: FI is significantly restricted, the FI code is discriminatory, and foreign investors may purchase real estate only in limited circumstances. All investors face significant bureaucratic impediments and corruption. Residents and non-residents face strict restrictions on access to foreign exchange, and the government imposes many controls on international payments.
- **20**—Same as above with the following exceptions: FI is discouraged and prohibited in many sectors, the FI code is discriminatory, and the approval process is opaque and subject to widespread corruption. Few sectors are open to FI. Expropriation of property is common. The government imposes extensive controls on international payments, transfers, and capital transactions.
- **10**—Same as above with the following exceptions: Foreign investors may not purchase real estate. The government controls or prohibits most international payments, transfers, and capital transactions.
- **0**—Same as above with the following exceptions: FI is prohibited, foreigners may not own real estate, and the government prohibits international payments, transfers, and capital transactions.

**Sources.** Unless otherwise noted, the authors used the following sources for data on capital flows and foreign investment, in order of priority: Official government publications of each country; Economist Intelligence Unit, *Country Commerce*, *Country Profile*, and *Country Report*, 2005–2008; Office of the U.S. Trade Representative, *2008 National Trade Estimate Report on Foreign Trade Barriers*; and U.S. Department of Commerce, *Country Commercial Guide*, 2005–2008.

#### Freedom #7: Financial Freedom

Financial freedom is a measure of banking security as well as a measure of independence from government control. State ownership of banks and other financial institutions such as insurers and capital markets is an inefficient burden that reduces competition and generally lowers the level of available services.

The authors score this component by determining the extent of government regulation of financial services; the extent of state intervention in banks and other financial services; the difficulty of opening and operating financial services firms (for both domestic and foreign individuals); and government influence on the allocation of credit. The authors use this analysis to develop a description of the country's financial climate and assign it an overall score on a scale of 0 to 100.

The following criteria are used in determining a country's score for this component of economic freedom:

- **100—Negligible government influence.** Independent central bank supervision and regulation of financial institutions are limited to enforcing contractual obligations and preventing fraud. Credit is allocated on market terms. The government does not own financial institutions. Financial institutions may engage in all types of financial services. Banks are free to issue competitive notes, extend credit and accept deposits, and conduct operations in foreign currencies. Foreign financial institutions operate freely and are treated the same as domestic institutions.

- **90—Minimal government influence.** Same as above with the following exceptions: Independent central bank supervision and regulation of financial institutions are minimal but may extend beyond enforcing contractual obligations and preventing fraud.
- **80—Nominal government influence.** Same as above with the following exceptions: Independent central bank supervision and regulation are straightforward and transparent but extend beyond enforcing contractual obligations and preventing fraud. Government ownership of financial institutions is a small share of overall sector assets. Financial institutions face almost no restrictions on their ability to offer financial services.
- **70—Limited government influence.** Same as above with the following exceptions: Credit allocation is slightly influenced by the government, and private allocation of credit faces almost no restrictions. Foreign financial institutions are subject to few restrictions.
- **60—Significant government influence.** Same as above with the following exceptions: The central bank is not fully independent, its supervision and regulation of financial institutions are somewhat burdensome, and its ability to enforce contracts and prevent fraud is insufficient. The government exercises active ownership and control of financial institutions with a significant share of overall sector assets. The ability of financial institutions to offer financial services is subject to some restrictions.
- **50—Considerable government influence.** Same as above with the following exceptions: Credit allocation is significantly influenced by the government, and private allocation of credit faces significant barriers. The ability of financial institutions to offer financial services is subject to significant restrictions. Foreign financial institutions are subject to some restrictions.
- **40—Strong government influence.** Same as above with the following exceptions: The central bank is subject to government influence, its supervision and regulation of financial institutions are heavy, and its ability to enforce contracts and prevent fraud is weak. The government exercises active ownership and control of financial institutions with a large minority share of overall sector assets.
- **30—Extensive government influence.** Same as above with the following exceptions: Credit allocation is extensively influenced by the government. The government owns or controls a majority of financial institutions or is in a dominant position. Financial institutions are heavily restricted, and bank formation faces significant barriers. Foreign financial institutions are subject to significant restrictions.
- **20—Heavy government influence.** Same as above with the following exceptions: The central bank is not independent, and its supervision and regulation of financial institutions are repressive. Foreign financial institutions are discouraged or highly constrained.
- **10—Near repressive.** Same as above with the following exceptions: Credit allocation is controlled by the government. Bank formation is restricted. Foreign financial institutions are prohibited.
- **0—Repressive.** Same as above with the following exceptions: Supervision and regulation are designed to prevent private financial institutions. Private financial institutions are prohibited.

**Sources.** Unless otherwise noted, the authors used the following sources for data on banking and finance, in order of priority: Economist Intelligence Unit, *Country Commerce*, *Country Profile*, and *Country Report*, 2005–2008; Deloitte, *Country Snapshot*; Organization for Economic Co-operation and Development; official government publications of each country; U.S. Department of Commerce, *Country Commercial Guide*, 2005–2008; Office of the U.S. Trade Representative, *2008 National Trade Estimate Report on Foreign Trade Barriers*; U.S. Department of State, *Investment Climate Statements 2008*; World Bank, *World Development Indicators 2008*; and various news and magazine articles on banking and finance.

#### Freedom #8: Property Rights

The property rights component is an assessment of the ability of individuals to accumulate private property, secured by clear laws that are fully enforced by the state. It measures the degree to which a country's laws protect private property rights and the degree to which its government enforces those



laws. It also assesses the likelihood that private property will be expropriated and analyzes the independence of the judiciary, the existence of corruption within the judiciary, and the ability of individuals and businesses to enforce contracts. The more certain the legal protection of property, the higher a country's score; similarly, the greater the chances of government expropriation of property, the lower a country's score. Countries that fall between two categories may receive an intermediate score. The authors grade each country according to the following criteria:

- **100**—Private property is guaranteed by the government. The court system enforces contracts efficiently and quickly. The justice system punishes those who unlawfully confiscate private property. There is no corruption or expropriation.
- **90**—Private property is guaranteed by the government. The court system enforces contracts efficiently. The justice system punishes those who unlawfully confiscate private property. Corruption is nearly nonexistent, and expropriation is highly unlikely.
- **80**—Private property is guaranteed by the government. The court system enforces contracts efficiently but with some delays. Corruption is minimal, and expropriation is highly unlikely.
- **70**—Private property is guaranteed by the government. The court system is subject to delays and is lax in enforcing contracts. Corruption is possible but rare, and expropriation is unlikely.
- **60**—Enforcement of property rights is lax and subject to delays. Corruption is possible but rare, and the judiciary may be influenced by other branches of government. Expropriation is unlikely.
- **50**—The court system is inefficient and subject to delays. Corruption may be present, and the judiciary may be influenced by other branches of government. Expropriation is possible but rare.
- **40**—The court system is highly inefficient, and delays are so long that they deter the use of the court system. Corruption is present, and the judiciary is influenced by other branches of government. Expropriation is possible.
- **30**—Property ownership is weakly protected. The court system is highly inefficient. Corruption is extensive, and the judiciary is strongly influenced by other branches of government. Expropriation is possible.
- **20**—Private property is weakly protected. The court system is so inefficient and corrupt that outside settlement and arbitration is the norm. Property rights are difficult to enforce. Judicial corruption is extensive. Expropriation is common.
- **10**—Private property is rarely protected, and almost all property belongs to the state. The country is in such chaos (for example, because of ongoing war) that protection of property is almost impossible to enforce. The judiciary is so corrupt that property is not protected effectively. Expropriation is common.
- **0**—Private property is outlawed, and all property belongs to the state. People do not have the right to sue others and do not have access to the courts. Corruption is endemic.

**Sources.** Unless otherwise noted, the authors used the following sources for information on property rights, in order of priority: Economist Intelligence Unit, *Country Profile*, *Country Report*, and *Country Commerce*, 2005–2008; U.S. Department of Commerce, *Country Commercial Guide*, 2005–2008; and U.S. Department of State, *Country Reports on Human Rights Practices*, 2005–2008.

#### Freedom #9: Freedom from Corruption

Corruption erodes economic freedom by introducing insecurity and uncertainty into economic relationships. The score for this component is derived primarily from Transparency International's Corruption Perceptions Index (CPI) for 2007, which measures the level of corruption in 179 countries. The CPI is based on a 10-point scale in which a score of 10 indicates very little corruption and a score of 0 indicates a very corrupt government. In scoring freedom from corruption, the authors convert the raw CPI data to a scale of 0 to 100 by multiplying the CPI score by 10. For example, if a country's raw CPI data

score is 5.5, its overall freedom from corruption score is 55. For countries that are not covered in the CPI, the freedom from corruption score is determined by using the qualitative information from internationally recognized and reliable sources.<sup>4</sup> This procedure considers the extent to which corruption prevails in a country. The higher the level of corruption, the lower the level of overall economic freedom and the lower a country's score.

**Sources.** Unless otherwise noted, the authors used the following sources for information on informal market activities, in order of priority: Transparency International, *Corruption Perceptions Index*, 2007; U.S. Department of Commerce, *Country Commercial Guide*, 2005–2008; Economist Intelligence Unit, *Country Commerce, Country Profile*, and *Country Report*, 2005–2008; Office of the U.S. Trade Representative, *2008 National Trade Estimate Report on Foreign Trade Barriers*; and official government publications of each country.

### **Agricultural Variables:**

#### **Fertilizer per Hectare:**

Fertilizer consumption (100 grams per hectare of arable land) measures the quantity of plant nutrients used per unit of arable land. Fertilizer products cover nitrogenous, potash, and phosphate fertilizers (including ground rock phosphate). Traditional nutrients--animal and plant manures--are not included. The time reference for fertilizer consumption is the crop year (July through June). Arable land includes land defined by the FAO as land under temporary crops (double-cropped areas are counted once), temporary meadows for mowing or for pasture, land under market or kitchen gardens, and land temporarily fallow. Land abandoned as a result of shifting cultivation is excluded. Source: Food and Agriculture Organization, *Production Yearbook* and data files.

#### **Tractors per Hectare:**

Agricultural machinery refers to the number of wheel and crawler tractors (excluding garden tractors) in use in agriculture at the end of the calendar year specified or during the first quarter of the following year. Arable land includes land defined by the FAO as land under temporary crops (double-cropped areas are counted once), temporary meadows for mowing or for pasture, land under market or kitchen gardens, and land temporarily fallow. Land abandoned as a result of shifting cultivation is excluded. Source: Food and Agriculture Organization, *Production Yearbook* and data files.

#### **Percent Land Irrigated:**

Irrigated land refers to areas purposely provided with water, including land irrigated by controlled flooding. Cropland refers to arable land and permanent cropland. Source: Food and Agriculture Organization, *Production Yearbook* and data files.

#### **Cereal Yield per Hectare:**

Cereal yield, measured as kilograms per hectare of harvested land, includes wheat, rice, maize, barley, oats, rye, millet, sorghum, buckwheat, and mixed grains. Production data on cereals relate to crops harvested for dry grain only. Cereal crops harvested for hay or harvested green for food, feed, or silage and those used for grazing are excluded. Source: Food and Agriculture Organization, *Production Yearbook* and data files.

#### **Value Added per Agricultural Worker:**

Agriculture value added per worker is a measure of agricultural productivity. Value added in agriculture measures the output of the agricultural sector (ISIC divisions 1-5) less the value of intermediate inputs. Agriculture comprises value added from forestry, hunting, and fishing as well as cultivation of crops and

livestock production. Data are in constant 2000 U.S. dollars. Source: Derived from World Bank national accounts files and Food and Agriculture Organization, Production Yearbook and data files.

**Rural Population as Percent of Total:**

Rural population is calculated as the difference between the total population and the urban population. Source: The data on urban population shares used to estimate rural population come from the United Nations, World Urbanization Prospects. Total population figures are World Bank estimates

**Geographic Center Latitude:**

This entry includes rounded latitude and longitude figures for the purpose of finding the approximate geographic center of an entity and is based on the locations provided in the Geographic Names Server (GNS), maintained by the National Geospatial-Intelligence Agency on behalf of the US Board on Geographic Names.

**2006 Water Resources (Cubic Meters per Person per Year):**

Per Capita Actual Renewable Water Resources gives the maximum theoretical amount of water actually available, on a per person basis, for each country. In reality, a portion of this water may be inaccessible to humans. Actual renewable water resources are defined as the sum of internal renewable resources (IRWR) and external renewable resources (ERWR), taking into consideration the quantity of flow reserved to upstream and downstream countries through formal or informal agreements or treaties and possible reduction of external flow due to upstream water abstraction.

**Time Trend:**

The distance of a given data point from 1995: (Year-1995). For example the year 2001 would have a value of 6 for this variable. Inclusion of this variable is to capture the effects of better technology and availability of technology over time.

**APPENDIX 2: International Data Set Countries:**

Argentina  
Australia  
Bangladesh  
Botswana  
Brazil  
Cambodia  
China  
Colombia  
France  
Germany  
Guatemala  
India  
Indonesia  
Japan  
Kazakhstan  
Kenya  
Korea, Rep.  
Lao PDR  
Malaysia  
Mexico  
Myanmar  
Nicaragua  
Philippines  
Poland  
Russian Federation  
Spain  
Thailand  
Ukraine  
United Kingdom  
United States  
Venezuela, RB  
Vietnam

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