A growing literature in Political Science focuses on the relationship between ethnic economic inequality and civil war onset. Estimating the impact of ethnic inequality on civil war onset is difficult because of measurement error and lack of cross-national data. Existing studies are inconclusive and highly limited due to selection bias. Small sample sizes have significantly constrained the power of statistical tests. We use an original dataset spanning 51 ethnic groups in 99 countries to test the impact of ethnic economic inequality on civil war onset. We find ethnic inequality is positively related to civil war onset. However, contrary to conventional wisdom, this relationship is weak and is mitigated by other more influential factors like group size and political power.

Conventional wisdom suggests ethnic inequality predicts civil war onset. Stewart suggests that when individual self-esteem is bound up with ethnic identity, ethnic inequality produces grievances that lead to mobilization and civil war. However, recent cross-national studies have been inconclusive due to methodological problems (Fearon J & Laitin D, working paper presented at APSA 1999). Although case studies suggest ethnic inequality increases rebellion by disadvantaged groups, they are not generalizable and suffer from selection bias.

This paper will conduct a large-sample study of cross-national ethnic inequality. First, we review the challenges in testing the impact of ethnic inequality on civil war. Next, we attempt to overcome these challenges through a large-N statistical analysis of ethnic inequality and civil war onset. We draw on an original data set comprising surveys conducted by the Demographic and Health Surveys (DHS) group and research conducted by Laitin, Fearon, Kasara and myself. Finally, we examine the case of the Hutu in Rwanda in order to illustrate other variables that interfere with the impact of ethnic inequality on civil war. Our results suggest that economic disadvantages weakly predict for ethnic rebellion. However, other factors like political power and group size strongly affect observed outcomes.

**Theoretical Review**

Political scientists have proposed both rationalist and relative deprivation explanations for civil war (Sambanis N, presented at Brookings Institution Trade Forum 2004). However, a growing body of literature focuses on ethnic inequality, a type of relative deprivation. Stewart argues that the intersection of economic inequality and cultural differences makes culture a powerful organizing force for conflict. Sambanis notes that without economic inequality, group identity is likely to be weak. But group inequality may have an impact on individual welfare, deepening grievances. Where the group responsible for inequality has a monopoly on political power, the aggrieved group may seek change through violence.

**Empirical tests on this relationship are inconclusive and sparse.** Although economic inequality increases the probability of civil war, their analysis is purely based on published reports, without rigorous empirical foundation. Using the same data as Guer and Moore, Fearon and Laitin find no relationship between inequality and civil war, citing both multicollinearity and measurement error (working paper presented at APSA 1999). Why so few cross-national studies? Humphreys notes inequality data is unavailable for many countries (Harvard Portal on Economics and Conflict, 2002).

Our research suggests these countries have vested interests in preventing data collection. For example, Lebanon’s 1926 Constitution allocates government offices using the size of each religious sect. The Lebanese government has had a powerful disincentive against collecting data that could shift this balance of power. Further, these countries are often undergoing political instability that impedes data collection. If data is unavailable for countries suffering precursors to civil war, our tests will suggest the relationship between economic inequality and civil conflict is weaker than it is (Humphreys M, Harvard Portal on Economics and Conflict, 2002).

Another reason for the lack of cross-national studies is measurement error. Many countries face problems operationalizing definitions of their major ethnic groups. For example, heterogeneous ethnic characteristics of Mestizos in Mexico make it hard to distinguish between Mestizos, Whites and Indigenous Peoples based on language or region. This makes it difficult to construct good estimates of ethnic inequality with data. Further, large-N cross-national comparisons are based on household surveys that vary in quality, reducing the likelihood that relationships between variables will be found. Stewart and Klugman have proposed broader definitions of ethnic inequality that include political, economic and socio-cultural differences. However, it is unclear if a variable will be sensitive to so wide an array of values or if it can be constructed at all.

**Ethnic Inequality and Civil War**

Jonathan Phua, Stanford University

Conventional wisdom suggests ethnic inequality predicts civil war onset. Stewart suggests that when individual self-esteem is bound up with ethnic identity, ethnic inequality produces grievances that lead to mobilization and civil war. However, recent cross-national studies have been inconclusive due to methodological problems (Fearon J & Laitin D, working paper presented at APSA 1999). Although case studies suggest ethnic inequality increases rebellion by disadvantaged groups, they are not generalizable and suffer from selection bias. Small sample sizes have significantly constrained the power of statistical tests. We use an original dataset spanning 51 ethnic groups in 99 countries to test the impact of ethnic economic inequality on civil war onset. We find ethnic inequality is positively related to civil war onset. However, contrary to conventional wisdom, this relationship is weak and is mitigated by other more influential factors like group size and political power.

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**Theoretical Review**

Political scientists have proposed both rationalist and relative deprivation explanations for civil war (Sambanis N, presented at Brookings Institution Trade Forum 2004). Rationalist theories argue civil war is likely in states with conditions conducive to rebel organization, such as low income per capita, economic growth or mountainous terrain. These conditions either decrease rebellion’s opportunity cost or decrease the capacity of the state, facilitating the mobilization of an insurgent movement. Relative deprivation theories argue that civil wars occur when a sub-state group becomes sufficiently aggrieved to mobilize for political change. The available evidence supports rationalist explanations for civil war (Sambanis N, presented at Brookings Institution Trade Forum 2004). However, a growing body of literature focuses on ethnic inequality, a type of relative deprivation. Stewart argues that the intersection of economic inequality and cultural differences makes culture a powerful organizing force for conflict. Sambanis notes that without economic inequality, group identity is likely to be weak. But group inequality may have an impact on individual welfare, deepening grievances. Where the group responsible for inequality has a monopoly on political power, the aggrieved group may seek change through violence.

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**Ethnic Inequality and Civil War**

Surveyors administered by the Demographic and Health Surveys (DHS) group provide a way around these problems. Using factor analysis, they assign individual wealth scores derived from responses to asset-ownership questions. This wealth score cannot be used cross-nationally as it is an ordinal ranking, rather than a cardinal value. We match individuals to their ethnic groups according to language or religion, following rules developed by Kasara (Kasara K, unpublished research, 2005) and based on a list of ethnic groups developed by Fearon. We then compute the quintile of each individual’s wealth score and aggregate by ethnic group, to find each group’s mean wealth quintile on a scale of 1 to 5. This procedure creates a sample of 216 ethnic groups across 31 countries, enumerated by the ethnic group.

Next, we augment our DHS

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**References**


Appendix A: Biotechnology and Total Utility Patenting Rates (1985-1996) in Silicon Valley and Route 128


quantities with data on ethnic inequality drawn from Global Barometer Surveys, censuses and published research. Unlike the DHS data, this collection is presented across countries, including per capita income, mean years of education, poverty incidence, and socio-economic data. The dataset is rich in quality and cross-indicator comparisons by transforming all the data, including DHS data, into a uniform variable (see page 6).

We sample up to 515 ethnic groups in 97 countries. For our dependent variable, we use the Minorities At Risk (MAR) dataset, which assigns a score ranging from 0 (no rebellion) to 7 (protracted civil war) to each ethnic group for each five-year period from 1945 to 1998 based on published reports. We take the highest value across this period and code it as the maximum rebellion score (maxreb). We transform maxreb into a dummy variable (rebmec) by pooling observations in the upper four and lower three quintiles, to guard against problems in causation and examine ethnic inequality against other variables that may predict for civil war. Unlike the DHS data, this dataset is not uniform in quality and we transform all the data, including DHS data, into a dummy variable (rebmec) by pooling observations in the upper four and lower three quintiles, to guard against problems in causation and examine ethnic inequality against other variables that may predict for civil war.

**Social Sciences**

**Social Sciences**

**Conclusion**

Conventional wisdom suggests that economic inequality affects the probability of civil war. A systematic investigation of the data confirms a weak relationship. Factors like group size and possibly political power have a greater impact on the onset of civil war. Further research should guard against problems in causation and examine economic inequality against other variables that may predict for civil war.

**Notes**

5. Petersen’s Resentment theory (see page 5).
6. Petersen’s Resentment theory (see page 5).
7. Petersen’s Resentment theory (see page 5).

**SURJ**
The Genetic Engineering of America’s Farmland: Concerns regarding patentability and the use of intellectual property rights

Mikhail Sofer, Stanford University

An inducement to create

The extent of patent law’s reach has long been a subject of interpretation and debate. In authoring the 1993 Patent Act, Thomas Jefferson viewed the patent monopoly not as a natural right, but as “an inducement to bring forth new knowledge.” Science, he believed, was the most certain way to further societal progress. Over the years, courts have broadly interpreted the patent statute, granting ownership over innovations once ineligible for protection. As intended by the framers of the original Act, expansion of the scope of patentability has nurtured the development of scientific spheres like biotechnology, but it has also allowed companies to exert a historically unprecedented amount of control over their industries. In recent cases involving biotech giant Monsanto Corporation, U.S. courts have consistently supported Monsanto’s patents on genetically modified seeds, holding farmers liable for infringement beyond the control of their choice.

This raises two questions: first, is it ethical to assign monopoly over a living thing, especially one as fundamental as seed? And second, how far does that right extend? Perhaps there is a line, as Jefferson proposed, where we must separate legitimate protection from abuse.

Public tradition becomes private practice

In millennia past, seed breeding was not an exact science. Farmers selected and crossed the best-adapted varieties, building upon previous knowledge through experimentation. The trend toward science-based solutions spread to the U.S. from Europe in the 18th century, and as the economy grew increasingly dependent upon agricultural exports, the need for production uniformity and higher yields moved seed breeding from farms to centralized public research centers like universities. Today, however, particularly in lucrative areas like commercial crop breeding and biotechnological applications, private agricultural research has — and continues to — displace public research.

In 1995, private investment constituted more than half of the $20 billion spent on agricultural R&D in the developed world. The major catalyst for this change has been the extension of intellectual property rights to biotechnologies, which has made investments in such projects more lucrative and thus appealing to companies seeking to maximize profits. Although universities still play a role in the research process, their sources of funding too have shifted from being almost entirely public, to largely private, in nature.

Although agricultural technologies like machinery and chemicals have always been protected under the Patent Act, similar patent protections had never been extended to plants on the basis that they were creations of nature, which are not patentable. In 1930, Congress passed the Plant Patent Act (PPA), which permits the patenting of plants, but only those that reproduce asexually. Congress had aimed to limit the reach of PPA, but conceding in 1970 that sexually reproducing plants need some form of protection as well, passed the Plant Variety Protection Act (PVPA), which grants owners an exclusive right to multiply and market varieties of the protected seed for 20 years. Though similar in nature to utility patents (a generic category for inventions that perform useful functions), PVPA made two critical exceptions: scientists could use PVPA-protected varieties for research, and farmers would be able to save patented seed for the next harvest.

The biggest change came in 1996, when the U.S. Supreme Court ruled in Diamond v. Chakrabarty that a living microorganisms could be patented under the utility patent criteria for regular inventions. The U.S. Patent and Trademark Office (U.S. PTO) affirmed and extended this new rule in Ex parte Hibberd (1985), which concluded that all sexually reproducing plants were eligible for utility patent protection. Following the ruling, the U.S. PTO began accepting applications for utility patents on sexually reproducing plants, even though Congress had never authorized the agency to do so. With these revolutionary reinterpretations of the law, biotechnology became a highly attractive and lucrative industry, almost overnight.

Utility patents vs. PVPA

Some university researchers believe that the encouragement of genetically engineered (GE) plants within the meaning of 35 U.S.C. § 101 — the section of the Constitution that enumerates criteria for patentability — is a beneficial change, since it has enabled companies to recoup their research costs, which can easily reach into the tens of millions for the requisite lab research, field testing, maintenance research, and commercialization steps. Without the potential for financial returns, private firms would have no incentive to pursue expensive biotech projects.

Farmers, lawyers, and policymakers tend to be less enthusiastic about the changes regarding plant patentability because the statutory exemptions that exist under PVPA do not apply to utility patents. In other words, patent holders can legally exclude the public from the patented variety, even for research or agricultural purposes. One of the most controversial outcomes has been the use of this restriction by biotech companies to bar farmers from farming their land in the traditional manner. In fact, Monsanto’s “Technology Use Agreement,” which farmers must sign in order to use Monsanto’s GE seed varieties, prohibits farmers from saving seed and replanting it the following season. Instead, farmers must purchase a new supply each year, a highly inefficient practice given that the perfectly acceptable seed from the first crop goes to waste. Those who fail to comply with the agreement terms — whether out of ignorance, negligence or no fault of their own — face serious financial consequences. This controversial agreement has been the basis for Monsanto’s suits against numerous U.S. farmers.

Jonathan Phua is a junior from Singapore majoring in Political Science and Management Science & Engineering. He first encountered research as a part of the Stanford experience, and he thanks Professors David Laitin and James Fearon for their invaluable guidance and advice. He enjoys thinking about complex problems, reading and criticizing poetry, watching plays and traveling all over the world.