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Indicators of Legal Issues in the Blueprint Matrix for the Accountability of Property Rights

by Heywood Fleisig and Nuria de la Peña of the Center for the Economic Analysis of Law, prepared for Chemonics Inc. with the support of USAID

Well-designed indicators can provide a fast and simple idea of how one country's property rights system compares with another's. Such indicators can show how the system improves and worsens over time.¹ They can measure the effect of projects and reforms. Indicators are only useful, though, when they are tied together in some analytical framework that gives each indicator its proper weight. Indicators cannot just stand alone as "reasonable" indicators.² This note discusses why a weighting system for property rights indicators is essential, how such a weighting system would work, and then sets out elements of such an indicator system for rights in real property.

Why indicators must have weights

Useful indicators must have weights to permit cross country comparisons and comparisons over time. Consider this example. Suppose we were developing indicators for cars. One indicator of whether a car was good could be whether it had a steering wheel; another indicator of whether a car was good could be whether it had a built-in holder for coffee cups. These are both desirable features in a car. However, a car without a steering wheel won't run at all, while a car without a cup holder could run perfectly well. These two indicators have very different bearing on the adequacy and performance of the car. That creates problems in interpreting different levels of indicators and changes in indicators over time.

Taking the indicator values for an industrial country at 100, suppose that the automobile industry of developing Country A had an index of 80/100 on steering wheels and 100/100 cup holders; while developing Country B, had an index of 90/100 on steering wheels and 20/100 on cup holders. Country A would have an unweighted average combined score of 90/100 while country B would have a combined score of only 55. Despite this, most people would think that country B was doing a much better job in automobiles assembly than country A. Moreover, if country B's score changed in a subsequent year so that the steering indicator fell to 80/100 and the cupholder index fell to 60/100 (cup holders), we would actually think that country B's performance had worsened, not improved, the rise in indicator to 70/100 notwithstanding. Nor can we solve this problem of indicator ambiguity by adding additional indicators. One hundred unweighted indicators will do no better than two indicators without a rule for weighing the importance of the indicators.

¹ This note was written by Heywood Fleisig and Nuria de la Peña with the assistance of Lance Girton of the Center for the Economic Analysis of Law (CEAL) for Chemonics Inc. with the support of USAID. Heywood Fleisig and Lance Girton are economists and Research Associates at CEAL, Nuria de la Peña is Director of Legal Operations.

² See Heywood Fleisig, Neil Roger and Syed Mahmmod, "Indicators of Private Sector Development" (Washington, DC: The World Bank, 1995)

The only way to address this problem is weight the indicators according to the role of the indicator in meeting the overall objective of the activity. We can think of many performance measures for cars into which steering wheels and cup holders would fit: passenger miles traveled, cost per passenger mile, safety, speed, and acceleration. Most cars will have very different combinations of these features. The total value of those different features to consumers is reflected by the price of the car. The net benefit to society of producing cars, however, must also reflect the cost of producing those cars. The net benefit to society equals the amount the consumers would be willing to pay for these cars less the cost of producing them. Indicators are inputs in this calculation and they can also guide us in diagnosing ways to cut costs or increase value. Consumer publications routinely publish “indicators” along with prices. Indicators without values provide considerably less complete guidance.

An Indicator System for Legal Property Rights

Property rights systems also create value in the property that they govern. These systems also have costs. The best systems generate more value and cost less. The more a legal defect reduces the value of property, and the less it costs to fix it, the more weight the indicator of such a defect should have.

How can we link property rights to the value of property? As a general matter, the more income property yields, the longer it yields that income, and the less it costs to generate that income, the more that property is worth. So, for example, if an acre of land yielded a net profit of \$US 1,000 every year with absolute certainty and forever then that acre would be about as attractive as long-term US government bonds. If the current rate of interest were 5%, then investors would pay about \$20,000 for that acre of land because \$20,000 in government bonds would also yield \$1,000 (5% of \$20,000).

Many factors will affect the value of this land. An increase in output prices will raise net income and increase land prices; an increase in output volume, because of new technologies or the use of more skilled workers will raise net income; increases in taxes will lower net income and lower land prices; a new road will lower costs and raise net profits, increasing the value of land. Of particular importance is increased risk. Suppose that the net profit was not \$1000 every year but only averaged \$1000 each year. The more variance in annual returns, the greater the risk to the owner. For such a risky investment, the investor would regard the comparable investment not the US government bond, but riskier bonds of private corporations or non-US governments. To compensate for greater risk, the yields on those bonds exceed the yields on US government bonds. Suppose the “risk-adjusted” rate of return, determined by the aversion to risk of investors in this country was 10%. Then the value of the same acre of land would be \$10,000 (because its income equals the 10% return on \$10,000 of comparably risky bonds). Each of these effects on the value of land can be calculated with reasonable precision.

Legal Indicators and the Value of Property Rights

Problems in the legal framework for property will also affect the value of that property. The market value of land will trade at a discount below its potential value when these legal problems are present. This note focuses on two important measures: the cost of maintaining tenure and the losses arising from a poor legal framework for using property as collateral for loans. The better the system governing property rights, the closer the market value of its land approaches its potential value.

A poor legal framework for land tenure means that owners must take a variety of measures to protect their holdings: they must register their land, maintain guards to prevent squatting and trespassing, or file suit to evict squatters. Each of these remedies has a cost. The higher these costs, the more the market value of land departs from its potential value. The Appendix sets out these issues in greater detail.

A poor legal framework for taking property as collateral means that property owners cannot get large secured loans at low interest but must rely on small unsecured loans at high interest rates. Since the profit from the output of land will be greater the lower is the interest cost, the value of real property than can be used as collateral is greater.

The appendix and the indicators discuss how to measure these and how other indicators – diagnostic indicators – enter into these calculations and provide guidance for how to reform systems.³

A wide variety of plausible indicators are available. Some of these are set out below. These indicators should not be applied mechanically. Appropriate indicators will often vary from country to country and with the purpose of the indicator. For example, a few indicators may serve to compare performance across countries. Others may be useful for monitoring progress within a country. Yet others may be important to monitor project implementation.

A country’s overall Property Rights Index (**PRI**) for legal issues equals the actual market value of property as a percentage of the potential value of the property where a value of 10 indicates that the legal and regulatory system permits the market value to achieve the full potential. Two other key PRIs relate to the cost of defending property rights and the cost of defective systems of secured lending. These two PRIs together explain the deviation between the overall PRI's actual value and the PRI's potential value of 10. All other indicators are diagnostic indicators that act as inputs into the PRI. They have separate weights, for diagnostic purposes, but their value lies in how they feed into the main indicators and how they guide policy work toward the reform.

Country: _____					
Overall Property Rights Index (PRI) on Legal Issues =					
Property Rights Legal Issues Indicators					
Indicator	Type	Scoring 1 – 10	How the Data can be Obtained	What the Indicator will Demonstrate	Country's Score
Property Rights in Land – Defending Ownership Right					
Cost of enforcing real property rights, by registration, personal guards, or lawsuits	%	((100% - PV(Cost)/ Potential Land Value))/10 10: zero enforcement cost 0: enforcement costs	See diagnostic indicators	How all diagnostic indicators in this section combine to raise cost of property protection and drive market values below potential.	

³ See Lance Girton, Heyoow Fleisig, and Nuria de la Peña, “Financial Market Efficiency...” for a discusión of measuring the cost of an inefficient legal framework for secured lending.

Country: _____					
Overall Property Rights Index (PRI) on Legal Issues =					
Property Rights Legal Issues Indicators					
Indicator	Type	Scoring 1 – 10	How the Data can be Obtained	What the Indicator will Demonstrate	Country's Score
		absorb most of property's value			
Weights: Discount under potential value caused by weak systems of real property rights. Land registration usually gives more protection against unauthorized use or seizure. Often personal guards are required to enforce these rights. For low income families on small parcels, one adult is often assigned the task of preventing squatting. For high income families, the cost is more frequent procedures for eviction. Costs: For unregistered private land, Min of (PV(one family member's income)/Potential land value; E(cost of legal processes to defend rights under laws governing unregistered land)/Potential land value. For registered land E(cost of registration) + E(cost of legal processes to defend rights under laws governing registered land)/Potential land value. See Appendix for discussion and derivation.					
		█			
Fraction of the total property in the country that is filed in the registry <i>Proporción de propiedades registradas respecto del total disponible.⁴</i>	%	25% = 10	Geographical country survey and registry records.	Whether the laws to make property rights public and hence, enforceable against the public at large provide a viable system for land markets. Not all property in a country needs to be filed in the registry, but land markets that are developed will show more than 25% of their land in the registry since they would expect to enforce their transactions against other parties and the public at large.	
Weight of Indicator: None. This is a diagnostic indicator. The cost of registration will be an element in the cost of registration as entered in the registration indicator.					
Cost of registering real estate transactions as a percentage of the total registry costs divided the number of transactions. <i>El costo de registro arancel promedio de los instrumentos legales de operaciones sobre la</i>	annual %	<100 % = 10 points, with negative escalation above 100%.	Registry records and budget, regulation on allowable registry fees and applicable taxes at registration; interviews of	The extent to which registry laws do not set out registry transaction costs that are not more than the costs of running the registry, so that do not otherwise operate as a regressive tax. Costs should be assessed from the time a private document is simply in	

⁴ The text in italics corresponds to the legal indicators included in the Blueprint general matrix revised in August 2005 and our suggested changes.

Country: _____					
Overall Property Rights Index (PRI) on Legal Issues =					
Property Rights Legal Issues Indicators					
Indicator	Type	Scoring 1 – 10	How the Data can be Obtained	What the Indicator will Demonstrate	Country's Score
<i>propiedad inmueble (post mortem e inter vivos y división de bienes) debería ser igual al costo del sistema de registro archivo dividido por el número total de operaciones archivadas.</i>			wait times at a sample of jurisdictions.	writing and signed by the parties (without notarization), and should include the average wait time under the average income in the country at notary, registry and tax offices.	
Weight of Indicator: None. This is a diagnostic indicator. The cost of registration will be an element in the cost of registration as entered in the registration indicator.					
Percentage of properties that have a unique cadastre and registration identification number. <i>Porcentaje de las propiedades que tienen un número de identificación único catastral y registral.</i>	%	25% = 0	Land survey, Cadastre records	A High number of properties with a unique cadastre and registry identification will demonstrate the effective implementation of the registry and cadastre legislation, which leads to less controversy and better collection of taxes. Often, in developed countries only some property has a cadastre unique identification number, (e.g., rural land in the cadastre will only show a natural description); however, systems are advancing towards such standard.	
Weight of Indicator: None. This is a diagnostic indicator. The cost will be an element in the cost of registration as entered in the registration indicator.					
Percentage of total real estate included in the cadastre <i>Porcentaje del territorio incluido en un catastro.</i>	%	100% = 10	Country's survey; cadastre's office records	The extent to which cadastre legislation has been implemented.	
Weight of Indicator: None. This is a diagnostic indicator. The cost will be an element in the cost of registration as entered in the registration indicator.					
The registry and the cadastre identification of land is the same. <i>La descripción Catastral y la descripción en el Registro de la</i>	%	100% = 10	Country's survey; cadastre's office records	The extent to which the registry and the cadastre legislation has been consistent in the identification of the property rights.	

Country: _____					
Overall Property Rights Index (PRI) on Legal Issues =					
Property Rights Legal Issues Indicators					
Indicator	Type	Scoring 1 – 10	How the Data can be Obtained	What the Indicator will Demonstrate	Country's Score
<i>Propiedad coinciden.</i>					
[average] Time to process a title to untitled property. <i>Plazo del proceso de regularización de un predio.</i>	average days	20 days = 10, negative escalation 20 days is considered a reasonable legal time in advanced legal systems.	Survey of titling records	The extent to which land titling laws set out a procedure that is expedited in time, or grant automatic title.	
Weight of Indicator: None. This is a diagnostic indicator. The cost will be an element in the cost of registration as entered in the registration indicator.					
Cost of the regularization process in relation to the average income <i>Costo del proceso de regularización de un predio con relación al ingreso medio del país.</i>	%	us\$ and percentage. 1% = 10, negative escalation	Survey of titling records	The extent to which land titling laws set out a procedure that is affordable by the population at large.	
Weight of Indicator: None. This is a diagnostic indicator. The cost will be an element in the cost of registration as entered in the registration indicator.					
Time to process a cadastre registration. <i>Plazo del proceso catastral.</i>	0	Time, immediate upon filing 0 = 10, with negative escalation	Survey of cadastre transactions	The extent to which land cadastre laws set out a procedure that is expedited in time.	
Weight of Indicator: None. This is a diagnostic indicator. The cost will be an element in the cost of registration as entered in the registration indicator.					
Number of property rights conflicts as a percentage of the population. <i>Cantidad de conflictos sobre derechos de propiedad con relación a la población PBI.</i>	%	----[U.S or Canada data necessary]	A survey should gather the number of controversies (court records will not show conflicts if the courts do not function well in the country).	the extent to which the laws set out a self enforceable systems and clear property rights.	

Country: _____					
Overall Property Rights Index (PRI) on Legal Issues =					
Property Rights Legal Issues Indicators					
Indicator	Type	Scoring 1 – 10	How the Data can be Obtained	What the Indicator will Demonstrate	Country's Score
Weight of Indicator: None. This is a diagnostic indicator. The cost will be an element in the cost of registration as entered in the registration indicator.					
Percentage of the population that has [remote] direct and free access to the registry and cadastre. <i>Porcentaje de la población que tiene acceso público [remoto] directo y gratuito para obtener información catastral y registral</i>	%	100 % = 10 with negative escalation below 100. Direct Internet search access with a computer and a common internet navigator software and no additional software or costs is considered 100% free access.	Survey	Whether the laws provide remote and free public access that is effective to the population at large.	
Weight of Indicator: None. This is a diagnostic indicator. The cost will be an element in the cost of registration as entered in the registration indicator.					
Costs of time and expenses for the resolution of disputes in relation to the average income in the country <i>El costo de tiempo y gastos para la resolución de controversias en proporción al ingreso medio del país.</i>	% in a given year	0.1% = 10 with reverse escalation	Narrowed to land disputes: Judicial system statistics, survey to survey time on line and at personal appearances (other than trial day) at judicial offices, central bank statistics.	The extent to which the law sets out self enforceable mechanisms and provides for expedited procedures.	
Weight of Indicator: None. This is a diagnostic indicator. The cost will be an element in the cost of registration as entered in the registration indicator.					
Percentage of the cost of eviction and sale of collateral in relation to the average property values during the lowest quarter of that year. <i>Porcentaje del costo de recuperar la posesión del bien afectado a la garantía y venderlo con relación al valor promedio de la</i>	%	3% = 10 with reverse negative escalation.	Legal assessment, surveys, including average legal or notary fees and wait time.	The extent to which the law sets out self enforceable mechanisms and provides for expedited procedures for eviction and sale of collateral.	

Country: _____					
Overall Property Rights Index (PRI) on Legal Issues =					
Property Rights Legal Issues Indicators					
Indicator	Type	Scoring 1 – 10	How the Data can be Obtained	What the Indicator will Demonstrate	Country's Score
<i>propiedad durante el trimestre más bajo .</i>					
Weight of Indicator: None. This is a diagnostic indicator. The cost will be an element in the cost of registration as entered in the registration indicator.					
Costs of eviction of tenants in relation to the average property values during the lowest quarter that year. <i>Costo para desalojar al arrendatario incumplido y recuperar la posesión del bien con relación al valor promedio de la propiedad durante el trimestre más bajo.</i>	%	3% = 10 with reverse negative escalation.	Legal assessment, surveys, including average legal or fees and wait time.	The extent to which the law sets out expedited procedures for evicting tenants.	
Weight of Indicator: None. This is a diagnostic indicator. The cost will be an element in the cost of registration as entered in the registration indicator.					
Right to Use Real Property as Collateral					
Lost property value arising from defective system for secured transactions.	%	((100% - PV(Cost)/ Potential Land Value))/10 10: zero gap with most efficient secured transactions system; 0: high interest rates absorb most of property's value	See diagnostic indicators	How all diagnostic indicators in this section combine to raise interest rates and worsen loan terms, driving market values below potential.	
Weights: Discount under potential value caused by weak systems of secured lending. Real property owners can get financing only at high unsecured rates rather than low secured rates. Output/rentals from land financed at lower rates have a higher profit and therefore potential value to the property owner. The discount equals the present value of land taken at the secured lending rate (PV(R(t) sec) present value of the same earnings stream taken at the higher unsecured lending stream (PV(R(t) unsec). Improvements in the secured transactions system (see diagnostic indicators below) such as reduced notary fees, costs of filing in the registry, and so forth will reduce interest rates, increase loan sizes and lead to market values closer to potential. See Appendix for discussion and derivation.					
Ratio of actual private mortgage credit to potential private	%	60% = 10	Calculated from IFS or Central Bank	The extent to which mortgages permit more access to credit. Private	

Country: _____					
Overall Property Rights Index (PRI) on Legal Issues =					
Property Rights Legal Issues Indicators					
Indicator	Type	Scoring 1 – 10	How the Data can be Obtained	What the Indicator will Demonstrate	Country's Score
mortgages <i>Crédito de la propiedad inmueble como porcentaje del total de crédito</i>			Bulletin	includes only private loans that do not carry a government guarantee. Potential credit is derived from examining the ratio of mortgage credit to property value In countries with developed property rights laws and collateral laws. .	
Weight of indicator: The gain from using land as collateral is the lower interest rate charged on secured loans and the larger loan size relative to the cash flow associated with the real estate. Real property that can be mortgaged is worth more than real property that cannot be mortgaged. The maximum loan/value ratio for the economy as a whole is given by an industrial country comparator. The potential gain from using the maximum loan to value ratio is ((potential mortgage credit-actual mortgage credit)*(unsecured loan rate – mortgage loan)*.5 (See note by Girton, Fleisig, de la Pena); The weight of this indicator will be the gain from actual mortgage lending /potential value of land.					
Interest rate spread between private non-bank loans secured with real estate and private, non-bank unsecured loans	Percentage	Secured loans interest rates are 12% lower = 10 points.	Calculated from IFS or Central Bank Bulletin plus interviews.	The extent to which problems in the mortgage legal framework increases interest rates. Non bank loans here give a better understanding of the impact of a good framework for secured transactions than bank loans because bank loans could carry an implied government guarantee in countries where the government often refinances non-performing banks. Note also that the underlying property rights problems are not reflected here because lenders will only first take as collateral a well- established property right.	
Weight of Indicator: None. This is a diagnostic indicator. The cost will be an element in the cost of mortgage credit as entered in the registration as entered in the registration indicator.					
Cost of filing mortgages in the registry as a percentage of the cost of property <i>Costo de [registro] la</i>	%	<100 % = 10 points, with negative escalation above 100%.	Registry records and budget, regulation on allowable	The extent to which mortgage registry laws do not set out registry transaction costs that are not more than the costs	

Country: _____					
Overall Property Rights Index (PRI) on Legal Issues =					
Property Rights Legal Issues Indicators					
Indicator	Type	Scoring 1 – 10	How the Data can be Obtained	What the Indicator will Demonstrate	Country's Score
<i>transacción [de hipotecas] de registro como porcentaje del costo de operación del Registro dividido el número de operaciones.</i>			registry fees and applicable taxes at registration; interviews of wait times at a sample of jurisdictions.	of running the registry, so that do not otherwise operate as a regressive tax. Costs should be assessed from the time a private document is simply in writing and signed by the parties (without notarization), and should include the average wait time under the average income in the country at notary, registry and tax offices.	
Weight of Indicator: None. This is a diagnostic indicator. The cost will be an element in the cost of mortgage credit as entered in the registration as entered in the registration indicator.					
Percentage of the real estate equity that may secure a loan. <i>Porcentaje de garantía del capital del crédito.</i>	%	100% = 10 with negative escalation above 100%	Superintendency records, statistics	The extent to which the laws permit collateral to be evicted and sold at a cost that recovers the loan.	
Weight of Indicator: None. This is a diagnostic indicator. The cost will be an element in the cost of mortgage credit as entered in the registration as entered in the registration indicator.					
<i>Percentage registered second trusts as a proportion of total mortgages.</i> <i>Porcentaje de créditos sobre el valor de la vivienda garantizada por hipotecas en segundo grado presentados para su registro por diversos prestamistas.</i>	annual %	50% = 10 Advanced property laws show an active market of second trust financing at a ratio of about 50% of total mortgages.	Superintendency of banks	The extent to which the law permits second trust by voiding restrictive clauses and setting up clear ranking of priority rules.	
Weight of Indicator: None. This is a diagnostic indicator. The cost will be an element in the cost of mortgage credit as entered in the registration as entered in the registration indicator.					
Must mortgages be notarized and what is the cost?	Yes/no + cost	0 % of the average income = 10 points [note that notary costs are	Legal analysis of notaries laws and	Shows the power of notaries in the secured transactions system and the extent to which	

Country: _____					
Overall Property Rights Index (PRI) on Legal Issues =					
Property Rights Legal Issues Indicators					
Indicator	Type	Scoring 1 – 10	How the Data can be Obtained	What the Indicator will Demonstrate	Country's Score
		unnecessary, hence 0% =10 points] Dollar cost as a percentage of average income.	regulations; interviews	notarization adds to the cost of pledging assets	
Weight of Indicator: None. This is a diagnostic indicator. The cost will be an element in the cost of mortgage credit as entered in the registration as entered in the registration indicator.					
Stamp fees and taxes levied on mortgages, including property transfer tax	Cost	5% = 10 points	Legal analysis of tax laws and regulations	The extent to which the system of secured transactions is used to levy taxes.	
Weight of Indicator: None. This is a diagnostic indicator. The cost will be an element in the cost of mortgage credit as entered in the registration as entered in the registration indicator.					
Costs to securitize mortgage loan portfolios in a private market, <i>Costo del prestamista para titularizar la cartera hipotecaria en mercados privados con relación al valor promedio de la propiedad durante el trimestre más bajo.</i>	%	us\$ 15 = 10 for a loan portfolio of 100 mortgages.	Excluding legal fees, survey of notary costs and trust administration costs if the law requires a qualified trustee, and registry regulations for registry filing costs, and taxes if applicable at the time of registration.	Whether the law effectively permits securitizing with a floating security interest against a mortgage loan portfolio.	
Weight of Indicator: None. This is a diagnostic indicator. The cost will be an element in the cost of mortgage credit as entered in the registration as entered in the registration indicator.					
Distribution of property rights					
The distribution of land is consistent with the distribution of income and wealth in the country; compared to international comparators. <i>La tenencia formal de bienes raíces es</i>		Compute Gini coefficient of land ownership by size of holding and by level of income compared to Gini coefficients for real property and for all wealth. f	National census, real estate registry	The extent to which the property rights legal system discriminates against minorities.	

Country: _____					
Overall Property Rights Index (PRI) on Legal Issues =					
Property Rights Legal Issues Indicators					
Indicator	Type	Scoring 1 – 10	How the Data can be Obtained	What the Indicator will Demonstrate	Country's Score
<i>proporcional a los datos demográficos del país.</i>		For comparison with domestic wealth, Gini coefficient equals coefficient for all wealth, 100 % = 10 For comparison with international comparators, Gini confident above divided by same coefficient for international comparators, 100% = 10.			
The distribution of mortgages is consistent with the distribution of income and wealth in the country; compared to international comparators. <i>La tenencia formal de bienes raíces es proporcional a los datos demográficos del país.</i>		Compute Gini coefficient for mortgages by size of mortgage and by level of income compared to Gini coefficients for real property and for all wealth. f For comparison with domestic wealth, Gini coefficient equals coefficient for all wealth, 100 % = 10 For comparison with international comparators, Gini coefficient above divided by same coefficient for international comparators, 100% = 10.	National census, real estate registry; Superintendent of banks	The extent to which the property rights legal system discriminates against minorities.	
The distribution of land is consistent with the demographic distribution of the population in the country, in terms of race, religion and sex. <i>La tenencia formal de bienes raíces es</i>		For both preceding measures, examine bottom, middle, and upper thirds by target groups. Compare to same measure for all domestic wealth and for foreign	National census, real estate registry	The extent to which the property rights legal system discriminates against minorities.	

Country: _____					
Overall Property Rights Index (PRI) on Legal Issues =					
Property Rights Legal Issues Indicators					
Indicator	Type	Scoring 1 – 10	How the Data can be Obtained	What the Indicator will Demonstrate	Country's Score
<i>proporcional a los datos demográficos del país.</i>		comparators			

Appendix: Deriving the Property Rights Index

The potential value of land under a given technology and endowment of human and physical capital is the present value of returns from the land with zero cost of defending title and an ability to mortgage at the mortgage interest rate from the most efficient mortgage system. That is, we compute present value (PV) of returns (R(t)) from land, expressing the potential value of land as

(1) $PV(R(t)|_{sec})$, where PV is the present value operator and "sec" denotes the secured interest rate from the most efficient mortgage system. That is, mortgage rates with the same spread over the government borrowing rate as the best industrial countries and loan/value ratios of 80%

In such a system, the market value MV of the real property would equal this present value:

$$(2) MV = PV(R(t)|_{sec})$$

When defending property rights is costly and requires registration, personal guards, or legal action against trespassers and squatters, the market value of the land declines to reflect the present value of those expected costs, $PV(E(costs(t))|_{sec})$, where E is the expectation operator, so that

$$(3) MV = PV(R(t)|_{sec}) - PV(E(costs(t))|_{sec}).$$

When land cannot be efficiently mortgaged, the value of land will decline to reflect the deficiencies in the mortgage market. Instead of taking the present value of future receipts at the secured lending rates, the market will reflect the higher unsecured lending rate and place a lower valuation on the future receipts equal to

$$(4) PV(R(t)|_{unsec}), \text{ where "unsec" represents the higher unsecured lending rate.}$$

The diminution in the value of the land arising from the absence of a working secured transactions system for real estate, fixtures will equal

$$(5) PV(R(t)|_{sec}) - PV(R(t)|_{unsec}).$$

When rights to use real property as collateral are not well designed and secured transactions markets are imperfect, the market value of land will decline further under its potential value:

$$(6) MV = PV(R(t)|_{sec}) - PV(E(costs(t))|_{sec}) - (PV(R(t)|_{sec}) - PV(R(t)|_{unsec}))$$

The Property Rights Index (PRI) is then defined as the market value divided by the potential value, or

$$(6) PRI = MV / PV(R(t)|_{sec}).$$

For the best systems, the PRI = 100%. That is, the market reflects 100% of the potential value of the property.

The PRI can be decomposed into its components -- cost of tenure and the cost of secured transactions problems -- to yield separate indicators for each:

$$(7) \text{ PRI} = \text{MV} / \text{PV}(\text{R}(t)|\text{sec}) = 100\% - [\text{PV}(\text{costs}(t)|\text{unsec}) / \text{PV}(\text{R}(t)|\text{sec})] - [(\text{PV}(\text{R}(t)|\text{sec}) - \text{PV}(\text{R}(t)|\text{unsec})) / \text{PV}(\text{R}(t)|\text{sec})].$$

So, for example, if a country had a potential land value of \$2000/hectare, an expected property rights protection cost of \$300/hectare and a security interest deficiency with a value equal to \$250/hectare, then the market value of land would be \$1450/hectare. Its overall PRI would be 1450/2000 or 72.5%, its PRI for property rights protection would be 300/2000 or 15% and its PRI for a security interest deficiency would be 12.5%. In some cases it will be desirable to standardize the PRI on best practice industrial country or Latin American practices. That can be done easily by dividing the PRI for the country in question by the comparator PRI. To place the overall PRI on the same scale as the Diagnostic Indicators, simply divide by 10.

For presentation purposes, as indicated in the text, it is sometimes desirable to "reverse" the indicator so that 10 is always "good". In that presentation, the PRI for the overall system would be expression (6) divided by 10, where a PRI of 10 is the best and 0 is the worst. In our example, the overall indicator would have a value of 7.25. The indicator for the cost of property protection would be (100%-15%)/10=8.5, where 10 would be zero cost (the best) and 0 would mean costs of protection so high that the market value of land was zero. Similarly, the indicator for the security interest deficiency would be (100%-12.5%)/10=8.75, where 10 would mean no discount for high interest rates arising from a deficient secured transactions system and 0 would mean a discount for high interest rates so great that it effectively reduced the value of land to zero.