

Lecture 13
Economics/EEP C181, International Trade
Midterm Review

- Answers to assignments 1 and 2 posted on website
- If you want to be well prepared, do lots of practice problems (study guide on reserve in library)
- Past midterms and answer keys on class website
- No calculators or notes please during the exam. No blue books necessary

I. Ricardian Framework

Contributions and assumptions:

- Only one factor of production; no distributional conflicts over gains from trade
- Technology is NOT the same across countries
- Shows why/how countries gain from trade as each specializes in the good in which it has a comparative advantage
- Even countries that have an absolute advantage in all goods gain from trade as long as the post-trade relative price differs from the autarky (=pre-trade price).
- Can you show all the ways to illustrate gains from trade?

Relative price of X in terms of Y = opportunity cost of X in terms of Y

= unit labor requirement for X/Y = a_x/a_y .

So if unit labor requirements given by the following:

	Cheese	Wine	Relative price of cheese in terms of wine?
Switzerland	4	8	
France	3	1	

Who has absolute advantage in cheese? In wine?

Who has a comparative advantage in cheese? In wine?

Where will post-trade relative price of cheese in terms of wine settle?

Given the total labor endowment, you should be able to graph the PPF for France or Switzerland. Assume that Switzerland has an endowment of 80 and France has an endowment of 60:

How can you show that there are gains from trade on the PPFs above, assuming that after trade the price settles at 2?

If the price after trade settles at 2, what does the world supply curve for cheese relative to wine look like?

At what price is there complete specialization?
At what price is Switzerland incompletely specialized?
At what price is France incompletely specialized?
At what price will both countries specialize in cheese?

Extensions: many goods. Recall that exporter as cost advantage (costs = prices = $a \cdot w$)

II. The Specific Factors Model

- Assumes 3 factors, 2 goods (steel and corn). One factor is assumed to be mobile across sectors (usually labor, but it could be something else). Two factors are specific to each of the two goods—for example, capital is specific to steel and land is specific to corn.
- Need to be able to show what happens to the factor return to the mobile factor if the price of steel or corn rises or falls. What happens to the allocation of labor across the two sectors? Let's assume that the price of steel rises:

- What happens to the return to capital? To land?
- What happens to the nominal return to labor? The real return?
- Contribution of this framework: while it remains true that there continue to be gains from trade, model makes clear the distributional conflicts that arise in opening up to trade.

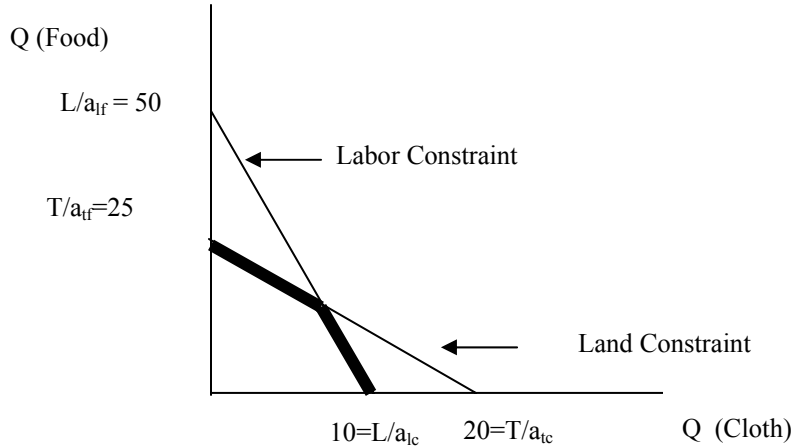
III. The Heckscher-Ohlin Model

- Assumes that all factors are mobile (hence a long run model, while specific factors model can be thought of as the short-run model).
- Trade patterns are dictated by differences in factor endowments, NOT differences in technology. Technology is assumed to be the same across countries (driving the result that with trade, factor prices equalize across countries).
- Four important results: (1) the Heckscher-Ohlin Theorem (2) the Stolper-Samuelson Theorem (3) Factor-Price Equalization (FPE) and (4) the Rybczynski Theorem.
- Can use the Stolper-Samuelson theorem to understand increasing inequality as an outcome of greater globalization. According to SS, trade leads to an increase in the return to a country's abundant factor and a fall in the return to its scarce factor. So if the US is abundant in skilled labor and scarce in unskilled labor, trade will lead inequality to rise. But difficult to prove the linkages (recall lecture on this). So what does SS imply should happen in developing countries if they are well endowed with unskilled labor?
- Can you manipulate Edgeworth Boxes?
- Evidence for and against this model?

Deriving the PPF in this framework:

	Labor	land	(L)	(T)
Cloth	$a_{lc} = 10$	$a_{tc} = 5$	100	100
Food	$a_{lf} = 2$	$a_{tf} = 4$	100	100

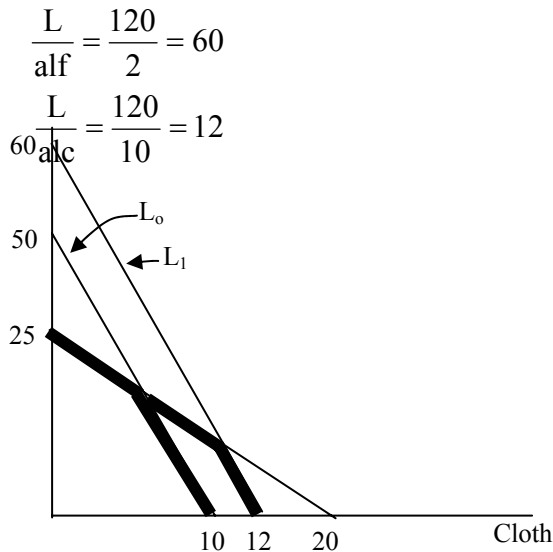
So now we draw the PPF (production possibility frontier) with two factors:
 Clothing is more labor-intensive
 Food is more land-intensive



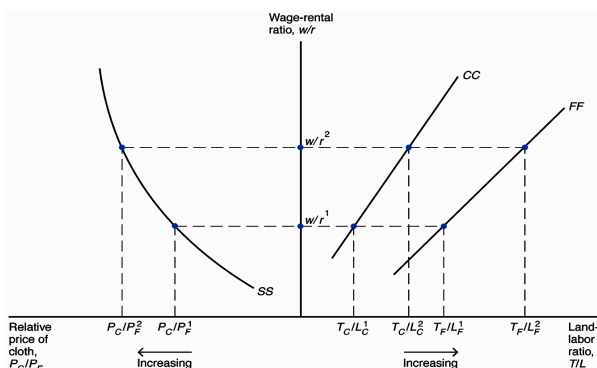
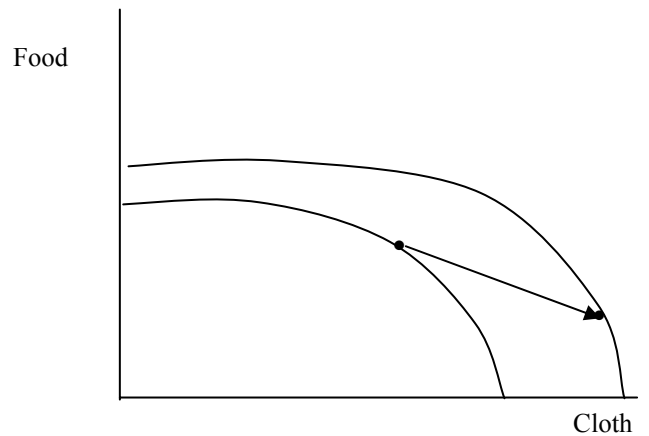
Where is the PPF exactly? Food production is "bounded" by the land requirement and cloth production is "bounded" by labor. The PPF is the internal shaded area--it is now kinked.

What happens if the endowment of labor expands? According to the Rybczynski theorem, we would expect the production of cloth to increase by more than the increase in the endowment of labor, and the production of food to fall. Intuition: cloth production was "bounded" before by a lack of labor.

Say labor increases to 120 then we get:



Labor Constraint shifts Out:

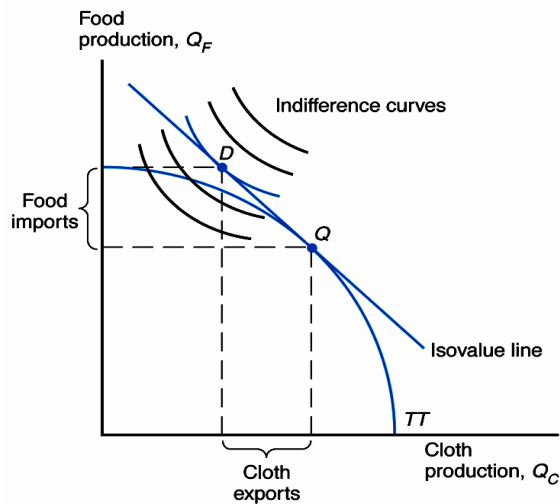


Graph at left shows that if Price of Cloth increases, return to factor used Intensively to produce cloth rises, and both Sectors reduce their use of that factor.

Left quadrant illustrates SS; right quadrant
 Indicates factor intensity and how it changes
 With changes in factor prices.

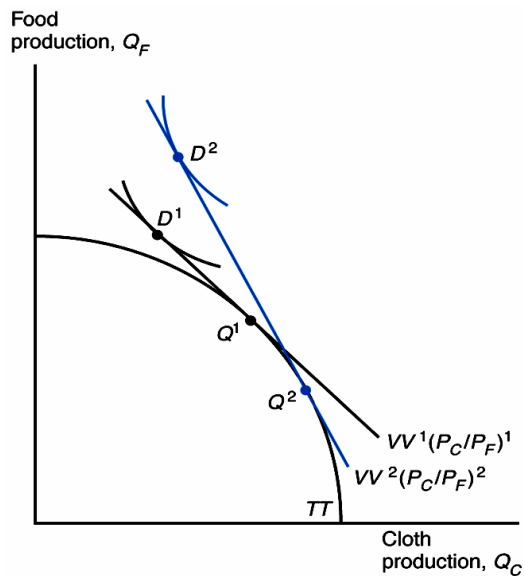
IV. The Standard Trade Model & Gravity

The last part of the first half of the course brings together all three models to present a standard model of trade. We draw a general production possibility frontier, with the price line (what is the slope?) tangent to the PPF at point Q. The economy below produces at Q but consumes at D. You should be able to derive quantities of exports and imports from these types of diagrams.



A country's terms of trade are defined as : $TOT = P_{export}/P_{import} = P_C/P_F$
 If your TOT rise (ie P_C rises or P_F falls), welfare rises. (ie you are better off).
 Below, the country exports cloth. If P_{cloth} rises, what happens?

- (1) The production of cloth rises
- (2) The country's terms of trade improved
- (3) Welfare increased; the country is now on a higher indifference curve.



Trends in terms of trade for developed and developing countries (class notes, textbook)

Gravity:

- Should know the basic formula: $\log \text{ trade between country } i \text{ and country } j = (\log \text{ GDP/capita country } i) \times (\log \text{ GDP/capita country } j) / \log \text{ distance between country } i \text{ and } j$
- Empirical application discussed in class (Andrew Rose) shows that model works well, plus other factors matter (currency unions, common border, common language, shared colonial past, etc)

IV. Globalization, Inequality and Poverty

- Increasing inequality within the US and many developing countries
- Is trade the explanation? What are other explanations? Policy solutions?
- What are the links between poverty and globalization?

Policy solutions (too rushed in discussion on inequality and trade)

(1) Protection. No economists are advocating this, NOT even the authors (such as Adrian Wood, in your reading), who actually believe that trade is a major explanation for increasing inequality. So among economists, those who believe that trade policy caused inequality to increase and those who don't actually agree on the policy recommendations, which makes the debate over causes somewhat silly from a policy viewpoint. So what do the economists advocate?

(2) Believe in the market and do nothing. If market forces truly work, then the increasing returns to college education and collapsing market for lower skilled workers should lead more workers to go to college, reducing the pool of unskilled workers.

(3) With credit market constraints and uneven educational opportunities across regions (schooling quality is a function of local conditions, not uniform), the market is very unlikely to correct the problem.

As the income of current unskilled workers falls, particularly in the face of imperfect credit markets, then borrowing against future earnings may be difficult--making it impossible to finance the additional education necessary to escape the lower wage ranks. This problem is compounded by the fact that primary and secondary education is largely locally financed, making it harder for the unskilled or their children to acquire an education in the early years.

One solution: reducing credit market imperfections to allow people to borrow against future earnings--ie increase opportunities to borrow for college.

(4) Worker training.

German and Japanese firms provide much more worker training than do US firms. As a result, these firms can treat college-educated and non-college-educated workers as much closer substitutes in production than US firms. Another difference is that in the US, worker training is concentrated among the most skilled workers--exacerbating the wage and skill gaps.

(5) Social safety nets. In the context of the current debate over outsourcing, there is a significant emphasis is on providing more social safety nets, universal health insurance, portability of pensions, side-agreements on labor and the environment that cushion short run costs of trade. Krugman argues that without these safety nets, we could easily revert to a protectionist world, which would be harmful to all countries.

1.3. Comparisons across countries: the need to bring income figures into a single currency (e.g., US\$)

There are two options to do this. The first is to use the official exchange rate that tells us how many local currency units (LCU) are needed to acquire one dollar. The other is to use an exchange rate that reflects the relative purchasing power of the local currency relative to the dollar, called the Purchasing Power Parity exchange rate (PPPe).

1.3.1. Comparisons at the official exchange rate

Define the official exchange rate as $e = \text{Number of LCU}/1\$$. e is thus the price of the dollar for a foreign national. Levels of GDPpc can be compared across countries by transforming the GDPpc measured in LCU into GDPpc measured in US\$. This is done by dividing GDPpc measured in LCU by the exchange rate:

$$GDP_{pc}^{\$} = \frac{1}{e} GDP_{pc}^{LCU} .$$

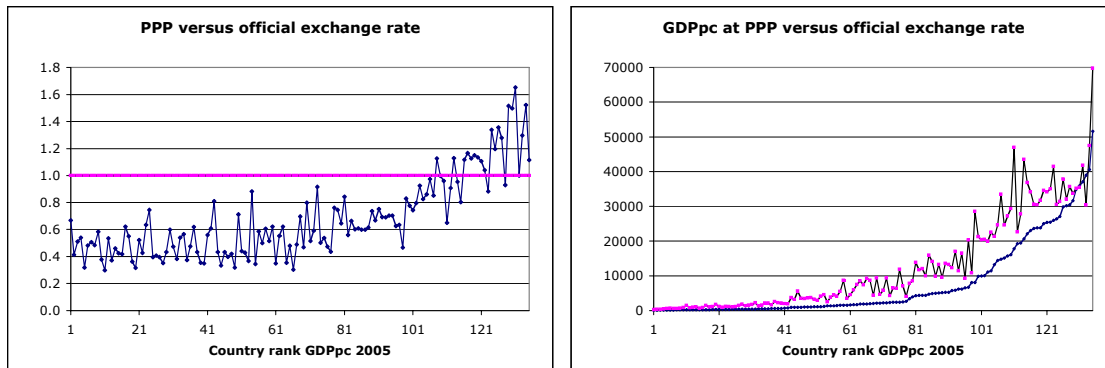
The problem with this approach is that movements in the exchange rate will create changes in $GDP_{pc}^{\$}$ even if there has been no change in GDP_{pc}^{LCU} . For instance, a devaluation of the official exchange rate, say from 5 pesos/US\$ to 10 pesos/US\$ in Mexico will halve $GDP_{pc}^{\$}$ even though there has been no immediate change in the country's average wellbeing. Conversely, countries that maintain an overvalued official exchange rate, say at 5 pesos/US\$ instead of 10 pesos/US\$, will appear better off when measured in dollar terms than they really are. For this reason, we would like to use an exchange rate that reflects some equilibrium value. This is the equilibrium exchange rate that is sustainable in terms of inflows and outflows of dollars into and out of the country (see Chapter X).

1.3.2. Comparisons at the Purchasing Power Parity-adjusted exchange rate (PPPe)

There are in addition differences in prices across countries, so one dollar may buy more in, say, India than the United States. For example you could buy a haircut in India for one dollar of a same quality as you get for \$10 in the United States. To account for this in comparing GDPpc across countries, we need to adjust for the relative purchasing power of currencies.

To make cross country comparisons of GDPpc that reflect relative wellbeing while prices differ, we can define an exchange rate that adjusts for the purchasing power of a dollar in the two countries. This is the PPPe defined as the number of LCU required to buy the same amount of goods and services (quality adjusted) as 1 US\$ in the U.S. In this case, GDPpc in US\$ with the same purchasing power is:

$$PPPadjusted\ GDP_{pc}^{\$} = \frac{1}{PPP_e} GDP_{pc}^{LCU} .$$



Data source: World Bank, World Development Indicators online

Figure 1. PPP versus official exchange rate

As can be seen in Figure 1 (left panel), PPPe is below the official exchange rate in most countries with a GDP inferior to that of the United States. As a consequence, in low income countries, $PPP_{pc}^{\$} > GDP_{pc}^{\$}$. In India, for example, in 2005 $PPP_{pc}^{\$}$ is \$2149 compared to a $GDP_{pc}^{\$}$ of \$450. In the US, $PPP_{pc}^{\$} = GDP_{pc}^{\$}$ by construction (\$30,600). In high income countries such as Japan and Germany, $PPP_{pc}^{\$} < GDP_{pc}^{\$}$. In Japan, for example, $PPP_{pc}^{\$}$ is \$24,041 compared to a $GDP_{pc}^{\$}$ of \$32,230.

Poverty and Poverty Lines: Frequently Asked Questions

What is poverty, and how is it measured?

Poverty is a condition of *unacceptable material deprivation*, according to a particular society's standards of what is or is not acceptable. Poverty is widely acknowledged to be a multi-dimensional concept, but most efforts to measure the extent and severity of poverty among a given population focus on one dimension – *income* poverty. Income poverty is measured in relation to an official poverty line – a level of income or consumption expenditures designated as the minimum needed by an individual or household to avoid poverty. Poverty lines are generally set by national governments, and used together with household survey data to measure the incidence of poverty among the population. Because they are social constructs, national poverty lines differ from one country to another. Countries with higher average incomes generally choose higher poverty lines, whereas low-income countries typically set their poverty lines at the estimated cost of physical subsistence: a bare-minimum diet, plus a modest addition for necessities other than food. Some countries set their poverty lines in terms of income, others in terms of expenditure; in either case, both cash and own-production (e.g., output from a family farm) are included.

Since 1990, the World Bank has tracked global poverty trends based on a common international poverty line – the so-called “\$1-a-day” line. The next FAQ examines this concept.

Why isn't “\$1 per day” actually \$1/day? The international poverty line, old and new.

One of the two legislative definitions of the “very poor” is “individuals living on the equivalent of less than \$1 per day (as calculated using the purchasing power parity (PPP) exchange rate method).” This definition clearly refers to the international poverty line established by the World Bank and used to track the regional and global incidence of extreme poverty. Because this concept is so central to the application of the legislation, it's worth examining this concept in a bit more detail.

The international poverty line was first developed by World Bank researchers working on the 1990 *World Development Report (WDR)*, which focused on poverty. In order to estimate the share of the world's population living in extreme poverty, the WDR team examined the national poverty lines that low-income countries were themselves using to track poverty among their own citizens. To compare these national poverty lines, they first had to be converted to a common currency; for this conversion, the WDR team used Purchasing Power Parity (PPP) exchange rates, which are adjusted for differences in the purchasing power of currencies in domestic markets (more on PPP exchange rates below). Once this adjustment was made, it turned out that the poverty lines of the poorest countries spanned a range between \$275 and \$370 per year in PPP terms at 1985 prices. These two values were used as the basis for constructing the first solid estimates of the global incidence of extreme poverty in reference to a common poverty line. Because the higher of these two values was so close to \$1 per day, it soon became known as the “dollar a day line.”

In 2000, the World Bank significantly revised the international poverty line, in order to take advantage of new PPP data covering a much larger number of developing countries. The researchers set the new line at the median (middle value) among the national poverty lines of the 10 poorest countries. The resulting line was \$1.08 per day at 1993 PPP – that is, at purchasing power parity based on 1993 prices. Although the new line differs from the original version, it continues to be called the “dollar a day line,” and serves as the common international standard of extreme poverty.

What are PPP exchange rates, and what difference do they make in calculating poverty lines?

Standard exchange rates measure the relative values of different currencies in relation to goods, services, and financial assets traded internationally. In contrast, PPP exchange rates measure the relative values (purchasing power) of currencies in *domestic* markets, including the cost of services – haircuts, housing, local transportation, etc. – that are not traded across international borders. Consumption PPPs – the variety used to convert the international poverty line into local currencies – measure the relative cost of a representative bundle of goods and services in each country, weighted by the share of each item in overall consumer spending. Using PPP exchange rates to convert the international poverty line into local currencies helps ensure that the calculated values correspond to a similar standard of living in each country. The key word here is “helps,” because there is much room for error in this calculation – a topic explored below.

It is essential to notice that PPP exchange rates tend to be *very different* from standard market exchange rates, especially for countries at very different levels of real income. For example, at late-2006 prices, the market exchange rate to the US dollar was 1.3 times the PPP exchange rate in Albania, 2.3 times in Bolivia, 3.3 times in Uganda, and 5.2 times in Vietnam. That means that using market exchange rates to compute the local currency equivalent of the “\$1 a day line” produces values *completely different* than those resulting from using PPP exchange rates as required in the legislation. The main source of the difference is that many services tend to be relatively much cheaper in poor countries than in rich countries; because those services are not traded internationally, the difference in their relative cost affects PPP exchange rates but not market rates.

Can't I just use the official exchange rate to find the local currency equivalent of the “\$1-per-day line” for the country where my organization works?

This would certainly be simpler, but is inconsistent with the language of the legislation, which specifically requires that the \$1-per-day line be “calculated using the purchasing power parity (PPP) exchange rate method.” And the choice makes an enormous difference in who gets counted as very poor. Official exchange rates for low-income countries typically exceed PPP exchange rates by several-fold, and would produce similarly higher estimates of the local-currency equivalent of the “\$1-per-day” extreme poverty line, if used to replace PPPs in the calculations. That would in turn lead to a much higher estimate of the share of the population living under that line.

An example may help. The most recent household survey data for Bangladesh (2000) imply that 36 percent of

the population were living under the “\$1-per-day” extreme poverty line, properly calculated using PPP exchange rates. Bangladesh’s official exchange rate for 2003 was about 2.7 times the PPP rate (50.25 vs. 18.7 taka/US\$1). If the official exchange rate were used in place of the PPP rate, almost all Bangladeshis – nearly 97 percent – would be counted as “very poor.” Clearly, using official exchange rates grossly distorts the estimated share of a country’s citizens living in extreme poverty by international standards.

How can I determine the equivalent to the “\$1 a day” international poverty line in the country where my program operates?

The key to computing these values is the 1993 consumption PPPs published by the World Bank at <http://iresearch.worldbank.org/PovCalNet/jsp/index.jsp> To convert these values into the local-currency equivalent of the international poverty line at current prices, multiply the published PPP by 1.08, and then by the ratio of the current Consumer Price Index to its average value in 1993.

For the convenience of practitioners, a detailed explanation of this calculation, along with recent values for a wide range low- and middle-income countries, is contained in the Annex of *National and International Poverty Lines: An Overview* by Don Sillers. A downloadable file [Excel: 90KB] shows the data and calculations used to produce that Annex.

Do calculations based on the World Bank’s published PPP exchange rates accurately identify the local currency equivalent of the \$1 a day line for my country?

The World Bank’s published PPP rates are the best currently available, but are subject to significant errors that reduce their reliability for estimating “\$1 a day” equivalents for many countries. The main problem is that many poor countries were not included in the comparative price surveys that form the basis of the current PPPs – the 1993 round of the International Comparison Program, or ICP. PPPs for those “missing” countries have instead been estimated using regression methods, which are known to be subject to large errors. Errors in country-specific PPPs cause similar errors when converting the international poverty line into local currency. A new round of the ICP, currently underway, substantially expands the range of countries from which price data are being collected. When the new PPPs are released in late 2007, this source of error will be dramatically reduced, providing a much clearer picture of the country-level incidence of extreme poverty and of trends in poverty over time.

A second issue with currently available PPPs is that they measure the relative cost of the consumption based on *national* consumption patterns, rather than the consumption patterns of the poor. As a result, calculations based on published PPPs may produce local-currency equivalents to the “\$1 a day line” that actually differ from one country to another. The size and pattern of this source of error is difficult – perhaps impossible – to determine without additional data. The new round of the ICP will report “poverty PPPs” based on the consumption patterns of the poorest households. Once released, those estimates should provide a stronger basis for translating the international poverty line into truly equivalent local values.

How does one determine the income level that corresponds to the cut-off point for the bottom 50% living below the national poverty line?

This is not an easy question to answer. As USAID interprets the legislation, the key is to determine the share of the population living below the national poverty line, and then identify the level of income or expenditures that divides that group into two halves: (1) the “very poor” as defined by the legislation; and (2) the less poor half of those living below the national poverty line. For example, if the national poverty line is 80 pesos per month in per-capita expenditure, and the latest household survey data tell us that 28 percent of the national population is living on less than that amount, we need to find the monthly expenditure level below which 14 percent of the national population is living. Based on what we know about national income and expenditure distributions, we can be certain that the answer is *not* 40 pesos a month, or 50% of the national poverty line. But to be more specific than that, we need to have more specific data on the distribution of income or expenditures in the country in question. One source of such data is the World Bank Poverty Monitor site at

<http://iresearch.worldbank.org/PovCalNet/jsp/index.jsp>, which provides the latest household survey data for many developing countries, along with an analytical tool (PovCal) that estimates the shape of a country’s distribution based on those household survey data. If you know the percentage of the population living under the national poverty line, you can use that tool to search for two values: (1) the monthly expenditure (in U.S. dollars) associated with that percentage, and for (2) the monthly expenditure associated with a poverty incidence exactly half of the current value. The national poverty line can then be multiplied times ratio between those two values to identify the expenditure level under which the “poorest 50% of the national poor” live.