ECON 4311 − Economy of Latin America
Lecture 4: Economic Growth and Latin America (pt. 4)

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Outline

Introduction

▶ So far, we've focused on understanding:

- The mechanics of growth

- The fundamental causes of growth

    ▶ Institutions

- Growth accounting exercises

▶ Previously we argued that, although growth is fundamental for a country's standards of livings, there is more to it than just growth.

- Economic inequality (consumption, income, and wealth).

- Prevalence of criminal activity.

- Environmental quality.

Introduction

▶ Until the 1980s, most in the economics literature were primarily interested in raising GDP per capita.

▶ Environmental economics started to emerge in the 1970s and 1980s.

- Not only important to grow. . .
- . . . also how to grow.

Introduction

▶ Rapid economic growth in a low- or middle-income country can create extremely high levels of pollution and environmental degradation.

- Clearest example is China.

- Rapid industrialization led to unsustainable levels of pollution.

  ▶ Soil contamination, waste, water- and air pollution...

Introduction

▶ In Chinese cities, outdoor air pollution is the biggest environmental challenge for public health (Kan, 2009)

▶ A 2007 World Bank report conducted with China's national environmental agency found that:

   "*Outdoor air pollution caused 350-400k premature deaths a year. Indoor pollution contributed to an additional 300k deaths.*"

▶ According to the Chinese Ministry of Health, industrial pollution has made cancer China's leading cause of death.

▶ Although pollution problems might have been starkest in China, these are important in many other world regions, including Latin America.

Introduction

Figure: Air pollution in the world, 2018

Introduction

Externalities

▶ **What is an externality?**

A cost for or benefit to a third party who did not agree to it.

▶ **Two types of externality**:

- Positive: a benefit to a third party.

- Negative: a cost for a third party.

▶ **Many examples of externalities**:

- Susceptible, recovered, vaccinated individuals in the presence of viruses

- Infected individuals in the presence of viruses

- Family or friends smoking indoors in our presence

- Uber driver driving too fast or too slow

Externalities and Market Failures

▶ The presence of externalities generates **market failures**.

▶ A market failure is a situation in which the allocation of goods and services by a free market is not Pareto efficient.

   • With Pareto efficient, we mean what is socially optimal.

▶ In the presence of negative externalities, the market tends to overproduce goods/services.

   • E.g., too much activity by infected individuals, too much smoking,. . .

▶ In the presence of positive externalities, the market tends to underprovide goods/services.

   • E.g., too little activity by susceptible individuals, too low vaccination rates,. . .

Pollution: A Negative Externality

Why do we say that pollution is a negative externality?

▶ Firms do not internalize the negative effects that their polluting behavior has on other members of society.

- E.g., a paper mill without pollution-control equipment.

- Cheaper to produce without pollution-control equipment.

- Firm only cares about profits.

▶ Similar with individuals and smoking.

Negative Externalities and the Environment
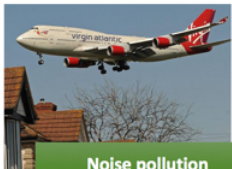

Air pollution from factories

Pollution from fertilizers

Industrial waste

Noise pollution

Collapsing fish stocks

Methane emissions

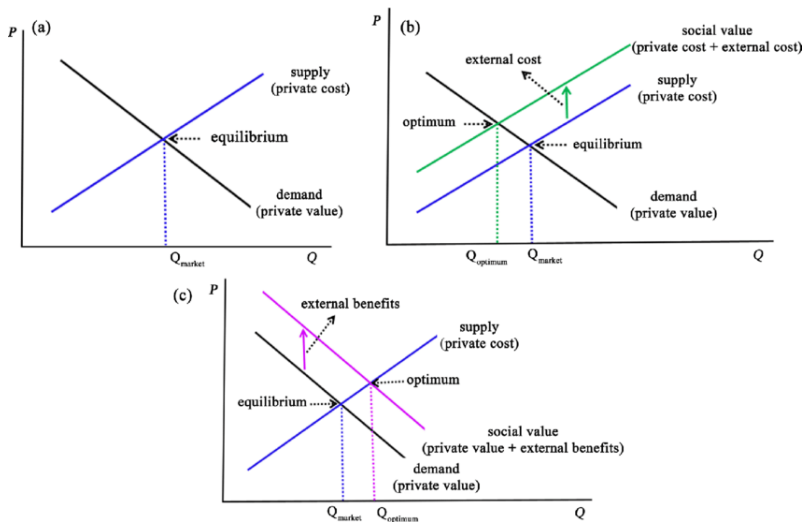# Supply and Demand with and without Externalities

Figure: (a) Efficient Market; (b) Negative externality; (c) Positive externality.

Correcting for Negative Externalities

▶ In situations like (b):

- Firms would choose to produce without pollution-control equipment.

- Simply because production costs will be lower in the absence of this (additional or more expensive) equipment.

- This explains the difference in supply curves: with pollution-control equipment, it is more expensive to produce any amount of, say, paper.

- This would lead to over-provision of paper and "too much pollution".

▶ To correct for the market failure, the government could tax those producing without pollution-control equipment.

Correcting for Positive Externalities

▶ In situations like (c):

- Consumers demand too little of a desirable product (say, vaccines).

- This is because some individuals do not internalize that by getting vaccinated, they reduce the infection probability for other individuals.

- Absent interventions, individuals would demand less vaccines than what society finds optimal.

- This explains the difference in demand curves: at any given price for vaccines, society finds optimal to consume more vaccines.

▶ To correct for the market failure, the government could subsidize the consumption of vaccines.

Environmental Policy

▶ Given the impact of the environment on the well-being of individuals, many governments are concerned with *environmental policy*.

  • Still a controversial policy in many places, including the US.

▶ **Environmental policies** are laws and regulations to protect the environment.

  • At government-level, these comprise federal, state, and local policies.

  • These policies are needed because of the many externalities involved.

  • Environmental protection is balanced with other public policy concerns (e.g., economic growth, affordable energy, etc.).

▶ So far, in the environmental problem:

  "*There are no solutions, only trade-offs*" ∼ Thomas Sowell

Environmental Policy

▶ An important question is: **how to regulate the market economy?**

  • Not an easy task. Many complications involved.

▶ A good starting point is a **cost-benefit analysis**.

  • An exercise that compares the estimated costs and benefits of a given activity or policy and then decides whether it is desirable.

  • E.g., pollution in itself, a carbon tax of 20%, . . .

  • These exercises are done both from individual and societal perspectives.

▶ Pollution has obvious costs: poor air quality, polluted water, scarred landscape, . . .

▶ But also benefits: enables more comfortable and faster travel, allows us to consume more and cheaper goods, . . .

Environmental Policy

Ideally, we would like to design environmental policies that equate the societal marginal cost of pollution with its marginal benefit
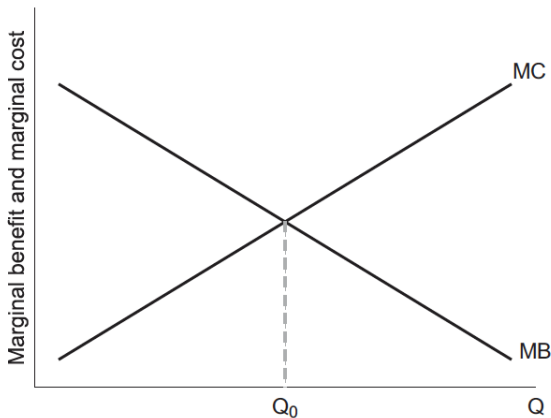
Environmental Policy

▶ The social costs of pollution are not included in the market price.

▶ Calculating the social costs of pollution is a very challenging task.

  • First must agree on the "socially-desirable" level of pollution.

  • How much to care about other countries/regions?

  • How much to care about future generations?

▶ Although it is very hard to know what is a socially-desirable level of pollution and, thus, optimal environmental policy. . .

▶ Most reasonable people admit that environmental policies are needed.

Environmental Policy

▶ Two broad types of environmental policy:

- **Command and control (CAC)**: policies that control pollution by setting an allowable level of pollution.

  ▶ Example: Manufacturing firms cannot pollute more than X.

  ▶ Production consistent with X *with* and *without* pollution-control equip.

  ▶ **Pro**: controls pollution levels directly.

  ▶ **Con**: Limits incentives to reduce pollution.

- **Market-based initiatives (MBIs)**: use of market signals to influence producer behavior with regards to pollution.

  ▶ Example: Pollution tax. Pay X dollars for each gallon of gasoline.

  ▶ **Pro**: gives incentives to develop more efficient technologies.

  ▶ **Con**: does not control pollution levels directly.

Access to Clean Water and Sanitation

The largest problem affecting the average person in the region is the poor quality of water produced by the public sector in municipalities

	Access to improved water source (%)				Access to improved sanitation (%)			
	Rural		Urban		Rural		Urban	
	1990	2015	1990	2015	1990	2015	1990	2015
Argentina	69	100	97	99.6	69	93.6	89	95
Bolivia	41	78.9	91	99.3	41	26.8	41	64.5
Brazil	68	86.6	96	99.3	31	58	79	90.9
Chile	48	100	99	100	53	98.9	91	100
Colombia	69	86	98	99.8	41	72	82	88.3
Costa Rica	87	99.5	99	99.7	83	94.3	93	98
Ecuador	61	80.4	84	99.5	37	80.3	74	89.4
El Salvador	59	83.4	91	97.8	30	87	70	93.2
Guatemala	75	89.4	91	97.5	49	53.1	81	80.7
Honduras	60	84.3	92	98.7	33	75.1	70	83.7
Mexico	59	93.7	92	99.5	35	80.7	78	91.4
Nicaragua	54	60.7	92	97.4	26	62.8	59	85.8
Panama	67	87.3	98	98.9	41	59.2	76	85.7
Paraguay	24	98.4	83	99.2	14	80.7	62	98.3
Peru	44	72.4	88	94.6	16	58.2	71	81.9
Uruguay	75	93.7	98	99.5	81	94.9	94	95.7
Venezuela, RB	71	86.4	93	98.8	45	72.3	89	97.7
Latin America	60.6	87.1	94.3	98.8	42.6	73.4	76.4	89.4

Source: World Bank (2019).

Industrial Water Pollution

Easier to make progress in the industrial water pollution problem than in other areas: relatively small number of firms, visible activity.

	Kilograms per day (thousands)		Kilograms per day worker	
	1990	2006	1990	2006
Argentina	186.7	155.54	0.2	0.23
Bolivia	8.4	11.54	0.24	0.25
Brazil	780.4	–	0.19	–
Chile	66.8	92.5	0.22	0.25
Colombia	93.2	86.99	0.19	0.2
Costa Rica	27.3	–	0.2	–
Ecuador	25.6	44.75	0.23	0.28
El Salvador	7.7	–	0.22	–
Guatemala	16.1	–	0.27	–
Honduras	17.8	–	0.23	–
Mexico	174.3	370.81	0.18	0.19
Nicaragua	10.5	–	0.27	–
Panama	9.7	13.72	0.26	0.32
Paraguay	3.3	10.81	0.28	0.28
Peru	56.1	–	0.2	–
Uruguay	38.7	–	0.23	–
Venezuela, RB	96.5	–	0.21	–
Portugal	147.9	105.04	0.15	0.15
Spain	320.3	379.73	0.17	0.15
Canada	321.5	310.28	0.17	0.16
US	2,565.20	1,897.50	0.15	0.14

Source: World Bank (2006).

Air Pollution

▶ Problems with air pollution specially pressing in metropolitan areas.

▶ Consequence of both industrialization and urbanization.

	CO₂ emissions (metric tons per capita)		Motor vehicles per 1,000 people
	1990	2014	Recent years
Argentina	3.4	4.7	316 (2015)
Bolivia	0.8	1.9	72 (2015)
Brazil	1.4	2.6	350 (2019)
Chile	2.5	4.7	230 (2015)
Colombia	1.7	1.8	116 (2018)
Costa Rica	1.0	1.6	224 (2015)
Ecuador	1.6	2.8	141 (2015)
El Salvador	0.5	1.0	41 (2015)
Guatemala	0.5	1.2	115 (2015)
Honduras	0.5	1.1	18 (2017)
Mexico	3.7	3.9	297 (2015)
Nicaragua	0.6	0.8	79 (2015)
Panama	1.1	2.3	171 (2015)
Paraguay	0.5	0.9	98 (2015)
Peru	1.0	2.0	78 (2015)
Uruguay	1.3	2.0	280 (2015)
Venezuela, RB	6.2	6.0	145 (2015)
Latin America	1.7	2.4	163
Portugal	4.2	4.3	566 (2015)
Spain	5.6	5.0	591 (2015)
Canada	15.7	15.1	670 (2016)
US	19.3	16.5	837 (2016)

Sources: World Bank (2019); Wikipedia (2019).

Urbanization in Latin America

	Percentage of population in urban areas	
	1990	*2017*
Argentina	87	92
Bolivia	56	69
Brazil	74	86
Chile	83	87
Colombia	69	80
Costa Rica	50	79
Ecuador	55	64
El Salvador	49	71
Guatemala	42	51
Honduras	40	56
Mexico	71	80
Nicaragua	53	58
Panama	54	67
Paraguay	49	61
Peru	69	78
Uruguay	89	95
Venezuela, RB	84	88
Latin America	63	74
Portugal	48	65
Spain	75	80
Canada	77	81
US	75	82

Source: World Bank (2019).

Deforestation

▶ A problem that deserves especial attention for many reasons:

   1. Forests generate positive externalities:
      ▶ Naturally reduce the amount of CO_2 that is in the atmosphere.
      ▶ Plants and trees absorb part of the CO_2 particles that are in the air.

   2. Forests cover 40% of the land in Latin America.

   3. Climate change is a global problem.

   4. Deforestation and biodiversity.

   5. Is there a better way to mitigate the impact of pollutants?

Deforestation in Latin America

	Total forest area (thousands of hectares) (2015)	Average annual percentage change (1990–2015)	Plantation forests	Average annual percent change (1990–2015)
Argentina	27,112	−0.88%	1,202	2.28%
Bolivia	54,764	−0.51%	26	1.20%
Brazil	493,538	−0.39%	7,736	2.21%
Chile	17,735	0.65%	3,044	3.13%
Colombia	58,501.74	−0.37%	70.9	5.60%
Costa Rica	2,756	0.30%	17.6	−3.76%
Ecuador	12,547.88	−0.57%	55.24	1.00%
El Salvador	265	−1.19%	16.2	2.10%
Guatemala	3,540	−1.02%	185	6.40%
Honduras	4,592	−1.74%	0	–
Mexico	66,040	−0.21%	87	11.90%
Nicaragua	3,114	−1.24%	48	1.41%
Panama	4,617	−0.34%	80.4	9.70%
Paraguay	15,323	−1.10%	98	3.06%
Peru	73,973	−0.20%	1,157	3.10%
Uruguay	1,845	1.25%	1,062	3.24%
Venezuela, RB	46,683	−0.41%	557	0.00%
Portugal	3,182	−0.29%	891	0.44%
Spain	18,418	1.34%	2,909	1.71%
Canada	347,069	0.01%	15,784	9.79%
US	310,095	0.10%	26,364	1.88%

Source: Food and Agriculture Organization of the United Nations (2018).

Sustainable Growth

▶ Trade-off between environmental issues and economic growth.

▶ To protect the environment, it is necessary to limit economic activity (via CAC policies or MBIs).

▶ **Sustainable growth**: slower rate of economic growth than what would be possible without environmental concerns in exchange of a better preserved environment.

  • "Sustainable growth", trendy in both private and public domains.

  • Always for good reasons?

▶ Since climate change is a global problem, many countries and organizations have argued for global policies.

  • E.g., global carbon tax to avoid carbon leakages.

Sustainable Growth

▶ **Global environmental policies** are a great idea and probably the most desirable course of action.

▶ However, they **raise distributional concerns**:

  • Is it fair for China to face the same environmental regulations than US?

  • Both countries are at very different stages of development.

  • Less costly (in terms of standards of living) for advanced economies to comply with global regulations.

The Kuznets Curve

▶ Simon Kuznets found a relationship in the data in the 1950s that came to be known as the "Kuznets curve".

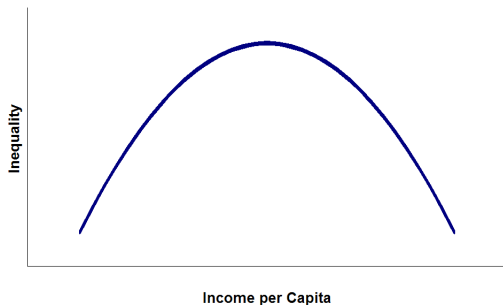▶ Inverted U-shaped relationship between GDP per capita and income inequality.

Figure: The Kuznets Curve

The Environmental Kuznets Curve

▶ Grossman and Krueger (1993) found a relationship between GDP per capita and pollution similar to the one between GDP per capita and income inequality.
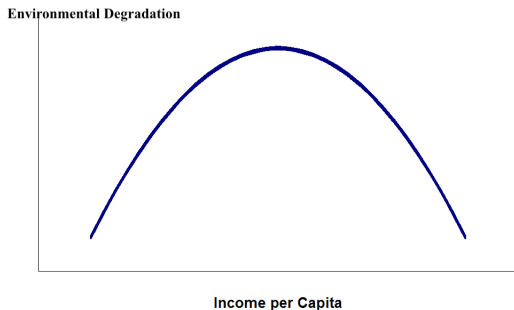

Figure: The Environmental Kuznets Curve

Taking Stock

▶ Not only important to grow, but also how to grow.

▶ Rapid economic growth in low- and middle-income economies associated with high levels of pollution & environmental degradation.

  • Important consequences for public health.

▶ Pollution, as a negative externality.

▶ Different types of environmental policies (CAC and MBIs) to correct for or limit the effect of environmental externalities.

▶ Pressing environmental challenges in Latin America (and the world): water quality, access to sanitation, air pollution, deforestation, etc.

▶ Sustainable growth and the Kuznets' curves.

Thank You!