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32921
Social Sustainability
Leseprobe

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Teil I.

Conceptual and Empirical Foundations of Social Sustainability

Course Outline

This course introduces students to the economic foundations, measurement, and policy challenges of social sustainability. Social sustainability concerns the ability of societies to maintain and improve well-being, social cohesion, and equal opportunities within and across generations. It is therefore not only concerned with how well people live today, but also with whether social, economic, and political institutions create durable opportunities for future well-being.

The course takes an economic perspective on social sustainability. Economics is useful in this context because it provides tools for analyzing trade-offs. Societies face scarce resources, competing policy objectives, and heterogeneous needs. Public policy must therefore ask how resources can be used efficiently, how welfare should be distributed, how risks should be shared, and how institutions can support resilience over time. Social sustainability is thus not simply about redistribution or social policy in a narrow sense. It is about the long-run capacity of a society to generate welfare, distribute opportunities fairly, and protect individuals against risks that may otherwise lead to persistent disadvantage.

A central organizing idea of the course is:

$$\text{social sustainability} = \text{welfare} + \text{distribution} + \text{dynamics} + \text{evidence}.$$

The first component, *welfare*, asks whether social arrangements improve individual and collective well-being. The second component, *distribution*, asks who benefits, who bears risks, and whether opportunities are fairly distributed. The third component, *dynamics*, emphasizes that social sustainability is not only a snapshot at one point in time. It concerns life-course trajectories, intergenerational mobility, demographic change, and the resilience of households and institutions. The fourth component, *evidence*, reflects the fact that policy evaluation requires credible empirical knowledge about causal effects.

The course combines theoretical frameworks, measurement concepts, empirical methods, and policy applications. The theoretical part introduces welfare economics, social welfare functions, intergenerational welfare, market failures, optimal taxation, and social insurance. The measurement part discusses well-being, inequality, poverty, multidimensional deprivation, and social mobility. The empirical part introduces modern quasi-experimental methods and shows how causal evidence can be connected to welfare analysis through the Marginal Value of Public Funds. The policy applications then examine central domains of social sustainability, including education, health, labor markets, demographic change, social insurance, care, gender inequality, migration, and technological change.

The overall goal is to enable students to assess social policy in a disciplined way. A policy may be well-intentioned but ineffective. It may improve average outcomes while worsening inequality. It may generate short-run benefits but long-run fiscal or demographic pressures. Conversely, a policy may be costly today but highly valuable if it improves children's opportunities, prevents cumulative disadvantage, or strengthens resilience. The course therefore teaches students to ask three connected questions:

1. *What should society value?*
2. *How can these values be measured?*
3. *What is the causal effect of policies designed to improve them?*

Learning Objectives

By the end of the course, students will be able to:

- define social sustainability from an economic perspective and distinguish it from economic and environmental sustainability;
- explain why social sustainability requires attention to welfare, distribution, dynamics, and empirical evidence;
- understand core welfare-economic concepts, including Pareto efficiency, social welfare functions, welfare weights, intergenerational welfare, and equity–efficiency trade-offs;
- analyze inequality, poverty, deprivation, and social mobility using appropriate measurement concepts;
- evaluate the role of education, health, labor markets, social insurance, family policy, and demographic change for sustainable societies;
- interpret empirical evidence from modern applied microeconometric approaches, especially quasi-experimental designs;
- connect causal evidence to welfare analysis using concepts such as fiscal externalities and the Marginal Value of Public Funds;
- critically assess social policies with respect to their short-run and long-run effects on welfare, distribution, opportunity, resilience, and fiscal sustainability;
- communicate policy-relevant insights in a clear, evidence-based, and economically structured way.

Prerequisites

Students should be familiar with the basic economic and statistical concepts covered in:

- intermediate microeconomics;
- introductory econometrics, especially regression analysis;
- basic welfare economics, although this is helpful rather than strictly required.

The course is designed to be accessible to students with a standard economics background. Technical concepts are introduced gradually and are motivated through applications to social sustainability.

Structure of the Course

The course proceeds in four steps.

First, it develops the conceptual foundations of social sustainability. Chapter 1 introduces the concept and explains why social sustainability is best understood as a dynamic and intergenerational problem. Chapter 2 provides the welfare-economic framework. It discusses efficiency, distribution, social welfare functions, discounting, market failures, the role of the state, and optimal taxation.

Second, the course turns to measurement. Social sustainability cannot be analyzed without indicators. We therefore discuss how to measure well-being, inequality, poverty, deprivation, social mobility, and equality of opportunity. This part of the course emphasizes that measurement is never purely technical. Choosing an indicator also means deciding which dimensions of social life are treated as relevant.

Third, the course introduces empirical evaluation. Since policy debates often involve causal claims, students learn how modern quasi-experimental methods can be used to estimate policy effects. Difference-in-differences, regression discontinuity designs, and instrumental variables are introduced as tools for constructing credible counterfactuals. The course then connects causal evidence to welfare analysis through the Marginal Value of Public Funds.

Fourth, the course applies these tools to central policy domains. These include education and human capital, labor markets, health, social insurance, family and care economies, migration, demographic change, and technological change. In each area, the course asks how institutions affect welfare, distribution, opportunities, and resilience over time.

1. Introduction – What Is Social Sustainability?

1.1. Definitions and Conceptual Foundations

Definition 1 ***Social sustainability*** *refers to the ability of a society to maintain and improve individual well-being, social cohesion, and equal opportunities within and across generations.*

This definition emphasizes that social sustainability is not only about current living conditions. It is also about the long-run capacity of societies to provide secure, inclusive, and fair opportunities over time. A socially sustainable society allows individuals to participate in economic and social life, protects them against risks that may lead to persistent disadvantage, and maintains institutions that support well-being across generations.

Social sustainability is one dimension of sustainable development. It is closely related to economic and ecological sustainability, but it is not identical to either of them. Economic sustainability focuses on whether an economy can maintain productivity, income generation, and fiscal capacity over time. Ecological sustainability focuses on whether human activity remains compatible with climate stability, biodiversity, natural resources, and ecological limits. Social sustainability focuses on whether people can live secure, healthy, and self-determined lives in societies that provide fair opportunities, social participation, and protection against persistent disadvantage.

Key distinction

Ecological sustainability asks whether human activity respects ecological limits.

Social sustainability asks whether social and economic arrangements support well-being, inclusion, fair opportunities, and resilience within and across generations.

The three dimensions of sustainability are analytically distinct, but practically interdependent. Economic growth can finance education, health care, infrastructure, and social insurance. Ecological stability protects the natural foundations of life and long-run prosperity. Social sustainability ensures that economic and ecological transformations remain compatible with inclusion, fairness, and social cohesion.

Concept	Main focus	Typical limitation if considered alone
Economic sustainability	Growth, productivity, fiscal capacity, long-run economic viability	May ignore distribution, social risks, and ecological limits
Ecological sustainability	Climate stability, biodiversity, natural resources, ecological limits	May ignore who bears the costs of ecological protection
Social sustainability	Well-being, distribution, social cohesion, opportunity, resilience	Requires normative judgments about fairness, need, and intergenerational responsibility

Table 1.1.1.: Economic, ecological, and social sustainability

Table 1.1.1 summarizes the distinction. Economic sustainability asks whether the economy can remain productive and financially viable. Ecological sustainability asks whether human activity respects the limits of natural systems. Social sustainability asks whether people have access to the resources, opportunities, and institutions needed for secure and meaningful lives.

The distinction matters because progress in one dimension does not automatically imply progress in the others. A country may experience strong economic growth while inequality rises and social mobility declines. A climate policy may reduce emissions while increasing energy poverty. A pension reform may improve fiscal sustainability while shifting risks to older or low-income households. Social sustainability therefore requires attention to the distributional and dynamic consequences of economic and ecological change.

Motivating example: climate policy and energy poverty

A carbon price can be ecologically sustainable because it reduces emissions. However, it may be socially problematic if it raises heating and transport costs for low-income households. A socially sustainable climate policy therefore combines ecological incentives with distributional compensation, such as climate dividends, targeted transfers, or investments in public transport and energy-efficient housing.

Motivating example: economic growth and inequality

An economy may grow rapidly while income gains accrue mainly to high-income groups. Such growth may be economically successful, but socially unsustainable if it weakens social mobility, increases poverty risks, or reduces trust in institutions. Social sustainability therefore asks not only how much income is produced, but also how opportunities, risks, and gains are distributed.

Motivating example: demographic change and care

Population ageing is not only a fiscal challenge. It is also a social sustainability challenge. Longer lives can increase well-being, but ageing societies require sustainable pension systems, adequate long-term care, fair intergenerational burden sharing, and support for informal caregivers. Without such institutions, demographic change may generate insecurity, gender inequality, and social exclusion.

For this course, social sustainability is organized around four dimensions:

$$\text{social sustainability} = \text{welfare} + \text{distribution} + \text{dynamics} + \text{evidence}.$$

The first dimension is *welfare*. Social sustainability requires that institutions and policies improve individual and collective well-being. This includes material living standards, health, education, security, and the ability to participate in social life.

The second dimension is *distribution*. Social sustainability asks who benefits from economic and social arrangements and who bears risks. It is therefore concerned with inequality, poverty, deprivation, social exclusion, and unequal opportunities.

The third dimension is *dynamics*. Social sustainability is not only about outcomes at one point in time. It is about trajectories. Temporary disadvantage may be less problematic if individuals can recover quickly. The same disadvantage becomes more serious if it persists, accumulates, or is transmitted across generations.

The fourth dimension is *evidence*. Social sustainability policy requires credible empirical knowledge. It is not enough to know that a policy is well-intentioned. We need to know whether it actually improves welfare, reduces disadvantage, strengthens resilience, and does so at a reasonable social and fiscal cost.

Course perspective

Social sustainability is not only about describing social problems. It is about evaluating trade-offs. A policy may increase total welfare but worsen inequality. It may protect the environment but burden vulnerable households. It may create short-run costs but improve long-run opportunity. The economic approach helps analyze these trade-offs systematically.

1.2. Social Sustainability in the Sustainability Triangle

Sustainable development is often described as the interaction of three dimensions: economic, ecological, and social sustainability. The triangle metaphor is useful because it emphasizes that policy choices often create complementarities and trade-offs across these dimensions.

A policy can support all three dimensions at once. For example, investments in energy-efficient social housing may reduce emissions, lower energy costs for low-income households, and improve health. In this case, ecological and social sustainability reinforce each other. Similarly, public transport investments may reduce emissions, improve access to jobs and education, and support social participation for households without cars.

But conflicts are also possible. A climate policy that increases energy prices may support ecological sustainability while creating social hardship. A growth policy that increases employment may support economic sustainability while increasing environmental pressure. A pension reform may improve fiscal sustainability while shifting risks to older or low-income workers. Social sustainability therefore requires attention to the distributional and dynamic consequences of policies.

Complementarities and trade-offs

Policies can create complementarities across the three sustainability dimensions, but they can also create conflicts. Social sustainability asks whether economic and ecological transformations are compatible with fair burden sharing, social inclusion, and long-run resilience.

A useful example is the idea of a *just transition*. Climate policy may require structural change in energy production, transport, housing, and industrial production. These changes may be necessary for ecological sustainability. However, they can also create social risks if workers in carbon-intensive industries lose their jobs, if low-income households face higher energy prices, or if rural households lack access to affordable transport alternatives. A just transition tries to combine ecological transformation with social protection, retraining, regional support, and fair compensation.

Example: just transition

A coal phase-out may be ecologically necessary, but it can be socially disruptive for workers and regions that depend on coal production. A socially sustainable transition therefore combines emission reduction with retraining, regional investment, income support, and credible long-term employment opportunities.

Another example is demographic change. Population ageing creates pressure on pension systems, health care, and long-term care. These pressures are often discussed under the heading of fiscal sustainability. But ageing is

also a social sustainability issue. It raises questions of intergenerational fairness, care responsibilities, gender inequality, and social participation in old age. A pension system may be financially sustainable because benefits are reduced, but socially problematic if old-age poverty rises. Conversely, generous benefits may support social security but become difficult to finance if contribution burdens on younger generations become too high.

Example: demographic change

A pension reform can be fiscally sustainable but socially unsustainable if it increases old-age poverty or shifts excessive burdens to younger generations. Social sustainability requires balancing fiscal viability, adequate protection, and intergenerational fairness.

The sustainability triangle therefore helps clarify the broader perspective of this course. Social sustainability is not a residual category added to economic and ecological concerns. It is the dimension that asks whether economic development and ecological transformation are compatible with human well-being, fair opportunities, social cohesion, and resilience over time.

Discussion question

Can a policy be ecologically sustainable but socially unsustainable? What institutional design could reduce this conflict?

1.3. Course Roadmap

The course proceeds from concepts to policy evaluation.

1. **Conceptual foundations.** We define social sustainability and distinguish it from economic and environmental sustainability.
2. **Welfare economics.** We introduce efficiency, social welfare functions, intergenerational welfare, market failures, and the role of the state.
3. **Measurement.** We discuss well-being, inequality, poverty, multidimensional deprivation, mobility, and equality of opportunity.
4. **Causal evidence and welfare evaluation.** We introduce quasi-experimental methods and the Marginal Value of Public Funds.
5. **Policy domains.** We apply the framework to education, labor markets, health, social insurance, care, demographic change, migration, climate transition, and technological change.

The central idea is that social sustainability requires a combination of normative reasoning, empirical measurement, and causal evidence. Welfare economics clarifies what society may want to achieve. Measurement tells us how social outcomes can be described. Causal inference tells us whether policies change these outcomes. Welfare evaluation then asks whether the benefits are worth the fiscal and social costs.

If social sustainability requires weighing well-being across individuals and generations, we need a framework for evaluating social outcomes. How should society compare different allocations of resources, opportunities, and risks? When is an allocation efficient? When is it fair? And how should we evaluate trade-offs between present and future generations? These questions lead to welfare economics, the topic of the next chapter.

2. Welfare Economics and Social Sustainability

2.1. Introduction

This chapter introduces the normative foundations of the course. The central question of welfare economics is how alternative institutions, markets, and public policies affect social well-being. In a course on *social sustainability*, this question takes a particularly broad form. We are interested not only in whether resources are allocated efficiently, but also in whether societies create durable conditions for social participation, resilience, fair opportunity, and protection against persistent disadvantage.

More broadly, the central question in welfare economics is how society should use scarce resources. This question is also at the heart of social sustainability. Social sustainability concerns whether economic and social arrangements allow people to live decent, secure, and self-determined lives, not only today but also in the future. Scarce resources such as labor, capital, land, public funds, administrative capacity, and environmental resources should therefore be used to generate high social value.

Economic efficiency provides one important benchmark for this question. If resources are used inefficiently, society wastes opportunities to improve people's lives. For example, if health care, education, housing, or public infrastructure could be reorganized in a way that benefits some people without harming others, then the current arrangement leaves avoidable welfare gains unused. From a social sustainability perspective, such waste is problematic: it means scarce resources are not fully contributing to well-being, inclusion, resilience, or equal opportunities.

However, efficiency is not the same as social sustainability. An economy can be efficient and still be highly unequal, socially exclusionary, or intergenerationally unfair. Pareto efficiency, in particular, is a very weak normative criterion. It asks whether there are unexploited opportunities for mutual improvement, but it does not ask whether the resulting distribution of welfare is fair. A situation in which one person owns almost everything and another person has very little can still be Pareto efficient if helping the poorer person would require redu-

cing the richer person's welfare. Thus, Pareto efficiency is a useful starting point, but it cannot by itself define a socially sustainable society.

A useful way to summarize the relationship is the following: social sustainability requires that resources are not wasted, but it also requires attention to distribution, vulnerability, participation, and intergenerational effects. In the language of this course, social sustainability combines four perspectives:

$$\text{social sustainability} = \text{welfare} + \text{distribution} + \text{dynamics} + \text{evidence}.$$

Welfare economics provides tools to clarify the first two elements: how much welfare society can generate and how it is distributed across individuals.

We are now concerned with the most important theoretical pillar – welfare economics – as this is a necessary condition for social sustainability. This means: Without efficient resource use, a society cannot be sustainable.

This chapter proceeds in five steps. Section 2.2 introduces the distinction between positive and normative analysis. Section 2.3 discusses allocative efficiency and the Pareto criterion. Section 2.4 explains why efficiency alone is insufficient for a course on social sustainability. Section **??** introduces social welfare functions and welfare weights. Section **??** then outlines the main rationales for state intervention, including market failure, redistribution, and missing insurance markets.

2.2. Positive and normative economics

A useful starting point for welfare economics is the distinction between *positive* and *normative* economics. Economics can be used in two distinct ways. On the one hand, it can describe and explain the world as it is. On the other hand, it can evaluate alternative states of the world and ask which are socially preferable. Positive economics addresses the former and asks how individuals, firms, and governments behave and how markets operate. Normative economics, in contrast, is concerned with the latter, and asks how scarce resources *should* be allocated and how institutions ought to be designed from the viewpoint of society as a whole. Welfare economics belongs to the latter category.

Positive versus normative economics

Positive economics analyzes how the economy works. It studies facts, behavior, institutions, and causal mechanisms.

Normative economics evaluates whether one allocation or policy is better than another according to some social criterion.

This distinction is essential because many policy debates involve both types of questions. Consider unemployment insurance. A positive question is whether higher benefits reduce job-search intensity. A normative question is whether the resulting insurance gains outweigh any efficiency costs. Likewise, in health policy, a positive question is whether insurance increases healthcare utilization, while a normative question is whether broader insurance coverage improves social welfare.

For social sustainability, both dimensions matter. Policies must be grounded in a realistic understanding of incentives and behavior, but they must also be judged according to explicit normative criteria. Welfare economics provides the conceptual language for doing so.

2.3. Allocative efficiency

2.3.1. The idea of allocative efficiency

A natural benchmark in welfare economics is *allocative efficiency*. Allocative efficiency asks whether goods and resources are allocated to those uses where they generate the highest value. In a simple market setting, this means that a good should be consumed whenever an individual's willingness to pay for an additional unit exceeds the social cost of producing that unit. Conversely, a good should not be consumed if the resources required to produce it could generate greater value elsewhere.

The key comparison is therefore between *marginal benefit* and *marginal cost*. The marginal benefit of a good is reflected in the maximum amount consumers are willing to pay for one additional unit. The marginal cost is the value of the resources society must give up in order to produce that unit. An allocation is allocatively efficient if all units for which marginal benefit exceeds marginal cost are produced and consumed, and no units for which marginal cost exceeds marginal benefit are produced.

In a competitive market without externalities, market equilibrium provides a natural illustration of allocative efficiency. The demand curve represents consumers' willingness to pay for additional units, while the supply curve represents the marginal cost of producing them. The efficient quantity is reached where demand equals

supply. At quantities below this point, some consumers value an additional unit more than it costs to produce it, so society could gain by producing more. At quantities above this point, the cost of producing an additional unit exceeds consumers' willingness to pay, so society would gain by producing less.

For example, consider the market for bread. If a loaf of bread costs society €2.50 to produce but a consumer is willing to pay €4.50 for it, producing and consuming that loaf creates a social surplus of €2.00. If, however, another loaf costs €4.50 to produce, but consumers are willing to pay only €2.50, then producing that loaf uses resources whose value exceeds the benefit consumers receive from it. Allocative efficiency requires producing bread up to the point at which the willingness to pay for the marginal loaf equals the marginal cost of producing it.

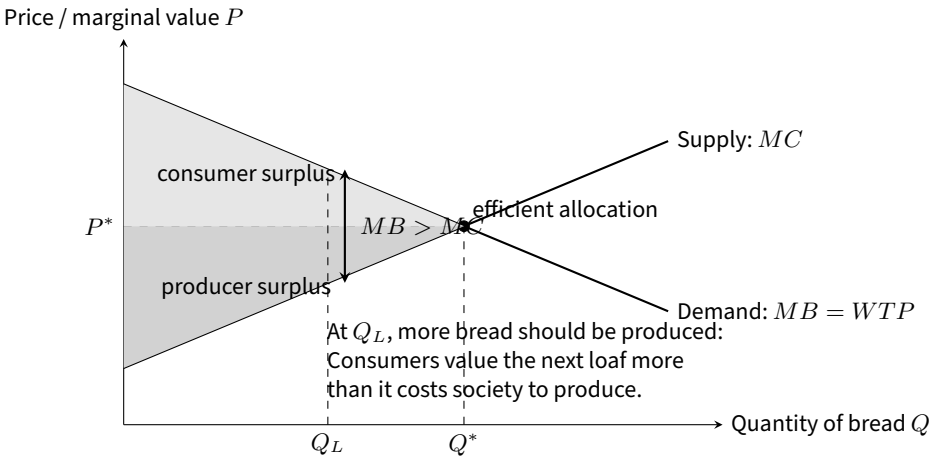

Figure 2.3.1.: Allocative efficiency in the market for bread

Notes: MB = Marginal benefit (measured in the monetary willingness to pay; WTP). MC = Marginal costs, i.e., what is society's total cost of producing another marginal unit?

Importantly, allocative efficiency is not the same as distributive justice. An allocation may be efficient even if some individuals cannot afford important goods. Efficiency asks whether resources are used where they create the greatest total value; equity asks how the resulting goods, income, and opportunities are distributed across individuals.

2.3.2. Pareto Efficiency

The most basic efficiency concept in welfare economics is *Pareto efficiency*. An allocation is Pareto efficient if there is no feasible alternative allocation that would make at least one person better off without making anyone else worse off. Equivalently, an allocation is Pareto inefficient if society could reallocate resources so that at least one individual is better off while leaving all others at least as well off as before.

Pareto efficiency

An allocation is **Pareto efficient** if there is no feasible alternative allocation that makes at least one person better off without making anyone else worse off.

This definition is deliberately minimal. It does not require interpersonal comparisons of utility. It does not require us to say whether the utility of individual A is more important than the utility of individual B. It only asks whether there are still unexploited gains from reallocation. If such gains exist, the current allocation is inefficient.

In a simple market setting with one good, Pareto efficiency can be defined as the condition in which the marginal social value equals the marginal social cost of producing the good, which we denote by X. The marginal social value, denoted by MSV, measures the value society obtains from one additional unit of X. The marginal social cost (MSC) measures the value of the resources society must give up to produce an additional unit. The efficient quantity x^* is reached where marginal social value equals marginal social cost:

$$MSV(x^*) = MSC(x^*).$$

If $MSV > MSC$, then producing more of the good creates additional social surplus. Society gains more from the additional unit than it gives up in resources. If $MSC > MSV$, then too much of the good is being produced. The resources used for the additional unit could generate greater value elsewhere.

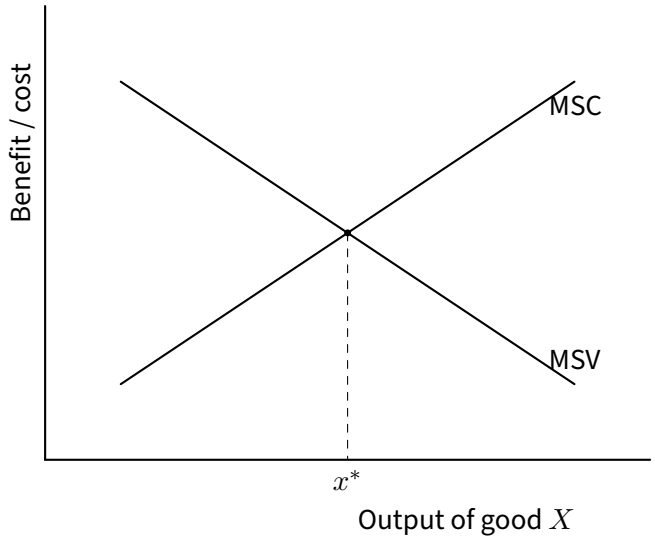

Figure 2.3.2.: Economic efficiency

Figure 2.3.2 illustrates this logic. For quantities below x^*, the MSV curve lies above the MSC curve. This means that an additional unit of good X is worth more to society than it costs to produce. Producing more would

therefore increase total surplus. For quantities above x^*, the opposite is true. The MSC curve lies above the MSV curve, meaning that the resources required to produce one more unit are more valuable than the additional benefit society receives. The quantity x^* is efficient because it exhausts all mutually beneficial production opportunities.

This graphical argument captures one dimension of Pareto efficiency: the economy should not produce too little or too much of a good. But Pareto efficiency has several dimensions. A fully efficient economy must satisfy efficiency in production, efficiency in consumption, and efficiency in the overall product mix.

2.3.3. A Simple Economy with Two Individuals and Two Goods

To make the idea more precise, consider a society consisting of two individuals, A and B. Both individuals consume two goods, X and Y. Their utilities are given by

$$\begin{aligned} U^A &= U(X^A, Y^A), \\ U^B &= U(X^B, Y^B). \end{aligned} \tag{2.1}$$

The utility function $U(\cdot)$ describes how each individual ranks different consumption bundles. For example, X could be housing and Y could be food, or X could be health care and Y could be other consumption. The bundle (X^A, Y^A) describes how much of each good individual A receives, while (X^B, Y^B) describes the corresponding bundle of individual B.

The goods X and Y are produced using capital K and labor L:

$$\begin{aligned} X &= X(K^X, L^X), \\ Y &= Y(K^Y, L^Y). \end{aligned} \tag{2.2}$$

This means that producing each good requires inputs. For example, producing health care requires medical equipment, buildings, doctors, nurses, and administrative staff. Producing education requires schools, teachers, digital infrastructure, and time. Society cannot produce unlimited amounts of all goods because resources are finite:

$$\begin{aligned} K^X + K^Y &= \overline{K}, \\ L^X + L^Y &= \overline{L}. \end{aligned} \tag{2.3}$$

The total amount of capital is $\overline{K}$ and the total amount of labor is $\overline{L}$. If more labor and capital are used to produce good X, fewer resources remain available to produce good Y. Welfare economics studies how these scarce resources should be allocated across production activities and across individuals.

The problem therefore has two connected dimensions. First, society must decide how much of each good to produce. This is the efficiency problem in production and product choice. Second, society must decide who receives the goods once they have been produced. This is the distribution problem. Social sustainability requires attention to both: society should use its resources productively, but it should also care about whether the resulting allocation supports inclusion, security, and fair opportunities.

2.3.4. Efficiency in Consumption: The Edgeworth Box

The Edgeworth box is a useful tool for analyzing the distribution of goods between two individuals. Suppose the total quantities of goods X and Y are fixed. The Edgeworth box shows all possible ways of distributing these goods between individuals A and B.

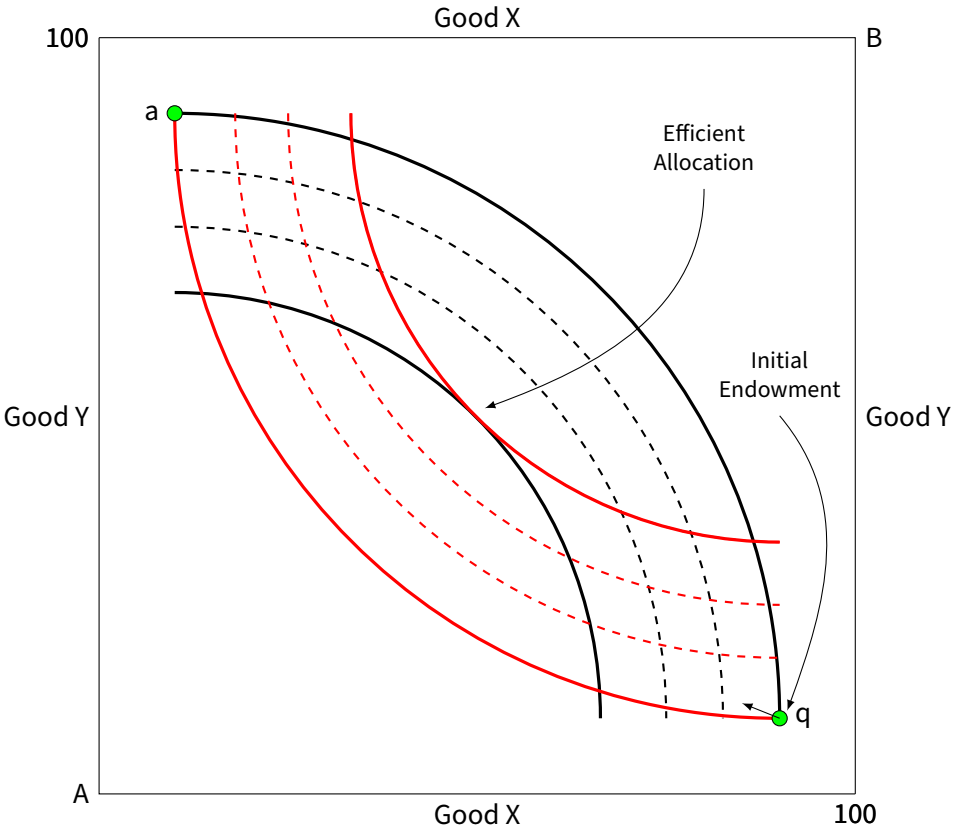

Figure 2.3.3.: Edgeworth Box

Figure 2.3.3 illustrates the basic idea. The width of the box represents the total amount of good X available in society. The height of the box represents the total amount of good Y. Individual A's consumption is usually

measured from the lower-left origin. Moving to the right gives A more of good X, and moving upward gives A more of good Y. Individual B's consumption is measured from the upper-right origin. Moving left gives B more of good X, and moving downward gives B more of good Y.

Every point inside the Edgeworth box describes a feasible allocation. If one point lies more to the right, individual A receives more of good X and individual B receives less of it. If one point lies higher, individual A receives more of good Y and individual B receives less of it. Thus, the Edgeworth box makes clear that distribution is about trade-offs: with fixed total resources, giving more of a good to one person means giving less of that good to another person.

The indifference curves in the Edgeworth box describe combinations of X and Y that give each individual the same level of utility. For individual A, indifference curves farther away from the lower-left origin represent higher utility. For individual B, indifference curves farther away from the upper-right origin represent higher utility. The shape of the indifference curves reflects the individual's willingness to trade one good for the other.

At many allocations, the indifference curves of A and B cross. Such an allocation is not Pareto efficient. The reason is that when indifference curves cross, the two individuals have different marginal rates of substitution. The marginal rate of substitution measures how much of one good an individual is willing to give up in exchange for one additional unit of the other good while keeping utility constant. If A and B have different marginal rates of substitution, then there is still room for mutually beneficial exchange. One individual values good X relatively more, while the other values good Y relatively more. By reallocating the goods, both individuals can potentially become better off.

A Pareto-efficient allocation in consumption is reached when the indifference curves of A and B are tangent to each other. At such a point, both individuals have the same marginal rate of substitution:

$$MRS^{A}_{XY} = MRS^{B}_{XY}.$$

This condition means that both individuals value the trade-off between X and Y in the same way at the margin. Once this is true, there is no further exchange of goods that can make one individual better off without making the other worse off.

2.3.5. The Contract Curve

The set of all Pareto-efficient allocations in the Edgeworth box is called the *contract curve*.

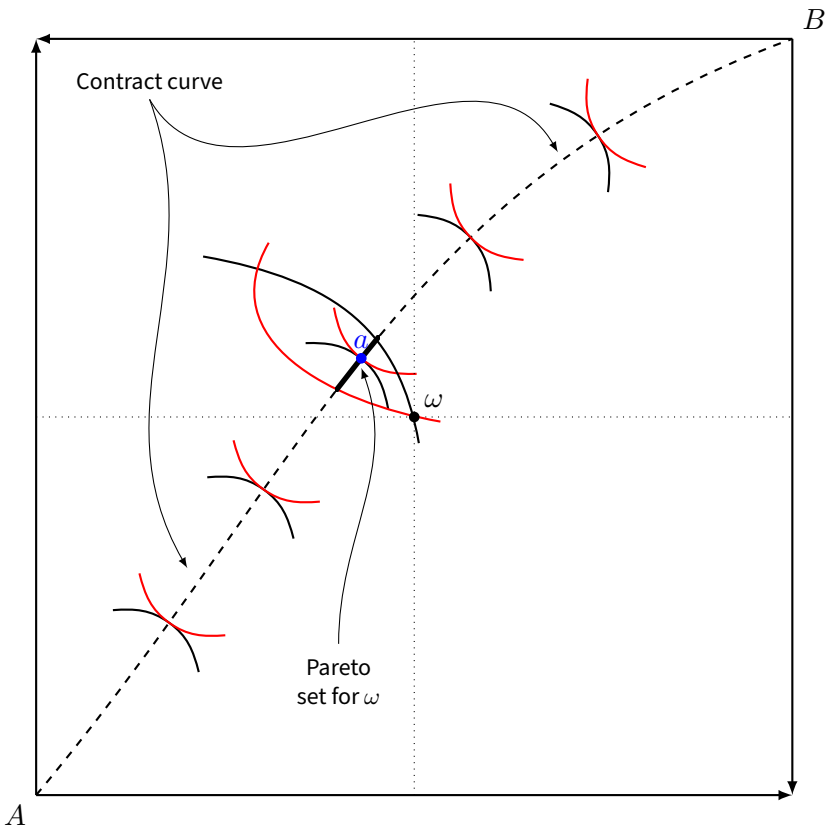

Figure 2.3.4.: Contract curve

Figure 2.3.4 shows the contract curve. Each point on this curve is Pareto efficient, as it defines the points at which bith individual have the same marginal rates of substitution for both goods. This does not mean that all points on the contract curve are equally desirable from a social-justice perspective. Some points may give most resources to individual A, while others may give most resources to individual B. All these points can be Pareto efficient because moving from one point on the contract curve to another usually makes one person better off and the other person worse off. Still, it can be that one individual is poor or even does not receive any resources.

2.4. Limits of Efficiency and Social Welfare Functions

2.4.1. From efficiency to social welfare functions: distribution, dynamics, and resilience

Pareto efficiency is an important benchmark in welfare economics because it identifies whether society is wasting opportunities for mutual improvement. If an allocation is Pareto inefficient, resources could be rearranged in a way that makes at least one person better off without making anyone else worse off. In such a case, society is clearly not making full use of its possibilities. From the perspective of social sustainability, this matters

because scarce resources such as income, labor, public funds, health care capacity, educational opportunities, housing, and environmental resources should not be wasted.

Key idea: Pareto efficiency

An allocation is **Pareto efficient** if no feasible reallocation can make at least one person better off without making someone else worse off. Pareto efficiency therefore rules out avoidable waste, but it does not by itself evaluate whether an allocation is fair, inclusive, or socially sustainable.

However, Pareto efficiency is only a minimal criterion. It tells us whether avoidable waste exists, but it does not tell us whether the resulting allocation is fair, inclusive, resilient, or socially desirable. An allocation can be Pareto efficient even if one individual has almost all resources and another has very little. As long as improving the situation of the worse-off individual would require reducing the utility of someone else, the allocation may satisfy the Pareto criterion. Pareto efficiency therefore rules out some forms of waste, but it does not rule out poverty, exclusion, inequality, or vulnerability.

This distinction is central for social sustainability. A socially sustainable society is not only one that avoids inefficient resource use. It is also one in which individuals have access to basic opportunities, can participate in social and economic life, and are protected against risks that may otherwise lead to persistent disadvantage. Efficiency is therefore relevant, but it is not sufficient. A society may be efficient in the narrow Pareto sense and still fail to provide acceptable living conditions, fair opportunities, or long-term social stability.

The contract curve illustrates this point. In an Edgeworth box, the contract curve contains all Pareto-efficient allocations. At each point on the contract curve, it is impossible to make one individual better off without making the other worse off. Yet the points on the contract curve may represent very different distributions of welfare. Some points may strongly favor individual A, while others may strongly favor individual B. Pareto efficiency alone cannot tell us which of these efficient allocations society should choose.

This separates two distinct questions:

1. *Efficiency question:* Is the allocation Pareto efficient, or are there still unexploited gains from exchange or production?
2. *Social evaluation question:* Among the Pareto-efficient allocations, which one is socially desirable?