

PARTICIPATORY INVESTMENT PLANNING

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CONTEXT

- The “model” of a participatory economy has been around for over 35 years. But what was previously proposed and analyzed in great detail was primarily a procedure for arriving at an **annual** plan.
- The formal paper which is the basis of this presentation -- co-authored with Allison Kerkhoff and now published by RRPE on line -- is a detailed proposal for how to do participatory **aggregate investment** planning.

IN THIS PRESENTATION

- I will first cover the **essential points** in that article without dwelling on tedious details.
- I will then **briefly** explain how once a decision about aggregate investment has been made, this can be transformed into a detailed, comprehensive investment plan.
- After which I will explain how **major findings** from investment planning -- which include how to make investment planning more participatory, and how investment and annual planning can be integrated to improve outcomes -- **can be applied to three different kinds of long-run, development planning** -- education planning, environmental planning, and strategic international economic planning.

Aggregate Investment Planning: A Simple Model

- There are three years, $t = 1, 2, 3$, after which the world ends.
- There is a single good, corn, which is both the sole consumption good, and, together with homogeneous labor, as seed corn, is the only other input into the production of corn.
- The amount of homogeneous labor available each year, $l(t)$, is exogenous, as is the corn stock at the beginning of year 1.
- To be used in production during a year corn must be available at the beginning of the year. All corn produced in year t is either consumed in year t or used as an input to produce corn in year $t+1$. And all corn produced in year t which is used as an input in year $t+1$ is entirely used up, and disappears by the end of year $t+1$.

In other words, corn is both the sole consumption good, and also a *capital* good -- not an *intermediate* good. But it is a capital good which depreciates entirely in the year after it became available.

Utility each year is a function of the amount of corn consumed that year: $U(t)[c(t)] = \sqrt{c(t)}$, $t = 1,2,3$.

The production function for corn, $F(t)$, is a function of how much corn is used and how much labor is used during the year: $x(t) = F(t)[\text{corn}(t), l(t)] = \sqrt{[\text{corn}(t)l(t)]}$ $t = 1,2,3$.

For convenience we assume that social welfare, SW , is simply the sum of utility in the three years: $SW = \sum U(t)$ ($t = 1,2,3$), i.e. that the social rate of time discount is zero.

Efficiency Conditions for Maximizing SW

(A) The last bushel of corn consumed in year 1 must increase utility in year 1 by the same amount as the last bushel of corn saved/invested in year 1 increases corn production in year 2, *times* the amount the last bushel of corn consumed in year 2 increases utility in year 2:

$$\begin{aligned} dU(1)[c(1)]/dc(1) &= \{\delta F(2)[\text{corn}(2),l(2)]/\delta \text{corn}(2)\}\{dU(2)[c(2)]/dc(2)\} \\ 1/[2\sqrt{c(1)}] &= \{\sqrt{l(2)}/[2\sqrt{\text{corn}(2)}]\}\{1/[2\sqrt{c(2)}]\} \end{aligned}$$

(B) The last bushel of corn consumed in year 2 increases utility in year 2 by the same amount as the last bushel of corn saved/invested in year 2 increases corn production in year 3, *times* the amount the last bushel of corn consumed in year 3 increases utility in year 3:

$$\begin{aligned} dU(2)[c(2)]/dc(2) &= \{\delta F(3)[\text{corn}(3),l(3)]/\delta \text{corn}(3)\}\{dU(3)[c(3)]/dc(3)\} \\ 1/[2\sqrt{c(2)}] &= \{\sqrt{l(3)}/[2\sqrt{\text{corn}(3)}]\}\{1/[2\sqrt{c(3)}]\} \end{aligned}$$

Two Tasks

For any given initial corn stock and supplies of labor in each year, these two equations in two unknowns can be solved for the optimal values for saving/investment in years 1 and 2, which gives the optimal production, saving/investment, and consumption plan for all three years, and the maximum possible social welfare.

Economic Task: Future labor supplies, utility functions, and production functions are unknown, and must be estimated as correctly as possible to maximize efficiency.

Political Task: We want people to participate in aggregate investment decision making in accord with how much they are affected by that investment decision.

Solution to the economic task

We demonstrate that when mistakes are made in estimating future labor supplies, utility functions, or production functions:

- Any mistakes concerning estimates of future conditions can be detected from results from subsequent annual plans during the investment planning horizon.
- Once mistakes are revealed it is possible to recalculate an optimal plan for the remaining years of the investment plan to mitigate welfare losses.
- In the article we use a concrete example to demonstrate how, by updating the investment plan, social welfare can be improved, although social welfare can never be as high as would be the case if estimates of future conditions were correct in the first place.

Solution to the political task

After careful consideration of: (a) **who** has best access to information, (b) **who** has an interest in more or less investment, and (c) the **fact** that future generations are not present to represent their own interests when investment plans are created; we propose a decision making procedure for aggregate investment decisions where:

- The **National Federation of Consumer Councils**, NFCC, estimates future utility functions, including consumers' preferences for new products.
- In consultation with industry federations, the **National Federation of Worker Councils**, NFWC, estimates future production functions.
- Using these estimates what is presumably the most efficient aggregate investment plan can be calculated.
- This plan is then tested against a **Generational Equity Constraint (GEC)** which limits how much consumption can differ between years covered by the aggregate investment plan.

The Generational Equity Constraint (GEC)

A: $c(t+1) < 1.\beta c(t)$, **and** B: $c(t) < 1.\beta c(t+1)$ for all t .

This *generational equity constraint* (GEC) will prevent consumption in adjacent years from differing by more than β percent even if the utility and production functions are such that in the “optimal” saving/investment plan they differ by more than β percent. The GEC is necessary for two reasons:

(1) As we demonstrate by example, for some possible productivity increases and changes in preferences an efficient investment plan may be unfair to either present or future generations.

(2) Future generations cannot be present when investment plans are created to protect their interests, so we need something to induce the present generation to treat future generations fairly. As the philosopher John Rawls famously taught, ideally we would like to have everyone vote on β behind a *veil of ignorance* which prevents people from knowing what generation they will be part of when they vote. So having everyone *know they are in generation-t* when they vote on β is not ideal.

However: When generation-t votes to choose a β it cannot be sure whether the constraint will be necessary, and apply at all, if part A will apply, or if part B will apply. That will depend on how productive or unproductive future technical changes turn out to be, and/or how preferences change in the future.

And if generation-t is tempted to vote for a very high β seeking to advantage itself anticipating that part A will apply, it **runs the risk** of disadvantaging itself if it turns out that part B applies instead -- which might occur if technological progress and/or preference development proves disappointing.

So we argue that the GEC yields a **reasonably satisfactory** solution to protect the interests of future generations when investment decisions are made by inducing the present generation to act as “honest brokers” so to speak. Once the efficient aggregate investment plan has been modified, if necessary, to be consistent with the GEC, it can be approved either by the national legislature or referendum.

From aggregate to comprehensive investment plan

In a separate article we have shown:

(1) Once we have the best possible, updated, aggregate investment plan we can calculate what the marginal social product of investment is in every year if we implement that plan -- call it $MSPI(t)$.

(2) When we now need to make decisions about how much of each distinct capital good to produce in any year, t , it is efficient to keep producing each capital good up to the point where it allows us to produce something in year $t+1$ that is $[1+MSPI(t)]$ greater than its marginal cost of production.

(3) We then demonstrate how this can be achieved if the indicative price worker councils demanding the capital good are charged $(1+d)$ times the indicative price producers are credited for in any year -- where $(1+d)$ is the ratio of the marginal utility of aggregate consumption in year t , divided by the marginal utility of consumption in year $t+1$ in the best possible aggregate plan -- something the IFC who quotes indicative prices during the annual planning procedure can calculate from information available from the aggregate investment plan.

Long-run development planning

Proposals for how to create and modify three different kinds of long-run development plans are presented in chapters 12, 13, and 14 of *Democratic Economic Planning* -- forthcoming from Routledge in 2020. The relevance here is this:

(1) The Generational Equity Constraint will play an even more important role in long-term development planning which covers much longer time periods than investment plans making the “missing generations problem” for democratic planning more acute.

(2) As we show, with suitable modifications for different categories of benefits, efficiency conditions can be calculated for education planning, environmental planning, and strategic international economic planning which are analogous to the efficiency conditions for investment plans stated previously.

With suitable modifications for (a) **who** has best access to information regarding the costs and benefits of more investment in education, preserving the environment, and creating comparative advantages in particular industries, and (b) **who** has a vested interest in each kind of investment, we can identify who and how different constituencies, or actors, should be involved in estimating different terms in the efficiency conditions for different kinds of development planning.

And like shorter term investment plans which usually cover less than a decade, these longer term development plans which cover many decades can also be updated when results of annual plans reveal that initial estimates of key future parameters turn out to be erroneous just as investments plan can be updated to mitigate welfare losses from inaccurate estimates of future conditions.

References

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