Reflecting Equity Outcomes in PIM Decisions/Actions

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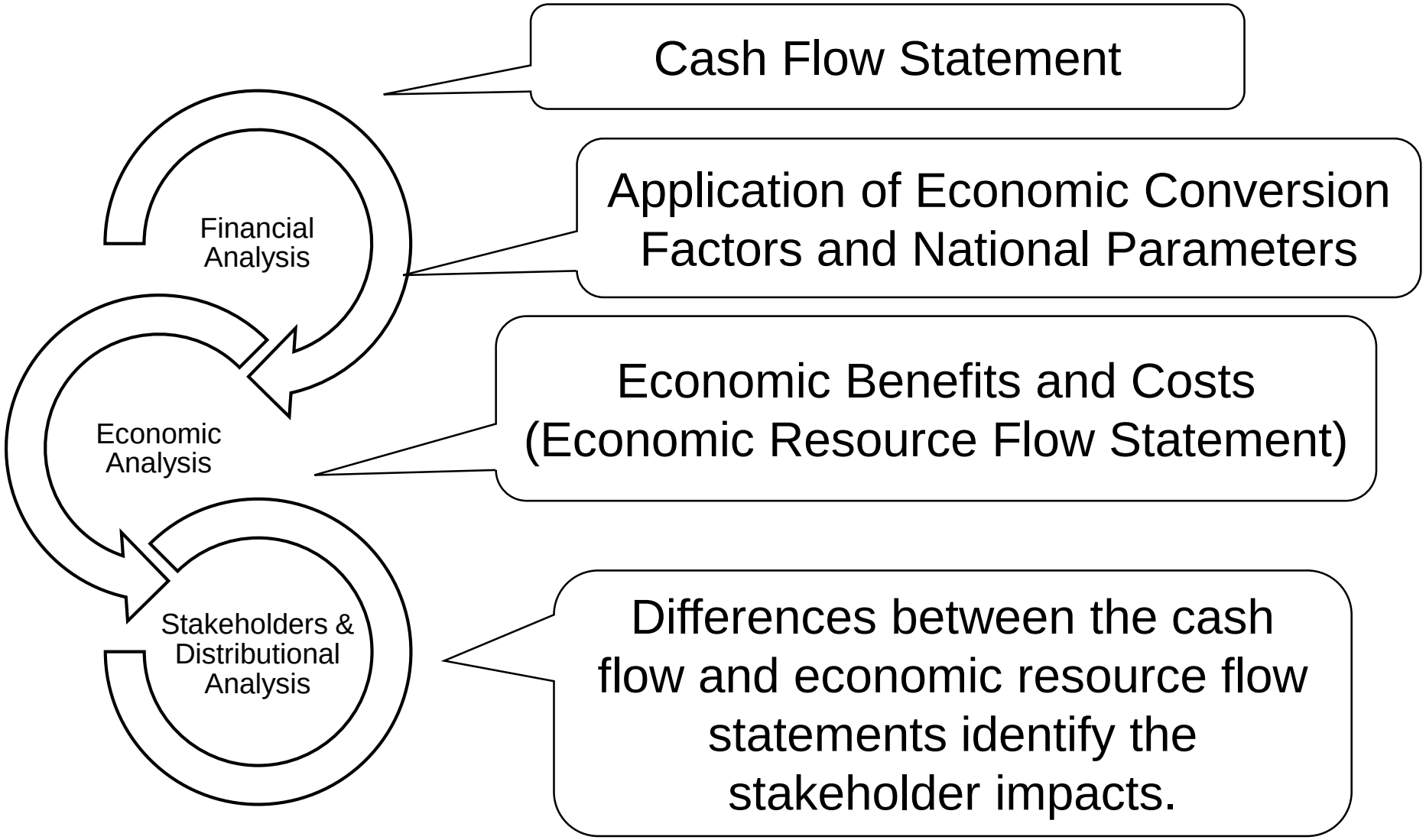
Foundations for Equity Analysis

- Integrated Investment Appraisal
  - Financial Analysis
  - Economic Analysis
  - Stakeholder Analysis – Distributional Accounting
  - Risk Analysis

Steps of Integrated Appraisal



ECONOMIC VALUE

=

FINANCIAL VALUE

+

TAX IMPACT

+

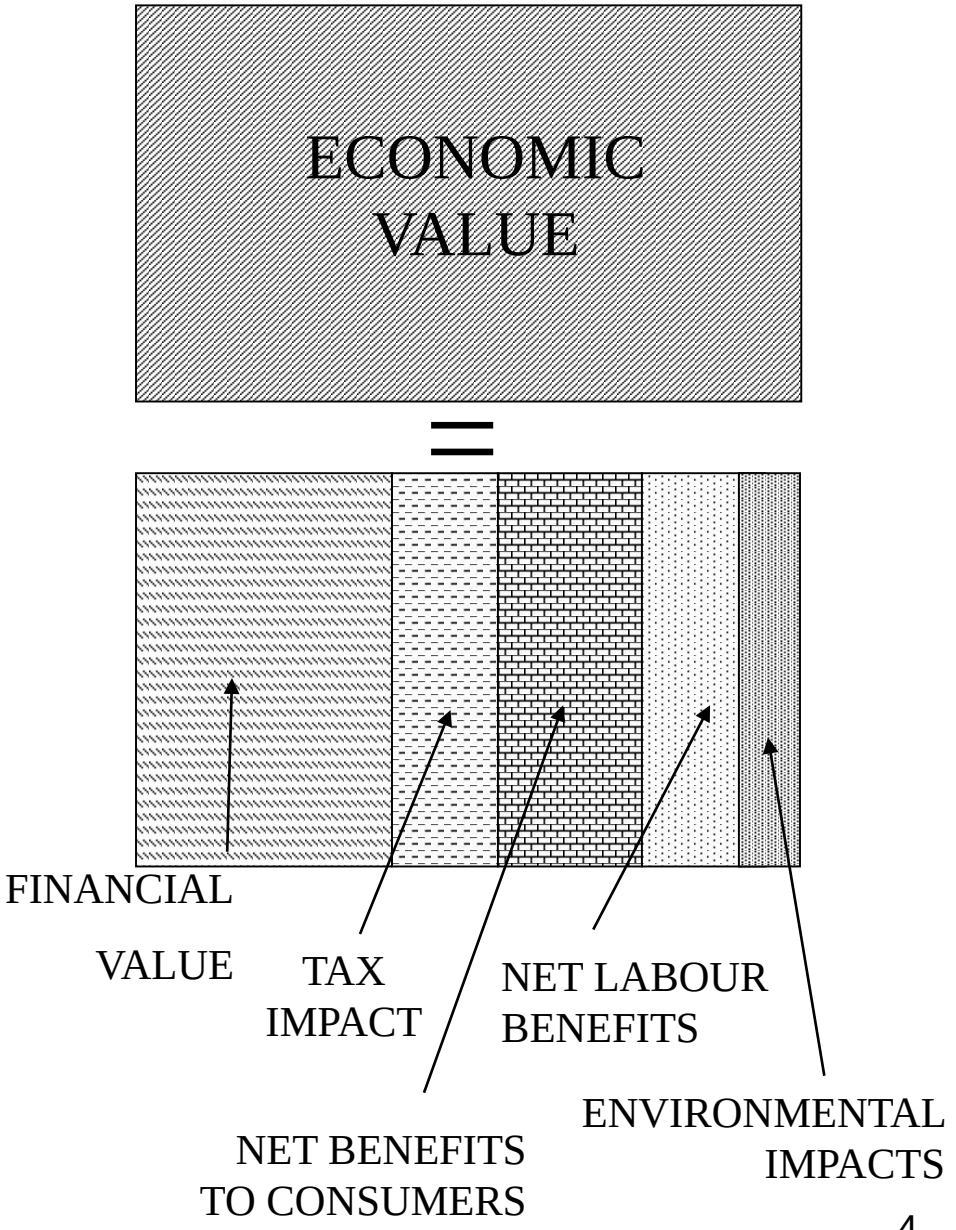
NET BENEFITS TO CONSUMERS

+

NET LABOUR BENEFITS

+

ENVIRONMENTAL IMPACTS



Stakeholder Analysis: General Relationship

- The following relationship holds when all benefits and costs are discounted using economic opportunity cost of capital (EOCK).

$$NPV^{ECON}_{@EOCK} = NPV^{FIN}_{@EOCK} + PV^{EXT}_{@EOCK}$$

- The reconciliation of the economic appraisal with the financial appraisal and the stakeholder impacts is a powerful check on the correctness of the economic analysis.

- It provides policymakers with the critical information of making allocation decisions involving considerations.

An Integrated Investment Appraisal of A Wind Farm: The Wolfe Island Wind Farm

- In 2004 the Government of Ontario introduced the first of several programs, designed to encourage private investment in renewable energy.

- Very much committed to reducing GHG emissions.

- Fast forward to 2017 and renewables – wind, solar and biofuel – now account for 14% of installed generating capacity, and almost 8% of total output.

- Project cost $478 million

- **But do the economic benefits of wind generation outweigh the economic costs?**

Integrated Investment Appraisal's Results

Economic, Financial and Stakeholder Analysis

	Canadian Economy	Wind Farm	Gas Plant	Hydro Plant	Domestic Consumer	Government
"Short Run"	-397.1	0.2	-176.4	-31.5	-120.7	-47.7
"Long Run"	-397.1	0.2	0	0	-328.6	-47.7

Externality Adjustments

1. Additional loss to Canada from the shadow price of government funds arising from loss of government revenue caused by the project.

2. If negative economic welfare externality is equal to 20% of government revenues lost then further economic cost to Canada of CAD 9.54 million
   Economic NPV for Canada is now
   (-397.1)+(-9.45) = CAD - 406.64 million.

Externality Adjustments

- External benefits from reduction in fuel consumption leading o GHG reduction.
- Global externality CAD + 61.35 Millions.
- Global economic NPV :

$$NPV_{t=0}^{globe} = NPV_{t=0}^{eco} + NPV_{t=0}^{envir}$$

-345.29= -406.64 + 61.35

- The social cost of CO2 that captures the environmental externality for the global economy was set at CAD$40.00 / tonne .

Equity Adjustments: When Needed?

- When a project has a positive Economic NPV without specific adjustments for distributional impacts then further adjustments are not necessary.
- Traditional Recommenations
- - Distributional Weights
- - Basic Needs
- Distributional Weights or Basic Needs externalities are adjustments to the economic analysis that might change the Economic NPV from negative to positive in situations where the project is marginally negative.

Distributional Weights Adjustment

- Distributional weights adjustments begin after the stakeholder analysis is completed that identifies the income impacts on each of the relevant stakeholder groups.

- Distributional weights would increase the benefits or costs of those individuals with low incomes (high marginal utilities of income) relative to the benefits and costs incurred by those with higher incomes.

Distributional Weights Adjustment

- To maintain economic efficiency the proportional adjustment should be capped at the net economic cost of bringing about this desirable change in the distribution of income by the most efficient alternative way.

- The weights should reflect what society is willing to give up in economic resources to bring about the particular change in the income distribution created by the project.

BASIC NEEDS ADJUSTMENT

- The attainment of the basic needs of poorer members of the community may also generate an increase in the total satisfaction of better off members of the community.

- The rationale for bne approach is not just that the poor should have more income, but that they should have better nutrition, medical care, housing etc.

- This public good externality may be included in the benefits of investments that lead to satisfying of the basic needs by disadvantaged members of the community.

AN APPLICATION OF BASIC NEEDS EXTERNALITY ESTIMATION:

Olifants-Sand Water Transfer Scheme (Basic Facts)

- A bulk water supply system that also provided water to some poor communities as well as to mines and other well off communities.
- The region affected is the Sekhukhune Cross Border District of Limpopo Province, South Africa
- This region has an unemployment rate of approximately 68%, compared to the average of 46% in Limpopo Province.
- Only about 40% of the households have access to the minimum water supply for drinking, cooking and critical hygiene of 25 liters per capita a day (l/c/d.

Olifants-Sand Water Transfer Scheme

- The economic analysis indicates that the project has a net present value that is highly positive.

- Financial cost of the project $ 714 mil Rand ($90mil)
- Economic net present value $ 810 mil Rand (100 mil)

- The increased availability of potable water is accompanied by both an increase in the amount of water consumed and a dramatic fall in the costs of water thereby increasing the real incomes of the poor individuals.
- The project was entirely self funded, but

- The design of the pricing system for water was designed to produce a desirable allocation of stakeholder impacts.

Allocations of Stakeholder Impacts (Consumer surplus) of the Olifants-Sand Water Transfer Scheme in the Northern Province of South Africa from Willingness to Pay Study

STAKEHOLDER	Present Value of Impact (millions of Rand)
Lebowakgomo Area	74.0
Rural Users	338.7
Mining	271.7
Polokwane	26.6
Irrigation	77.0
Labor	13.2

Estimation of Basic Needs Externalities

- With the present very low volumes of water consumption, it is estimated that approximately 80 percent of the incremental potable water provided to poor households by the project would be used for drinking, cooking and critical hygiene.

- For our estimates here we use an average rate of basic needs externality of 100 percent of the cost of supplying the increased water for these uses for those communities that at the bottom the income distribution in South Africa. The government has a policy of providing the basic quantities of water free to these groups.

Present Value of Basic Needs Community Externality from Increased Consumption of Water by Poor* due to Lower Prices

TYPES OF CONSUMER	PV of volume of increased water consumption million cubic meters[b]	PV of Externality *(Millions of Rand)*
Olifants Rural Centers	52.66	80.04
Lebalelo Rural	15.65	23.79
Total[a]	**68.12**	**103.83**

Note: *The poor are defined for this purpose as those in the bottom 40 percent of the income distribution. The two rural communities included in this analysis fall well below this threshold.

[a]Proportion of total increment water used for drinking, cooking and critical hygiene = 80%, Proportion of water consumed by lowest two deciles of income distribution = 100%, we included only the two areas (i.e., Olifants River Centers and Lebalelo Rural) where the very poor are living. The economic cost of supply is estimated to be equal to R1.9 per M3. Value of basic needs externality /m3 of target consumption is 100 percent of economic cost of supply.

[b]The water volumes are taken from the demand analysis of Cambridge Resources International, *Evaluation of the Olifants-Sand WaterTransfer Scheme in the Limpopo Province of South Africa,* Cambridge, MA, 2004, and discounted to 2004 using a real rate of discount of 11 percent.

Basic Needs Community Externality from Improved Housing, Nutrition, Health, Education of Poor* from Increased Real Income due to lower price for water and labour externality

STAKEHOLDER	Value of Impact (millions of Rand) (1)	Basic needs externality 30% premium (2)
Non Paying Users[a]	338.7	76.05
Labor[b]	10.56	2.38
Total	**425.9**	**78.43**

Note: *The poor are defined for this purpose as those in the bottom 20 percent of the income distribution.

[a]Poor receive 100% of income change; proportion of income spent on basic needs = 75%; basic needs externality = 30% of value of additional private expenditures on basic needs.

[b]Poor receive 80% (suppose 80% are the unskilled labor) of income change; proportion of income spent on basic needs = 75%; basic needs externality = 30% of value of additional private expenditures on basic needs.

Importance of Basic Needs Community Externalities

	Present Value (Millions of Rand)
PV basic needs externality due to price effect 30% premium	103.8
PV basic needs externality due to income effect 30% premium	78.4
PV total basic needs externality	182.2
PV total cost of project	714.1
Ratio of basic needs externality to total investment costs	0.255

Conclusion

- Distributional Weights and Basic Needs externality adjustments only impact decision making for marginally negative projects.
- These adjustments are made to projects a where a risk analysis would indicate that they have about a 50% probability of having a negative Economic NPV
- Is this a pro poor policy?
- A well done economic and stakeholder analysis provides the critical data on which social decision making can be made. Values are based on WTP and Resource Cost.