Accounting for Tax Distortions and Distributional Effects in Public Good Provision

Claus Thustrup Kreiner
University of Copenhagen, CESifo and CEPR

Kraka-EPRN Seminar
August 2012

Introduction

Main questions?

- How to carry out cost-benefit analysis in the public sector?
- Should optimal provision of public goods take into account distortionary taxation? If so, how?
- Should distributional effects be included? If so, how?
- Cost-benefit analyses of government projects in Denmark assumes MCF $= 1.2$. Does it lead to optimal provision of public goods?
- Related questions: (*i*) Existence of a double dividend on environmental taxation? (*ii*) Is differential commodity taxation better than a single tax rate?

The traditional approach

Original Samuelson rule

Expand public good consumption if (Samuelson, 1954):

$$\sum_n \text{MRS}_{cg} \geq \text{MRT}_{cg}$$

Problem: the formula does not take into account the distortionary effects of the tax system:

Expansion of public good consumption $\Rightarrow$ need to raise taxes $\uparrow$ $\Rightarrow$ dead-weight loss of taxation $\uparrow$

The traditional approach

Modified Samuelson rule

Adjust for distortionary costs of taxation (Stiglitz and Dasgupta, 1971; Atkinson and Stern, 1974; Browning, 1976):

$$\sum\nolimits_n \text{MRS}_{cg} \geq \text{MCF} \cdot \text{MRT}_{cg}$$

With a proportional tax system with tax rate m:

$$\text{MCF} = \frac{1}{1 - \frac{m}{1-m}\varepsilon}$$

Problem #1: Old controversy on whether it is most appropriate to use the compensated or the uncompensated elasticity for ε

With $m \approx 0.6$ and $\varepsilon = 0.1$, we obtain $\text{MCF} = 1.2$

Evaluation of government projects in Denmark assumes $\text{MCF} = 1.2$

Problem #2: Appropriate to ignore heterogeneity and distributional considerations?

The traditional approach

Accounting for heterogeneity, progressive taxation etc.

Dahlby (1998), Slemrod and Yitzhaki (2001), Gahvari (2006), Kleven and Kreiner (2006):

Proposition

A marginal expansion of a public good is desirable iff

$$\frac{\int_n \omega(n)\, MRS_{cg} f(n)\, dn}{1 - \int_n m \frac{\partial z}{\partial g} f(n)\, dn} \geq \frac{\int_n \omega(n)\, s(n)\, f(n)\, dn}{\int_n \left(1 - \frac{m}{1-m}\left(\Phi \cdot \varepsilon^c - \eta\right)\right) s(n)\, f(n)\, dn},$$

where ε^c is the compensated elasticity of taxable income w.r.t. to $1 - m$ and η is the income elasticity.

Problem #1: Relies on cardinal utility and interpersonal comparison (also the case for the previous simple formula)

Problem #2: Close to useless in practise

The traditional approach

Accounting for heterogeneity, progressive taxation etc.

What then?

Impose additional assumptions:

- Same social weights on all individuals, $\omega(n) = 1$ for all n
- Homogeneous elasticities ε^c and η
- No effect of government consumption on labor supply, $\partial z / \partial g = 0$
- Proportional tax system

$\Rightarrow$

$$\int_n \text{MRS}_{cg} f(n)\, dn \geq \frac{1}{1 - \frac{m}{1-m}\varepsilon}$$

Can be applied in practise ... but **relies on ridiculous assumptions**!

Hylland and Zeckhauser (1979), Christiansen (1981), Boadway and Keen (1993), Kaplow (1996, 2004), Kreiner and Verdelin (2012)

How far can we get with the **Pareto criteria**?

Analytical approach

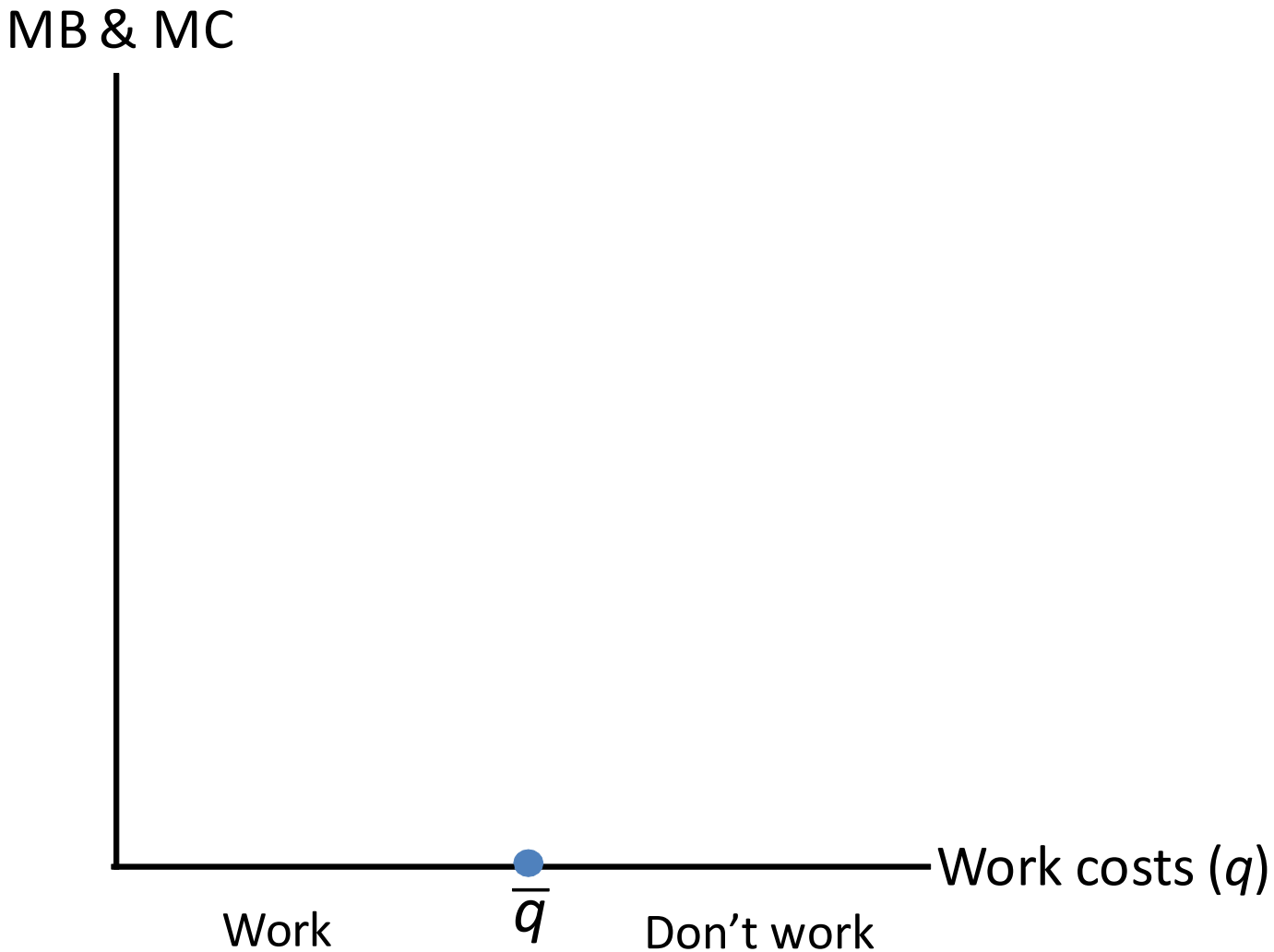
- Increase the tax of each individual/income group corresponding to the benefit received from the public good (the benefit principle) $\Rightarrow$ utility and equality are unchanged
- If the tax revenue is larger than the cost of the public good $\Rightarrow$ scope for a Pareto improvement

Main result

Reasonable assumption (willingness to pay uncorrelated with ability conditional on income) $\Rightarrow$ restores the **original Samuelson rule!**

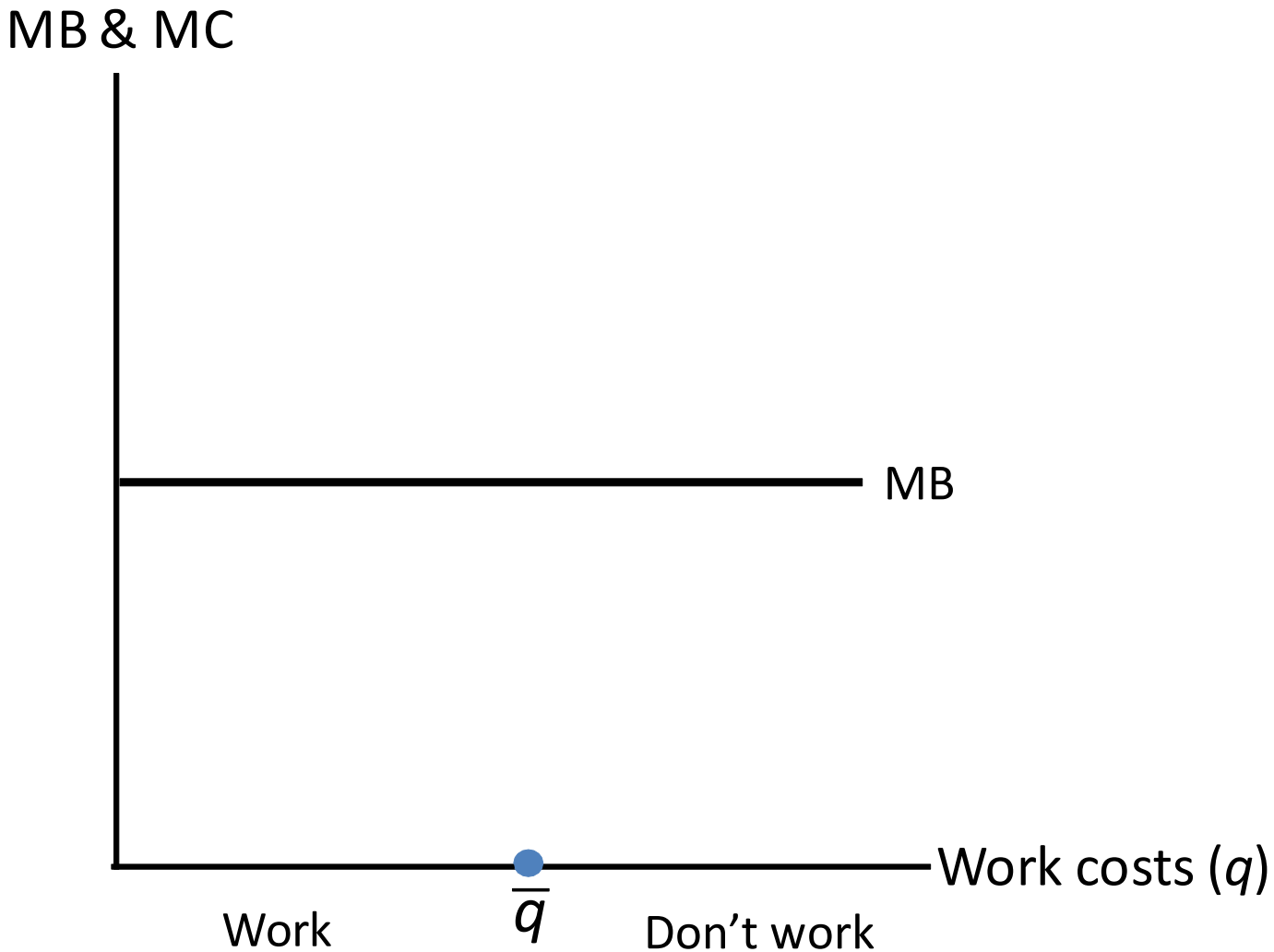
Traditional approach vs. new approach

Intuition behind traditional approach



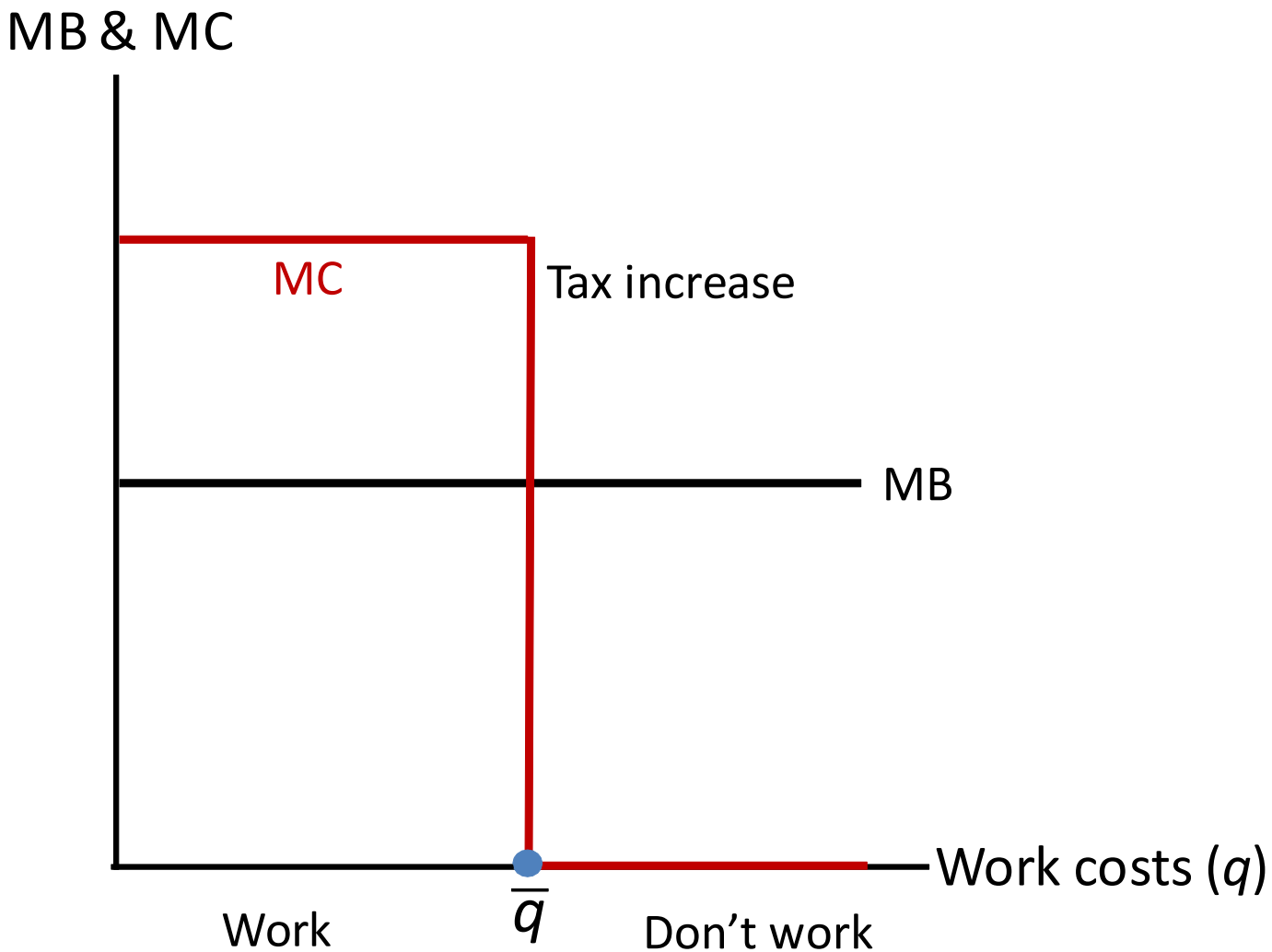
Traditional approach vs. new approach

Intuition behind traditional approach



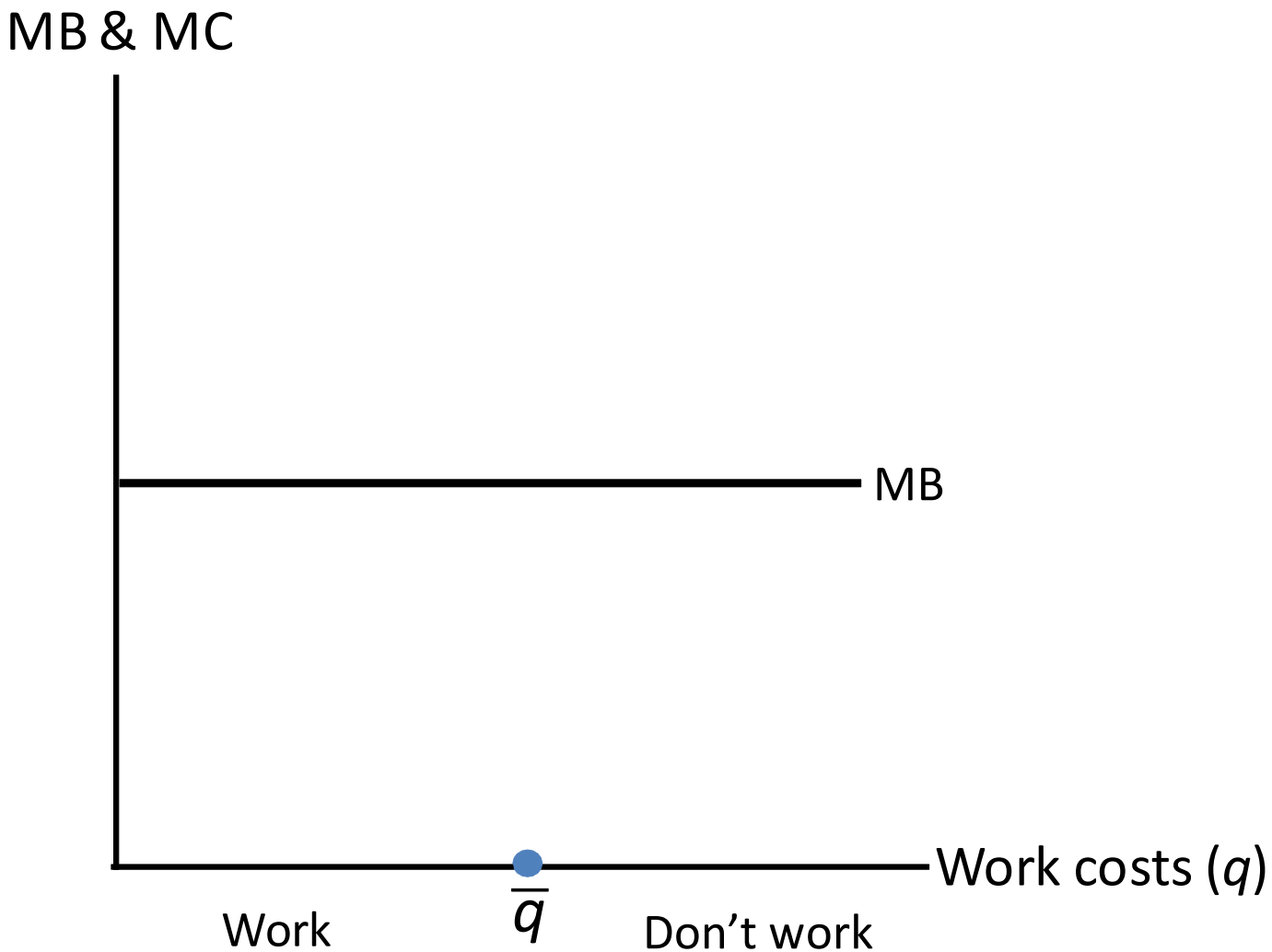
Traditional approach vs. new approach

Intuition behind traditional approach



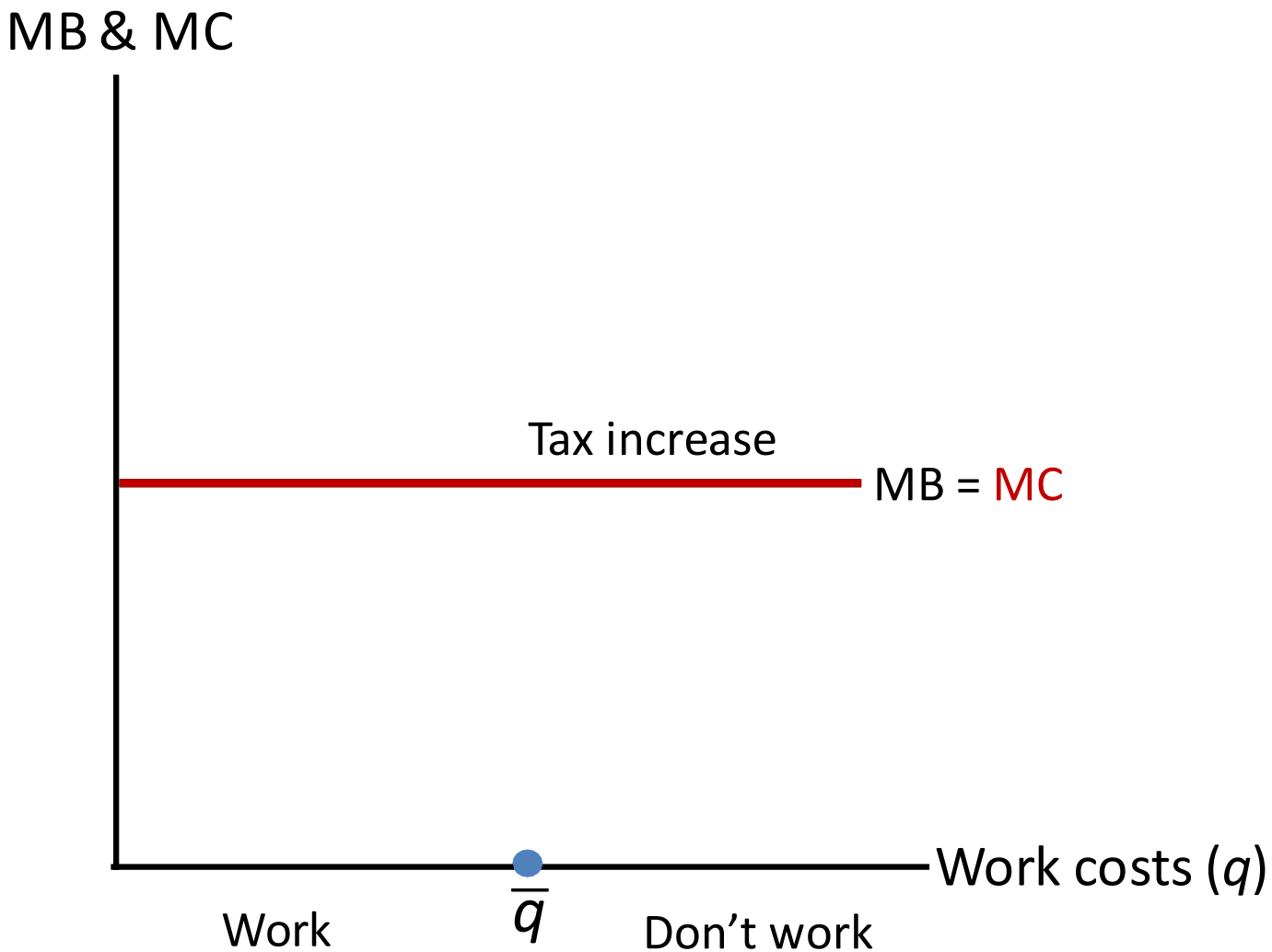
Traditional approach vs. new approach

Intuition behind new approach



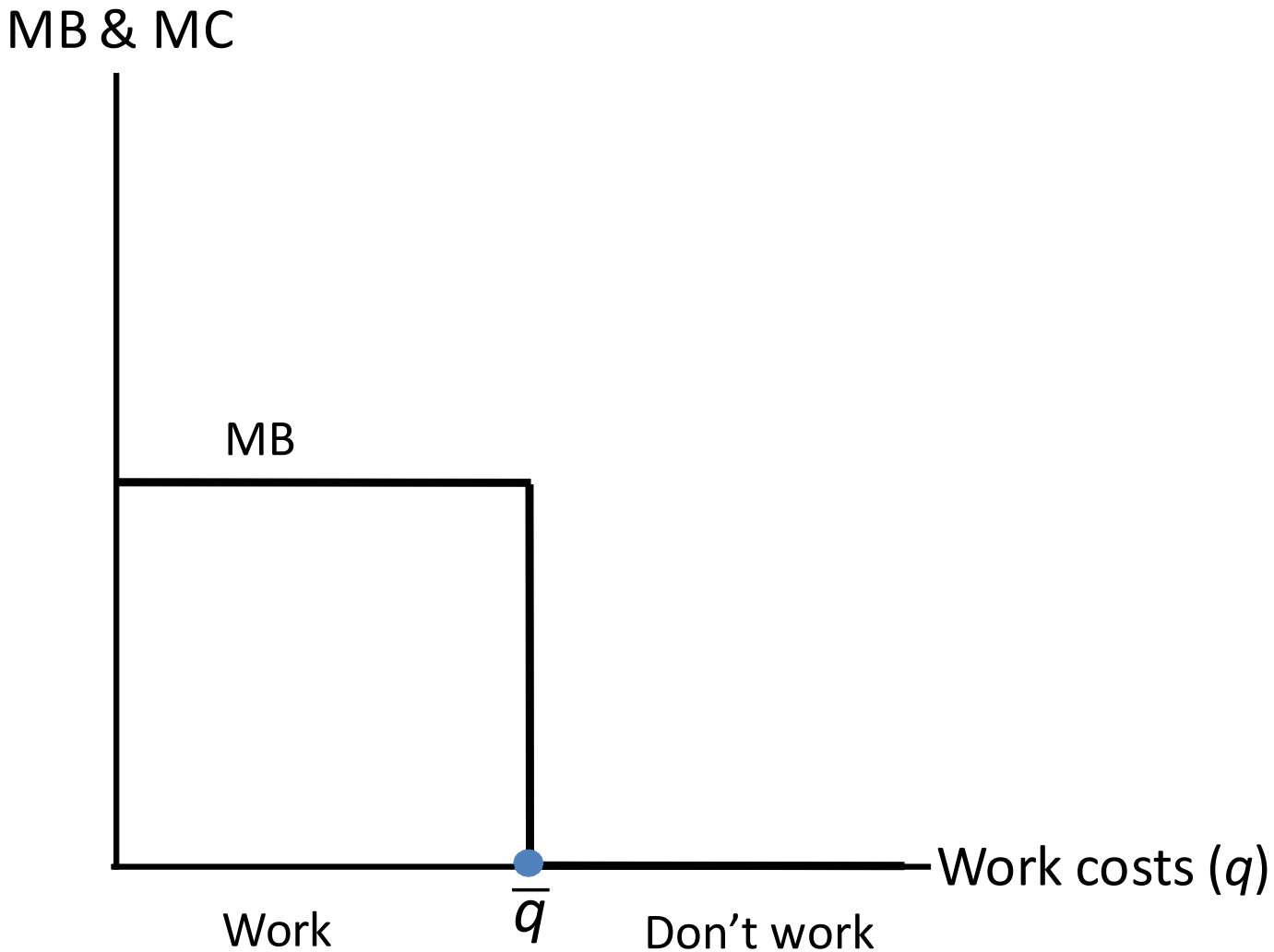
Traditional approach vs. new approach

Intuition behind new approach



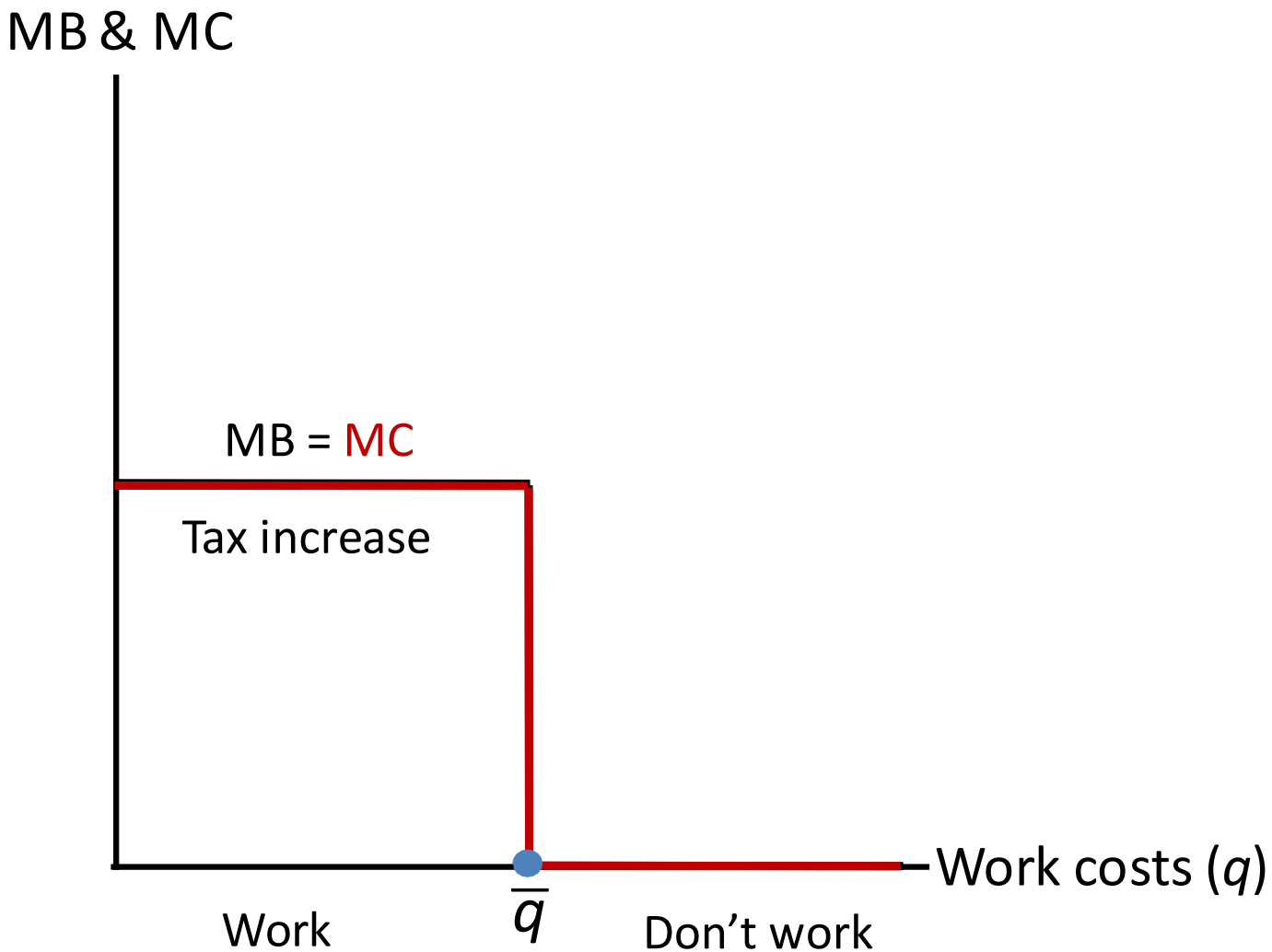
Traditional approach vs. new approach

Intuition behind new approach



Traditional approach vs. new approach

Intuition behind new approach



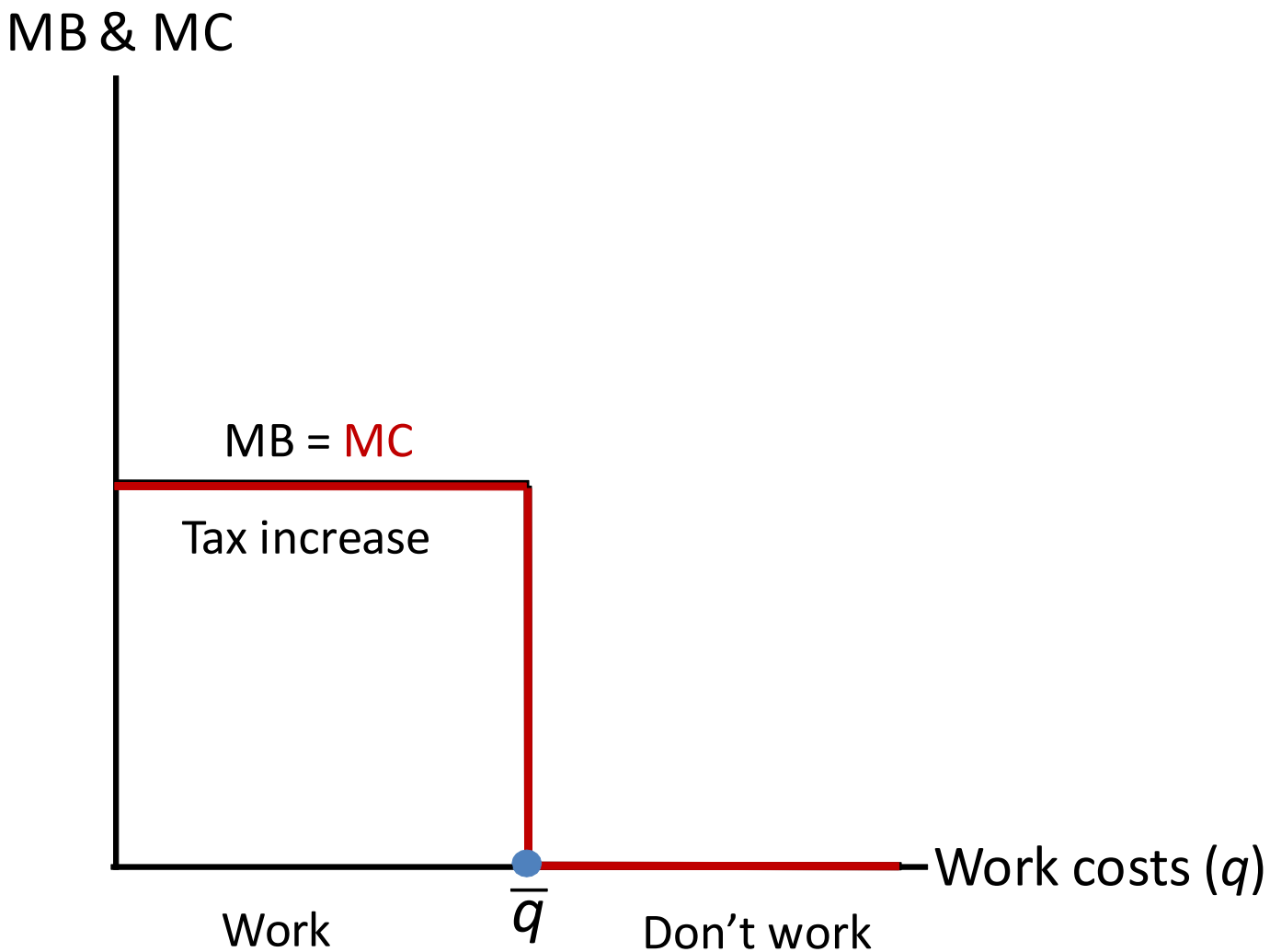
Pareto criteria $\Rightarrow$ The original Samuelson rule is restored $\Rightarrow$ distortionary taxation and distributional considerations should not be included in the CBA

The MCF correction is flawed and creates a downward bias: you will tend to reject projects that could have generated a Pareto improvement

Have assumed willingness to pay uncorrelated with ability conditional on income. What if not the case?

The new approach

The general theory



Proposition

A marginal expansion of a public good is desirable iff

$$\int_n \left(MRS_{cg}(z,n) + m \cdot \underbrace{\frac{\partial MRS_{cg}(z,n)/\partial n}{\partial MRS_{cz}(z,n)/\partial n}}_{=dz} \right) f(n)\, dn \geq MRT_{cg}.$$

The Samuelson rule is amended by a term that is affected by the *partial* correlation between ability and the marginal willingness to pay for the public good

If the marginal willingness to pay is increasing (decreasing) in ability levels then public good provision is below (above) the Samuelson rule

The correlation between ability and the marginal willingness to pay, *conditional on income*, determines deviations from the Samuelson rule

Examples:

- Police
- Opera
- Public transportation

Conclusion

The standard MCF correction of the Samuelson rule is flawed

Deviations from the original Samuelson rule *only* if correlation between ability and the marginal willingness to pay for the public good conditional on income

Given ignorance about the relevant correlations, the Samuelson rule seems to be the natural benchmark for policy evaluation (same argument normal used for homogenous commodity taxation)

Results do not require that we need to find the particular financing scheme giving rise to the Pareto improvement $\Rightarrow$

Musgrave (1959): redistributive and allocative branches of government may be dealt with separately

Aber dabei

Other efficiency arguments for public good provision below the Samuelson rule:

- Price signals are a very effective way to allocate resources but do often not exist when allocating government expenditures $\Rightarrow$ efficiency loss
- Not exposed to the same competitive pressure as goods supplied in the private economy (if you do bad, you are out of business) $\Rightarrow$ efficiency loss

Very difficult to quantify!

Extra Slide

The general theory

Utility is given by

$$u\left(c, g, z, n\right)$$

- Continuum of agents, denoted by n.
- g is a public good
- c is a private consumption good
- z is earnings (taxable income)
- Preference heterogeneity, home production or Beckerian household consumption technology
- Labour-leisure framework with homogenous preferences as a special case: $u\left(c, g, z/n\right)$

References

Atkinson, A.B. and Stern, N.H. (1974), Pigou, Taxation, and Public Goods, Review of Economic Studies 41, 119–28.

Ballard, C.L. and Fullerton, D. (1992), Distortionary Taxes and the Provision of Public Goods, Journal of Economic Perspectives 6, 117–31.

Boadway, R. and Keen, M. (1993), Public Goods, Self-Selection and Optimal Income Taxation, International Economic Review 34, 463–478.

Browning, E.K. (1987), On the Marginal Welfare Cost of Taxation, American Economic Review 77, 11–23.

Christiansen, V. (1981), Evaluation of Public Projects under Optimal Taxation, Review of Economic Studies 48, 447–57.

Dahlby, B. (1998), Progressive Taxation and the Social Marginal Cost of Public Funds, Journal of Public Economics 67, 105–22.

References

Danish Ministry of Transportation and Energy (2003), Manual for Economic Analyses in the Public Sector (in Danish), The Danish Ministry of Transportation and Energy, Copenhagen.

Hylland, A. and Zeckhauser, R. (1979), Distributional Objectives Should Affect Taxes But Not Program Choice or Design, Scandinavian Journal of Economics 81, 264–84.

Kaplow, L. (1996), The Optimal Supply of Public Goods and the Distortionary Cost of Taxation, National Tax Journal 49, 513–33.

Kaplow, L. (2004), On the (Ir)Relevance of Distribution and Labor Supply Distortion to Government Policy, Journal of Economic Perspectives 18, 159–75.

Kleven. H. J. and Kreiner, C. T. (2006), The Marginal Cost of Public Funds: Hours of Work Versus Labor Force Participation, Journal of Public Economics 90, 1955–73.

References

Kreiner, C.T. and N. Verdelin (2012), Optimal Provision of Public Goods: A Synthesis Scandinavian Journal of Economics.

Musgrave, R.A. (1959). The Theory of Public Finance, New York: McGraw Hill.

Samuelson, P. (1954), The Pure Theory of Public Expenditure, Review of Economics and Statistics 36, 387–89.

Stiglitz, J.E. and Dasgupta, P. (1971), Differential Taxation, Public Goods and Economic Efficiency, Review of Economic Studies 38, 151–174.