

CLIMATE CHANGE, MITIGATION AND DEVELOPING COUNTRY GROWTH

Michael Spence

ICRIER

July 7, 2009



Purpose

- **About 3.5 billion people live in predictably high growth environments**
- **Per capita energy consumption and carbon emissions will rise**
- **In 50 years, they will be at or near advanced country income levels and consumption patterns**
- **Adding the 1 billion people in advanced countries and you have close to 2/3 of the world's population at OECD levels in 50 years**
- **Questions**
 - **Is there a path that allows this growth to occur and reaches relatively safe levels of global per capita carbon emissions by 2060**
 - **If the answer is yes (or maybe yes) what set of commitments and supporting structures are needed to move in the right direction**
- **Hoping it contributes to a framework for ongoing discussions and negotiations**



Important Subjects Not Covered

- **Advanced country agreements and different starting points**
- **Adjusting for “real” differences in density, climate and related incentive problems**
- **Domestic implementation of climate change targets**
- **Incentives and penalties**
- **Adaptation and related financing**
- **Technology development incentives, sequencing and the role of the public sector technology advancement**
- **Whether we will be willing to pay the costs of mitigation in later stages when per capita emissions are lower and the incremental costs may be higher**



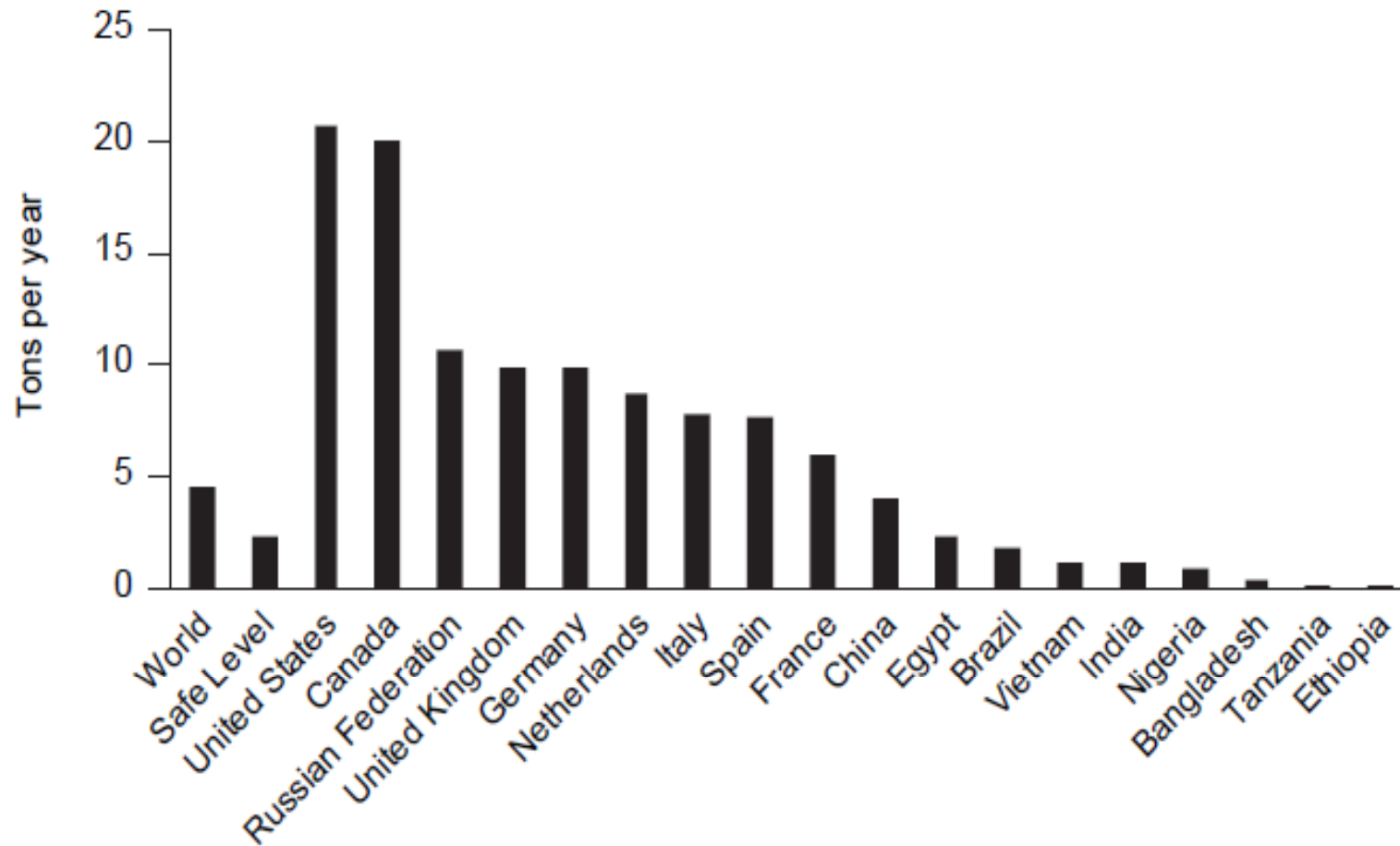
Things We Can't Know Now

- **Marginal cost of mitigation**
- **Efficient global pattern of mitigation**
- **Evolution of technology and mitigation costs**
- **Population growth in various parts of the world**

- **Challenge is to move in the right direction knowing that there will be many adjustments along the way**

- **Raiffa**
 - **Sequential collective decision-making under uncertain with learning**
 - **With important distributional or fairness issues**

Figure 1. CO₂ Emissions per Capita



Source: IPCC and Human Development Report 2007/2008 (UNDP).




Figure 2. Per Capita Emissions, 2009

	Population (millions)	2009 per capita emissions (tons)
United States, Canada, and Australia	330	20
Other advanced	670	11
High-growth developing	3,356	4.2
Lower-growth developing	2,178	1

Source: Population data from United Nations Department of Economic and Social Affairs; emissions per capita from IPCC and Human Development Report 2007/2008 (UNDP).



Figure 3. Per Capita Emissions with No Mitigation Effort

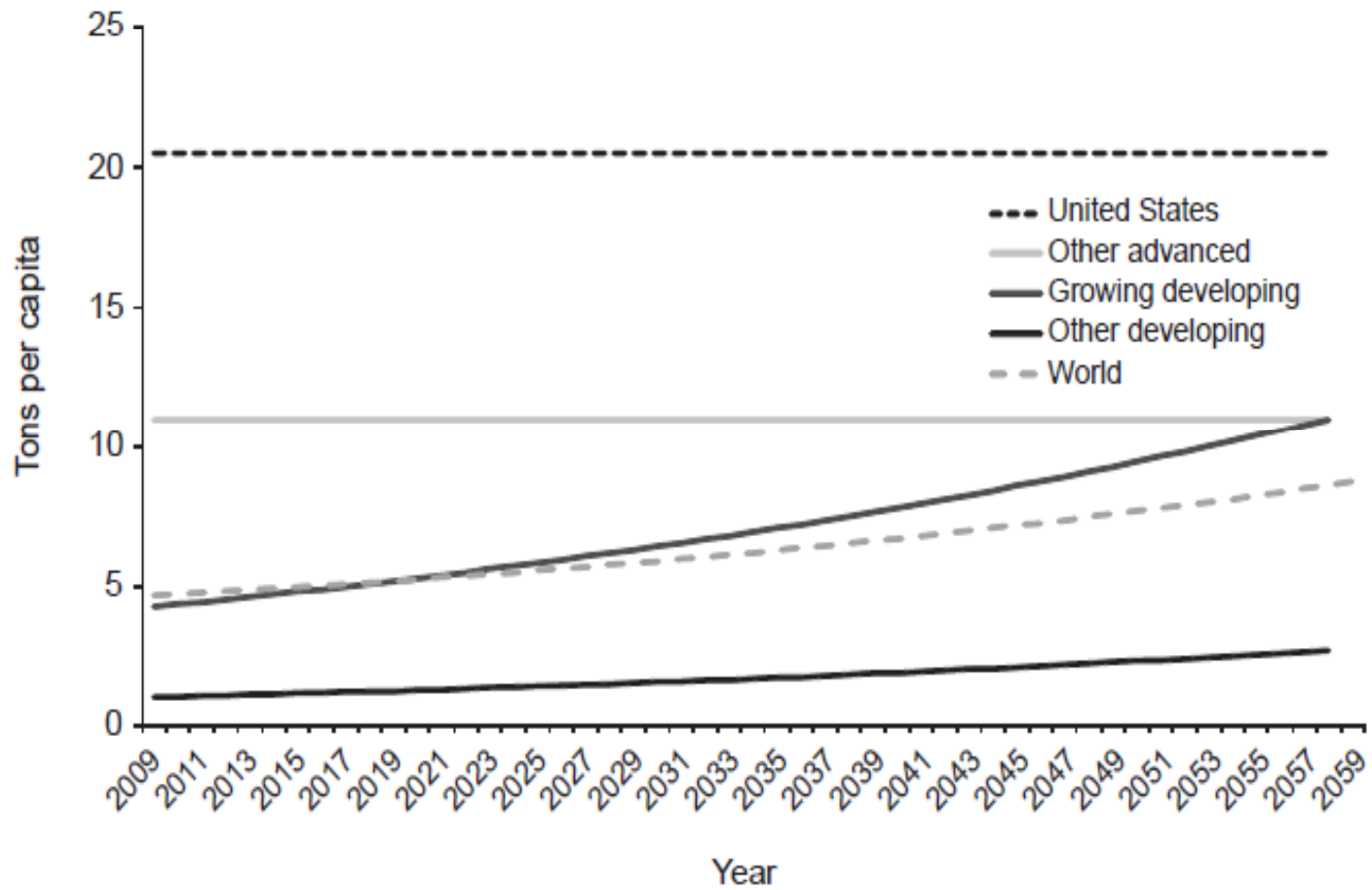
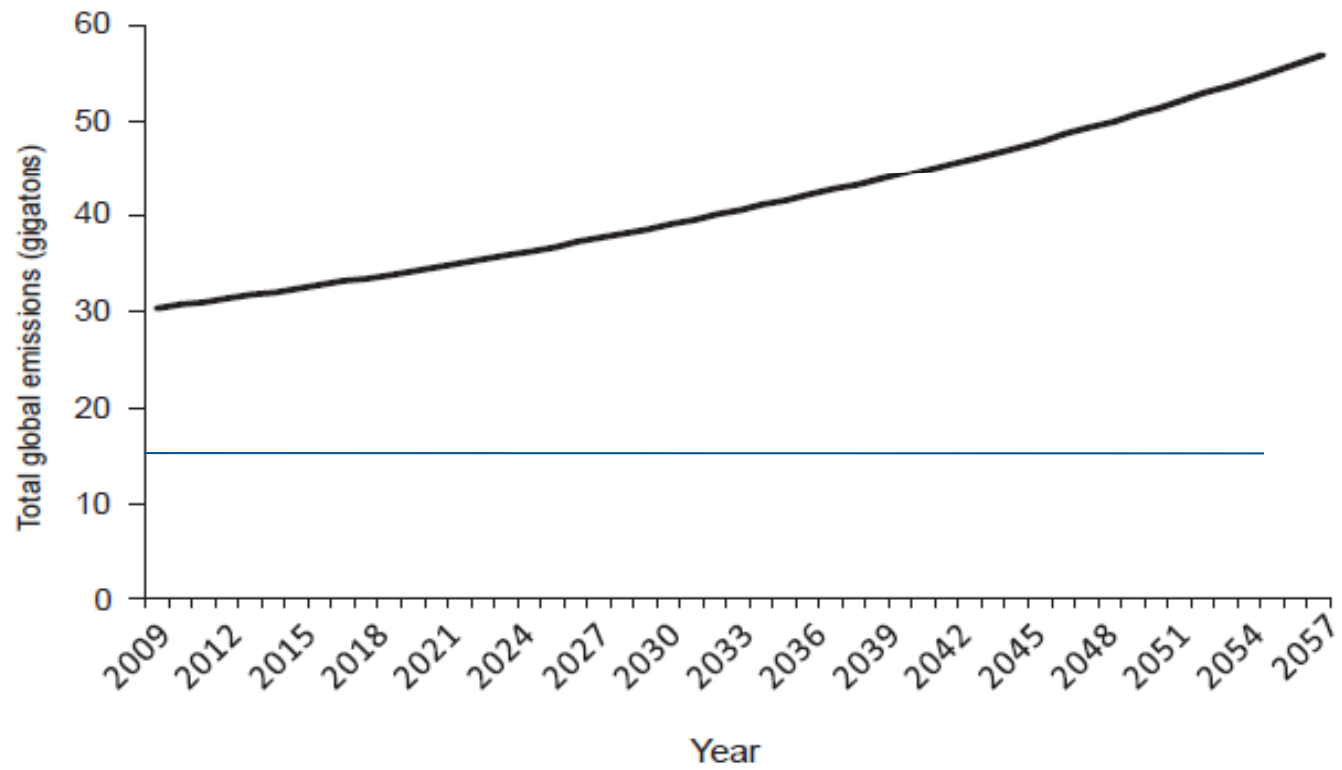
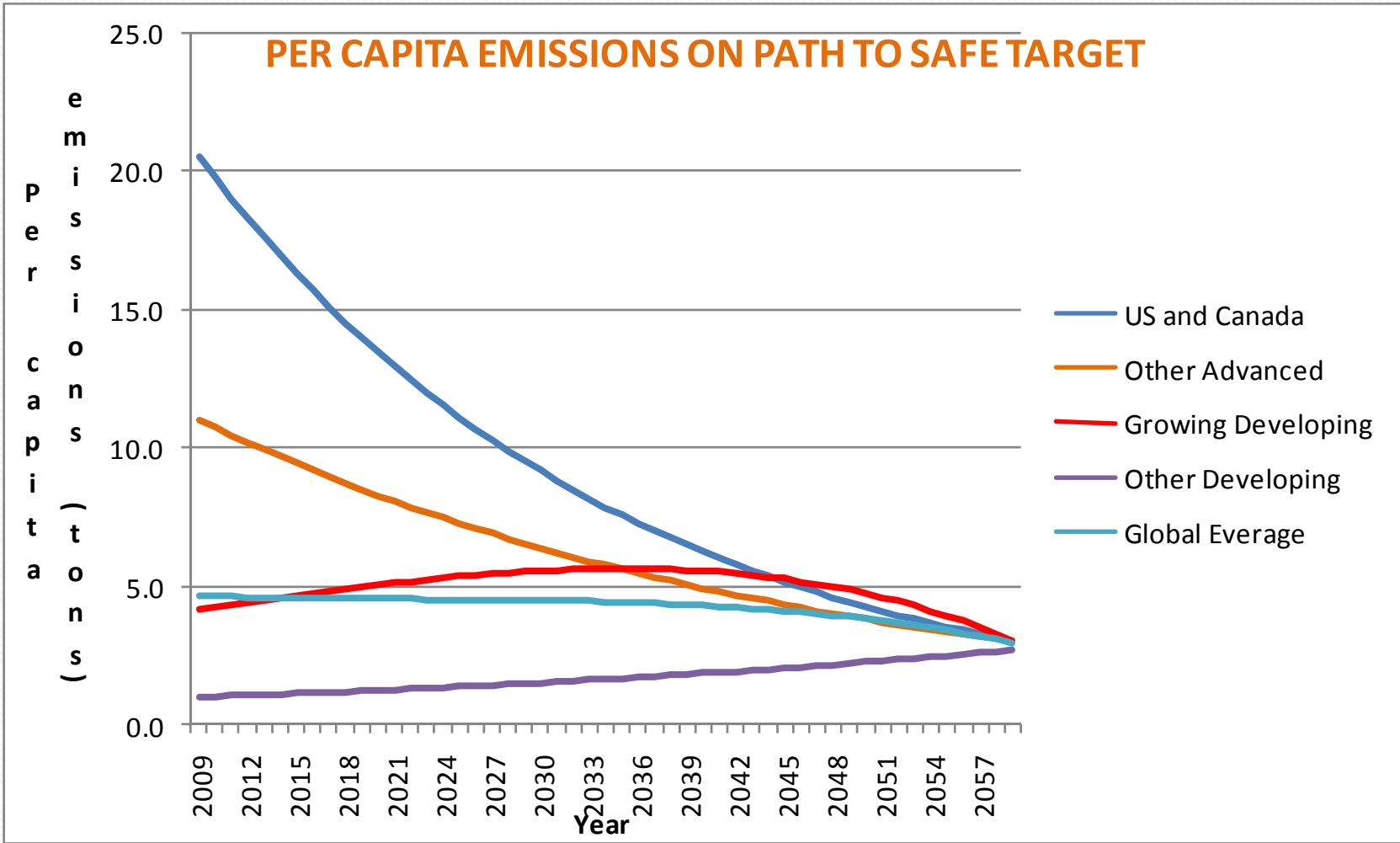




Figure 4. Total Global Emissions (Gigatons)



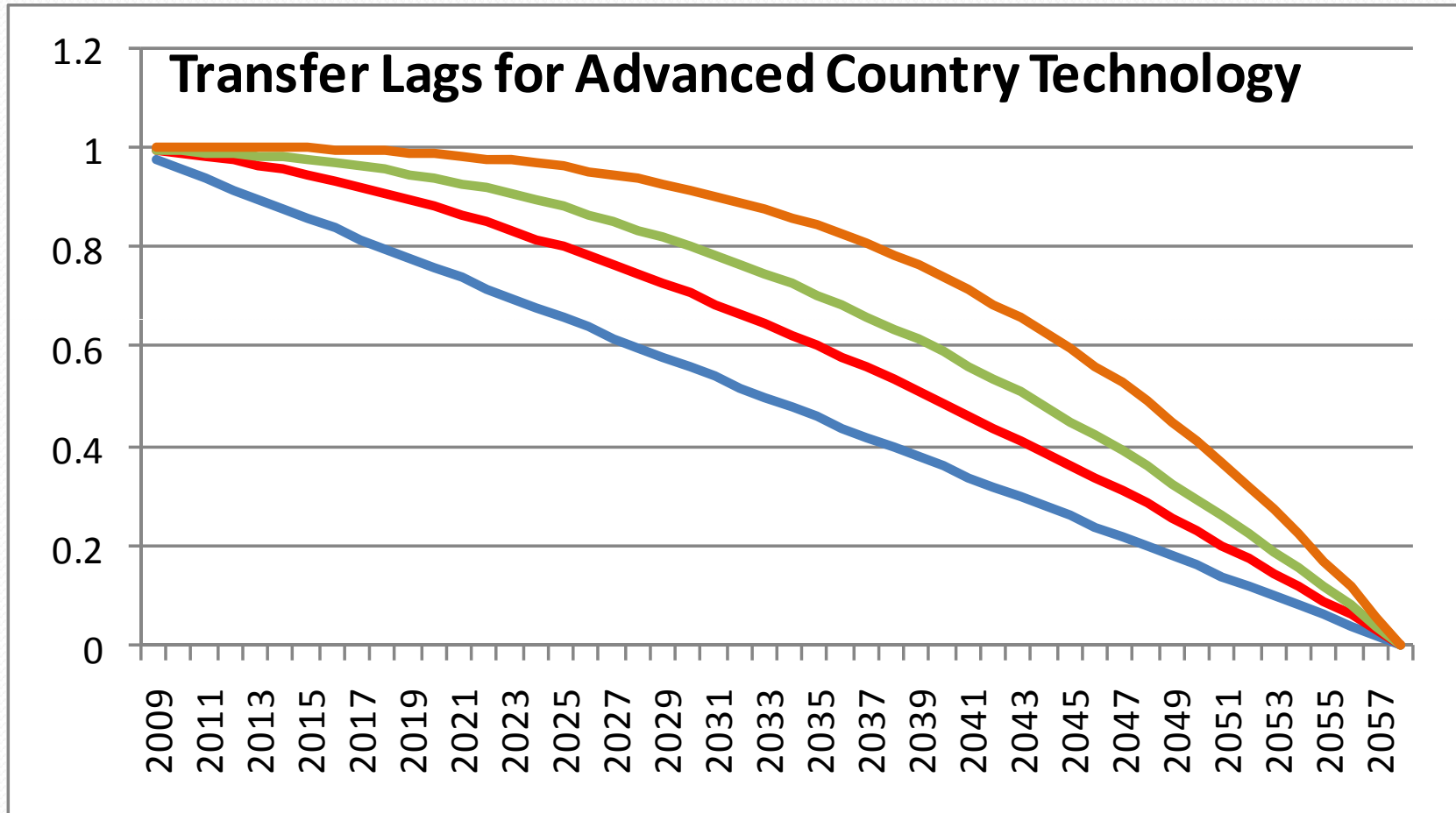
Source: Author's calculations.

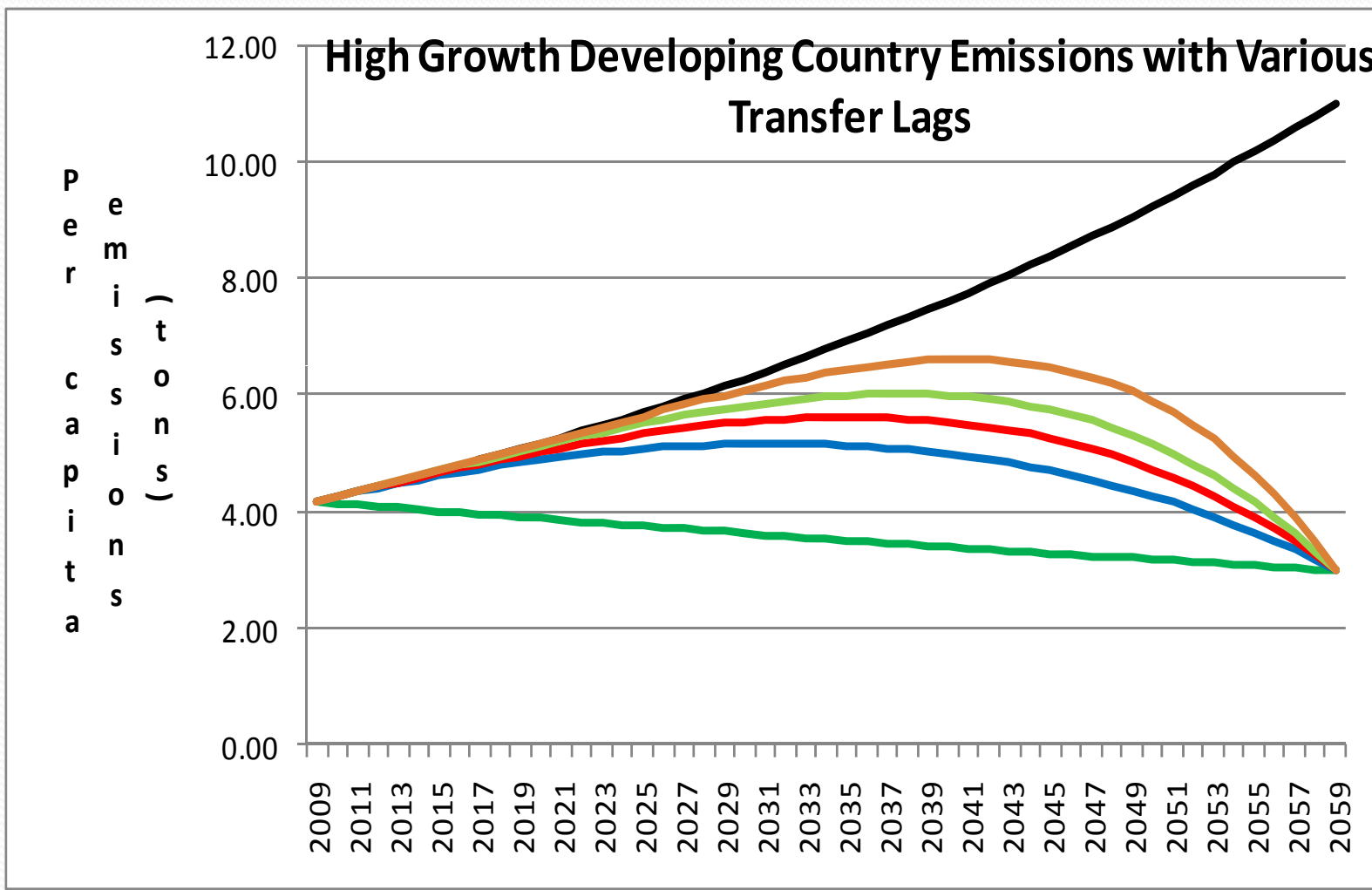


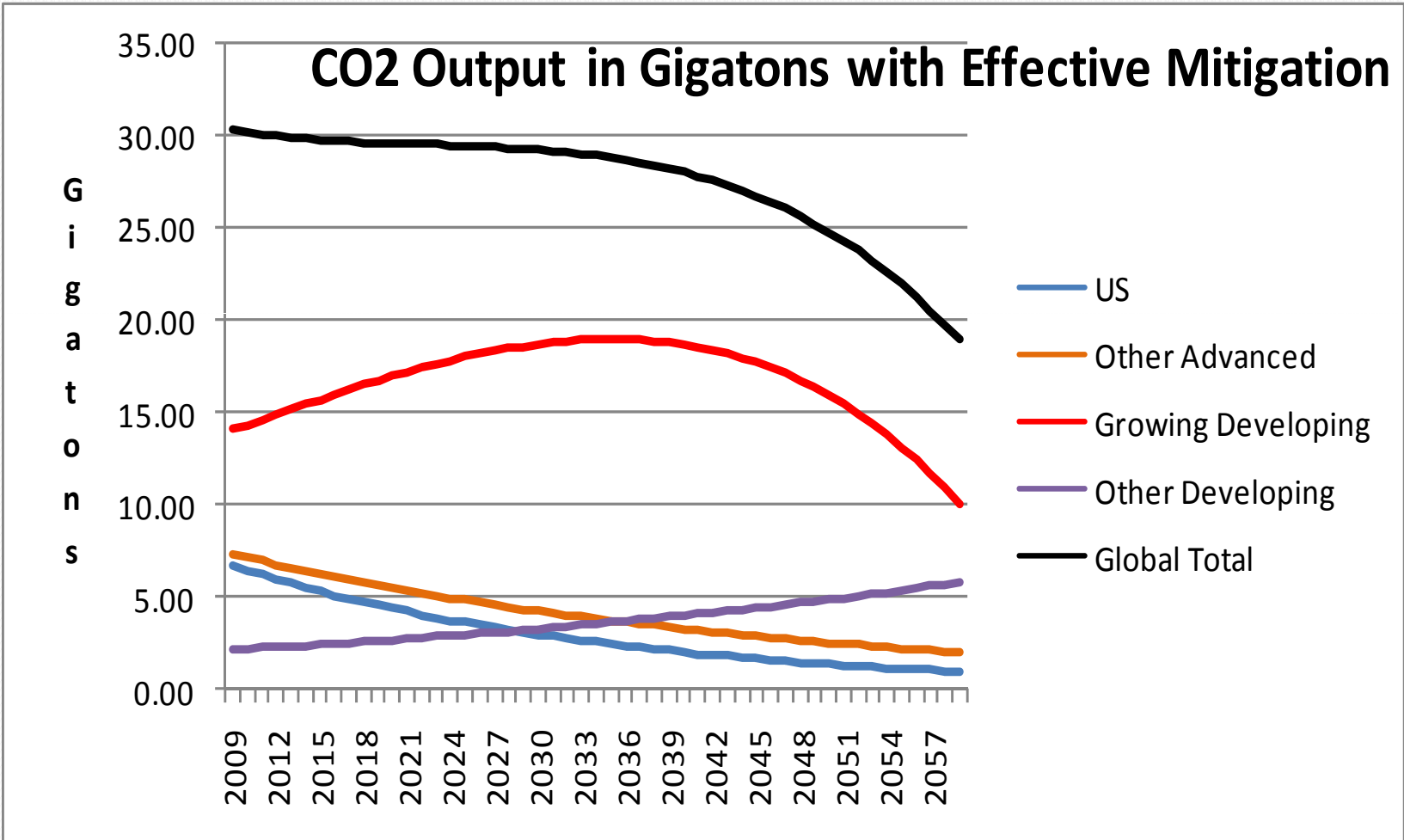
Transfer Lags

$$M(t) = D(t) \times \left\{ \frac{E(t)}{E(0)} \times [1 - T(t)] + T(t) \right\},$$

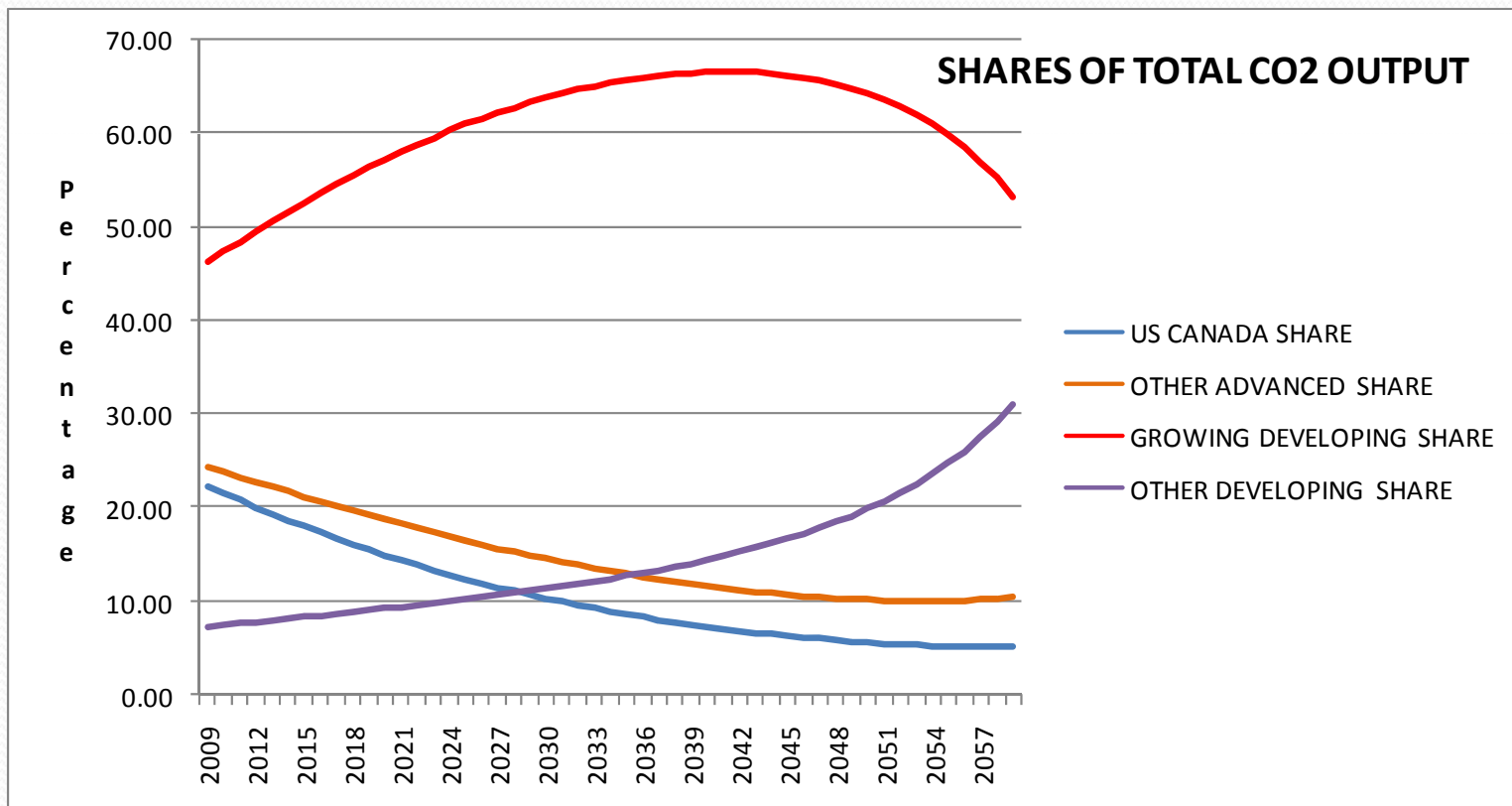
- $D(t)$ is high growth developing country emissions per capita at time t with not mitigation
- $M(t)$ is the same with mitigation
- $E(t)$ is European per capita emissions at t
- The function $1 - T(t)$ is roughly the fraction of European mitigation progress that has transferred to developing countries
- If $T(t)$ is 1 and stays there, $M(t) = D(t)$ and $D(t)$ by assumption just goes to $E(0)$. This is the no mitigation scenario
- If $T(t)$ is zero there is no lag







Flow Shares of CO2 Emissions: Stocks are Quite Different Because the Growth is Quite Recent





Key Issues and Concepts

- **Efficiency and fairness**
- **Per capita entitlements (with modifications for advanced countries)**
- **Separating location of mitigation from who pays for it**
- **Burden sharing**
- **Cross border mechanisms**
- **Graduation criterion – to advanced country status and responsibilities**

- **Making concrete the notion of “common commitment with differentiated responsibilities”**
- **Energy efficiency and low carbon energy**



Strategy

- **Advanced countries agree on targets (short to medium term rates of reduction of per capita emissions) that shift over to a tradable carbon credit system**
 - **Pricing carbon is important informationally**
- **Cross border mitigation count toward targets**
 - **Supported by developing countries**
 - **Disconnects location and cost absorption**
 - **Allows for efficiency**
 - **Global monitoring and accounting system**
- **Developing countries absorb and create technology**
- **Takes steps that are aligned with growth and development strategy – energy efficiency and pricing energy properly would be an example**
- **Agree on graduation criterion and the incentives it creates**



Long Term Targets

- **Don't make sense**
- **We do not know the costs over time or the efficient pattern of mitigation at various points along the way**
- **Would be very high risk for developing country growth**
- **Medium term targets for advanced countries are a useful interim set of incentives**



Global Carbon Credit Trading System

- **Prices carbon**
- **Produces efficient mitigation**
- **Allocation of credits does not determine total mitigation or where it occurs**
- **It does determine who pays for it**
- **There are no country level targets**
- **Location and cost absorption are separated**

- **In principle, developing country growth could be accommodated through the allocation of adequate credits**



But there is a practical problem

- **If one tries to calculate the credits need to make a developing country whole and embed it in a formula, you need to know in advance the price of carbon, the efficient global pattern of mitigation and the costs associated with mitigation in that particular country**
- **None of this is known in advance – the system is set up to determine it**
- **But then it is circular. The system requires an allocation of credits and a “fair” allocation requires data generated by the system**
- **With an under allocation, growth is reduced**
- **With an over allocation, there is a potential large income transfer from advanced to developing countries**



Advanced Country Carbon Credit Trading System

- **With**
 - An credit allocation based on population with careful adjustments for climate, size and density
 - An effective cross border mechanism and supporting infrastructure
 - Efficient technology transfer
 - A clear graduation criterion
- **Will**
 - Produce an efficient pattern of mitigation
 - Allow developing country growth
 - Support the paths described earlier
 - Achieve the longer term mitigation targets
 - Allow burden sharing to evolve with levels of income and carbon emissions



Graduation Criterion

- **Prime Minister Manmohan Singh has said that India could commit to not exceeding the average of advanced country per capita emissions**
- **This is clearly in the right direction**
- **Per capita income or per capita emissions**
- **They are clearly highly correlated**
- **For incentives per capita emissions are probably better**
- **Gross or net of cross border mitigation**



Advanced Country Medium Term Targets with the Cross Border Mechanism

- **Probably the best first step**
- **To be followed by advanced country carbon credit system**
- **Has the potential for inefficiency depending on how the targets are set**
 - **A high target in a very low cost mitigation environment with result in inefficiency**



Asymmetries Create Some Additional Problems

- **Energy and carbon intensive tradables**
- **Areas in which cross border mitigation will influence the domestic (pre cross border) path of carbon emissions**
 - **Natural resources, land use and reforestation**
- **Competitive disadvantage problems**