Socioeconomic Determinants of Obesity in the United States

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Abstract:

This paper investigates the socioeconomic determinants of obesity (as measured by BMI) in the United States. Logistic regression is employed on cross-sectional data from the 2011-2012 National Health and Nutrition Examination Survey (NHANES). The results show that, in general, holding other factors constant, individuals with a college diploma are less likely to be obese than those with a lesser education (except in extreme cases), married individuals are more likely to be obese than those that are not married, and females are more likely to be obese than males. Additionally, compared to white persons, Black and Hispanic persons have a greater probability of being obese, while Asians have a significantly lower probability of being obese. These findings are supported by the broader literature, in which different empirical techniques are often utilized.

JEL Classification: I12, I14

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1.0 INTRODUCTION

In 21st century America, obesity has become a central focus when discussing the health of American citizens. First Lady Michelle Obama is perhaps the figurehead of this era of obesity awareness, for she is the creator of the Let's Move initiative—a program that is "dedicated to solving the problem of obesity within a generation, so that children born today will grow up healthier and able to pursue their dreams" (Let's Move, n.d.).

Most are likely aware of the obesity epidemic, while it is probable that fewer are aware of the formal health condition referred to as obesity. The Let's Move webpage simply defines obesity as excess body fat. Body fat is difficult (and often costly) to measure directly (methods include skinfold thickness measurements, underwater weighing, bioelectrical impedance, dual energy x-ray absorptiometry and isotope dilution), thus a common way to measure obesity uses the body mass index (BMI) calculation, which measures weight in relation to height (Centers for Disease Control and Prevention, 2011).[1] Adults with a BMI between 18.5 and 24.9 are said to be of normal weight. Those with a BMI between 25.0 and 29.9 are considered overweight. Adults with a BMI of 30 or more are considered obese, while those with a BMI of 40 or more are classified as extremely obese (Let's Move, n.d.).

Interestingly, the interpretation of BMI values differs depending on whether the subject is a child/teen or an adult. In children and teenagers, it is common practice to use age- and sex-specific percentiles because the amount of body fat changes with age and differs between girls and boys (Centers for Disease Control and Prevention, 2011). In the adult population, BMI

[1] The CDC calculates BMI using one of the following two formulas:

$$\text{Weight (kg)} / [\text{Height (m)}]^2$$

or

$$\text{Weight (lb)} / [\text{Height (in)}]^2 \times 703$$

interpretations generally do not differ depending on the subject's age or whether the subject is male or female.

Obesity and overweight statuses have been linked to an increased risk for numerous maladies, including hypertension, dyslipidemia, type 2 diabetes, coronary heart disease, stroke, gallbladder disease, osteoarthritis, sleep apnea and respiratory problems, and certain cancers (Centers for Disease Control and Prevention, 2011). It is thus apparent that understanding the factors and behaviors that contribute to obesity can be critical in the fight against a variety of health conditions.

This study aims to analyze a certain cluster of such factors: socioeconomic determinants of obesity. Several studies have analyzed socioeconomic determinants of obesity. From a policy perspective, such studies are valuable because if policymakers are cognizant of those at-risk socioeconomic groups, targeted policies can be carried out and ancillary precautions can be taken. Furthermore, socioeconomic determinants of obesity may not be as commonsensical as some of the widely known health/biological determinants of obesity.

Specifically, this study will analyze socioeconomic determinants of obesity in U.S. adults. Determinants include income, education, marital status, gender, age, and race.

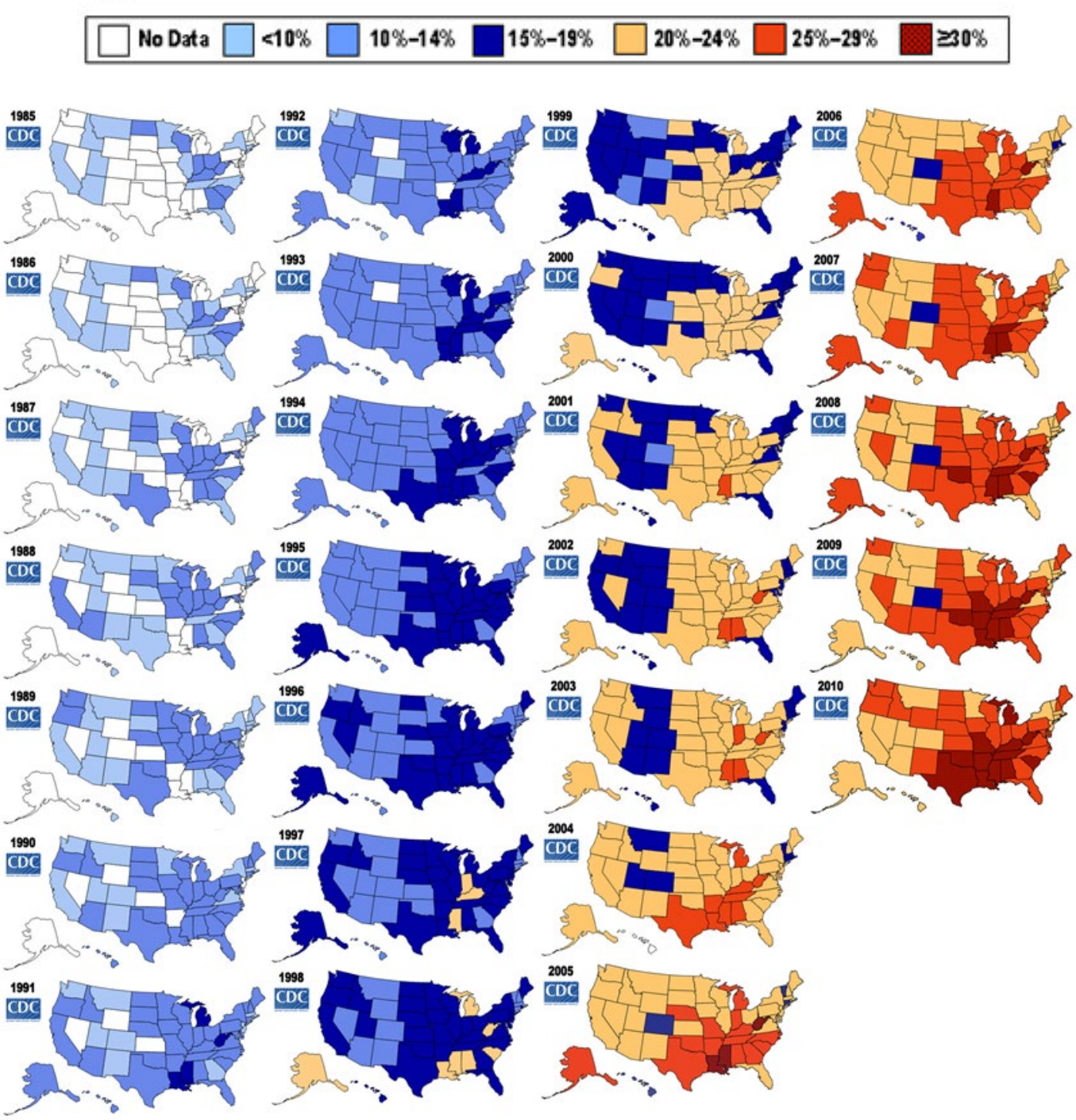
This study should prove to be relevant to many parties because of the rise of obesity and obesity awareness over the past quarter-century. America is more concerned with this health condition now than it has ever been in the past. The remainder of the paper will proceed as follows. In Section 2 there will be a brief discussion of the recent trends in the obesity epidemic. In Section 3, there is a review of the relevant literature. Section 4 describes the data and empirical methodology. Section 5 presents the empirical results and Section 6 presents conclusions.

2.0 TREND

In the recent past, obesity has become a mainstream issue in the United States. According to the National Center for Health Statistics (NCHS), obesity rates in the United States have more than doubled in both adults and children since the 1970s. Ogden et al. (2014) reveal that more than two-thirds of U.S. adults are overweight or obese (BMI $\geq$ 25). The Food Research and Action Center (2014) estimates that the number is at 68.5%. According to the Harvard School of Public Health website, in 1990 obese adults comprised less than 15% of the population in most U.S. states. By 2010, 36 states had obesity rates of 25+% and 12 of those had obesity rates of 30+%. Furthermore, while aggregate obesity rates have seemed to more or less remain constant since 2003, rates are still increasing in some groups—namely certain racial groups (i.e., non-Hispanic blacks, Hispanics, and Mexican Americans) possess higher rates of obesity. Perhaps more concerning is the fact that obesity rates are rising in the children/adolescents demographic and that youths are typically becoming overweight or obese at earlier ages (Harvard School of Public Health, 2014). According to the CDC, childhood obesity has more than doubled in children and quadrupled in adolescents over the past three decades (Centers for Disease Control and Prevention, 2014).

The prevalence of obesity throughout the United States has undergone a radical propagation over the past 25 years. **Figure 1** maps the percent of obese adults by state from 1985-2010. It is evident that obesity was sparsely distributed throughout the United States in 1985. In 2010, however, each U.S. state had no less than a 21% obesity rate amongst its adult population.

Figure 1: Percent of Obese (BMI ≥ 30) in U.S. Adults



Source: Centers for Disease Control and Prevention

3.0 LITERATURE REVIEW

Seeing that the U.S. obesity epidemic is widely publicized and has become a prominent issue in the domains of public health and health policy (among others), it is understandable that the obesity literature is abundant. This paper, however, emphasizes socioeconomic disparities with regard to obesity. Therefore, the following literature review will home in on socioeconomic factors in explaining obesity. Additionally, seeing that this topical area is truly multidisciplinary in nature, references will be drawn from a variety of disciplines.

Ogden et al. (2010a) published a detailed NCHS Data Brief detailing the relationship between socioeconomic status and obesity in American children and adolescents. The researchers find that low income children and adolescents have a greater chance of being obese than their higher income peers (but the relationship does not always hold when crossing racial and ethnic boundaries). The report also finds that children and adolescents whose parents have college degrees are less likely to be obese than those whose parents do not hold a degree (again, the relationship does not hold for all racial and ethnic groups). Interestingly, the authors also state that most obese children and adolescents are not classified as low income. Finally, as expected, the report states that the prevalence of childhood obesity increased regardless of income level between 1988-1994 and 2007-2008.

In a separate NCHS Data Brief, Ogden et al. (2010b) studied obesity and socioeconomic status in American adults. Findings included that, among men, obesity levels are generally similar at all levels of income. Among non-Hispanic Black and Mexican-American men, however, higher levels of income are associated with higher levels of obesity. Additionally, higher income women are less likely to be obese than lower income women and most obese women are characterized as low income individuals. In men, the authors find no significant relationship between obesity and

education. Contrarily, women with college degrees are less likely to be obese than less educated women. These aforementioned findings seem to be consistent with Ailshire (2009), who found the risk for obesity to be unevenly distributed among racial/ethnic and socioeconomic groups. As expected, between 1988-1994 and 2007-2008 the overall prevalence of obesity in adults increased regardless of education or income.

Though somewhat outdated, Sobal and Stunkard (1989) published a comprehensive review of the literature regarding socioeconomic status and obesity. The review comprises 144 relevant studies. In motivating their study, the authors state that "understanding biological factors…cannot fully explicate human obesity without considering psychological, social, and cultural influences". Sobal and Stunkard (1989) credit Veblen (1889) as being the first to put forth the possibility that socioeconomic status may be related to body weight. In the review, the authors separate results by developed and developing countries. This study, focused on socioeconomic status and obesity in the United States, is thus more interested in the authors' findings for developed countries. In the paragraphs to follow, this study will reference many of the studies discussed in Sobal and Stunkard (1989).

The first empirical studies executed on the relationship between socioeconomic status and obesity found that obesity was six times more prevalent in women of lower socioeconomic status than those of upper socioeconomic status (Goldblatt et al., 1965; Moore et al., 1962). Intuitively, Goldblatt et al. (1965) also discovered a positive relationship between socioeconomic status and thinness in women. Of the 30 studies that provide data on women and concern the United States, a developed nation, in Sobal's and Stunkard's (1989) meta-study 28 (93%) report an inverse association between socioeconomic status and obesity. Hence, the relationship is relatively unambiguous in the pre-1990 literature. Others have shown that this inverse relationship carries

across racial boundaries (Gillum, 1987). In sum, "no matter what measure of SES [socioeconomic status] or obesity was used or what population group was studied, the results were monotonously similar: SES was inversely related to obesity among women" (Sobal and Stunkard, 1989).

Such a consensual relationship in the literature does not carry over when studying men in the United States. The 27 pre-1990 studies on such a group included 12 (44%) that found the same inverse relationship that was deemed true in women, 12 (44%) that found a positive relationship, and 3 (11%) that found no relationship (Sobal and Stunkard, 1989). Sobal and Stunkard (1989) speculate that these different results in men could be attributed to "differences in food intake or energy expenditure between samples, differences in demographic variables, or differences in such mediating variables as age, race, smoking, chronic disease, or alcohol intake" and deem that the relationship is worthy of further study.

In female children, the socioeconomic status-obesity relationship is predominantly thought to be inverted, but it is nowhere near as consensual as it is for women (Sobal and Stunkard, 1989). In boys, the relationship is even less clear. However, studies that found an inverted relationship for girls tended to find the same relationship for boys, while studies that found a direct relationship for girls tended to find the same relationship for boys (within-study consistency) (Sobal and Stunkard, 1989). What is rampant in the pre-1990 literature, then, is the conclusion that as girls transition into women, a cogent inverse relationship manifests itself (Braddon et al., 1986; Peckham et al., 1983; Power and Moynihan, 1988). In a post-1990 paper, Singh et al. (2008) find that ethnic minority, non-metropolitan residence, lower socioeconomic position, higher television viewing, and higher physical inactivity levels are all independently associated with higher rates of obesity in children and adolescents. Additionally, Rossen and Schoendorf (2012) find that racial

and ethnic disparities relating from socioeconomic status in pediatric obesity did not change significantly between 2001 and 2010 and remain significant.

Chou et al. (2002) constructed a model (from which the model presented in this paper is adapted) and found that the number of fast-food restaurants, the number of full-service restaurants, the cost of a meal, the price of grocery food, the price of cigarettes, clean indoor air laws, and hours of work per week, hourly wage rates, and marital status have "expected effects on obesity".

4.0 DATA AND EMPIRICAL METHODOLOGY

4.1 Data

This study uses data from the 2011-2012 version of the National Health and Nutrition Examination Survey (NHANES). The nationwide survey, which occurs in two year intervals, combines interviews and physical examinations. The NHANES program is undertaken under the direction of the National Center for Health Statistics (NCHS), which is part of the Centers for Disease Control and Prevention (CDC). For the 2011-2012 survey, 13,431 persons were selected from 30 different study locations. Of those selected, 9,756 completed the interview and 9,338 underwent the examination (Centers for Disease Control and Prevention, 2011-2012). This study solely uses data on the 5,444 adults (21+) in the survey. Descriptive statistics are presented in **Figure 2**.

Figure 2: Descriptive Statistics

Descriptive Statistics: Continuous Variables								
Variable	**Description**	**N**	**Mean**	**Median**	**Std. Dev.**	**Max.**	**Min.**	**Range**
BMXBMI	Body Mass Index (kg/m^2)	5124	28.8166667	27.7	6.883405	82.1	13.4	68.7
RIDAGEYR	Age in years at screening	5444	49.5602498	49	17.55245	80	21	59
INDFMPIR	Ratio of family income to poverty	4961	2.42909897	1.91	1.665934	5	0	5

Descriptive Statistics: Discrete Variables				
Number of Variable Levels				
Variable	**Description**	**Levels**	**Missing Levels**	**Nonmissing Levels**
RIAGENDR	Gender	2	0	2
OBESE	Obese (BMI ≥30)	2	0	2
ADULTEDUC	Education Level	6	1	5
MARRIED	Marital Status	3	1	2

Frequencies: Discrete Variables		
Variable	**Frequency**	**Percent**
RIAGENDR		
1	2680	49.23
2	2764	50.77
OBESE		
0	3603	66.18
1	1841	33.82
ADULTEDUC		
1	549	10.09
2	766	14.08
3	1142	21
4	1586	29.16
5	1396	25.67
Missing	5	
MARRIED		
0	2756	50.69
1	2681	49.31
Missing	7	

4.2 Empirical Model

Chou et al. (2002) built two Ordinary Least Squares (OLS) regression models—one in which the dependent variable was BMI and another in which the dependent variable was the probability of being obese. This study is concerned with modeling the probability of being obese, and thus the empirical model is derived from the second of Chou et al.'s (2002) specifications. Rather than employing OLS, however, this study makes use of logistic regression—specifically, a logit model. Logistic regression is superior to OLS when attempting to model probabilities. Perhaps most importantly, with logistic regression, predicted probabilities must fall between 0 and 1 while with OLS, predicted probabilities can be less than 0 or greater than 1, which is of course impossible.[2] This particular model also excludes a number of the regressors which were included in the Chou et al. (2002) model. This is attributable to NHANES data availability and this study's emphasis on socioeconomic determinants of obesity.

The model can be written as follows:

$$\text{logit}(\hat{p}) = \hat{\omega}_0 + \hat{\omega}_1(income) + \hat{\omega}_2(educ\_lt9) + \hat{\omega}_3(educ\_lths) + \hat{\omega}_4(educ\_hs) + \hat{\omega}_5(educ\_somecoll) + \hat{\omega}_6(married) + \hat{\omega}_7(gender) + \hat{\omega}_8(age) + \hat{\omega}_9(race\_mexamer) + \hat{\omega}_{10}(race\_otherhisp) + \hat{\omega}_{10}(race\_nonhispblack) + \hat{\omega}_{11}(race\_nonhispasian) + \hat{\omega}_{12}(race\_other)$$

The model attempts to measure the probability that a person is obese (BMI $\geq$ 30), given the certain socioeconomic factors. The *income* variable is measured as the ratio of family income to poverty (with anything above a value of 5 being classified as 5). The variable *educ_lt9* corresponds to a person whose highest level of education is less than 9th grade, *educ_lths* corresponds to a person whose highest level of education is 9th-11th grade (including 12th grade with no diploma), *educ_hs* corresponds to a person whose highest level of education is through high school (high school diploma/GED or equivalent), and *educ_somecoll* corresponds to a person whose highest level of education is some college or AA degree. All of these *educ* variables are compared to

[2] For a comparison of Ordinary Least Squares and Logistic Regression, see Pohlmann and Leitner (2003)

people who are college graduates or above. The *married* variable corresponds to whether or not the subject is married. The *gender* variable is a binary variable denoting whether the individual is male or female. The *age* variable denotes a person's age at the time of the survey's screening portion. Finally, *race_mexamer* comes into play if the subject is Mexican American, *race_otherhisp* if the subject is racially classified as Other Hispanic, *race_nonhispblack* if the subject is racially classified as Non-Hispanic Black, *race_nonhispasian* if the subject is racially classified as Non-Hispanic Asian, and *race_other* if the subject is racially classified as Other Race (including Multi-Racial). The base race group is Non-Hispanic White.[3]

Below is a derivation that allows one to use the model to predict $\hat{p}$ directly:

$$1)\ \log\left(\frac{\hat{p}}{1-\hat{p}}\right) = \widehat{\omega}_0 + \widehat{\omega}_1 x_1 + \widehat{\omega}_2 x_2 + \cdots + \widehat{\omega}_n x_n = \text{logit}(\hat{p})$$

$$2)\ e^{logit(\hat{p})} = \left(\frac{\hat{p}}{1-\hat{p}}\right)$$

$$3)\ 1 - \hat{p} = \left(\frac{\hat{p}}{e^{logit(\hat{p})}}\right) = \hat{p}e^{-logit(\hat{p})}$$

$$4)\ \frac{1-\hat{p}}{\hat{p}} = e^{-logit(\hat{p})}$$

$$5)\ \frac{1}{\hat{p}} - 1 = e^{-logit(\hat{p})}$$

$$6)\ \frac{1}{\hat{p}} = e^{-logit(\hat{p})} + 1$$

$$7)\ \hat{p} = \frac{1}{1+e^{-logit(\hat{p})}}$$

[3] The independent variables measuring income, education, and marital status had 483, 5, and 7 missing values, respectively. To combat this problem of missing data, a decision tree algorithm was used to impute values.

5.0 EMPIRICAL RESULTS

Empirical results are presented in **Figures 3, 4, and 5**. The model shows that education, marital status, gender, and race each possess power in explaining the likelihood of a U.S. adult being obese when controlling for other relevant factors.

Figure 3: Logistic Regression Results

Predictor	df	Wald χ^2	p
Ratio of family income to poverty	1	0.7431	0.3887
Education	4	22.7909	0.0001***
Married	1	3.2203	0.0727*
Gender	1	36.3535	<.0001***
Age	1	0.5652	0.4522
Race	5	235.0574	<0.0001***
Test	**df**	**χ^2**	**p**
Likelihood Ratio Test	13	415.7493	<0.0001***
Note: *** , **, and * denotes significance at the 1%, 5%, and 10%, respectively.			

5.1 Income

The income variable is not statistically significant at any reasonable level of significance. This may be due to the way in which the variable was measured—even if the ratio of a family's income to the poverty level is greater than 5, it is recorded as 5. Hence, 5 is by far and away the mode for this variable. There could also be an issue stemming from multicollinearity.

5.2 Education

The effects that variables have on the probability of being obese are best illustrated by examining the odds ratios that can be derived from the empirical model. In **Figure 5**, we can see that holding other factors constant, compared to those with bachelor's degrees and above:

- Those with an education that terminates prior to high school possess 5.1% *lower* odds of being obese

Figure 4: Analysis of Maximum Likelihood Estimates

Parameter	df	Estimate	Standard Error	Wald χ^2	p
Constant	1	-0.8354***	0.1052	63.06	<.0001
Ratio of family income to poverty	1	-0.0193	0.0224	0.74	0.3887
Education: Less than 9th Grade	1	-0.218**	0.0891	5.99	0.0144
Education: 9th-11th grade (Includes 12th grade with no diploma)	1	0.0955	0.0691	1.91	0.1668
Education: High school graduate/GED or equivalent	1	0.146**	0.0587	6.18	0.0129
Education: Some college or AA degree	1	0.1425***	0.0545	6.84	0.0089
Married	1	-0.0568*	0.0316	3.22	0.0727
Gender	1	-0.1808***	0.03	36.35	<.0001
Age in years at screening	1	0.00135	0.0018	0.57	0.4522
Race: Mexican American	1	0.559***	0.0882	40.15	<.0001
Race: Other Hispanic	1	0.1856**	0.0848	4.79	0.0285
Race: Non-Hispanic Black	1	0.5525***	0.0631	76.64	<.0001
Race: Non-Hispanic Asian	1	-1.4252***	0.1104	166.57	<.0001
Race: Other Race - Including Multi-Racial	1	0.0891	0.1507	0.35	0.5545
*Note: *** , **, and * denotes significance at the 1%, 5%, and 10%, respectively.*					

Figure 5: Odds Ratio Estimates

Effect	Point Estimate
Ratio of family income to poverty	0.981
Less than 9th Grade vs. College Grad+	0.949
9th-11th grade (Includes 12th grade with no diploma) vs. College Grad+	1.299
High school graduate/GED or equivalent vs. College Grad+	1.366
Some college or AA degree vs. College Grad+	1.361
Married (Not Married vs. Married)	0.893
Gender (Male vs. Female)	0.697
Age in years at screening	1.001
Mexican American vs. Non-Hispanic White	1.682
Other Hispanic vs. Non-Hispanic White	1.158
Non-Hispanic Black vs. Non-Hispanic White	1.671
Non-Hispanic Asian vs. Non-Hispanic White	0.231
Other Race - Including Multi-Racial vs. Non-Hispanic White	1.051

- Those with an education level between 9th and 11th grade possess 29.9% *greater* odds of being obese
- Those with a high school degree or equivalent possess 36.6% *greater* odds of being obese
- Those with some college possess 36.1 % *greater* odds of being obese

Based on these results, in general, we can conclude that, ceteris paribus, college graduates are less likely to be obese than those with lower levels of education, except for those with extremely low levels of education. The notion that obesity likelihood decreases with education is consistent with the literature (Devaux et al., 2011; Cutler and Lleras-Muney, 2006; Webbink et al., 2008).

The result that those with less than a 9th grade education are less likely to be obese, ceteris paribus, is very interesting. More analysis is necessary to determine why this is the case. It could perhaps have something to do with a lack of resources available to devote toward food, as there is a strong positive correlation between education and income (Bureau of Labor Statistics, 2014).

5.3 Marital Status

The results of the model illustrate that those individuals that are single have 10.7% *lower* odds of being obese than those that are married. This result is consistent with the existing literature on the subject. Sobal et al. (1992), however, argue that such a relationship is only significant in men. This study did not break down the effect of marital status on probability of being obese by gender.

5.4 Gender

The gender variable produced a remarkable, yet expected, result. Holding other factors constant, the model predicts that men possess 30.3% *lower* odds of being classified as obese than do women. This is consistent with a 2002 study published in the Journal of the American Medical Association, which determined that there were more overweight American men, but more obese American women (Weight Awareness, n.d.). Similarly, the World Health Organization (WHO) found that

"in all WHO regions women were more likely to be obese than men. In the WHO regions for Africa, Eastern Mediterranean and South East Asia, women had roughly double the obesity prevalence of men" (World Health Organization, n.d.). The latter part of this excerpt makes the 30.3% estimate found in this study believable. It is also worth noting that the parameter estimate is significant at the 1% level of significance.

5.5 Age

The results associated with the age variable are nowhere near as clear-cut as those with the gender variable. In this particular model, age has an extremely negligible (and statistically insignificant) effect on the probability of being obese. Future studies may look into different specifications of this variable.

5.6 Race

We can see that holding other factors constant, compared to non-Hispanic white persons:

- Mexican Americans hold 68.2% *greater* odds of being obese
- Other Hispanics hold 15.8% *greater* odds of being obese
- Non-Hispanic Blacks hold 67.1% *greater* odds of being obese
- Non- Hispanic Asians hold 76.9 % *lower* odds of being obese
- Other races not mentioned hold 5.1% *greater* odds of being obese

Additionally, all parameter estimates are individually statistically significant at the 5% level of significance with the exception of the Other Race category (which is not surprising, seeing that it contains many races). The discovery that Blacks and Hispanics are more likely to be obese than white persons is consistent with a CDC study that found "compared with whites, Blacks had 51% higher and Hispanics had 21% higher obesity rates" (Centers for Disease Control and Prevention, n.d.). Additionally, The Henry J. Kaiser Family Foundation reports that, in 2012, Asian/Pacific

Islander had the lowest adult obesity prevalence among racial/ethnic groups. This is in line with the non-Hispanic Asian result presented in this paper.

6.0 CONCLUSION

This paper confirmed the results of many existing studies concerned with socioeconomic determinants of obesity in the United States. However, this study modeled, using a logit-link function, the odds and probability of a person being obese, given socioeconomic determinants. This allows one to predict the probability that a person possessing certain socioeconomic characteristics is obese.

In general, holding other factors constant, individuals with a college diploma are less likely to be obese than those with a lesser education (except in extreme cases), married individuals are more likely to be obese than those that are not married, and females are more likely to be obese than males. Additionally, compared to white persons, Black and Hispanic persons have a greater probability of being obese, while Asians have a significantly lower probability of being obese.

From a health policy perspective, the results in this study could be used to better identify at-risk socioeconomic groups and could spark further research into the factors that cause disparities in obesity among socioeconomic groups. Furthermore, the model allows one to classify (based on a chosen probability threshold) a hypothetical individual with a particular set of socioeconomic traits as obese or not obese. This ability could aid policymakers in crafting more personalized policy measures.

It must be noted that there may be several important variables missing from the model presented in this study. Future research may look into controlling for items such as physical activity and diet (which were beyond the scope of this study, which focused on socioeconomic aspects of obesity). Different variable specifications (i.e. log(age) or age^2) could be explored, as

could variable interactions. Additionally, the model presented in this paper could be improved by incorporating a better income variable. The ideal income variable would have continuous values. Lastly, better methods, such as the Hosmer-Lemeshow test, could be employed to assess the goodness of the regression model.

7.0 BIBLIOGRAPHY

(n.d.). Retrieved from Let's Move: http://www.letsmove.gov/about

Ailshire, J. A. (2009). The Social Determinants of Obesity.

Braddon, F. E., Rodgers, B., Wadsworth, M. E., & Davies, J. M. (1986). Onset of obesity in a 36 year birth cohort study. *British Medical Journal, 293*, 299-303.

Bureau of Labor Statistics. (2014, March 24). *Employment Projections*. Retrieved from Bureau of Labor Statistics: http://www.bls.gov/emp/ep_chart_001.htm

Centers for Disease Control and Prevention. (2011, September 13). *Healthy Weight - it's not a diet, it's a lifestyle!* Retrieved from Centers for Disease Control and Prevention: http://www.cdc.gov/healthyweight/assessing/bmi/adult_bmi/

Centers for Disease Control and Prevention. (2011-2012). *National Health and Nutrition Examination Survey*. Retrieved from http://www.cdc.gov/nchs/nhanes/nhanes2011-2012/overview_g.htm

Centers for Disease Control and Prevention. (2013, August 16). *Adult Obesity Facts*. Retrieved from Overweight and Obesity: http://www.cdc.gov/obesity/data/adult.html#History

Centers for Disease Control and Prevention. (2014, February 27). *Adolescent and School Health*. Retrieved from Centers for Disease Control and Prevention: http://www.cdc.gov/healthyyouth/obesity/facts.htm

Centers for Disease Control and Prevention. (n.d.). *Compared with whites, Blacks had 51% higher and Hispanics had 21% higher obesity rates*. Retrieved from Centers for Disease Control and Prevention: http://www.cdc.gov/Features/dsObesityAdults/

Chou, S.-Y., Grossman, M., & Saffer, H. (2002, October). An Economic Analysis of Adult Obesity: Results from the Behavioral Risk Factor Surveillance System. *NBER Working Paper Series*.

Cutler, D., & Lleras-Muney, A. (2006). Education and Health: Evaluating Theories and Evidence. *NBER Working Paper*.

Devaux, M., Sassi, F., Church, J., Cecchini, M., & Borgonovi, F. (2011). Exploring the Relationship Between Education and Obesity. *OECD Journal: Economic Studies, 1*.

Gillum, R. F. (1987). Overweight and obesity in Back women: A review of published data from the National Center for Health Statistics. *Journal of the National Medical Association, 79*, 865-871.

Goldblatt, P. B., Moore, M. E., & Stunkard, A. J. (1965). Social Factors in Obesity. *Journal of the American Medical Association, 152*, 1039-1042.

Harvard School of Public Health. (2014). *An Epidemic of Obesity: U.S. Obesity Trends*. Retrieved from The Nutrition Source: http://www.hsph.harvard.edu/nutritionsource/an-epidemic-of-obesity/

Moore, M. E., Stunkard, A. J., & Srole, L. (1962). Obesity, Social Class and Mental Illness. *Journal of the American Medical Association, 181*, 962-966.

Ogden, C. L., Carroll, M. D., Kit, B. K., & Flegal, K. M. (2014, February 26). Prevalence of Childhood and Adult Obesity in the United States, 2011-2012. *The Journal of the American Medical Association, 311*(8), 806-814.

Ogden, C. L., Lamb, M. M., Carroll, M. D., & Flegal, K. M. (2010a, December). *Obesity and Socioeconomic Status in Children and Adolescents: United States, 2005-2008.*

Ogden, C. L., Lamb, M. M., Carroll, M. D., & Flegal, K. M. (2010b, December). *Obesity and Socioeconomic Status in Adults: United States, 2005-2008.*

Overweight and Obesity in the U.S. (2014). Retrieved from Food Research and Action Center: http://frac.org/initiatives/hunger-and-obesity/obesity-in-the-us/

Peckham, C. S., Stark, O., Simonite, V., & Wolff, O. H. (1983). Prevalence of obesity in British children born in 1946 and 1958. *British Medical Journal, 286*, 1237-1242.

Pohlman, J. T., & Leitner, D. W. (2003, December). A Comparison of Ordinary Least Squares and Logistic Regression. *The Ohio Journal of Science, 103*(5), 118-125.

Power, C., & Moynihan, C. (1988). Social class changes and weight-for-height between childhood and early adulthood. *International Journal of Obesity, 12*, 445-453.

Rossen, L. M., & Schoendorf, K. C. (2012, October). Measuring health disparities: trends in racial−ethnic and socioeconomic disparities in obesity among 2- to 18-year old youth in the United States, 2001–2010. *Annals of Epidemiology, 22*(10), 698-704.

Singh, G. K., Kogan, M. D., Van Dyck, P. C., & Mohammad, S. (2008, September). Racial/Ethnic, Socioeconomic, and Behavioral Determinants of Childhood and Adolescent Obesity in the United States: Analyzing Independent and Joint Associations. *Annals of Epidemiology, 18*(9), 682-695.

Sobal, J., & Stunkard, A. J. (1989, March). Socioeconomic status and obesity: A review of the literature. *Psychological Bulletin, 105*(2), 260-275.

Sobal, J., Rauschenbach, B. S., & Frongillo, E. A. (1992). Marital status, fatness and obesity. *Social Science & Medicine, 35*(7), 915-923.

The Henry J. Kaiser Family Foundation. (2012). *Overweight and Obesity Rates for Adults by Race/Ethnicity*. Retrieved from The Henry J. Kaiser Family Foundation: http://kff.org/other/state-indicator/adult-overweightobesity-rate-by-re/

Veblen, T. (1889). *Theory of the Leisure Class.* Fairfield, NJ: Kelley.

Webbink, D., Martin, N., & Visscher, P. (2008). "Does Education Reduce the Probability of Being Overweight? *CPB Discussion Papers 102*.

Weight Awareness. (n.d.). *Weight problems affect both men and women*. Retrieved from Weight Awareness: http://www.weightawareness.com/topics/doc.xml?__topic_id=111&doc_id=1202

World Health Organization. (n.d.). *Global Health Observatory*. (World Health Organization) Retrieved from World Health Organization: http://www.who.int/gho/ncd/risk_factors/obesity_text/en/

Population and the German Economy

Presented By:

Jon Skaza

German Economy: About

- 6th largest economy in the world
- Leading exporter of machinery, vehicles, chemicals, and household equipment
- Low fertility rates and declining net immigration are stressing the country's social welfare system
- Reforms launched by the government Chancellor Gerhard Schroeder has contributed to strong growth and falling unemployment
- Minimum wage of $11 per hour to take effect in 2015
- Budget surplus of 0.1% in 2012

German Economy: Facts and Figures

- GDP (PPP): $3.227 trillion (6th)
- GDP Real Growth Rate (183rd):

2011	3.4%
2012	0.9%
2013	0.5%

- GDP Per Capita (PPP): $39,500 (29th)
- GDP Composition by Sector of Origin:

Agriculture	0.8%
Industry	30.1%
Services	69%

German Economy: Facts and Figures

- Labor Force: 44.2 million (15th)
- Labor Force by Occupation:

Agriculture	1.6%
Industry	24.6%
Services	73.8%

- Unemployment Rate: 5.3% (52nd)
- Inflation Rate: 1.6% (43rd)

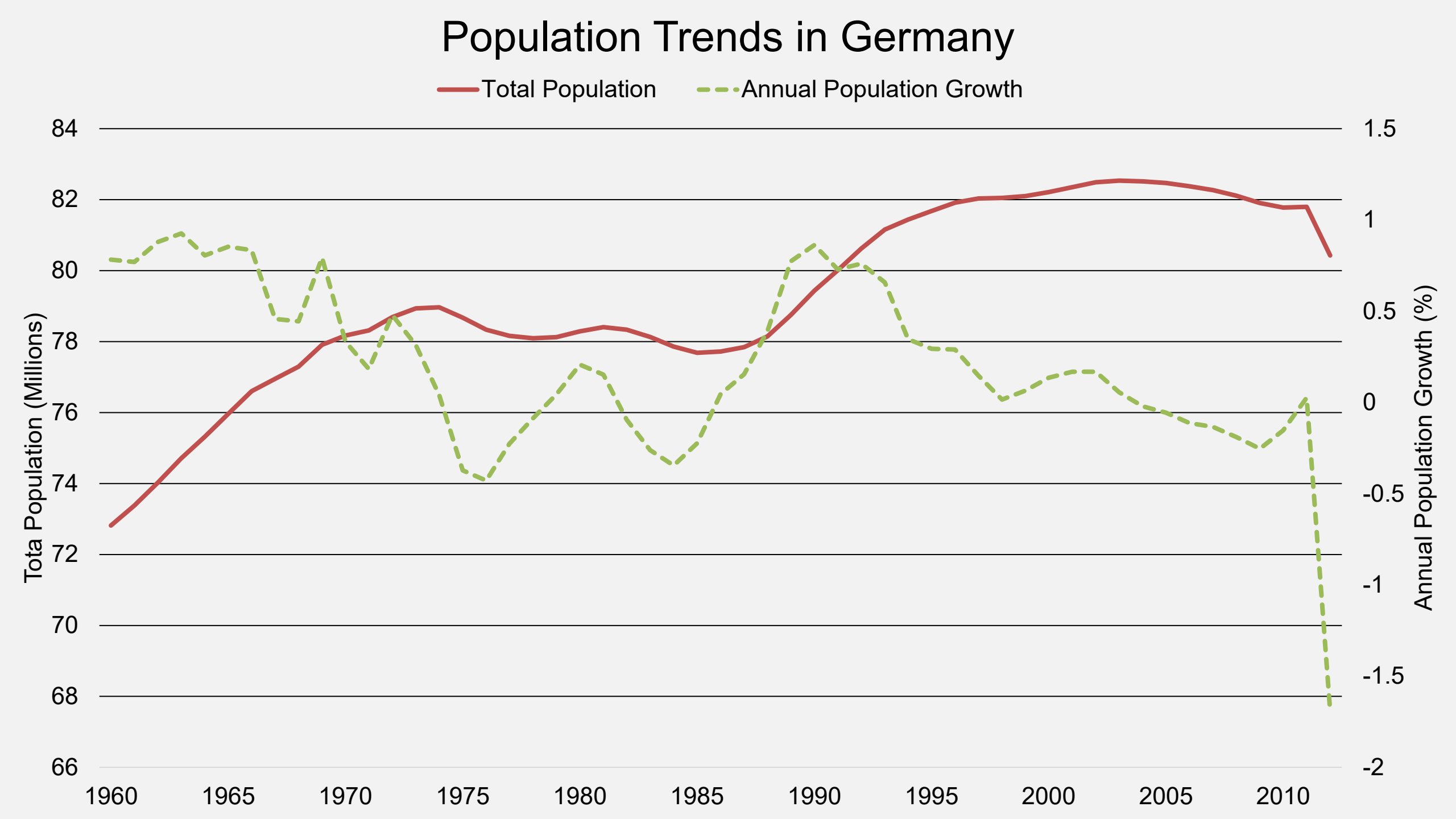
German Economy: Facts and Figures

- Exports: $1.493 trillion (4th)
- Imports: $1.233 trillion (4th)
- Exchange Rate (EUR per USD):

2008	0.6827
2009	0.7198
2010	0.755
2011	n/a
2012	0.7752
2013	0.7734

The Population Issue

- Rapid population decline
- Plunge in fertility rates throughout Europe
- Germany discovered it had lost 1.5 million inhabitants in its most recent census
- By 2060, the country could shrink by an additional 19 percent, to about 66 million
- Germany's birth rate has fallen by 11% since 2000


Population Trends in Germany
Total Population
Annual Population Growth
Tota Population (Millions)
Annual Population Growth (%)
84
82
80
78
76
74
72
70
68
66
1.5
1
0.5
0
-0.5
-1
-1.5
-2
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005
2010

The Downside of Population Shrinkage & Aging Population

- Lower LFP and savings rates (Bloom et al., 2011)
- Concerns about long-term economic growth (Bloom et al., 2011)
- Fiscal concerns (e.g., social welfare) (Auerbach et al. 1989)
  - ≈4 workers for every pensioner in the European Union. By 2060, the average will drop to ≈2 (European Union's 2012 report on aging)
- "Low-fertility societies don't innovate because their incentives for consumption tilt overwhelmingly toward health care. They don't invest aggressively because, with the average age skewing higher, capital shifts to preserving and extending life and then begins drawing down. They cannot sustain social-security programs because they don't have enough workers to pay for the retirees. They cannot project power because they lack the money to pay for defense and the military-age manpower to serve in their armed forces." (Last, 2013)

What Happened?

- Large families began to go out of fashion in West Germany in the 1970s when the country prospered
- Fertility rate began dropping to ≈1.4 children per woman, while replacement rate is 2.1 children
- Rapid population decline

What Has Germany Done?

- Benefits and tax breaks
  - Allowances for children and stay-at-home mothers
  - Tax break for married couples

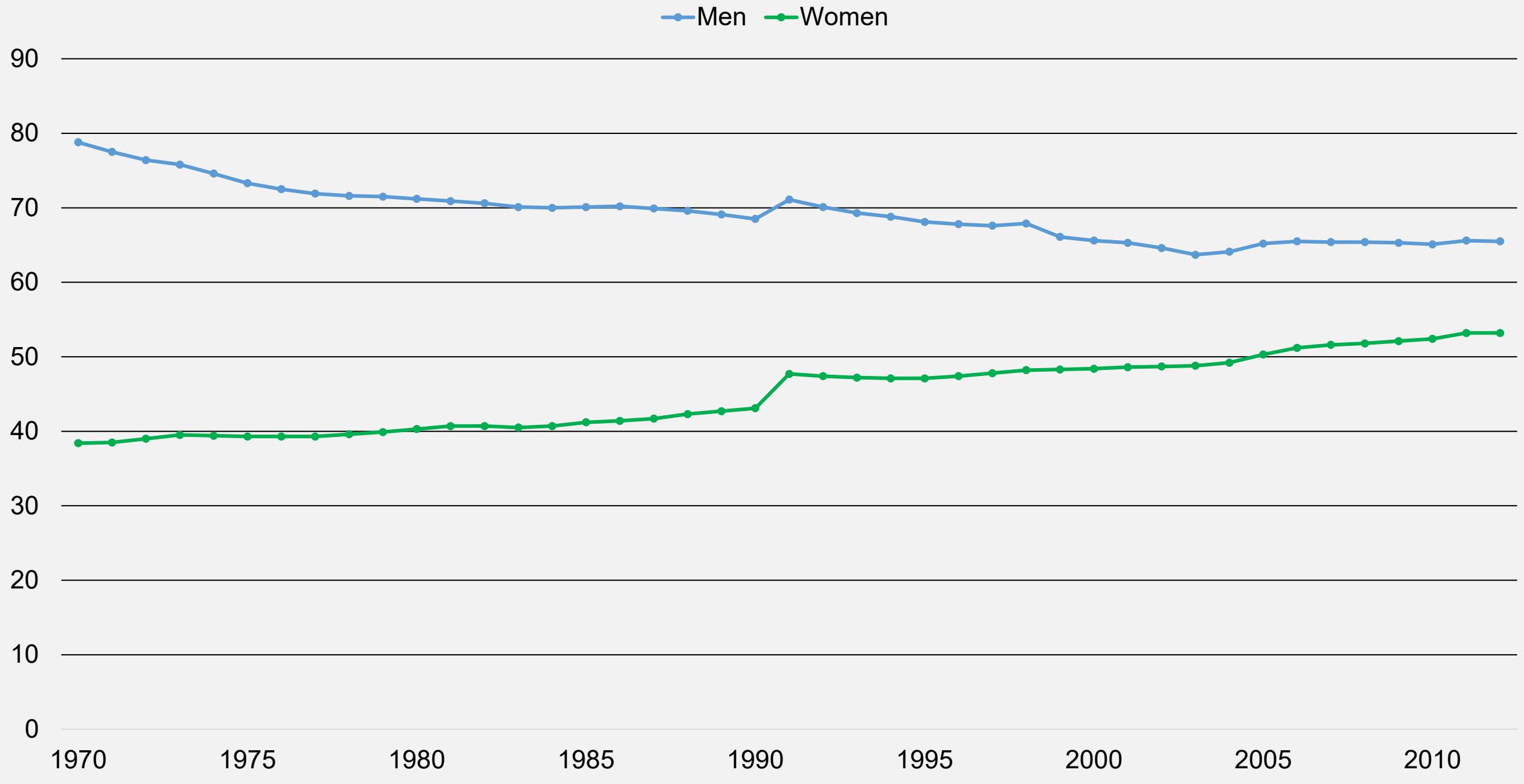
What Has Germany Done?

- ~~Benefits and tax breaks~~
  - ~~Allowances for children and stay-at-home mothers~~
  - ~~Tax break for married couples~~

What Needs to Happen…Soon?

- Extend working lives of the elderly (Maestas and Zissimopoulos, 2009)
- Attract immigrants
- Get more women in the work force, while encouraging them to have more children
  - About a quarter of the female workforce comprises working mothers with poorly paid “mini” jobs

Germany Labor Force Participation Rates



Policy Recommendations

- Support women juggling motherhood and careers by expanding day care and after-school programs
- Steadily raise the retirement age
  - Positive indication: retirement age moved from 65→67; share of people ages 55-64 in the work force had risen to 61.5% in 2012 compared to 38.9% in 2002
- Modify working conditions
  - Volkswagen has redesigned its assembly line
  - More flexible hours
- Immigration policy
  - Huge challenge

Aid, Debt Relief, and Trade: An Agenda for Fighting World Poverty

Matthew Duguay

Jonathan Skaza

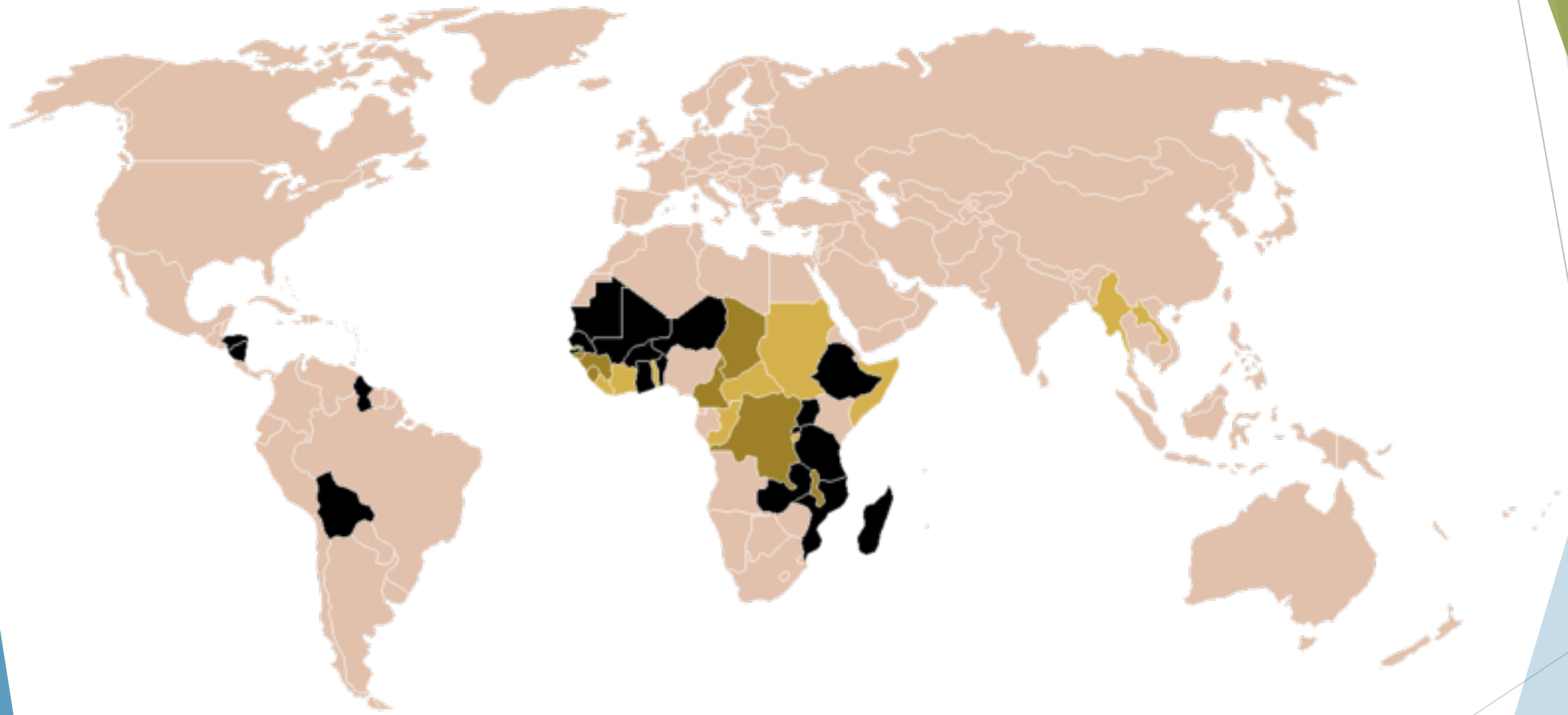
Agenda

1. Summary of Case
2. Foreign Aid
    a) Trends
    b) Lit Review
    c) Effectiveness vs. Efficiency
    d) Fighting Disease
3. Debt Relief
    a) Pros vs. Cons
4. Trade
5. Conclusions
6. Discussion Questions

Brief Summary of Case

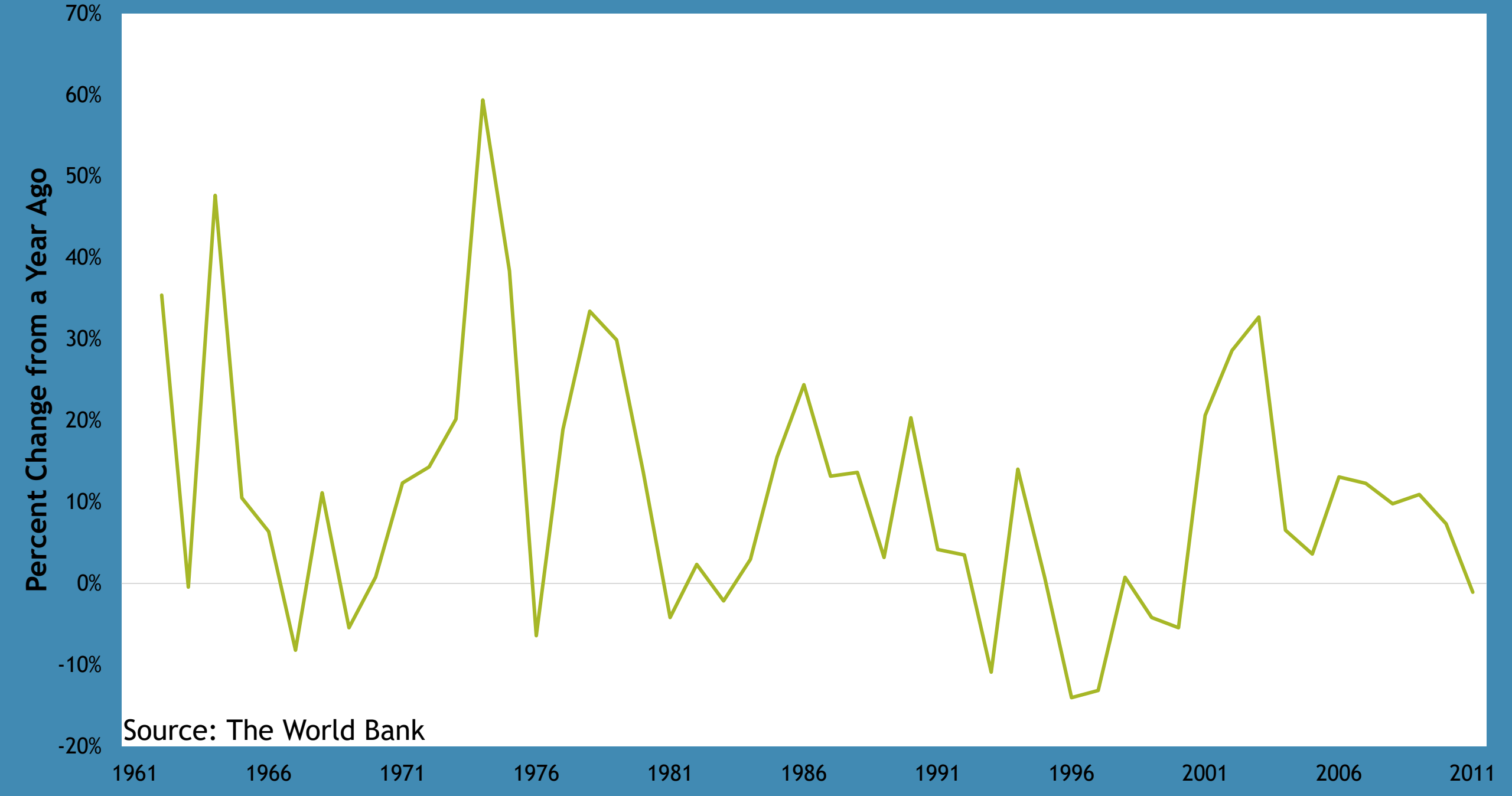
2006 G8 Conference

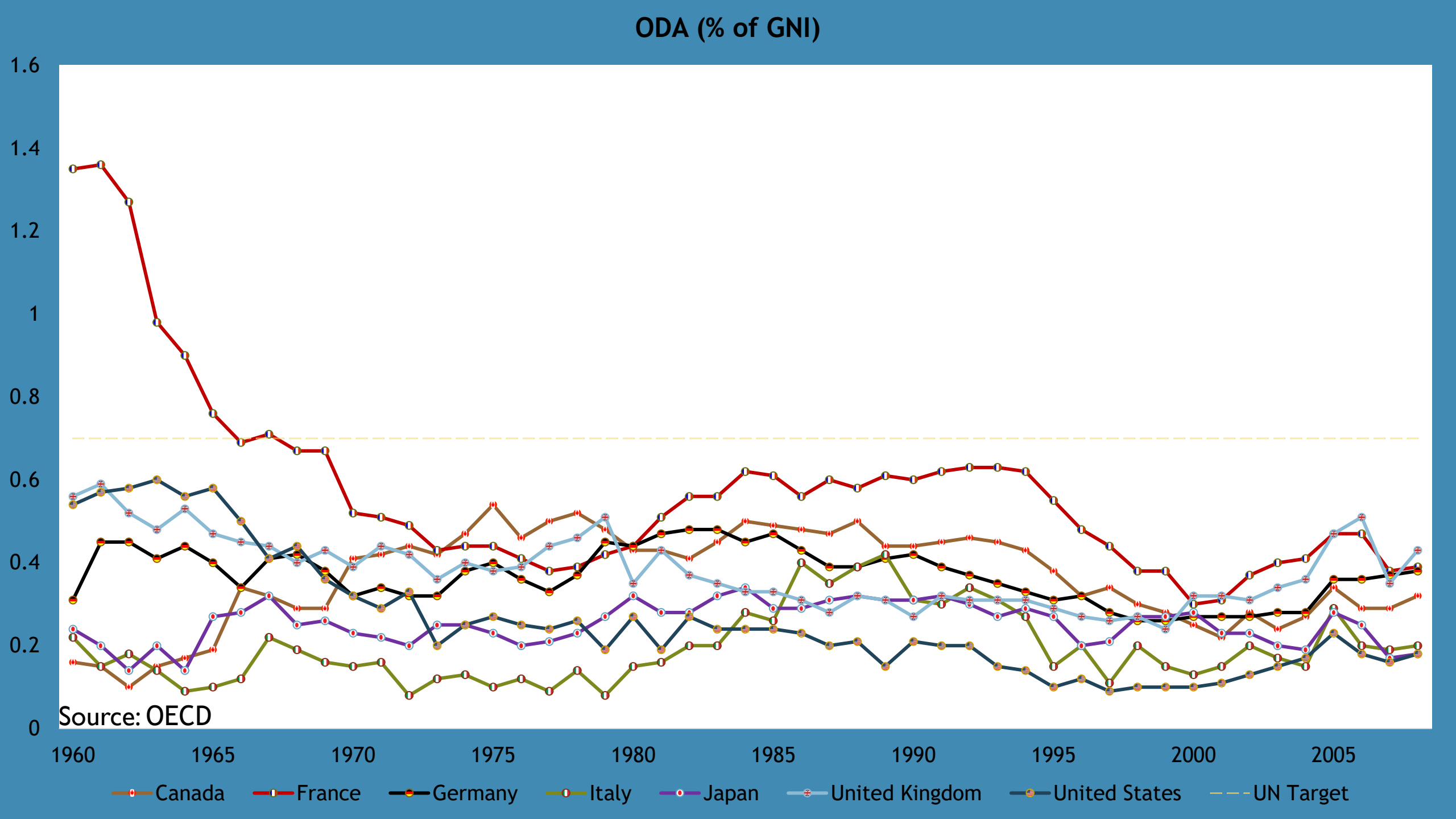
- Central themes: energy security, education, fight against infectious diseases
- Aid and trade of ‘secondary concern’
- Bono: “Overall, there is one cheer on debt, half a cheer on AIDS, and boos and wolf-whistles for what is happening on trade”
- Countries that obtained debt relief in 2006 had an extra $1 billion to spend on worthwhile programs
- Aid extended by G8 nations in 2005 averaged 0.27% of GNI; UN target of 0.7%
- In 2006, total ODA in real terms declined for first time since 1997
- World leaders acknowledged the importance of aid for trade to help developing countries
- Lack of progress in removing trade barriers for US, EU, and others



HIPC-a group of approximately 39 developing countries with high levels of poverty and debt overhang which qualify for special assistance from the IMF and the World Bank

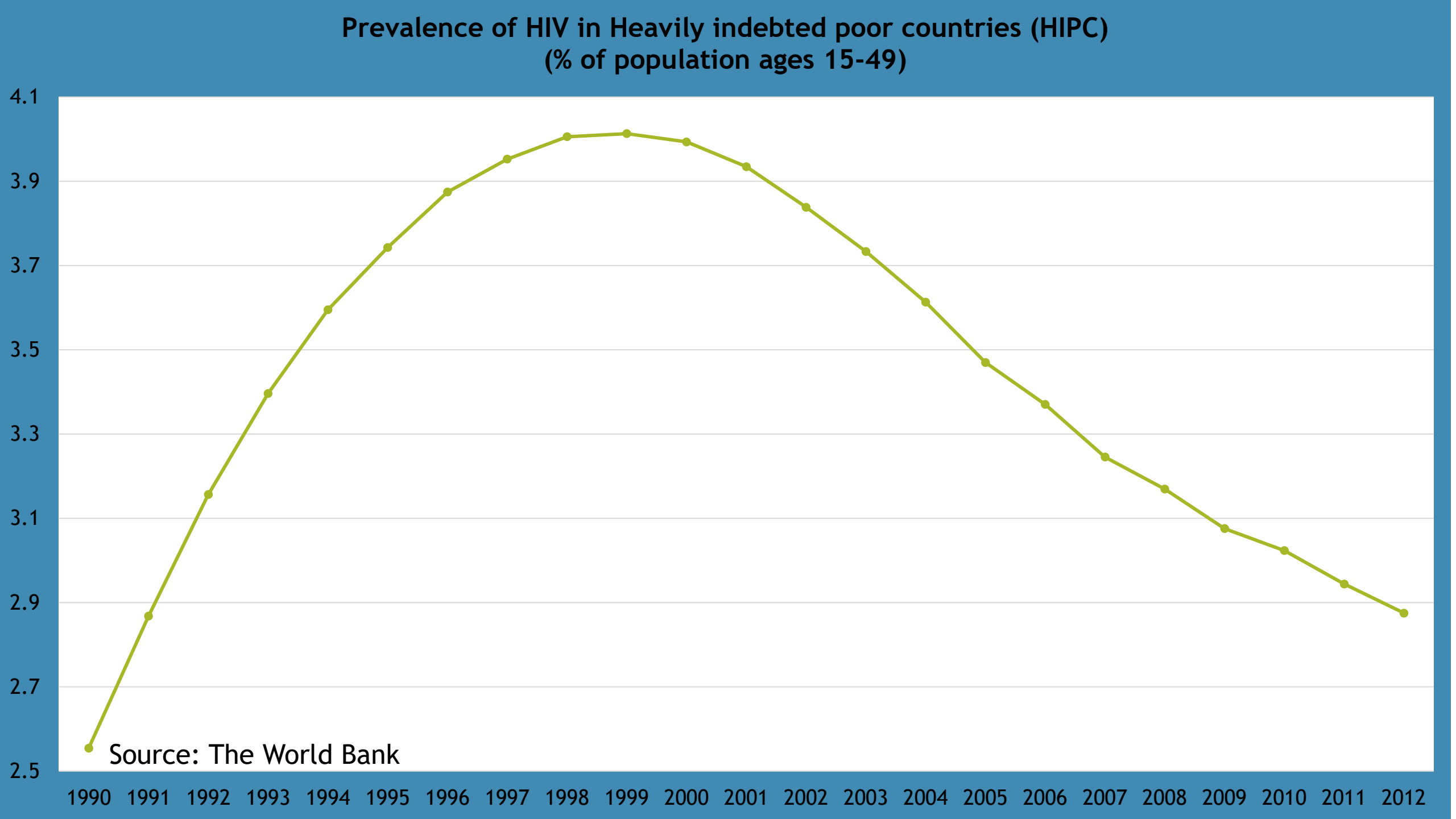
Net ODA and Official Aid Received in Heavily indebted poor countries (HIPC)



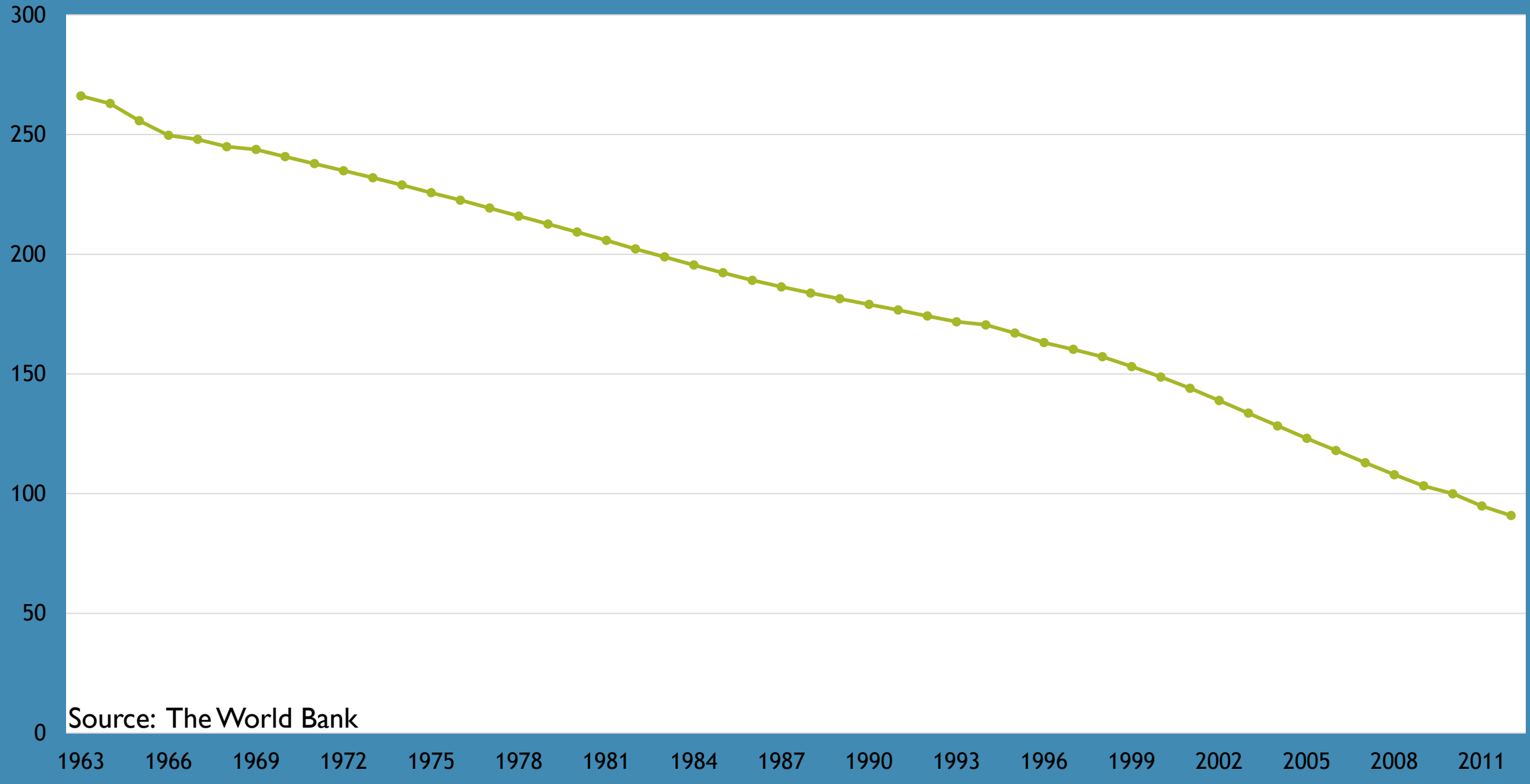

ODA (% of GNI)
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005
Source: OECD
Canada
France
Germany
Italy
Japan
United Kingdom
United States
UN Target

Is Aid Effective?

- **Poverty would be higher in the absence of aid** (McGillivray, 2005)
- **Aid's impact on growth depends on policy regimes of recipient country** (Burnside & Dollar, 1997, 2000, 2004; Collier & Dollar, 2001, 2002; Svensson, 1999; Collier & Dehn, 2001; Collier &Hoeffler, 2002)
- **Aid works *regardless of* policy regimes** (Amavilah, 1998; Durbarry et al., 1998; Hansen & Tarp, 2000, 2001 (to name a few))
- **Depending on the democratization of the recipient, aid is positively associated with the level of well-being (HDI)** (Kosack, 2003)
- **In general, aid results in higher public expenditure** (McGillivray, 2005)
- **Aid is subject to diminishing returns** (Durbarry et al., 1998; Collier & Dollar, 2002; Collier & Hoeffler, 2002; Hansen & Tarp, 2000, 2001; Dalgaard & Hansen, 2001; Hudson & Mosley, 2001; Lensink & White, 2001; Dalgaard et al., 2004)

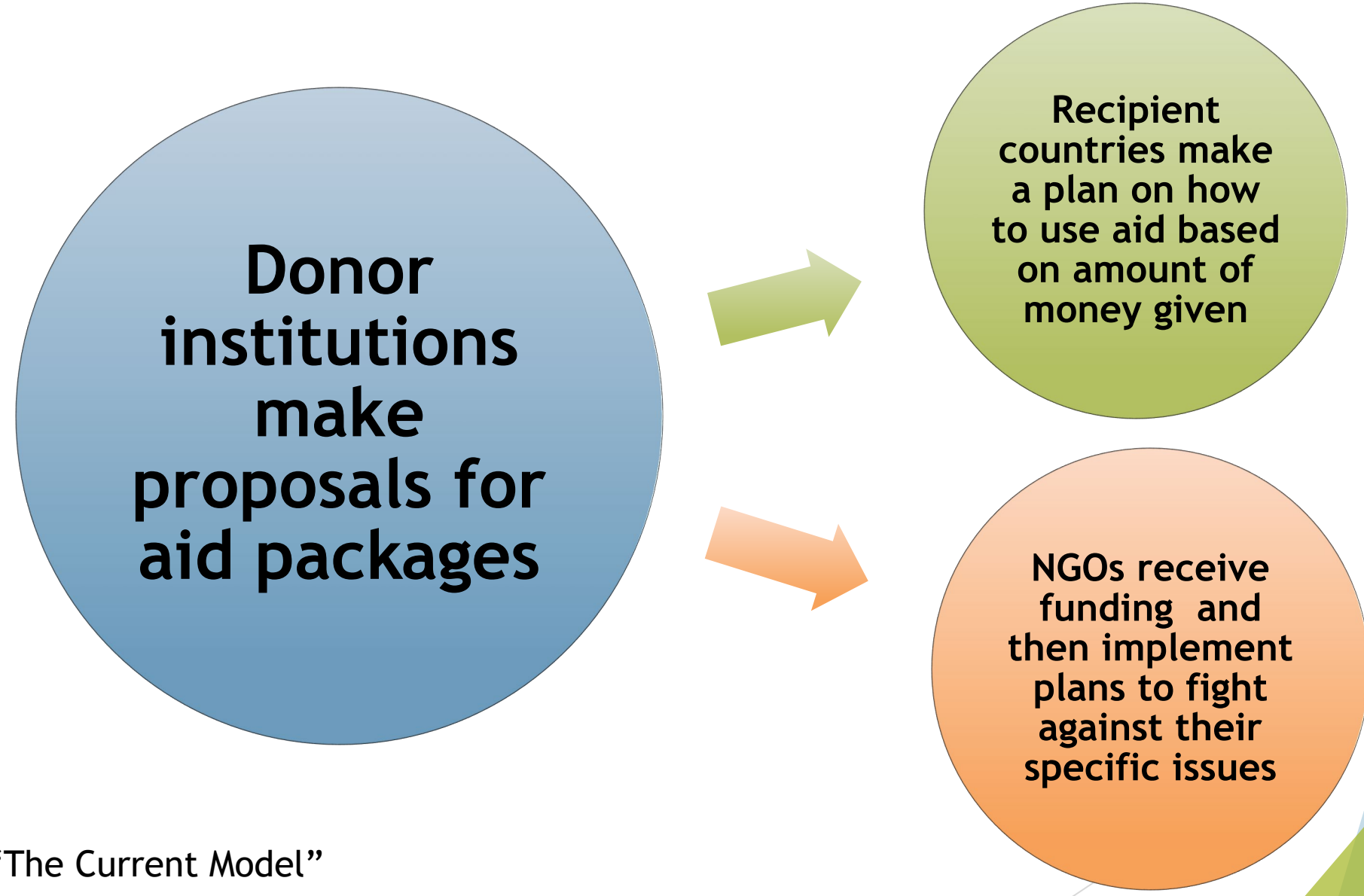

Prevalence of HIV in Heavily indebted poor countries (HIPC)
(% of population ages 15-49)
4.1
3.9
3.7
3.5
3.3
3.1
2.9
2.7
2.5
Source: The World Bank
1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012

Under-5 Mortality Rate in Heavily indebted poor countries (HIPC)
(per 1,000 live births)



http://www.gapminder.org/world/#$majorMode=chart$is;shi=t;ly=2003;lb=f;il=t;fs=11;al=30;stl=t;st=t;nsl=t;se=t$wst;tts=C$ts;sp=5.59290322580644;ti=2010$zpv;v=0$inc_x;mmid=XCOORDS;iid=tzK6dx2JltRfVXFI1ADh84w;by=ind$inc_y;mmid=YCOORDS;iid=0AkBd6lyS3EmpdEdDWHhBcFpjMUo4MGE2X2Q4WXFQRGc;by=ind$inc_s;uniValue=8.21;iid=phAwcNAVuyj0XOoBL_n5tAQ;by=ind$inc_c;uniValue=255;gid=CATID0;by=grp$map_x;scale=lin;dataMin=-2.7012;dataMax=242$map_y;scale=lin;dataMin=-50.2904;dataMax=93$map_s;sma=49;smi=2.65$cd;bd=0$inds=

Is Aid Efficient?



"The Current Model"

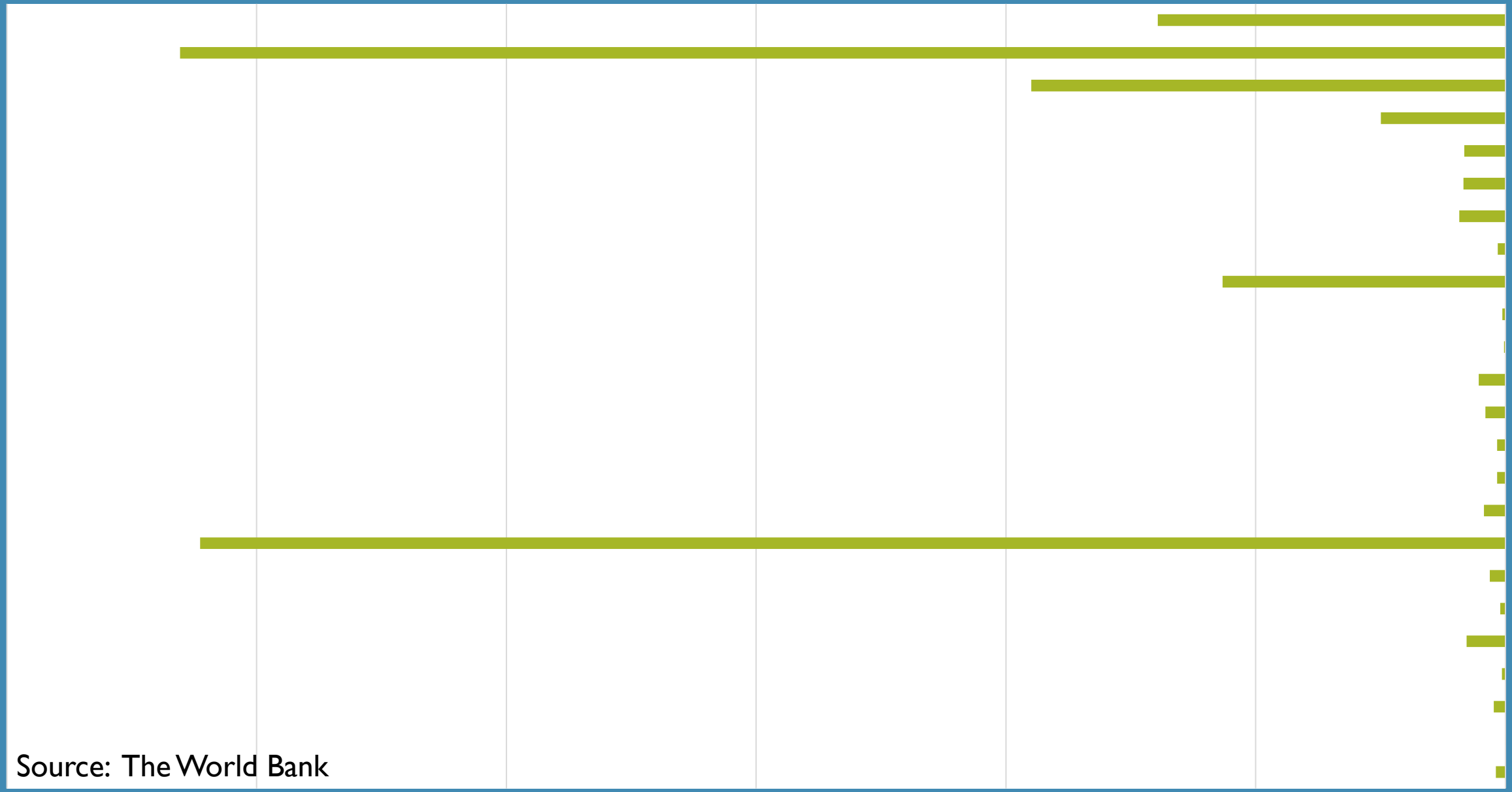
Is Aid Efficient?

- According to Sachs, we should **first** learn what developing countries hope to accomplish and how much money they need to accomplish their goals
- Goals should be aligned with MDGs
- “actual transfer of funds must be based on rigorous, country-specific plans that are developed through open and consultative processes, backed by good governance in the recipient countries, as well as careful planning and evaluation”
- Knowledge sharing from developing countries to lesser developed countries

Debt Relief

- 2006 marked a strong year in debt relief
- There has been great progress with the outcomes of relieving debt
- It has allowed:
  - Free health care in Zambia
  - Construction of better roads for farmers in Ghana
  - Food for 3.5 million people hit by a drought in Tanzania
  - The hire of 50,000 teachers to enroll 3.5 million more children into school in Nigeria

Case Study: Debt forgiveness or reduction in Developing Countries in Middle East & North Africa (current US$)



Source: The World Bank

Pros of Debt Relief

- Fight world poverty
- Allows impoverished nations to allocate their resources in more efficient ways
- Countries that obtained debt relief in 2006 had an extra $1 billion to spend on worthwhile programs
- Political influence could be a possible motive

Cons of Debt Relief

- Moral hazard
- Decreases motivation
- Encourages bad loans
- In many cases with the poorest of poor countries, feeding them money and relieving debt isn't the best solution
  - Attack the fundamental problem
  - Prevent for the future
  - World Bank in 2003

Trade

- Trade is what has really been lacking compared to debt relief and financial aid
- *“Overall, there is one cheer on debt, half a cheer on AIDS, and boos and wolf-whistles for what is happening on trade.”*
- HIPC
- Domestic vs. International debate
- Agriculture based economies

Conclusion

- 2006 G8 Conference shed light on strengths and weaknesses
- Aid effectiveness vs. efficiency
  - Overall, literature leans toward effective
  - Diminishing returns
  - Arguably inefficient
- Pros and Cons of Debt Relief
- Room for improvement in spurring trade in developing nations
  - Developed P.O.V. vs. Developing P.O.V.

Discussion Questions

- What is the most efficient way to help an impoverished country grow economically?
- Should the US devote more resources to helping lesser developed countries?