Occasional Paper No. 88
National Center for the Study of Privatization in Education
Teachers College, Columbia University

Home-Schooling in the US

January 2004

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Abstract: This paper reviews recent evidence on home-schooling and home-based education in the US. Using various sources including state-level information and data on home-schoolers who took the SAT in 2001, we describe the characteristics of home-schoolers and analyze the motivation to home-school. We then evaluate home-schooling in terms of freedom of choice, efficiency, equity, and social cohesion. Throughout the evaluation, we note difficulties in identifying the treatment effect of home-schooling. On freedom of choice, we find that home-schooling may be highly liberating. On efficiency, we compare SAT test scores of home-schoolers with students in other types of school (noting the lack of evidence on home-school costs). There are serious methodological concerns in ascribing overall test score differences to home-school provision, including self-selection of test-takers and absence of controls for co-variates; but we do find relative differences between results for Verbal and Math tests for home-schoolers. Issues of equity in relation to home-schooling arise because families are now the ultimate determinants of a child's welfare and prospects; we find relatively strong intergenerational academic transfers for home-schoolers. The research on social cohesion, which is mainly published in general media, reports positive effects but focusses entirely on the individual home-schooler and not broader societal impacts. We trace the consequences of this evaluation for policies on regulation, finance, and support services for home-schooling.

Acknowledgements
The author appreciates discussions with Hank Levin and colleagues at Teachers College; extensive comments from Pat Lines; research assistance from Chad D'Entremont and Pei-Winnie Ma; information from state Education Departments; and Drew Gitomer and the Educational Testing Service for making the SAT data available.

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1. Introduction

Of the 55 million school-aged children in the US in 2002, NCES (2001) estimated that approximately 800,000 to 1 million (1.6-1.8%) are being schooled at home.[1] This figure – albeit imprecise – is considerably higher than the combined numbers of students in charter schools and voucher programs, reforms which have attracted considerably more academic attention. Moreover, home-schooling is the ultimate in privatization: the education of children who home-school is typically privately funded, privately provided, and (almost fully) privately regulated. Essentially, home-schooling gives primacy to private interests in education over a broader public interest. Yet, it seems to be garnering broad-based support: whereas in 1985, only 16% of families thought home-schooling a good thing, by 2001 this figure had risen to 41% (Rose and Gallup, 2001, 46; see also Hammons, 2001).

This development and increasing acceptance of home-schooling prompts many fundamental questions in relation to the organization of the US school system. As an alternative to public schooling, home-schooling may satisfy families with particular educational preferences (typically religious) or those who are disaffected by publicly-funded choices (see Stevens, 2001). Its growth may cast doubt on the efficiency of a schoolhouse operation, in that home provision is regarded as more effective (interview with Milton Friedman by Kane, 2002). Moreover, there are concerns about the public goods produced by home-schooling and the welfare of the children involved. Finally, home-schooling may have a strong economic impact on family expenditure patterns, time allocations, labor force participation, housing prices (near good schools), and preferences for public services.

This paper offers a review of home-schooling and its potential implications for education policy reform. We begin by describing the characteristics of home-schoolers, drawing on information from recent surveys, reviews, and state data. We then review the factors motivating the choice of home-schooling relative to other schooling options. Next, we evaluate home-schooling using criteria set out by Levin (2002) of freedom of choice, efficiency, equity, and social cohesion. We conclude with a discussion of the policy instruments used to influence home-schooling and the implications for an education system with a sizeable home schooling sector. To advance discussion of home-schooling across these

aspects, we introduce evidence from the highly selective cohort of home-schoolers who took the SAT in 2001.

2. The Home-Schooling Movement

2.1 Home-Schooling and Home-Based Educational Practices

Home-schooling is a diverse practice (Petrie, 2000, 479; Stevens, 2001). It is not a discrete and determinate form of education provision, particularly when contrasted with enrollment at a public school which has a formal governance structure and offers a definite pedagogy and standard curriculum, taught by a teacher as part of a regular instructional program fitted into the academic calendar. Indeed, home-schooling is sometimes lauded for not being "four-walls education", with some families explicitly motivated by a desire to unschool their children (Stevens, 2001; on special education, see Ensign, 2000). Other families may follow the formal approach of a school (e.g. with timetables or lesson plans). In general, the instructional mode of home-schooling appears to be characterized by its heterogeneity.

Two useful distinctions are worth noting. One is between complete home-schooling and home-based education. The former occurs where there is no interaction between the student and a school (although the student may draw on resources in the community). Home-based education occurs where the student draws on the resources of the school as desired (e.g. for specialist courses, sports, or extracurricular activities) or participates in a distance-learning program delivered by a school (e.g., an umbrella school). The latter approach is reasonably common: data indicate that 20% of home-school families sent their children to school for part of the day (NCES, 2001).[2] The second useful distinction is the duration of home-schooling: although difficult to estimate, many home-schoolers do attend schools for a large period of their childhood (perhaps spending only 2 years home-schooling, see Lines, 2002; Isenberg's (2002) data show similar durations, with home-schoolers enrolling in public schools by later grades, see also Rudner, 1999). Others may be home-schooled throughout childhood. Thus, the duration of home-schooling is likely to be bimodal, with

averages masking the distinction between short-term home-schoolers and those who are fully home-schooled.

Home-schooling is also a diverse practice in terms of regulations and laws (for a legal history, see Buss, 2000; Somerville, 2001). Although legal across all states, as reviewed by the Home School Legal Defense Association, there are 9 states (including Texas) with little-to-no regulation, 14 states (including California) where regulation is low, 14 states with moderate regulation, and 11 states where regulation is relatively high (to include assessments and, possibly, inspections; although these are rarely enforced). Home-schooling operations are also regarded differently across the states. Lambert (2001) reviews the legislation, finding state interpretations where operating as a home-school is classified in various ways, including: distinctly 'not a private school'; possibly a private school or having affiliated status (depending on how the law is interpreted); a nonpublic school; or, in some cases, as a public school. These different operational characteristics will influence both the regulatory burden and the financing of home-schools. Such diversity is compounded by the lack of information either on how such regulations are enforced or on how legal statutes are applied.

Bearing these measurement difficulties in mind, Table 1 reports on state-level estimates of home-school numbers across the 23 states where data are available (all states were scrutinized for data). These data show around 1.68% of students were being home-schooled, broadly corroborating other estimates (perhaps with downward bias where families must self-report home-schooling to their State Department of Education). States vary widely in the proportions of home-schoolers. They also show considerable variations in the proportions of home-schoolers in relation to those in private schools. Taking the average across the 23 states, the home-school sector is about one-fifth the size of the private sector (but in Arkansas and Montana, it is almost half the size).

2.2 The Characteristics of Home-Schoolers

These estimates of 0.8-1.0 million home-schoolers in the US represent a sizeable increase from the CPS and NHES96 figures for the early 1990s of 0.4-0.6 million (Bauman, 2002; for data on the growth in Florida and Wisconsin since the 1980s, see Isenberg, 2002; on earlier decades, see Knowles et al., 1992). Inevitably, a group this large will include families with

many different characteristics and motivations.[3] Nevertheless, a better understanding of these household characteristics may assist in societal acceptance and support for home-schooling, as is desired by the families involved and their advocates (Lines, 2002).

Early adopters of home-schooling have been described as either 'ideologues' or 'pedagogues' (Nemer, 2002): either they did not agree with what was taught in public schools or felt they could do a better job of educating their children themselves. As the population of home-schoolers grows, other characteristics can be identified. In contrast to public school families Lines (2002) describes home-schooling families as "more religious, more conservative, white, somewhat more affluent, and headed by parents with somewhat more years of education"; and a similar picture emerges from national and state-level data (e.g. Isenberg (2002) finds home-schooling correlated with status as an Evangelical Protestant in Wisconsin; see Rudner, 1999, Tables 2.2-2.9). The religiosity of home-schoolers clearly reflects a difference in preferences, but may also reflect the greater legal recourse families have in claiming religious freedom from public demands (on religion, see Mayberry et al., 1995). As well, it is plausible that home-schooling families are in the middle of the distribution of household incomes: when household income falls below a certain threshold, both parents must work; when it rises above a threshold, private schooling options can be financed more readily. Similarly, more educated parents are likely to feel more competent as educators of their child, but at a certain level of education these parents will be attracted to lucrative employment prospects.

To augment this literature, the top panel of Table 2 reports data on the characteristics of students who took the SAT in 2001, according to school type.[4] This data only relates to students who are college-aspirant, but it is useful in comparing home-schoolers who intend to go to college with school students with equivalent intentions. The home-school cohort is 6,033 (0.5% of all test-takers). As found elsewhere, home-schoolers tend to be white, with a first language that is English, and without a disability. However, whereas around half of all public students and two-thirds of religious school students profess a religious faith, the figure for home-schoolers is just above two-fifths. Yet, a high proportion of these home-schoolers are Baptists: their adherence rate is 17.7%, compared to 11.1% within the public schools.

The middle panel of Table 2 shows family characteristics. Home-schoolers are very unlikely to have a mother who reports a high school education, but they are not strongly represented in the upper tail of the education distribution. Similarly, many home-schooling families are in the middle of the distribution of household incomes. Finally, the bottom panel of Table 2 shows county-level statistics for affluence and childhood deprivation, matched to the residence zipcodes. These data show home-schoolers are generally not from affluent counties, even compared to public school students, but they are less likely to live in areas of high child poverty.[5]

2.3 The Motivation to Home-School

Although these descriptive data give some indication of the families' motivation, the growth of home-schooling can also be related to social and structural phenomena (on the reasons parents give for home-schooling, see Bauman, 2002). The mother's role is critical in the decision to home-school, and economic studies focus on her efficacy as a teacher and more formally on her time budget (Houston and Toma, 2003; Isenberg, 2002). Labor force participation propensities impact on the decision to home-school. So, whereas 20% of mothers whose children attend school do not work, the respective figure for home-schoolers is 50% (Isenberg, 2002). Other family-related factors may include a shift toward more intensive investments in fewer children (rather than extensive investments in family size) and an increase in the heterogeneity of preferences for educational curricula, instruction, and pedagogy.

Of policy interest is the relationship between home schooling and other educational options, particularly given the cost of home-schooling relative to public schooling. (Currently, families who home-school do not receive public funds directly). A number of reasons for avoiding public schools – besides a preference for religious education – have been offered. (Similar arguments can be applied against private schools: Isenberg (2002) finds home-schooling is more common in non-metropolitan areas with fewer private schools). One is the inflexibility and lack of responsiveness of provision in the public sector, e.g. in districts which cover large populations, or in areas where funding increasingly comes from state sources. A second reason may be the greater conformity in public schools, where such

conformity fails to accommodate diverse preferences. A third reason (which has not been directly examined) is the increased pressure in public schools for standardized testing. Others may include: families' perceptions that public school resources are insufficient; or that public schools are dangerous environments.

More generally, the technology of education and schooling may be such that diseconomies of scale set in very early (or productivity growth is slow, relative to other industries). Thus, productivity at home-schooling may not be that much lower than productivity levels in schoolhouses. There is reasonably strong evidence that school/district effectiveness is correlated with small size (Andrews et al., 2002) and few large-scale private school operators exist (Levin, 2001). Also, there are many advocates of smaller class sizes (Krueger, 1999) and demonstrated benefits from individualized tutoring (Rosé et al., 2003). (Home-schoolers may group together to increase 'class sizes' in some cases). Schools may also face informational costs and high transactions costs (especially when children's safety is involved and when family preferences are varied or idiosyncratic). Home-schooling may allow for families to save on learning materials, uniforms, transportation costs, and contributions to the school; although these are substantial for private schools (e.g. fees), they may be non-trivial in public schools also. Finally, families may obtain some funds, e.g through a cyber/virtual charter school arrangement (Huerta and Gonzalez, 2003), tax credits, or donations from their (religious) community.

Using cross-sectional district-level data across ten states (and panel data for one state, Kentucky), Houston and Toma (2003) model the choice to home-school relative to public school. They find evidence that home-schooling proportions are greater where the public school drop-out rate is higher and where public school expenditures are lower. The strongest impact was found for the standard deviation of incomes: greater heterogeneity in incomes (and presumably preferences for education) is associated with higher proportions of home schooling. Public schooling was also more likely in more densely populated areas. (However, Houston and Toma (2003) report a number of contrary results: district-level average male income and female education levels were positively related to public schooling enrollment; no measure of religious preferences is found to be significant). In an extension, Houston and Toma (2003) model private school choice to home-school choice for the same datasets: home

schooling is preferred where more families are married and where male income levels are lower (whereas private schooling preferences are strongly correlated with the proportions of Catholics in the district).

To further identify the motive to home school, Belfield (2004) applies a multinomial logit model to the NHES99 dataset and the cohort of SAT test-takers (using individual-level data avoids the aggregation bias faced by Houston and Toma, 2003). Home-schooling propensities are modelled against public, private-religious, and private-independent schools. The results on family characteristics affirm the descriptions given above. Few community characteristics emerge (there is some indication of less home-schooling in the Northeast, but no differences by urban/suburban area, by county poverty rate, or by ethnic composition of zipcode). In comparisons of the four school choices, home-schoolers appear to have characteristics that are intermediate between the public and private school sectors, e.g. on religion, maternal education, ethnicity, and maternal employment. In other words, these families – at least in terms of averages – appear more mainstream than the existing private school sector. However, such surveys cannot easily assess either the spread of responses (partly because of small sample sizes) or the intensity of characteristics (e.g. the degree of religiosity).

3. A Framework for Evaluating Home Schooling

3.1 Criteria for Evaluation

Because home-schooling is the ultimate in education privatization, it prompts discussion which is strongly ideological: advocates and detractors may make claims that lack rigor, reflect only one position, or are based on partial evidence. One way to avoid this is to apply a comprehensive, established framework which has been used to evaluate other privatization reforms (see Levin, 2002). The framework has four criteria – freedom of choice; efficiency; equity; and social cohesion – each of which requires trade-offs to be made.

3.2 Freedom of Choice

Clearly, home-schooling and home-based education represent an expansion of educational options in terms of the technology of schooling. Indeed, all aspects of the educational process – including access, administration, use of teacher and physical resources, and assessment – may be chosen openly by the family, such that the education market is greatly liberalized. Home-based education can combine instructional modes from home and school. (In contrast, private schools often appear technologically similar to public schools, see Benveniste et al., 2003). Such opportunities will be attractive to some parents, even for a short duration; and especially where families are able to negotiate with their public school for tailored home-based education. Also, if the broader purpose of education is to create a diverse society, then an array of choices may be socially desirable. Given that home-schooling families do not receive public funds (or receive fewer funds than with full-time enrollment), this independent choice has considerable persuasive power.

However, the desire for choice cannot be regarded as the sole determinant: even when home-schooling is not publicly funded, the state has responsibilities (and expectations) regarding child-rearing, and these must also be acknowledged. Also, an education system that accommodates home-schooling (e.g. through customized programs) will favor some families over others. On current evidence, the families most capable of exercising such choice for a reasonable duration are (typically) two-parent, middle-income families with mothers who are not in full-time employment. Thus, the demand for greater freedom of choice to home-school may not extend to the majority of the population.

3.3 Efficiency

The criterion of efficiency can be investigated by looking at expenditures or resources used and the outcomes of home-schooling.[6] From the home-schooling family's perspective, absent irrationality, the practice must be optimal because it is a preferred choice. From the state's perspective, a higher proportion of home-schoolers should result in savings where, as is currently the case in most states, home-schoolers do not receive public funds. However, this saving will be offset where: home-schoolers draw on public resources as part of a home-based education plan; home-school families can claim tax credits, tax deductions, and funding

through cyber/virtual charter schools; and where additional regulatory costs are incurred by the state. Limited information is available on these costs.[7]

Most studies therefore concentrate on the outcomes of home-schooling. Advocates contend that small class sizes, flexible instruction (without age-tracking), and dedicated parent-teachers should make home-schooling more effective than other forms of education (but, Cai et al. (2002) find home-school teachers use more controlling teaching styles; for a full treatment on home-schooling instruction, see Stevens, 2000). In rebuttal, educational outcomes may be skewed toward those on which the family has competence, and educational progress may be slow if there is no formative assessment or peer-pressure to learn (although home-school parents may exert more pressure or have higher expectations as a result of their supervision).

In comparing outcomes from home-schooling against public schooling, three empirical issues arise. The first is the common concern over the endogeneity of school choice, that is different types of families choose the type of school that their children attend, and little can be inferred about the impacts of schools for students who do not attend them (Neal, 1997). The second is the need to distinguish the absolute performance of home-schoolers from the treatment effect of home-schooling. Given the above-median resources of many home-schooling families, academic performance should be high even if home-schooling itself is not differentially effective. Full controls for family background are needed, however, to identify a treatment effect. Finally, home-schoolers can often choose which tests to take and when to take them (and have parents administer them), introducing other biases.

Practical difficulties also arise in obtaining data to identify home-schooling impacts. The ideal source would be state or district-level data in states where test information is required. However, review of the data available across nine states with 'high regulation' of home-schooling yields very limited information. In five such states (WA, UT, WV, PA, NY), home-school students are not required to take state assessments or their results are not recorded. This situation arises because: test assessment is often voluntary for these students; tests are administered at district-level and not available from state data; and test results may be returned to parents without being recorded.[8] Ray (2000, 74-75) reviews mean home-schooling achievement levels from these sources, finding high performance by home-

schoolers (see also Rudner, 1999; for a similar approach, Rothermel (2002) reports on the very high academic performance on standardized tests of a sample of 419 home-schoolers in the United Kingdom). However, even where averages are available, school choice endogeneity controls and family background controls cannot be applied, such that a treatment effect can be identified.

Test score data from surveys is becoming available. Rudner (1999) reports average test scores for home-schoolers on the Iowa Tests of Basic Skills or the Tests of Achievement Proficiency by 39,607 students from approximately 22,000 families. The findings only refer to the performance of home-schoolers and not to the treatment effect of home-schooling, because no adjustments for any family background characteristics are made and none of the endogeneity corrections are applied (see Welner and Welner, 1999). (Also, in some cases the test was applied in the home, raising issues in regard to test administration). Using raw averages, home-schoolers post very high scores (above those in public and private schools): the composite scaled scores of home-schoolers range from the 77th to 91st percentile rank across grades K-12; scores are higher in Reading, Language, Math, Social Studies, and Science. (Given selection into test-taking, however, these scores may not indicate how well the average home-schooler performs).

The SAT may be useful: in reflecting final outcomes of schooling; in being applied in a standard manner under test conditions; and in that it is a high-stakes test, well-correlated with future college completion and earnings. However, data on individual SAT scores is unlikely to be indicative of the academic impact of home-schooling, for reasons given above. Rather, SAT results can be useful for looking at relative differences and in providing information on the sizes of possible biases.

Table 3 shows the SAT scores of students according to school type from the 2001 test-takers. The first row shows the raw test score, unadjusted for selection effects and family background controls. The importance of endogeneity correction is evident from the bottom rows of Table 3: home-schoolers make up only 0.5% of all SAT test-takers, a proportion considerably below their representation in the student population and lower than any other school type. Observed home-schoolers' scores are likely to be inflated: the negative correlation between test-taking proportions and test scores on the SAT has long been noted

(see Behrendt et al., 1986). (For raw scores, home-schoolers obtain high SAT-Total scores, with a mean of 1093; this is 0.4 (0.2) standard deviations above the public school (private religious school) scores, but 0.15 standard deviations below those in private-independent schools). This selection effect means that absolute scores are unlikely to be useful indicators.

Nevertheless, it is possible to make some conclusions in relative terms. Notably, most of the home-schooling premium comes from higher SAT-Verbal scores and not the SAT-Math scores. (This distinction between Verbal/Reading and Math scores is also found in Rudner's (1999) data). Insofar as there is a treatment effect (of indeterminate size) from home-schooling, it appears to be much greater for Verbal than Math. This discrepancy may reflect greater parental competence across the subject disciplines.

Table 3 also reports scores with controls for family background (and a sizeable array of other covariates listed in the Table Notes, including the state-level SAT test-taking participation rate). After controlling for these co-variates, the predicted SAT-total scores for home-schoolers and private-independent school students converge toward the mean: the home-school premium over private-religious school students falls almost to zero.[9] (Also, home-schoolers actually perform worse than would be predicted on SAT-Math). The differences between raw and predicted scores give some indication of the strength of co-varying characteristics in explaining test-score differences.[10]

Finally, non-educational outcomes have also been considered. One such outcome is child health. Whereas schools undertake preventive health care services (e.g. screening for visual or hearing impairments, innoculation), these services are not regularly provided by pediatricians and so may be less accessible for home-schoolers (see Klugewicz and Carraccio, 1999). An important economic outcome relates to earnings: home-schoolers may graduate without a diploma that serves as a labor market signal, which in turn raises the costs of job search (although diplomas may be obtained through alternative assessment systems). Yet, this consequence will be offset where home-schoolers attend college, and where they do well on academic tests which are correlated with earnings.

The efficiency of home-schooling varies considerably according to whether the family or state perspective is adopted. Given the positive correlation between family wealth and home-schooling, it is likely that families do incur high costs which may be worthwhile where

the absolute educational outcomes of home-schoolers are also high (this high-cost and high-effect scenario is evident from cost-effectiveness studies of adult tutoring, see Levin et al., 1987). For states, the efficiency of home-schooling appears to depend in addition on what resources must be allocated to home-schoolers and whether any indirect financing burdens arise (e.g. on other public services).

3.4 Social Cohesion

As well as in terms of private academic benefits, home-schooling must also be evaluated in terms of the public benefits that are generated. Critics of home-schooling argue that it reduces the socially beneficial outcomes from schooling, both for home-schooler and society at large (see Reich, 2002).[11] It separates children from their peers, impairing 'identity formation/choice' and the appreciation of social values and norms if home-schooling becomes 'indoctrination' (see Buss, 2000). It may undermine the formation of such social norms; and in exiting the public system, home-schoolers may also undermine the voice needed to reform public schools such that they better accommodate families' preferences (Lubienski, 2000). In rebuttal, home-schooling need not be an isolating experience: Isenberg (2002) finds around 50% of home-schoolers have siblings attending school; and home-schoolers may be rooted in a religious community. Home-schooling need not be incompatible with public values: some home-schooling parents would like public schools to teach communitarian values more intensely (see Stevens, 2001; Nemer, 2002). Also, where education is intended to create a diverse society, then a plurality of educational options should be promoted (Smith and Sikkink, 1999). The general public is ambivalent: being asked whether home-schooling promotes good citizenship, equal numbers agree as disagree (Rose and Gallup, 2001, 46).

In a review on the social outcomes, Medlin (2000) finds generally supportive evidence on home-schoolers' behavior: home-schoolers report being more mature and better socialized, participate in activities in their community, and socialize with children of different ages.[12] However, this evidence may not be robust. There are many difficulties in evaluating socialization outcomes, especially from small samples of data drawn from an imprecisely defined population or from a convenience sample. Survey respondents (particularly parents) are likely to give socially desirable responses. Survey measures may be

imperfect constructs for socialization over the period of childhood, and survey instruments do not readily allow for comparison between home-schooling and other types of schooling, controlling for family background effects. Many studies report no comparison group and do not indicate whether the effects are substantively significant. Finally, much of the literature considers younger children. (There may also be issues of publication bias: many studies are reported in sympathetic journals).

Again, the possibility of adverse selection is a concern – those families that feel least inclined to integrate with the rest of society may be the most likely to opt out; and these families will not be easily detected in surveys. More fundamentally, almost all the relevant evidence on social cohesion focusses on the individual child, with very little information about how home-schooling impacts on other members of society (and on taxpayer support for public education).[13] Evidence from young children is unlikely to yield evidence about the externalities produced from home-schooling, for example. The salient relationship is between home-schooling, religiosity, and social cohesion: many argue for the separation of religion from public endeavours such as schooling to prevent laws being viewed through a theocratic rather than a democratic lens; however, others may argue that society should be forged as a "community of communities" where diverse religious affiliations play a role in societal development (Smith and Sikkink, 1999).

3.5 Equity

Home-schooling should also be evaluated in terms of equity, an important motivation for state intervention in the education system. Several issues arise, largely as a consequence of the complete transfer of responsibility for a child's education from the state to the individual family.

First, home-schooling clearly weakens the opportunity for a community to guarantee or verify that children obtain a reasonable level of education or personal well-being. Summative assessments may be used to ensure that educational standards are being met, but evaluation of well-being is fraught. Generally, the average family's incentives to care for their children are stronger than the state's. There is also evidence that some public schools are dangerous, adversely impacting on children's well-being (there were 1.5 million violent incidents in US

public schools in 2000, Miller, 2003). From the parental perspective, therefore, home-schooling is associated with improved well-being for the child where the alternatives are dangerous.

But, from society's perspective parental preferences cannot be taken as given. Some families do abuse and neglect their children (Child Protective Services receives reports on 3 million children annually, of which over 1,000 involve fatalities, see ACF, 2003), and educational agencies play a significant role in identifying such occurrences. It may be possible to perform a form of calculus on the trade-offs of home-schooling on children's welfare.[14] But, no such calculus has been performed and it would be dogged by two difficult issues. The first is that of weighting the welfare of children who may be abused against the welfare of children who are denied the opportunity to be home-schooled. The second is that families who are prone to abuse may be most likely to opt out of schooling to avoid detection (another adverse selection effect). One solution is to allow home-schooling but with greater sanctions on abusive families and more extensive monitoring, yet the efficacy and efficiency of such an approach (including the high infrastructure costs) must be considered.

Second, although family resources are the main determinant of all children's education, for home-schoolers they become almost the only determinant. Home-schooling may therefore entrench intergenerational attributes, such that highly educated or wealthy families transfer resources to their children most effectively. Educational inequalities and perhaps inequities will be perpetuated.

Although these intergenerational transfers may extend to social networks, beliefs, and lifestyles, they can most easily be examined by comparing socio-economic status (SES) gradients on test scores across school types. These gradients should be steeper for families that home-school. Using the SAT data, these gradients are reported in Table 4. Splitting the cohort by school type, OLS estimation is applied to the SAT outcome measures. The effect size coefficients on socio-economic status by quintile are reported, relative to those test-takers in the lowest quintile. In all cases, being in a higher SES quintile is associated with a higher test score. SAT scores increase as SES increases, with evidence of stronger family background effects for home-schoolers. Those in the second quintile score 0.32 standard deviations higher than those in the bottom quintile, the largest of the differentials according

to school type. Across the four quintiles, both home-schoolers and private-independent school students show strong family background effects, relative to public and private-religious school students. The effects are evident across Math and Verbal scores, but the Verbal gradients for home-school are steeper.

Given the importance of children's well-being and intergenerational effects, the equity of an education system with a sizeable home-schooling sector bears further scrutiny. Both beneficial and adverse consequences are possible, and some forms of home-schooling may generate significant positive externalities. However, evaluations based on the median home-schooler may mask distributional issues, particularly for those children in families with few resources.

4. The Impact of Home-schooling on U.S. Education

4.1 Designing Policies for Home-schooling

Even if the rate of growth of home-schooling slows, the current size of the sector means that education policies need to address the demands of home-schoolers. To design policies for home-schooling, three interlinked instruments need to be considered (Levin, 2002). These are: regulations; finance; and support services for students.

School regulations relate to durations of attendance in a school, teacher qualifications, curriculum content, reporting/approval, and testing/assessment. From a national review, states' requirements on home-schoolers are often summarized in a relatively short document. The main regulation is that home-schoolers notify the state with a Declaration of Intent (these are often downloaded from state websites). Durations of schooling are intended to be equal to a school year (with monthly attendance records to be submitted by the parent), and the curriculum is also expected to correspond (at least in terms of core courses). Parents (or tutors) may be expected to have at least a GED (or college degree, but not necessarily in the subject of instruction). At present, regulations on home-schooling appear very open: almost no instructional mode appears to be proscribed.

However, by law, the state has considerable latitude in regulating private schooling, and, in some cases this may extend to home-schooling. Lerner (1998, 373) concludes that such regulation will be defensible when it focusses on educational outcomes (where the state can claim a strong interest). For home-schooling, this means that – even without committing funds – states can impose reporting requirements and mandate test assessments; they might also perform on-site inspections. But, home-schoolers may more easily challenge regulations relating to inputs, such as attendance durations, curriculum content, teacher qualifications, and peer inputs.[15]

In conjunction with regulations, states and districts must also stipulate financing terms for home-schooling. Although funds for home-schooling are limited (and usually obtained indirectly), home-based students do draw on resources from public schools by 'opting in' when desirous. This raises policy questions as to what resources these students are entitled to and to what extent they should be allowed to negotiate terms with the public school (citing administrative inconvenience, some states may refuse access to public school resources, see Fuller, 1998). If home-schooling conveys positive externalities, then direct funding may be justifiable (e.g. through education tax credits or vouchers). In some states, home-schools can be classified as part of the public school system (thus entitling students to funds, e.g. for disabilities, see Lambert, 2001). However, the appropriate amount of funding may be difficult to estimate (absent reliable data on home-schooling costs), and with funding will also come pressure for more regulation.

Finally, states must set out what support services are appropriate for home-schoolers. Typically, such services include transportation and information on available school choices and so the demands of home-schoolers in this respect may be small. (Although home-based education does involve transportation to school). Rather, home-schoolers may need support in accessing health services and educational counselling, as well as in identifying the resources available to them through the public system. Also, education officials must adopt policies for validating courses taken by home-schoolers who wish to enter the public school system.

Yet, as Levin (2002, 164) points out, these policy instruments are only useful if implemented effectively. As noted above, test score accountability is irregularly enforced;

and there appear to be obvious problems in forcing parents to administer tests or to take their children to a testing center, and in then designing programs for children based on such assessments. Establishing even a general regulatory framework may be complex: home-schooling is heterogeneous; difficult to classify; and expensive to monitor. States and districts may therefore face considerable difficulty in contriving policy instruments in regard to home-schooling. (For example, some states stipulate that home-school educational programs must be 180 days in length, but this stipulation cannot be enforced without monitoring).[16] The status quo appears to be a bargain where home-schoolers receive no funds and little regulation is imposed; this serves home-schoolers and state/district officials tolerably well. But, it is debatable how well the taxpayer is being served by this arrangement; and as the numbers of home-schoolers rises, and where the opportunity to obtain funds (indirectly) increases, this status quo may be untenable.

4.2 The Future of Home-schooling

Potentially, home-schooling could revolutionize education in the U.S.: instead of regimented, standardized provision delivered within a detailed set of rules and regulatons, learning could be much more diverse, open, and flexibly tailored to a child's requirements and responsive to his or her individual development. Some education will take place in a schoolhouse, but increasing proportions may not, as children become integrated into more adult social milieux. Although currently high-quality data is sparse, a consensus description of the home-schooling sector emerges; what is less clear are the consequences both for the individual student and for broader society. Undoubtedly, one result would be a rise in the amount of religious education children receive. As well, there could be strong economic repercussions, not only at the individual level but also in regard to financing of public services. But, the diversity of home-schooling is such that generalization is difficult; inference using averages is problematic where the distribution of home-schoolers' characteristics is bimodal. For identifying treatment impacts, however, there is an opposite problem: home-school family backgrounds must be controlled for because these are on average more advantageous than for students in public schools.

Any impacts will become more important if home-schooling grows. Such growth will depend on several factors. First, home-schooling epitomizes freedom of choice as to how education is provided; although full home-schooling is limited to families with substantial home resources, short-term or part-time home-schooling is an option for many. Families may appreciate such freedom. Second, where home-schooling appears to be effective for the individual (either academically or socially) then other families will adopt the practice. (How these families would identify the treatment impact is not obvious). Third, the growth of home-schooling may depend on social acceptance, which thus far appears to be increasing (albeit in somewhat of an evidentiary vacuum).

Finally, home-schooling may interact with federal education policies as stipulated in 'No Child Left Behind' (NCLB). Home-schoolers may be liable in two ways: (i) home-based education does draw on public resources, some of which may be sourced at the federal level; (ii) some state laws classify home-schools as 'public schools'. NCLB legislation has two components that may relate to home-schooling. One is the expectation that every class will have a 'highly qualified' teacher, yet it will be difficult to enforce this for home-schooling families. The second is that NCLB requires a considerable increase in testing accountability (with tests through grades 3-8 in Reading and Math) to improve school quality. What sanctions might apply to home-schoolers who fail these tests is unclear. In summary, the growth of home-schooling will depend on federal, state and district policies in terms of regulation, finance, and support services; perhaps more influential will be how these policies are implemented or can be implemented.

Table 1
Home-Schooling Estimates by State

	Home Schoolers	Home-schoolers as % of Public School Students	Home-schoolers as % of Private School Students
AK	724	0.54	11.58
AR	12,474	2.78	46.82
CA[1]	96,337	1.54	15.81
CO	9,719	1.31	18.49
DE	2,290	1.98	9.47
FL	45,333	1.81	16.57
KS	14,249	3.04	35.12
KY[a]	6,208	0.94	9.40
ME	4,595	2.17	26.74
MI	1,033	0.06	0.60
MN	14,610	1.73	16.16
MT	3,788	2.49	45.41
NH	4,319	2.04	20.43
NM	6,487	2.05	33.70
NV	3,903	1.10	30.38
PA	23,903	1.32	6.96
RI	493	0.33	1.97
SD	2,723	2.15	27.80
TN	20,203	2.15	23.87
VA	22,021	1.89	22.40
VT	1,700	1.71	15.71
WA	11,699	1.16	15.20
WI	21,288	2.42	14.90
WV			
Across 24 states	*330,099*	*1.68*	*20.24*

Notes: [1] CA uses the term 'independent study (not adults)'. *Home-schooling sources:* [a]For KY, Houston and Toma (2003); for other states, email communications from state departments and state education department websites (URLs available from author). Home-schooling data are for most recent year (1999-2002). *Public school source:* http://nces.ed.gov/programs/digest/d02/tables/dt037B.asp; data for 2001. *Private School source:* NCES Digest, 2000, Table 64; data for 1999.

Table 2
Characteristics of SAT-takers by School Type (%)

	Home School	Public School	Private - Independent School	Private - Religious School
Student characteristics:				
African American	2.70	10.10	3.84	5.69
Asian	1.94	7.32	5.88	5.28
Hispanic	2.45	7.95	3.05	8.17
US citizen	78.12	83.39	61.55	82.70
First lang. not English	1.33	6.52	3.40	3.68
Disabled	4.36	6.47	7.73	6.50
Male	46.88	45.24	52.66	49.70
Religious faith (any)	41.80	52.51	36.79	66.69
Religion: Baptist	17.70	11.08	5.08	6.52
Religion: Hindu	0.15	0.60	0.70	0.25
Religion: Jewish	0.60	2.09	4.90	2.06
Religion: Lutheran	1.22	2.48	0.94	1.35
Religion: Methodist	1.86	5.24	3.51	1.45
Religion: Presbyterian	1.78	2.84	3.09	1.45
Religion: Catholic	5.77	18.39	9.32	45.22
Mother's education:				
High school	0.01	5.97	1.28	2.49
BA / Graduate degree	32.94	30.86	38.65	38.31
Family income:				
<$20K	8	12	5	7
$20K-$40K	28	22	12	17
$40K-$60K	28	21	13	22
$60K-$80K	17	18	13	23
$80K-$100K	8	11	11	19
>$100K	11	16	45	12
County-level data:				
Percent children in poverty in county	17.13	17.66	17.72	18.21
Average household income in county	$42,370	$43,380	$43,810	$43,960
Observations	*6033*	*975117*	*54682*	*137671*

Source: ETS data, 2001; Small-area sample household Census, 1997. Population of test-takers, with exclusion of foreign nationals, missing income, ages 14-24.

Table 3
SAT Test-Scores by School Type

	Home School	Public School	Private - Independent School	Private - Religious School
SAT Total:				
Test score raw:				
Mean	1093.1	1012.6	1123.8	1055.6
(SD)	(198.0)	(205.6)	(213.6)	(196.2)
Test score predicted[a]:				
Mean	1054.5	1021.1	1064.4	1050.5
(SD)	(80.0)	(104.8)	(92.7)	(93.7)
SAT Math:				
Test score raw:				
Mean	526.5	510.1	566.9	523.3
(SD)	(106.6)	(111.7)	(113.6)	(108.2)
Test score predicted[a]:				
Mean	527.7	513.4	534.8	528.0
(SD)	(42.3)	(55.4)	(49.2)	(49.6)
SAT Verbal:				
Test score raw:				
Mean	566.6	502.6	556.9	532.3
(SD)	(108.9)	(109.0)	(118.3)	(103.0)
Test score predicted[a]:				
Mean	526.7	507.8	529.6	522.6
(SD)	(39.2)	(51.4)	(45.2)	(45.8)
% of SAT test-takers	0.5%	83.1%	4.7%	11.7%
% of all students[b]	1.5%	89.4%	1.1%	8.0%
Observations	*6033*	*975117*	*54682*	*137671*

Source: ETS data, 2001. [a]Predicted test scores based on OLS estimation with SAT test score dependent variables and independent variables of: mother's education (6); father's education (6); gender; grade-level; disability; first language not English (1); ethnicity (4); US citizen (1); religion (10); Higher Education Carnegie class in state; state-level fees; state requires tests; state-level SAT participation rate; state-level participation rate squared; county-level poverty rate; county-level household income; district-level public school percent local funding; district-level per-pupil expenditures in public school; district-level ratio of at-risk students; district-level ratio of instructional expenditures; county-level public school teacher-student ratios. Full specification available from author. [b] NCES Digest of Education and Private School Survey (www.nces.ed.gov).

Table 4
SAT Test-score Gradients by Socio-Economic Status by School Type

	Effect Size Premium Relative to SES Q1 (Lowest Quintile)			
	Home School	**Public School**	**Private - Independent School**	**Private - Religious School**
SAT Total:				
SES Q2	0.32	0.16	0.21	0.14
SES Q3	0.38	0.26	0.36	0.24
SES Q4	0.60	0.47	0.62	0.45
SES Q5	0.63	0.52	0.70	0.47
SAT Math:				
SES Q2	0.12	0.08	0.09	0.07
SES Q3	0.14	0.12	0.16	0.11
SES Q4	0.25	0.22	0.29	0.22
SES Q5	0.27	0.24	0.31	0.22
SAT Verbal:				
SES Q2	0.20	0.09	0.12	0.07
SES Q3	0.24	0.14	0.20	0.13
SES Q4	0.35	0.25	0.33	0.23
SES Q5	0.36	0.28	0.38	0.25
Observations	*6033*	*975117*	*54682*	*137671*

Source: ETS data, 2001; population of test-takers, with exclusion of foreign nationals, missing income, ages 14-24. OLS estimation as per Table 2. All effect sizes are statistically significant at $p<0.05$.

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Endnotes

[1] Most recent estimates are based on survey responses from the National Household Education Survey (NHES99), with the actual number of homeschool respondents of 270-285, a figure which is then aggregated to give a national estimate of 0.8-1.0 million. However, Isenberg (2002) argues that this figure may be an understatement by 0.1 million, because of how the NHES99 classifies siblings' schooling. Also, the annual Gallup polls find 3% of families report that their eldest child is home-schooled. The Home School League Defense Association (an advocacy agency) estimates around 1.7-2 million home-schoolers in 2002 (see, www.hslda.org; earlier claims put the figure at 1.5 million in the mid-1990s, see McDowell and Ray, 2000).

[2] Indeed, the NCES (2001) definition of home-schooling leaves open the possibility that the majority of a students' education takes place in school. Home-schooling is identified where the child is being schooled at home and where any public schooling does not exceed 25 hours per week. The hourly threshold allows children who go to school three days per week to be classed as home-schooled. Throughout, we use the term 'home-schooling' to include those who may be undertaking home-based education.

[3] Despite the large size of the home-schooling population there are still difficulties in obtaining samples of home-schoolers for quantitative research: home-schoolers do not readily respond to government surveys, and data from homeschool organizations' membership lists may yield biased samples.

[4] Home-schooling is now one of the options for school type in the SAT questionnaire (introduced accurately in 2001). Using the SAT data cannot address the issue of the variety of home-schooling practices, but respondents are unlikely to be wary of regulation or personal intrusion when taking the SAT (the test administrators are not government officials, and schooling is almost over when students take the test).

[5] Petrie (2001, 483-4) reviews the law across Europe, finding: 11 countries where home education has been accommodated historically; 5 countries which do not permit home education legally but allow exceptions; and 1 country (Austria) which has recently legalized home education. However, her review indicates that some countries may be reverting towards restrictions on home education. Similar patterns of family characteristics emerge from this international evidence (on Norway, see Beck, 2000; on Canada, see Arai, 2000), with reliogisity (Christian evangelical) an important characteristic. Although, again, the numbers are extremely difficult to estimate (in the United Kingdom, for example, home-school numbers are not recorded, Rothermel, 2002).

[6] Home-schooling may promote efficiency across the education system, in that it serves as a competition for public schools. However, competitive gains in the education sector are modest (Belfield and Levin, 2002), and there is not much evidence that home-schooling is a response to the quality of local public schools rather than to differential preferences and characteristics of parents.

[7] For the family it may be possible to home-school without a high direct outlay: Rudner (1999, Table 12.2) finds the median expenditures on textbooks, lesson materials, tutoring and enrichment services, and testing is extremely low, at around $400 per year. However, the main cost to the family will be earnings forgone.

[8] For example, in Virginia the Department of Education reports that it "does not compile data on the achievement of children who are taught at home due to the variety of methods available to parents to report such achievement to the local superintendent. No independent data or data generated by the Department of Education is available describing student performance on other assessments such as portfolios, tests administered by correspondence schools, or parent-developed tests" (Supts Memo. No. 140, August 1996).

[9] As one approach to control for unobservable attributes correlated with the decision to home-school, the frequencies and estimations in Table 2 were performed with the sample restricted to Baptists. Broadly, the results are equivalent (details available from the author).

[10] Lastly, evidence on achievement in nonclassroom-based cyber-charter schools may also be pertinent to evaluations of home-schooling. Using California data, Buddin and Zimmer (2003) show that students educated in this way have substantially lower test scores than either classroom-based charter schools or public schools.

[11] Schools may be particularly important institutions for creating social cohesion: they are attended by all members of an age cohort; they are well-equipped to address the cognitive issues in relation to social cohesion; and they are ostensibly forums where debate and discussion is encouraged (see Carnegie Commission and CIRCLE, 2003).

[12] See also Petrie (2001, 493-494). In contrast, based on a survey of pediatricians in Wisconsin and Maryland, Klugewicz and Carraccio (1999) find 51% of pediatricians thought home-schoolers were less mature than their peers (with only 9% finding them more mature). As with home-schooling treatment impacts, the same methodological challenges arise here: the average student will report high levels of socialization and civic engagement because of SES (as is found in studies of civic participation, see Belfield, 2003).

[13] On the political backlash from home-schooling scandals in Spain and France, see Petrie (2001). On the antagonisms between parents, teachers, and school administrators within the education sector, see Lines (2002).

[14] Somewhat optimistically, Petrie (2001, 493) suggests it is reasonably easy to identify children who were genuinely being home-schooled as opposed to those children who were simply playing truant.

[15] Legally, home-schoolers have a strong defense against state regulations that force them to mix with other students: as Buss (2000, 1243) concludes, "whatever the state can do to control the *content* of classroom instruction, the state cannot control *with whom* children are educated. Parents are given authority over their children's school associations, particularly along ideological lines." However, state proscriptions in other domains may encourage associations.

[16] For example, regulations in Georgia state "The law only requires the program to operate the equivalent of 180 days". But, to the question "Should officials of the local public school system attempt to monitor the curriculum, the test program, student assessment process, students records or instruction time of home study programs?" the answer is "No" (www.doe.k12.ga.us/schools/homeschools.asp).