

Disability, Social Insurance, and Labor Force Attachment[†]

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Abstract

This research tackles an important economic and social policy issue that developed, and many developing economies, face and will be facing in the next decades, and which is how to manage and reform disability programs such that they can provide the necessary insurance to those who are not able to fully participate in the labor force, but without reducing the incentives to maintain the maximum attachment to the labor force of those who choose to. All of this while trying to manage the large costs of these kinds of programs in societies that demand a new focus on the abilities of individuals, not their disabilities. The discussion will focus on the case of the United States, but the conclusions and lessons we are going to extract could be applicable to any country that offers disability benefits and hopes to give disabled individuals the largest possible role among the labor force participants in the society.

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1. Introduction and Motivation

One of the main purposes of this research piece is to be part of the growing scientific research on disability issues that tries to change the focus towards one that emphasizes the abilities of individuals instead of their disabilities, and one that emphasizes work incentives and labor force attachment instead of lack of participation. This novel approach, however, will only succeed if at the same time it does not forget that individuals who have some kind of condition that limits their ability to perform a given task or job do need some kind of protection, either financial, institutional or in the form of health insurance. This protection in some cases will cover very long periods of time and is likely to be expensive.

A number of events and trends are coming together to make the study of disability programs and disability policies one of the most important and challenging topics in the intersection of several economics fields like public economics, health economics, and labor economics, and their interaction with related fields of study like public health, public policy, and demography. First, the growth of public insurance programs for people with disabilities has been tremendous in the last decade and a half in a number of countries, and with the rapid aging of the population around the world there is no clear end in sight to the expansion of these programs (See Andrews (1998), NRC (2001), Autor and Duggan (2006), McVicar (2008), and Lutz, Sanderson, and Scherbov (2008)). Second, the overwhelming evidence that the traditional incentive structures of these programs are obsolete because they focus mostly on the screening of individuals and clearly penalize any long-term attachment to the labor force after joining the rolls of the program (National Council on the Handicapped (1986), GAO (1987), Social Security Advisory Board (2003), and Stapleton (2004)). Third, traditional empirically-based reduced form models of analysis of the problem are not well equipped to provide useful policy recommendations to policy makers and lawmakers given the myriad of complexities involved in understanding how changes in programs will affect individual behavior, and the aggregate financial viability of those programs (Wolpin (1996), Wolpin (2007), Tuma (2001), Moffitt (2003), and Todd and Wolpin (2007)). Finally, it is becoming clear that analyzing these programs separately from other social insurance provisions can lead to flawed policy recommendations, given the clear connection and interaction between, for example, disability programs and retirement programs (Benítez-Silva, Buchinsky, and Rust (2003)), or disability programs and unemployment insurance provisions (Autor and Duggan (2003)).

This research will try to emphasize methodologies that will overcome, hopefully in a convincing fashion, the third and fourth concerns in order to tackle the key issue, the second one, and at the end of the day provide some hope for the endeavor of tackling the really tough issue of managing the situation presented in the first concern.

To those less familiar with disability policy, especially in countries like the United States, it is usually rather puzzling the trend (especially by the U.S. Social Security Administration) towards talking about work incentives, and the shift from the emphasis on disability to the focus on abilities. They are puzzled because it is usually assumed that the reason people are receiving benefits in the first place is because they cannot work at all. This view, common in countries with a simple binary definition of disability, only sees a role for the participation debate in the case of recovery. While recovery is certainly an interesting issue, the policy incentives even in

that case could be delivering a low percentage of returns to the labor force among those who overcome their health limitations. More importantly, this view assumes, rather naïvely, that the government screens individuals without error, and/or that the incentive structure leads only truly disabled individuals to apply. Both of the latter assumptions are wrong as the work of Nagi (1969), Smith and Lilienfeld (1971), and more recently Benítez-Silva, Buchinsky, and Rust (2006), has clearly shown. That research, which finds that classification errors are made, is essential in order to make the case that a policy of work incentives, not only directed to those who recover, is worth implementing. Ironically, the results of that research are also, in turn, the source of some of the main concerns about the reforms to the disability programs.

The existence of award errors, meaning that there are some people currently receiving disability benefits who are not truly disabled, allows us to introduce the concept of *residual work capacity*, and discuss the potential of individuals, even those on the rolls, for actively participating as productive members of society. While this could be explained in part by recovery, the fairly large estimations of this error rate suggest that it goes well beyond that. It seems clear, and it is now widely accepted, that the pool of applicants is in part made of non-disabled individuals, and that the pool of awardees has a substantial proportion of individuals that can work. The estimates of this classification error provided by researchers are surprisingly consistent, even though they have used different methodologies, data, and time periods, and is around 20%. In later sections we will describe in more detail the methodologies used to reach this estimate.

But the flipped side of the award errors are the rejection errors. The latter errors result from the fact that a large proportion of those who have been denied disability benefits actually deserved them. While the estimates of this other classification error differ a lot more in the literature, there is little doubt they exist, and they are important for us because they give us an assessment of the possible importance of what we will call *induced entry effect*. This measures how a possible change in the incentive structure of a program (in particular when it goes towards more generosity) has an effect on the number of people that will apply to the program. The government is especially interested in assessing this effect since it comes with larger administrative costs, and larger potential overall costs of the program, which could offset the possible gains from the policy reform.

In this paper we will first provide the definitions, terminology, and some connected results (mainly the results on classification errors), which will allow us to discuss a number of policies to foster work among the disabled. The assessment of those policies will be discussed in some detail using the U.S. as a case study, with an emphasis in understanding why the methods used to assess them are capable of providing useful policy recommendations. I will conclude with some comments and an enumeration of topics of future research in the analysis of disability, social insurance, and labor force attachment.

Throughout the paper I will rely on my previous work with a number of co-authors. While I very much encourage the reader to go back to those original sources (which I will reference in detail), the presentation here tries to be as self-contained as possible, and at the same time original in terms of how the ideas are discussed and how they are connected with the main points of this paper.

2. Some Definitions and Important Concepts

A disability can have many sources and many different effects in the ability of an individual to function in society. While many disabling conditions have as source a serious health problem resulting from an illness or an accident, in many other cases they are congenital or the result of conditions which might not affect (at least in a dramatic fashion and in the short or medium run) the general health of the individual. For the purposes of this study we are interested in the connection between disability and the capacity for work, and therefore our analysis is inspired, as most work since the publication of that seminal research, by the work of Nagi (1964, 1965, 1969, and 1991), and the classifications by the WHO (1980).¹

One of the main challenges of defining disability as a condition that limits, or even prevents work, is that the very level of disability could be a function of the type of work and the attitudes of the individual towards work and life in general. For example, it is reasonable to argue that a few decades ago being blind would have been considered a disabling condition for someone wanting to work as a professor, given the demands of this type of job, but with the appearance of new technologies and the willingness of society to accommodate its environment to the needs of individuals with vision problems, that is no longer an insurmountable obstacle for the interested individual. This exemplifies the fact that disability is a socially evolving concept and a function of how society and employers accommodate the needs of individuals with certain conditions, and also a function of those individuals' willingness to continue their attachment to the labor force.

One could envision a society so willing to invest in accommodating disabled individuals with all types of conditions that a large proportion of them would have the opportunity to work if they chose to. If that was the case, what would be the labor force participation that we should observe among disabled individuals? And related to that, what is the right comparison group to assess how far we are from that ideal?

These are controversial questions, because I have observed among some researchers and interest groups the tendency to implicitly answer both questions with their decision to compare disabled individuals with the rest of the, mostly non-disabled, population. The result of that comparison is that given the huge gap in participation among the groups analyzed, it must be that we are light-years away from that “ideal.” However, this comparison is very problematic for a number of reasons. First, it ignores the role played by the incentive structures created by the social insurance programs, which in general discourage work among those with a disabling condition serious enough to warrant receiving financial compensation and/or health insurance from some public or private entity. Second, it assumes, without much justification or empirical backing, that the reasons that encourage or discourage participation in the labor force among the disabled and the non-disabled are the same. Third, it ignores the fact that the proportion of conditions and individuals affected by those conditions, which are so serious that no reasonable accommodation could allow that person to work, might be non-trivial. Fourth, it tends to interpret the gap solely as the product of the lack of accommodations by employers and society, and also of discrimination.

¹ Recent discussions of the definition of disability can be found in Wunderlich et al. (2002), Social Security Advisory Board (2003), Burkhauser et al. (2003), and Stapleton (2004).

The problem is that it is a tall order to identify the likely effects of the three caveats I have enumerated, and it tends to put too much weight on the fourth residual interpretation. It is unclear, however, how to come up with an adjustment to the labor force participation figures that would allow us to either set an ideal or assess how far we are from it. Fortunately, it seems quite clear that there is a long way to go in terms of accommodations and social support for those with disabling conditions, so that we should be less worried, at least for now, about the ultimate and elusive objective, and more worried about moving in the right direction.²

One clear direction is towards setting up social insurance programs which do not discourage work among those with disabilities, which allow for an easy transition from work to disability and back, and that focus on the abilities of individuals and not their disabilities. In most countries, however, these objectives are at odds with the current incentive structures, forcing us to think about reforms as a first logical step towards that promised land of providing everyone, regardless of their disability status, the possibility of participating in the productive process.

The reason why we want to think about reforms is because we believe four things, and have hopes about a fifth one: (1) That not all disabling conditions completely prevent individuals from work; (2) That many disabled individuals, if given the right incentives and working conditions, would like to participate in the labor force; (3) That the cost of accommodations are likely to be more than compensated financially and in welfare terms by the potential contribution of the disabled to the economy, and (4) that discrimination plays a small role in explaining the low levels of participation among the disabled.

While assessing (3) and (4) will remain outside of the scope of this analysis, but hopefully not of future research, some approximate quantification of the role of (1) and (2) can be inferred from the assertion that even among those receiving benefits there are individuals with *residual work capacity*. This residual work capacity will be in fact quantified in connection with the existence of individuals who self-report not having a health limitation that prevents them from work while on the rolls of a disability insurance program. This inference is especially appealing in countries, like the United States, where the Social Security definition of disability is binary, meaning that it is an all or nothing decision by the government on the application for benefits. Clearly disability is better defined as continuous, covering a wide spectrum of possible attachments to the labor force. In a binary model it all comes down to where the threshold lies after implementing the screening process, and that threshold is endogenous to the incentive structure.

The hopes are over a fifth issue, and that is the size of the induced entry effect of policy reforms. If the induced entry effect is very large, any policy to foster work among the disabled will likely be too expensive to be considered seriously by the government. A simple approximation to the likely importance of this effect is the size of the rejection error in the system, that is, the backlog of individuals who were rejected but are, at least in theory, ready to jump back in if the system becomes more generous.

² I do not claim that discrimination does not exist, that would be naïve and insensitive, but instead that without understanding all the causes of the lack of participation, any estimates of the importance of discrimination are likely to be grossly upward biased.

From this discussion it is clear that we need to assess the size of the classification errors present in the award process in disability programs. We discuss this issue in the next section.

3. The U.S. Disability System: Description and Classification errors

In this section we will concentrate on the U.S. Disability system, but the assessment of the classification errors of any targeted social insurance system should be an objective in every country that offers this type of programs.³

There are two major publicly provided long-term disability programs in the United States, the Social Security Disability Insurance (SSDI) and the Supplemental Security Income (SSI). While the two programs share one system to decide who will receive benefits, the eligibility criteria are quite different, since SSI is means tested, and it is not considered Social Security, which allows beneficiaries to receive it at the same time as SSDI. In this study we will concentrate on SSDI, but many of the lessons we will extract from the analysis will also speak to the future of SSI. We refer the reader to the work of Stapleton et al. (1994), Lahiri et al. (1995), Benítez-Silva et al. (1999), Bound and Berkhauser (1999), and Haveman and Wolfe (2000) for a careful description and analysis of these programs.

The Social Security Disability Insurance (SSDI) program paid benefits to over 9.5 million Americans during 2006, at a cost of 92 billion dollars. These individuals have some type of severe health problem that, according to the government, is likely to last more than 12 months or result in death, and that prevents them from engaging in any substantial gainful activity (SGA).⁴ The SSDI provides them with earnings of more than \$970 a month.⁵ This program has work requirements and individuals need to have worked for 5 years out of the last 10 in order to qualify. There is no minimum age to receive the benefits, and when individuals reach the Normal Retirement Age it converts to Old Age Benefits. Individuals are eligible for Medicare two years after joining the program. The growth in the program in the last decade and a half has been impressive. For example, in 1990 there were only 4.9 million beneficiaries, and the SSA forecasts that the number of beneficiaries will increase by around 37% by 2012.

SSI is a means-tested cash assistance program enacted in 1974. Unlike SSDI, there is no work requirement for SSI benefits. However, SSI applications are evaluated according to the same process as DI benefits and satisfy the same basic definition of disability. During 2006 SSI paid benefits to 4.1 million individuals of ages 18 to 64, at a cost of 38 billions dollars. In 1990 the number of beneficiaries was 2.45 million. The SSI has very low asset threshold of only \$2,000 for a single individual. In terms of earnings threshold, for OASDI recipients all benefits above a \$20 disregard are subtracted from their SSI benefit level, and for those receiving labor earnings

³ Jiménez-Martín, Labeaga, and Vilaplana (2006) quantify the award errors in the Spanish system and find them to be much larger than in the U.S. For a description of the Spanish disability system and its current challenges related to work and long-term care, see Muñoz Machado et al. (1997), Sánchez (2004), Alba and Moreno (2004), Malo (2004), and Guillén (2007). For a recent description of the pension system in Spain see Molinas (2008).

⁴ The SGA for nonblind persons is \$900 a month, and it is \$1,500 a month for the blind.

⁵ As of December of 2006, 7.8 million individuals received SSDI benefits as disabled workers, spouses of disabled workers, or children of disabled workers. Of the total, 87% were disabled workers. Over 80% of the impairments among disabled workers were composed of mental disorders, problems of the nervous system, problems of the musculoskeletal system and connective tissue, endocrine diseases, and problems of the circulatory system.

the disregard is \$85 a month. This low earnings disregards result in the average SSI recipient receiving considerably less than the federal SSI benefit rate of \$623 a month. As a result of different eligibility requirements, the SSI program serves a different "clientele" than does the SSDI program: 57% of disabled adults under 65 receiving SSI benefits are women, whereas 52% of adult SSDI beneficiaries are male. In contrast to SSDI, SSI recipients are not subject to a five-month waiting period to receive benefits, and are immediately eligible for Medicaid benefits. However, monthly SSI benefits are significantly lower, averaging only \$455 per month in 2006. Notice, however, that as of December of 2006, over 1.2 million Americans were receiving both OASDI Disability benefits and SSI, indicating that a non-trivial proportion of DI recipients have a history of earnings which provide for a fairly low DI benefit, and current assets level which allows them to receive SSI.

The quantification of the classification errors in the disability system was pioneered by the ground work of Nagi (1964), which resulted in the seminal study in Nagi (1969). Nagi presented an independent external audit of a sample of 2,454 DI cases. Teams of five experts (consisting of a physician, a psychologist, a social worker, an occupational therapist, and a vocational counselor) conducted individual home examinations/interviews for their sample of DI applicants. With the assistance of a moderator, the team arrived at a collective decision about the disability status of the applicant, without knowledge of the SSA's actual award decision. The results are that the implied rejection error rate, 48%, was almost three times as large as the award error rate, 19%. The team of experts was slightly more lenient than SSA, concluding that 68% of applicants were disabled compared to the SSA's award rate of 62%. However, this difference is not large enough to explain the surprising number of classification errors. Overall, the expert team's decisions differed from SSA's award decision in over 30% of the cases considered.

Smith and Lilienfeld (1971) reported the results of an internal audit of DI awards done by the SSA's own Bureau of Disability Insurance (BDI). The BDI found that 21.2% of DI awards should have been denied and 22.5% of DI denials should have been awarded. However, the objectivity of SSA's "self-audits" may be open to question.

It was not until recently that another audit (in this case external) of the system has been conducted, this time using household level data, by Benítez-Silva, Buchinsky, and Rust (2006). The authors' approach for estimating the classification errors in the SSA disability award process is simple: they compare the SSA's award decisions to the self-reported disability status of a sample of applicants who, they argue, have provided truthful and accurate reports of their disability status. The authors study a subset of individuals from the Health and Retirement Study (HRS) who applied for DI or SSI benefits between 1992 and 1996. They compare the SSA's ultimate award decision a (i.e., after allowing for the possibility of appeal) to the individual's self-reported disability status d (recorded at the closest HRS interview to the time of application). The latter is a binary indicator that is set to 1 if the HRS respondent reports that they have an "impairment or health condition that prevents them from working entirely," and 0 otherwise. This is essentially the same as the SSA's definition of disability as an "inability to engage in substantial gainful activity." Although there are semantic differences between the SSA's definition of "disability" and the definition implicit in the use of the self-reported disability question in the HRS interviews, it is reasonable to believe that the definitional differences are of second order relative to the potentially more serious concern that DI or SSI applicants have an

incentive to misreport (i.e., exaggerate) the severity of their impairments and to claim that they are incapable of working even when they really can work.

Benítez-Silva, Buchinsky, and Rust (2006) estimate as follows the classification error rates, building upon some of their previous results that showed that the self-reported measure and the government decision are unbiased but noisy measures of each other (Benítez-Silva et al. (2004)). They argue that in addition to an individual's self-reported disability status d and SSA's ultimate award decision a , assume there exists a third, latent indicator of “true disability status,” τ . Consider first the case where $d = \tau$ (i.e., where d is treated as representing the measure of “true disability”). Using observations on the SSA's ultimate award decision a and the self-reported disability d for the sample of applicants from the HRS, the authors can estimate the joint distribution, $Prob \{a, d\}$. The estimated classification error rates can be computed as conditional probability statements using this joint distribution. There are two types of classification errors: *award errors* and *rejection errors*. The former is the conditional probability that a person who has been awarded benefits is not truly disabled, i.e., $Prob \{d=0 \mid a=1\}$. The latter error is the conditional probability that an applicant who was denied benefits is truly disabled, i.e., $Prob \{d=1 \mid a=0\}$. The authors estimate the award error to be 22% and the rejection error to be 58%.⁶

It is possible to estimate the award and rejection error rates without assuming that $d = \tau$, in the more realistic case where a and d are both noisy indicators of the latent indicator of true disability, τ . Based again on the results from Benítez-Silva et al. (2004), the authors argue that both a and d are *unbiased indicators* of true disability status τ . Under the additional assumption that the three binary random variables τ , d , and a form a trivariate probit system with a correlation structure that matches the correlation between the observed random variables a and d , they can derive formulae for the classification error probabilities by a straightforward application of Bayes Rule. The Bayes estimates of the award error rate is 21.7%, and the rejection error rate is 59.9%, which hardly differ from the award and rejection errors, 21.9% and 58.6% respectively, obtained in the case where it is assumed that $d = \tau$ with probability 1.

The Bayes estimates are based on an “equicorrelation assumption” which implies that a and d are equally accurate signals of true disability status τ . However, in order to assess the robustness of those conclusions, the authors also compute classification error rates under the assumption that unobservable factors that affect the Social Security award decision a are much more strongly correlated with the unobservable factors affecting true disability status τ , than are the unobservable factors affecting individuals' self-reported disability status d . This implies that the Social Security award decision a is a significantly more accurate signal of true disability than is an individual's self-report d . However, even in this case the classification error rates are substantial, and even in the “best case” (for SSA) results, the award error rate is 16% and the rejection error rate is 52%.

⁶ The award and rejection errors are different from the usual Type I and Type II errors of hypothesis testing. A Type I error rate is the probability of rejecting the null hypothesis that an applicant is “truly disabled”, when it is true, i.e., $Prob \{a=0 \mid \tau=1\}$, while Type II error rate is the probability of not rejecting the null hypothesis when it is false, i.e., $Prob \{a=1 \mid \tau=0\}$. Our point estimates of the Type I and II error rates of the SSA award process are 22% and 62%, respectively.

From these three studies that have audited the U.S. Social Security Disability system we can conclude that errors are made, that the award error is probably around 20%, and that the rejection error is probably close to 50%. This means that there are individuals with residual work capacity, which gives us hope for bringing some of them back into the labor market, but also means that the possible induced entry effects of future reforms to the system should be carefully assessed, since the number of individuals who could be ready to apply again, especially if the system is perceived as more generous, might not be trivial.

4. Disability Insurance and Work Incentives: Present and Future of Policy Reforms

In the last few years the Social Security Administration (SSA) has considered a number of policy changes with the objective of fostering work among SSDI recipients. This has become an important priority in the government's agenda regarding disability policy. For example, Jo Anne B. Barnhart, former Commissioner of the SSA, stated in 2003 that expanding the employment opportunities for people with disabilities was one of the main objectives of her administration.⁷ Furthermore, in the Social Security 2003—2008 strategic plan, she also set as an objective to have an increase of 50% in the number of people with disabilities who achieve employment, by 2008 relative to the 2001 levels.

The system has provided some work incentives for some time. For example, disabled beneficiaries are encouraged to return to work by providing a trial work period (TWP), and an extended period of eligibility (EPE). During the TWP, earnings are allowed to exceed the Substantial Gainful Activity (SGA) dollar amount for 9 months. During the 3-year EPE that follows the TWP, benefits are withheld only for those months in which earnings exceed the SGA amount. After the end of the EPE, monthly benefits are terminated when earnings exceed the SGA amount. Certain impairment related expenses that a person needs to make in order to work may be deducted when counting earnings to determine whether the work is substantial. Even if cash benefits are withheld, Medicare and Medicaid coverage can continue.⁸

More recently a number of additional initiatives have started to be implemented, and some are in the pipeline of the policy makers. Five of them are already in place in some degree, and we will discuss in more detail the two other initiatives that might be implemented in the future.

First, the SSA has put in place the Ticket to Work program, which allows SSDI recipients to obtain free vocational counseling from thousands of different agencies located around the U.S. to help them return to work. The agency is paid “prospectively,” that is, for every year a DI beneficiary stays off the rolls due to the vocational training and rehabilitation services it had provided up front. The agency receives 40% of the DI benefit the person would have been paid if they had stayed on the rolls. This initiative received a lot of support from researchers in the mid 1990s when the caseloads were increasing sharply while the rehabilitations and terminations had fallen to all time lows (see for example, Berkowitz (1996)). While the Ticket to Work Act seems like a highly innovative program, it is questionable as to whether it will represent a cost-

⁷ Stated in her address before the House Committee on Ways and Means Social Security Subcommittee, in September of 2003.

⁸ Muller (1992, 2000) indicates that only about 11% of new DI awardees eventually take advantage of the TWP.

effective use of government funds, and whether it will help a significant number of DI beneficiaries return to work. Since the policy is already implemented, the only alternative for researchers is to do “ex post” evaluations. These evaluations, so far, seem to show very poor results of this initiative (see for example Thornton (2007), and Capella-McDonnall (2007)).

The second initiative is the Expanded Availability of Health Care Services, which as of October 1, 2000, expands Medicaid and Medicare coverage to more people with disabilities who work. It extends Medicare Part A premium-free coverage for 93 months after the trial work period for most disabled beneficiaries who work. In addition, States now have the option to expand Medicaid coverage to workers with disabilities using income and resource limits set by the States.

The third initiative is the possibility of obtaining Expedited Benefits. Effective January 1, 2001, if a person's Social Security or SSI disability benefits have ended because of earnings from work, and if he or she becomes unable to work again within 60 months because of his or her medical condition the person would be able to request reinstatement of benefits, including Medicare and Medicaid, without filing a new application.

The fourth initiative is called the Disability Reviews Postponed. Effective January 1, 2001, an individual using a “ticket” does not need to undergo the regularly scheduled disability reviews. Effective January 1, 2002, people who have been receiving Social Security disability benefits for at least 24 months will not be asked to go through a disability review because of the work they are doing. However, regularly scheduled medical reviews could still be performed and benefits could be terminated if earnings were above the limits.

The fifth initiative is the Work Incentives Outreach Program. The law directs the Social Security Administration to establish a community-based work incentives planning and assistance program to disseminate accurate information about work incentives and to give beneficiaries more choice. SSA has established a program of cooperative agreements and contracts to provide benefits planning and assistance to all disabled beneficiaries, including information about the availability of protection and advocacy services.

It is still early to assess the ultimate effect of all these policies, but with the current hard numbers in hand the effect on Social Security terminations due to return to work above the SGA level have actually declined in percentage of initial beneficiaries from 2001 to 2006. Clearly this is disappointing, and seems to indicate that the piece-meal approach to reform is unlikely to lead to the kind of change needed for work to start playing a real role in the lives of millions of disability recipients. Precisely because of this, both among researchers and internally at SSA, there is the sense that more radical reforms are necessary.

We are going to discuss two such reforms to the system that could have a larger effect on the relationship between benefits and work. None of them has a deadline for implementation, but they are either under serious consideration or under preliminary study. One is what is termed internally as the “\$1 for \$2 Benefit Offset.” This policy has not yet been enacted, but former Commissioner Barnhart herself told Congress that “Ongoing Employment Supports to assist beneficiaries to obtain and sustain employment will be tested, including a Benefit Offset demonstration to test to effects of allowing DI beneficiaries to work without total loss of benefits

by reducing their monthly benefit \$1 for every \$2 of earnings above a specified level.” The analysis of this first alternative policy has been performed by Benítez-Silva, Buchinsky, and Rust (2008), and we will summarize their approach and findings. The second policy is the possibility of implementing a partial disability benefits system in the U.S., similar to what is already in place in countries like Spain, Germany, Sweden, or the Netherlands. This has been recently analyzed by Yin (2008), and we will briefly describe her set up and findings here. We will then finish this section discussing the intrinsic differences between these policies, arguing that they are actually complementary and that the U.S. should consider their implementation as a bundle which would have a deep and long lasting effect on the relationship between work and benefits, which is currently clearly biased toward work disincentives.

Before giving more details about the results of the two studies that use dynamic models to analyze the effects of policy reform, it is worth discussing why it is necessary to resort to the complexities of a full dynamic structural model to disentangle the effects at play. First, it is clear that the individuals who would be facing these new incentives are making inter-temporal decisions under uncertainty, and are taking into account the existence and details of all social insurance programs for which they might be eligible.⁹ Second, given that the policy is new and has not been implemented on this population before, no other methodology is better equipped to assess the effects of this reform. Dynamic structural models provide a quasi-experimental setting in which we can keep constant the rest of the environment in order to isolate the effect of changes in incentives. However, this methodology comes with a cost; namely, that we need to make a host of assumptions in order to solve and simulate these kinds of models, where some of these assumptions are hard to justify except for tractability and the need to set up the model with the objective of matching the data.

The best way to understand these models is to think about their different pieces, and how they come together to provide the policy recommendations that can help policy makers and lawmakers when making their decisions. Economic models can be described as having three connected pieces used to reflect the reality as close as possible. The first piece corresponds to the particular parameterization of preferences we will assume individuals have over consumption, leisure, health, or other variables considered to belong in the utility functions of individuals. Preferences also include a discount factor or a discount function that assesses the weight that future utility has with respect to current utility. Preference characterizations are *ad-hoc*, and the particular parameterizations hard to defend beyond their tractability and their mathematical properties that can sometimes be linked to certain behaviors which we believe reflect reality. In principle preferences could be easily changed to match just about any observable behavior, leading to the debate over the lack of non-parametric identification of dynamic models (see Rust (1994), Taber (2000), and Magnac and Thesmar (2002)). This lack of identification is not very satisfying, which leads most researchers to use very similar characterizations of preferences using functions, the properties of which are well understood and studied, and then providing in some cases a study of how sensitive their results are to the particular preference assumptions. Researchers then claim identification of the model within the parametric family chosen, and hope to find the best model within the constraints of the chosen parametric model.

⁹ See Benítez-Silva, Demiralp, and Liu (2008) for a recent discussion of what people know about Social Security rules in the United States using survey data, and the cost of their lack of knowledge of the details of the system.

The second key element are the beliefs agents have about the future states of the world, and about how current states will evolve towards those states. Many models assume perfect foresight, such that uncertainty does not play any role, but the trend is towards allowing different sources of uncertainty in dynamic models, using empirical distributions and stochastic processes to reflect the likely beliefs of individuals over future states of the world. While researchers also have considerable freedom in how they set up this part of the model, in general empirical data constrain how they are characterized, and it is easier to check whether the characterization is appropriate for the problem at hand. Modeling health uncertainties, wage uncertainties, interest rate uncertainties, mortality uncertainties, unemployment uncertainties, uncertainties over future government policies, and so on, are becoming commonplace among researchers dealing with these types of models.¹⁰

The third and final component, are the incentive structures set up to reflect the actual constraints faced by real decision makers. Theoretically this is simple: just take into account the constraints we know individuals face, and the laws specified in each case about the issue of study and include them in the model. However, in reality this can be quite complex since it requires keeping track of the large amount of information used by public and private entities to compute present and future benefits or future and present entitlements of all kinds.¹¹ These complex incentive structures result in complications of the models and the need for simplifications in order to avoid the curse of dimensionality which results in the lack of tractability of many models that conceptually are simple but become too large very quickly.

The key of using dynamic models for the analysis of policy reforms is to isolate the effects of the changes to the incentive structure that individuals face, keeping their preference and beliefs constant. This provides useful and reliable results, assuming that the benchmark models provide a good characterization of reality. The results should in general be robust to different characterizations of preferences and beliefs, assuming those are such that they come close to replicating reality. Ideally, the benchmark models will be estimated and pass a rigorous test of the quality of their approximation to reality, but in many cases they are either too complex to estimate or data limitations prevents us from devising a full-fledged estimation of the model, at least in the time frames required to provide timely policy recommendations.¹²

I believe, and I do not think (hope) I am alone, that economists should first put most of their efforts in characterizing as closely as possible to reality the incentive structure. After all, our social science is one of incentives, and it is the only piece connected with policy, since preferences are in general considered to be very hard (if at all possible) to change, and beliefs very slow to evolve and equally hard to modify through economic policy. While it is especially tempting (and many fall into that temptation rather easily) to use preference heterogeneity to explain behavior, it is less desirable than being able to account for it through the appropriate

¹⁰ Benítez-Silva et al. (2007) analyze the consequences of accounting for future benefits uncertainties on the retirement behavior of older Americans.

¹¹ For examples of how important it is to model incentives properly, in that case in the retirement system, see Benitez-Silva and Heiland (2007, and 2008).

¹² Rust and Phelan (1997), French (2005), and van der Klaauw and Wolpin (2005) estimate retirement models, and Blau (2008) solves and simulates a similar model focusing on consumption choices. Todd and Wolpin (2006) show the out-of-sample performance of a dynamic model of schooling and fertility using Mexican data.

incentives, or even empirically grounded homogeneous beliefs about future events affecting economic constraints.

4.1. The \$1 for \$2 Offset in the SSDI system

Under the \$1 for \$2 benefit offset, a SSDI recipient who earns more than the SGA after the TWP would not be terminated from the rolls. Instead their DI benefits would be reduced by \$1 for every \$2 earned above the SGA disregard. In simple terms, the \$1 for \$2 amounts to replacing the current 100% forfeiture of benefits due to earnings in excess of SGA, with a 50% surtax.

Clearly, the \$1 for \$2 offset would increase the overall level of generosity of the SSDI program. This is particularly clear for those who have fully or partially recovered and who would like to return to work in order to supplement their SSDI benefits. While it seems likely that the \$1 for \$2 offset would increase the amount of labor supplied to the market by some SSDI recipients, it is less clear whether or not it leads to cost savings from permanent *induced exit* from SSDI. In fact the \$1 for \$2 offset might make it more comfortable for SSDI recipients to remain on the rolls longer. In turn it could lead to a decrease in the number of beneficiaries who exit SSDI after the trial work period. Hoynes and Moffitt (1996) briefly touch on this policy reform within a simple static model, and emphasize the likely increase in caseloads but the ambiguous effect on work and total benefits paid.

Perhaps the biggest concern to policy makers is the possibility that the increased generosity of SSDI under the \$1 for \$2 offset would result in significant *induced entry* by individuals who are not yet on SSDI, but who could be induced, on the margin, to apply under the new policy. After all, in the previous sections we have argued that the large rejection error rates of the system imply that there is a substantial pool of individuals who could apply again for the program, especially if it becomes more generous. Previous studies by the SSA and the Congressional Budget Office (CBO) provide very different forecasts of the magnitude of the induced entry effect. The CBO (1997) estimates that the \$1 for \$2 offset would result in an increase of 75,000 SSDI beneficiaries over a ten-year period, whereas the SSA estimates that it would increase SSDI rolls by 400,000 over the same time period. Consequently, the CBO predicts that over the first five years the net costs will increase by \$410 million, while the SSA predicts that costs will increase by \$5.1 billion. The model described here predicts an induced entry effect that lies between these two projections.

The \$1 for \$2 offset has already been implemented for the Supplemental Security Income (SSI) program, but with a lower disregard of \$85 per month. However, since there are strict asset/income tests imposed on the SSI applicants, the induced entry effect is likely to be much smaller than it would be for the SSDI applicants. A study by Muller, Scott, and Bye (1996) concluded that the changes in labor force participation or earnings are negligible. In contrast, Neumark and Powers (2003) find significant labor supply disincentives due to state level supplements to the SSI benefits. These benefits appear large enough to completely swamp the effect on work incentives of the \$1 for \$2 proposal. The idea of extending the \$1 for \$2 offset to the SSDI program is extremely popular with disability advocates. They claim that the threat of loss of benefits due to earnings in excess of the SGA after the TWP is the primary reason why those SSDI beneficiaries who are able to return to work, do not do so.

In 1999 President Clinton signed a Federal law mandating that the Social Security Administration undertake a “demonstration project” (i.e., a controlled randomized experiment), to estimate the magnitude of labor supply response and the level of induced entry that would likely occur under the \$1 for \$2 offset. However, there is a lot of skepticism about the usefulness of such an approach. A panel of consultants chosen by the SSA to evaluate the proposed experiment concluded that classical experimental designs should not be used to study induced entry. Instead they recommended to rely on the insights of dynamic models of individual behavior and responses to hypothetical surveys (Tuma, 2001, p. v).

Benítez-Silva, Buchinsky, and Rust (2008) provide a detailed examination of the induced entry effect and other effects, using such a dynamic approach to provide predictions of the effects of the \$1 for \$2 offset proposal. The authors use a calibrated version of the life cycle model to examine the behavioral responses to the proposed \$1 for \$2 benefit offset plan. The model incorporates a realistic treatment of the SSA rules, particularly regarding the SSDI program. The model was calibrated by fitting the simulated data of a population of life-cycle optimizers to that of a sample of individuals born between 1931 and 1941, from the Health and Retirement Study (HRS), and their spouses. While this life-cycle model makes some simplifying assumptions, it provides a convincing illustration of the potential value of it, in general, and specifically for evaluating the effects of the \$1 for \$2 offset policy.

The model predicts that the \$1 for \$2 offset provides a very effective labor supply incentive. Under the baseline simulations—referred to as the *status quo*—which replicate the current policy environment, the authors find that about 9.5% of the SSDI recipients eventually return to work. In sharp contrast, under the \$1 for \$2 offset, 48.9% of the SSDI recipients eventually return to work at some point during their spells on SSDI. However, almost all of these individuals return to work only on a part-time basis and for a relatively short duration. The average number of years worked, while receiving SSDI benefits, is about 2.9 years. The mean earnings of those who return to work is \$9,096 annually, significantly higher than the SGA for this cohort, namely \$6,000 annually. The model incorporates health dynamics and it predicts that 75% of the individuals on the DI rolls will eventually experience some partial recovery, while 50% will fully recover. This implies that under the \$1 for \$2 offset, almost all of the fully recovered beneficiaries have sufficient incentives to return to work, whereas only 18% have sufficient incentives under the *status quo*.

An important reason for these large labor supply responses is that it is explicitly assumed that the SSA is able to make a credible commitment not to increase the audit rates—known internally at SSA as “continuing disability reviews” (CDRs)—for DI recipients who return to work. Under the *status quo*, engaging in the TWP leads to greater risk of being terminated from the DI rolls due to the audits. This is why only 10% of DI recipients take advantage of the TWP. If the authors assume that individuals continue to have these beliefs under the \$1 for \$2 offset, then the fraction of DI recipients who ultimately return to work falls from 48.9% to 36.8%.

Most importantly, the model predicts that the \$1 for \$2 offset will not have a very significant induced entry effect. The model predicts an increase of only 2.2% in the number of SSDI applications while SSDI rolls increase by 3.2%. However, the mean duration of a beneficiary on

the program increases only slightly, from 12.7 to 13.0 years. Thus, the induced entry effect is primarily responsible for the 5.9% increase in the total number of person-years spent on SSDI. The present value of benefit payments (discounted to age 21 at a 2% interest rate per year), increases by only 1.7%, from \$115,000 per beneficiary to \$117,000 per beneficiary. However, since there are more DI beneficiaries, due to induced entry, the total discounted value of SSDI benefit payments is predicted to increase by 4.9%. While the present value of Social Security contributions increases by 4.2% under the \$1 for \$2 offset, the net discounted cost of the SSDI program still increases by 5%.

In summary, the results indicate that the \$1 for \$2 offset provides a substantial benefit to a subset of SSDI recipients, allowing them to achieve higher income, consumption, and wealth accumulation during, and following, their spells on SSDI. In particular, annual consumption for these individuals increases by an average of 2.2% over their full lifetimes, and by 6.9% between the ages of 45 and 65. Nevertheless, the program is not generous enough to induce entry of younger individuals, because the “ex ante” increase in welfare for a younger person who has not yet experienced a disabling condition is small. The main welfare gains of the \$1 for \$2 occur “ex post” for people who have already entered SSDI and who have experienced a full or partial recovery.

4.2. A Partial Benefits SSDI system

As discussed in Aarts and de Jong (1996) the partial benefits options has been in place for some time in many European countries. However, in the U.S. even though there have been several occasions in which influential Think Tanks have mentioned the need to analyze this possibility, there has not been an analysis of this reform until the recent work by Yin (2008). In fact, in a report prepared by the Social Security Advisory Board (2006), their suggestions for long-term disability program enhancements include considering a partial disability program, they state “One concept that has been brought to our attention is that of establishing eligibility criteria for partial disability.” In an earlier report (2003), one of the alternative program changes they suggest is “changing the current all-or-nothing concept of disability eligibility to a program providing percentages of disability based (at least for less than 100 percent levels) on very specific medically determinable criteria.”

Yin builds upon the work of Benítez-Silva, Buchinsky, and Rust (2008) to solve and simulate a model that allows individuals to freely choose between four different levels of disability benefits, each of them with a different acceptable earnings maximum, where the highest level of disability (full benefits) is the same as in the current system, and the lower levels allow individuals to receive 75%, 50%, and 25% of the full benefit while working and earning more than the SGA in the current system, in some cases substantially more.

A partial Disability Insurance system amounts to essentially changing the current DI system from one that awards benefits only to those fully disabled (with health limitations that prevent them from working completely) to one that awards also partial benefits to those partially disabled (whose health limitations interfere with their work but not prevent them from working completely) and are employing their residual work capacities in the labor force, and changing the

Social Security definition of disability from a binary disability definition to a relatively continuous disability concept. The partial DI system encourages working and leaving the rolls by hoping that potentially higher benefits recipients will apply for lower benefits if they feel capable of working and earning more than the limit for the higher benefits. In that sense, it works in a similar way to the Trial Work Period (TWP) in the current DI system, but is expected to be more effective fostering a continuous attachment to the labor force among the disabled, compared to the very limited time provided in the TWP.

However, the main concern with this reform is, again, the induced entry effect that it could have, since it is unambiguously more generous than the current system. It is key therefore to set up the problem again within the dynamic structural framework that provides a quasi-experimental setting to study the effects of this reform.

Yin (2008) finds that the model predicts substantial increases in DI applications and number of individuals on the rolls when changing from status quo to a partial DI system. However, most of the increases are due to applications for partial benefits and awards to partial benefits. In fact, she finds a significant decrease in applications for full DI benefits, and a considerable drop in full DI benefit rolls. The mean duration spent on DI decreases substantially. This is likely due to the continuous attachment to the labor force under the partial DI system, which makes DI recipients go back to the labor force more easily and allows workers to apply for DI while still working. Her budgetary and welfare calculations show that a partial DI system, under some conditions, could result in financial savings for the government as well as clear welfare improvements for individuals.

4.3. No Need to Choose or Why not Have the Best of Both Worlds

The partial benefits system overcomes some of the more problematic aspects of the \$1 for \$2 offset proposal; namely, that it focuses on the current disability recipients and maintains a possibly inconsistent DI system where in order to get into the program you have to be fully disabled, but as soon as you are in the program, it is accepted that your disability is only partial. While this policy works well in order to accommodate health improvements, it clearly opens the door for more strategic behavior. The partial system does not focus on those currently receiving but on the incentives set up for those who will apply in the future, thinking about managing the impending growth in the system. It is an “ex-ante” intervention on the system, instead of the “ex-post” represented by the offset policy.

On the other hand, it should be taken into account that the partial system is likely to be much more costly in administrative terms given the large predicted increase in the caseloads. More importantly, given the large number of individuals currently on the rolls it is unclear whether it is enough to only focus on managing the future caseloads, but it becomes necessary to attack the problem from every angle. This means that these two policies are complementary and could be considered to be implemented at once. While one could be worried about the large induced entry effect of implementing two more generous policies at the same time, the truth is that some of the induced entry effect of the offset policy would be reduced by the implementation of the partial benefit system, since it is unlikely that individuals who want to maintain an attachment to the labor force would first drop completely, just to go back when they get full benefits.

The analysis of the consequences of these policy changes is likely to underestimate the final (positive) effect on the system since the models are set up in partial equilibrium. This means that they cannot account for the effects of changing the current social perception that disability and work are almost incompatible. The early intervention philosophy, which can prevent many individuals from dropping from the labor force to start with, can have a large and long-lasting effect in society and the pool of potential applicants. Also, implementing both reforms it is almost equivalent to allowing individuals to choose their disability level in a continuum, which maximizes the possibility of extracting the maximum residual work capacity from those individuals willing to work.

5. Comments and Conclusions

Many readers will likely be left with the feeling that we have only scratched the surface of the analysis of what is necessary to make a large proportion of disabled individuals become participants in the labor force. We have said nothing about how to get employers to invest in accommodations—sometimes through new technology—and hire more disabled individuals, how to change the social perceptions regarding the possible contributions of individuals with disabilities to the productivity of the private and public sector, or about the fact that the passing of laws protecting those with disabilities seems to have had, in many countries, a negative effect in the total number of disabled individuals who are employed. We have also been silent about how to compute the increased administrative costs to the system of implementing some of the more radical policy changes, and about alternative possible reforms to systems with some of these policies already in place. We have also ignored the possible participation of the private sector in providing and/or administering some type of disability insurance. All these issues are interesting and challenging areas of future research, and come to show the very modest objectives of this research piece.

We have first tried to make the case for a careful approach to interpreting the currently low labor force participation rates of individuals with disabilities, given the many reasons behind it, chiefly among them the very incentive structure that may lead those individuals to choose between benefits and work. We have also made the case for the existence of considerable residual work capacity even among those who are currently receiving full DI benefits, and for the need to account for potentially large induced entry effects into disability programs if the generosity of the system is affected by reforms. We have then discussed the need for additional reforms to the systems in order to change a system that has for too long sent the wrong message to disabled individuals about their relationship to the labor force. However, those reforms (or any reform for that matter) should not be implemented without a careful analysis, which in this case requires a quasi-experimental approach using the sophisticated tools of inter-temporal optimization under uncertainty.

Making every effort to give all members of our society the chance to become an economically productive individual seems hardly a tough sell, to policy makers and the society as a whole, in our advanced and fairly progressive democratic systems. The implementability of the provision of the conditions that would maximize the probability that disabled individuals would consider joining the labor force is a tougher problem that requires our attention and effort. A society

should be judged by the way it treats and provides for those who have had to deal with the most difficult situations, but also by whether it allows them to contribute productively to the economy and their own advancement, in the same way as any other member of society.

References

- Aarts, L.J.M., and P.R. de Jong (1996): “European Experiences with Disability Policy,” in J.L. Mashaw, V. Reno, R.V. Burkhauser, M. Berkowitz (eds.), *Disability, Work and Cash Benefits*. W.E. Upjohn Institute for Employment Research: Kalamazoo, Michigan.
- Alba, A., and Moreno, F. (2004): “Discapacidad y Mercado de Trabajo,” *Obra Social Caja Madrid*. Gente Interactiva. S.L. Madrid.
- Andrews, E.S. (1998): “Disability Insurance: Programs and Practice,” manuscript, World Bank.
- Autor, D.H., and M.G. Duggan (2003): “The Rise in the Disability Rolls and the Decline in Unemployment,” *Quarterly Journal of Economics*, February, 157—205.
- Autor, D.H., and M.G. Duggan (2006): “The Growth in the Social Security Disability Rolls: A Fiscal Crisis Unfolding,” *Journal of Economic Perspectives*, Vol. 20-3, 71—96.
- Benítez-Silva, H., Buchinsky, M., Chan, H., Cheidvasser, S., and Rust, J. (1999): “An Empirical Analysis of the Social Security Disability Application, Appeal and Award Process,” *Labour Economics*, Vol. 6, 147—178.
- Benítez-Silva, H., Buchinsky, M., Chan, H., Cheidvasser, S., and Rust, J. (2004): “How Large is the Bias in Self-Reported Disability?” *Journal of Applied Econometrics*, Vol. 19-6, 649—670.
- Benítez-Silva, H., Buchinsky, M., and Rust, J. (2003): “Dynamic structural models of retirement and disability,” manuscript, UMD, UCLA, y SUNY-Stony Brook.
- Benítez-Silva, H., Buchinsky, M., and Rust, J. (2006): “How Large are the Classification Errors in the Social Security Disability Award Process?” manuscript, SUNY-Stony Brook, UCLA, and University of Maryland.
- Benítez-Silva, H., Buchinsky, M., and Rust, J. (2008): “Induced Entry Effects of a \$1 for \$2 Offset in SSDI Benefits,” manuscript, SUNY-Stony Brook, UCLA, and University of Maryland.
- Benítez-Silva, H., Dwyer, D. S., Heiland, F., and Sanderson, W.C. (2007): “Retirement and Social Security reform expectations: A solution to the new early retirement puzzle,” manuscript SUNY-Stony Brook and Florida State University.
- Benítez-Silva, H., and Heiland, F. (2007): “The Social Security Earnings Test and Work Incentives,” *Journal of Policy Analysis and Management*, Vol. 26-3, 527—555.
- Benítez-Silva, H., and Heiland, F. (2008): “Early claiming of Social Security benefits and labor supply behavior of older Americans,” Forthcoming in *Applied Economics*, advance online publication: <http://www.informaworld.com/10.1080/00036840600994054>

Benítez-Silva, H., Demiralp, B., and Liu, Z. (2008): “Knowledge, Information, and Costs,” manuscript, SUNY-Stony Brook, Old Dominion University, and Ohio Northern University.

Berkowitz, M. (1996): “Improving the Return to Work of Social Security Beneficiaries,” in J.L. Mashaw, V. Reno, R.V. Burkhauser, M. Berkowitz (eds.), *Disability, Work and Cash Benefits*. W.E. Upjohn Institute for Employment Research: Kalamazoo, Michigan.

Blau, D. (2008): “Retirement and Consumption in a Life Cycle Model,” *Journal of Labor Economics*, Vol. 26-1, 35—71.

Bound, J., and R. Burkhauser (1999): “Economic Analysis of Transfer Programs Targeted on People with Disabilities,” in O. Ashenfelter and D. Card (eds.), *Handbook of Labor Economics*, Vol. 3C. Elsevier Science, North Holland: Amsterdam, the Netherlands.

Burkhauser, R.V., A.J. Houtenville, and D.C. Wittenburg (2003): “A User's Guide to Current Statistics on the Employment of People with Disabilities,” in D.C. Stapleton and R.V. Burkhauser (eds.), *The Decline in Employment of People with Disabilities: A Policy Puzzle*. W.E. Upjohn Institute for Employment Research: Kalamazoo, Michigan.

Capella-McDonnall, M. (2007): “Effectiveness of the Ticket to Work Program for Beneficiaries Who are Blind or Have Low Vision: Comparisons with Other Beneficiaries,” *Journal of Visual Impairment & Blindness*, Vol. 101-5, 296—301.

Congressional Budget Office (1997): “Time-Limiting Federal Disability Benefits,” Memorandum. Washington D.C.

French, E. (2005): “The Effects of Health, Wealth, and Wages on Labor Supply and Retirement Behavior,” *Review of Economic Studies*, Vol. 72-2, 395—428.

GAO (General Accounting Office) (1987): *Social Security. Little Success Achieved in Rehabilitating Disabled Beneficiaries*. Report to the Chairman, Subcommittee on Social Security, Committee on Ways and Means, House of Representatives.

Guillén Estany, M. (ed.) (2007): *Longevidad y Dependencia en España: Consecuencias sociales y económicas*. Fundación BBVA.

Haveman, R.H., and B. Wolfe (2000): “The Economics of Disability and Disability Policy,” in A.J. Culyer and J.P. Newhouse (eds.), *Handbook of Health Economics*, Volume 1. Elsevier Science, North Holland: Amsterdam, the Netherlands.

Hoynes, H.W., and R. Moffitt (1996): “The Effectiveness of Financial Work Incentives in Social Security Disability Insurance and Supplemental Security Income: Lessons from Other Transfer Programs,” in J.L. Mashaw, V. Reno, R.V. Burkhauser, M. Berkowitz (eds.), *Disability, Work and Cash Benefits*. W.E. Upjohn Institute for Employment Research: Kalamazoo, Michigan.

Jiménez-Martín, S., J.M. Labeaga, and C. Vilaplana Prieto (2006): “Award errors and permanent disability benefits in Spain,” Universitat Pompeu Fabra WP-966.

Lahiri, K., D.R. Vaughan, and B. Wixon (1995): “Modeling SSA's Sequential Disability Determination Process Using Matched SIPP Data,” *Social Security Bulletin*, Vol. 58-4, 3—42.

Lutz, W., W.C. Sanderson, and S. Scherbov (2008): “The coming acceleration of global population ageing,” *Nature*, Vol. 451-7, 716—719.

Magnac, T. and D. Thesmar (2002): “Identifying Dynamic Discrete Decision Processes,” *Econometrica*, Vol. 70-2, 801—816.

Malo, M.A. (2004): “¿Cómo afectan las discapacidades a la probabilidad de ser activo en España? Un análisis empírico con datos de la Encuesta sobre Discapacidades, Deficiencias y Estado de Salud de 1999,” *Cuadernos de Economía*, Vol. 27, 75—108.

McVicar, D. (2008): “Why have UK Disability Benefit Rolls grown so much?” *Journal of Economic Surveys*, Vol. 22-1, 114—139.

Moffitt, R. (2003): “The Role of Randomized Field Trials in Social Science Research: A Perspective from Evaluations of Reforms of Social Welfare Programs,” manuscript, Johns Hopkins University.

Molinas, C. (ed.) (2008): “Instrumentos Financieros para la Jubilación,” Fundación de Estudios Financieros. Working Paper No. 24.

Muller, L.S. (1992): “Disability Beneficiaries Who Work and Their Experience Under Program Work Incentives,” *Social Security Bulletin*, Vol. 55-2, 2—19.

Muller, L.S. (2000): “The Search for Evidence of a Labor Supply Response to a Benefit Offset,” Office of Research, Evaluation and Statistics, Social Security Administration.

Muller, L.S., Scott, G., and B.V. Bye (1996): “Work and Earnings of SSI Disability Recipients,” *Social Security Bulletin*, Vol. 59-2, 22—42.

Muñoz Machado, S., J.L. García Delgado, and L. González Seara (1997): *Las estructuras del bienestar*. Editorial Civitas, Madrid.

Nagi, S.Z. (1964): “A Study in the Evaluation of Disability and Rehabilitation Potential,” *American Journal of Public Health*, Vol. 54-9 1568—1579.

Nagi, S.Z. (1965): “Some conceptual issues in disability and rehabilitation,” Sussman M.B. (ed.), *Sociology and Rehabilitation*. Washington, D.C.: American Sociological Association.

Nagi, S.Z. (1969): *Disability and Rehabilitation: Legal, Clinical, and Self-Concepts and Measurement*. Ohio State University Press.

Nagi, S.Z. (1991): “Disability concepts revisited: Implications for prevention,” in *Disability in America: Toward a National Agenda for Prevention*. National Academy Press: Washington, D.C.

National Council of the Handicapped (1986): *Disincentives to Work under the Social Security Laws*. Report to the President and the Congress of the United States.

National Research Council (2001): *Preparing for an Aging World: The Case for Cross-National Research*. Panel on a Research Agenda and New Data for an Aging World, Committee on Population, Committee on National Statistics. National Academies Press.

Neumark, D. and E.T. Powers (2003): “The Effects of Changes in State SSI Supplements on Pre-Retirement Labor Supply,” NBER working paper 9851.

Rust, J. (1994): “Structural Estimation of Markov Decision Processes,” in R. Engle and D. McFadden (eds.), *Handbook of Econometrics*, Vol. 4, 3082—3139, Elsevier Science, North Holland: Amsterdam, the Netherlands.

Rust, J. and C. Phelan (1997): “How Social Security and Medicare Affect Retirement Behavior in a World of Incomplete Markets,” *Econometrica*, Vol. 64-5, 781—832.

Sánchez Fierro J. (2004): *Libro verde sobre la dependencia en España*. Madrid: Fundación AstraZeneca.

Smith, R.T. and A.M. Lilienfeld (1971): “The Social Security Disability Program: An Evaluation Study,” Research Report 39, Social Security Office of Research and Statistics.

Social Security Advisory Board (2003): *The Social Security Definition of Disability*. Washington, D.C.

Social Security Advisory Board (2006): *A Disability System for the 21st Century*. Washington, D.C.

Stapleton, D.C., B. Barnow, K. Coleman, K. Dietrich, and G. Lo (1994): *Labor Markets Conditions, Socioeconomic Factors and the Growth of Applications and Awards for SSDI and SSDI Disability Benefits: Final Report*. Lewin-VHI, Inc. and the Department of Health and Human Services. Office of the Assistant Secretary for Planning and Evaluation.

Stapleton, D.C. (2004): “The Eligibility Definition Used in the Social Security Administration's Disability Programs Needs to be Changed,” manuscript, Cornell University.

Taber, C.R. (2000): “Semiparametric Identification and Heterogeneity in Discrete Choice Dynamic Programming Models,” *Journal of Econometrics*, Vol. 96, 201—229.

Thornton, C. (Project Director) (2007): *Evaluation of the Ticket to Work Program: Assessment of Post-Rollout Implementation and Early Impacts*. Mathematica Policy Research Inc., under contract from the Social Security Administration.

Todd, P., and K.I. Wolpin (2006): "Using Experimental Data to Validate a Dynamic Behavioral Model of Child Schooling and Fertility: Assessing the Impact of the School Subsidy Program in Mexico," *American Economic Review*, Vol. 96-5, 1384-1417.

Todd, P., and K.I. Wolpin (2007): "Ex-Ante Evaluation of Social Programs," forthcoming in *Annals of Economics and Statistics*.

Tuma, N. (2001): "Approaches to Evaluating Induced Entry into a New SSDI Program with a \$1 Reduction in Benefits for each \$2 in Earnings," manuscript, Stanford University.

van der Klaauw, W., and K.I. Wolpin (2005): "Social Security, Pensions and the Savings and Retirement Behavior of Households," manuscript, University of North-Carolina-Chapel Hill.

WHO (World Health Organization) (1980): *The International Classification of Impairments, Disabilities, and Handicaps—A Manual Relating to the Consequences of Disease*. Geneva.

Wolpin, K.I. (1996): "Public-Policy Uses of Discrete-Choice Dynamic Programming Models," *American Economic Review*, Vol. 86, 427—32.

Wolpin, K.I. (2007): "Model Validation and Model Comparison Ex Ante Policy Evaluation, Structural Estimation, and Model Selection," *American Economic Review*, Vol. 97-2, 48—52.

Wunderlich, G.S., D.P. Rice, and N.L. Amado (eds.) (2002): *The Dynamics of Disability: Measuring and Monitoring Disability for Social Security Programs*, National Academy Press: Washington, D.C.

Yin, N. (2008): "Partial Benefits in the Social Security Disability Insurance: A Policy Alternative to Foster Work among the Disabled," manuscript, SUNY-Stony Brook and Baruch College.