# The Simple Analytics of Vouchering Out Unit-Based Housing Assistance

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July 22, 2005

Abstract

Evidence on the excessive costs of all forms of unit-based housing assistance compared with recipient-based housing vouchers argues for replacing unit-based with recipient-based assistance as soon as current contractual commitments permit. The U.S. Congress has already mandated the conversion of public housing projects to recipient-based assistance under certain circumstances and allowed it under other circumstances. It could go further and require housing authorities to offer recipient-based housing vouchers to all current public housing tenants, financing this initiative with the money currently spent on operating and modernization subsidies to these authorities. Furthermore, hundreds of thousands of units in private subsidized projects in the United States come to the end of their use agreements each year. At this time, the federal government could offer the occupants of these projects recipient-based vouchers rather than extending the use agreements. Despite the importance of this policy issue, there has been no theoretical analysis of the effects of vouchering out unit-based assistance on the consumption patterns and well being of occupants of housing projects. This paper shows how these effects depend upon the nature of the recipient-based voucher program, whether the household can remain in its project unit on the previous terms, the market rent of the project unit relative to the voucher program's payment standard, and the cost of moving.

**Introduction**

Housing assistance is a major part of the U.S. welfare system. Federal, state, and local governments spend about $50 billion a year on it. The most serious shortcoming of the current system of low-income housing assistance is its excessive reliance on unit-based programs that serve about two thirds of assisted households. Evidence indicates that recipient-based housing vouchers provide equally good housing at a much lower total cost than any program of unit-based assistance. Therefore, it would be possible to serve current recipients equally well (that is, provide them with equally good housing for the same rent), serve many additional families, and reduce taxes by shifting resources from unit-based to recipient-based assistance. This would involve terminating or phasing out current production programs, disengaging from unit-based assistance to existing apartments as soon as current contractual commitments permit, and avoiding new programs of unit-based assistance.

Despite the importance of this policy issue, there has been little analysis of the effects of vouchering out unit-based assistance on the consumption patterns and well being of occupants of housing projects. This paper presents a theoretical analysis of these effects. It shows how they depend upon the nature of the recipient-based voucher program, whether the household can remain in its project unit on the previous terms, the market rent of the project unit relative to the voucher's payment standard, and the cost of moving.

The paper is organized as follows. The first section provides an overview of the current system of low-income housing assistance in the United States. The second summarizes the evidence that argues for exclusive reliance on recipient-based housing assistance. The third presents theoretical analyses of the effects on recipient consumption patterns and wellbeing of replacing programs of unit-based housing assistance that account for the majority of assisted households with alternative voucher programs under alternative assumptions about the terms under which occupants of projects can remain in their current units. The fourth section summarizes the paper. Appendices A and B analyze several additional reform proposals. Appendix C analyzes effects of vouchering out programs of unit-based assistance that require households to pay more than 30 percent of their adjusted income for their housing.

**Overview of Current System of Low-Income Housing Assistance**

The U.S. government provides assistance to live in rental and owner-occupied housing.[1] The most important distinction between rental housing programs is whether the subsidy is attached to the dwelling unit or the assisted household. If the subsidy is attached to a rental dwelling unit, each family must accept the particular unit offered in order to receive assistance and loses the subsidy when it moves. Each recipient offered recipient-based rental assistance has a choice among many units that meet the program's standards, and the family can retain its subsidy when it moves. The analogous distinction for homeownership programs is between programs that provide subsidies to selected sellers of housing and those that provide subsidies to buyers who are free to choose from many available houses.

There are two broad types of unit-based rental assistance in the United States, namely, public housing and privately owned subsidized projects. Public housing projects are owned and operated by local public housing authorities established by local governments. The overwhelming majority were newly built for the program. Until 1969, with minor exceptions, federal taxpayers paid the initial development cost of public housing while tenants and local taxpayers paid the operating cost. However, the federal government now provides local housing authorities with substantial operating and modernization subsidies. In the public housing program, civil servants make all of the decisions made by private owners of unsubsidized housing as well as enforce the program's regulations.

The U.S. government also contracts with private parties to provide housing for low-income households. The majority of these private parties are for-profit firms, but non-profit organizations have a significant presence. The largest programs of this type are the IRS's Low Income Housing Tax Credit, HUD's Section 8 New Construction/Substantial Rehabilitation and Section 236, and USDA's Section 515/521. Under most programs, these private parties agreed to provide rental housing meeting certain standards at restricted rents to households with particular characteristics for a specified number of years. The overwhelming majority of the projects were newly built under a subsidized construction program. Almost all of the rest were substantially rehabilitated as a condition for participation in the program. It is important to

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[1] See Olsen (2003, pp. 370-394) for a more detailed description of the system of low-income housing programs in the United States.

realize that none of these programs provide subsidies to all suppliers who would like to participate. Since subsidies are provided to selected private suppliers, the market mechanism does not insure that subsidies are passed along to occupants of the subsidized units. If this is to be achieved at all, administrative mechanisms must be used.

The U.S. government has had two large homeownership programs for low-income households, namely, USDA's Section 502 Single Family Direct Loan Housing Program and HUD's Section 235 Homeownership Program. Over their histories, these programs have subsidized about 2.5 million families. The U.S. government also funds a block grant to state and local governments called the HOME Investment Partnerships Program that has been used to provide rental and homeownership subsidies to low-income families.

Unit-based rental assistance is the dominant form of housing assistance to low-income families in the United States.[2] The overwhelming majority of recipients receive rental assistance, and more than 70 percent of families served by low-income rental housing programs receive unit-based assistance. HUD provides unit-based rental assistance to more than three million families, the Low-Income Housing Tax Credit serves more than a million families, and the USDA's Section 515/521 program houses almost a half million families. HUD's Section 8 Housing Voucher Program accounts for almost all recipient-based rental housing assistance, and even this program now allows housing agencies to devote up to 20 percent of their vouchers to unit-based assistance.

**Argument for Exclusive Reliance on Recipient-Based Housing Assistance**

This section summarizes the arguments that have led many housing policy analysts to conclude that all housing assistance to low-income families should be recipient-based. The most important evidence concerns the excess cost of unit-based programs relative to recipient-based assistance for providing equally good housing. A second major advantage of recipient-based assistance is that it allows each recipient to occupy a unit with a combination of characteristics that best suits its circumstances and preferences provided only that the unit meets minimum housing standards. Recipient-based and unit-based assistance differ little in their other outcomes, and the parameters of a voucher program can be altered to change other outcomes

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[2] The primary source for the numbers in this paragraph is Millennial Housing Commission (2002, Appendix 3).

without affecting the preceding two advantages. Finally, evidence contradicts the usual arguments against exclusive reliance on recipient-based assistance.

*Recipient-Based Assistance Is More Cost-Effective Than Unit-Based Assistance*

The most important finding of the empirical literature on the effects of different housing programs from the viewpoint of housing policy is that recipient-based housing assistance has provided equally good housing at a much lower cost than any type of unit-based assistance.

Four major studies have estimated both the total cost per unit and the mean market rent of apartments provided by housing vouchers and the largest older production programs, namely Public Housing, Section 236, and Section 8 New Construction.[3] These studies are based on data from a wide variety of housing markets and for projects built in many different years. Two were expensive studies conducted for HUD by a respected research firm during the Nixon, Ford, Carter, and Reagan administrations. They are unanimous in finding that housing vouchers provide equally desirable housing at a much lower total cost than any of these production programs, even though all of these studies are biased in favor of the production programs to some extent by the omission of certain indirect costs.

The studies with the most detailed information about the characteristics of the housing provided by the programs found the largest excess costs for the production programs. Specifically, Mayo and his coauthors estimated the excessive cost of public housing compared to housing vouchers for providing equally desirable housing to be 64% and 91% in the two cities studied and the excessive cost of Section 236 to be 35% and 75% in these cities. Another study with excellent data on housing characteristics estimated the excessive cost of Section 8 New Construction compared to recipient-based Section 8 Certificates to be between 44% and 78%.[4]

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[3] The studies are Mayo et al. (1980), Olsen and Barton (1983), U.S. Department of Housing and Urban Development (1974), and Wallace et al. (1981). Olsen (2003, pp. 394-399) provides a brief summary of these studies. Olsen (2000) provides a detailed description and critical appraisal of the data and methods used in these studies as well as a summary of their results.

[4] Wallace and his coauthors made predictions of the market rents of subsidized units based on two different data sets containing information on the rent and characteristics of unsubsidized units. The study did not collect information on the indirect costs of the Section 8 New Construction Program. These indirect subsidies include GNMA Tandem Plan interest subsidies for FHA insured projects and the forgone tax revenue due to the tax-exempt status of interest on the bonds used to finance state housing finance agency projects. Based on previous studies, the authors argue that these indirect costs would add 20 to 30 percent to the total cost of the Section 8 New Construction Program. The range of estimates reported in the text is based on the four combinations of the two predictions of market rent and the lower and upper limits on the indirect costs.

Recent GAO studies produced similar results for the major active construction programs – LIHTC, HOPE VI, Section 202, Section 515, and Section 811 [GAO, 2001, 2002]. The excess total cost estimates based on the conceptually preferable life cycle approach range from 12% for Section 811 to 27% for HOPE VI [GAO, 2001, p.3]. These estimates are lower bounds on the excessive cost because some costs of the production programs were omitted. Most notably, the opportunity cost of the land was omitted from the cost of HOPE VI projects. This is a real cost to society of HOPE VI redevelopment. Furthermore, some projects under each program receive local property tax abatements. The preceding results ignore this cost to local taxpayers.[5]

It is often argued that production programs work better than recipient-based vouchers in the tightest housing markets. The GAO study contains evidence concerning whether production programs are more cost-effective than recipient-based vouchers in housing markets with low vacancy rates. In addition to the national estimates, the GAO collected data for seven metropolitan areas. The data for the GAO study refer to projects built in 1999. In that year, the rental vacancy rates in the seven metropolitan areas ranged from 3.1% in Boston to 7.2% in Baltimore and Dallas, with a median of 5.6%. The overall rental vacancy rate in U.S. metropolitan areas was 7.8%. So all of the specific markets studied were tighter than average. Only five of the largest seventy-five metropolitan areas had vacancy rates lower than Boston's. In each market, recipient-based vouchers were more cost-effective than each production program studied [GAO, 2002, pp. 19-20].

Unlike the earlier cost-effectiveness studies, the GAO study did not compare the total cost of dwellings under the different programs that were the same with respect to many characteristics. Instead it simply compared the average cost of dwellings with the same number of bedrooms in the same metropolitan area or the same type of location (metropolitan or nonmetropolitan). It has been argued that the GAO results overstate the excessive costs of the production programs for providing equally desirable housing because these programs provide better housing than the units occupied by voucher recipients. The available evidence does not support the view [Olsen, 2004, pp. 13-15]. Units built under construction programs typically provide better housing than the housing occupied by Section 8 voucher recipients when the projects are new. However, on average over the time that they serve subsidized households, projects provide worse housing.

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[5] The authors recognize many of these omissions [GAO, 2002, p.22].

The difference in cost-effectiveness between recipient-based and unit-based housing assistance has major implications for the number of households that can be served with the current budget. If we compare programs of recipient-based and unit-based assistance that serve recipients equally well (that is, provide them with equally good housing for the same rent), the unit-based programs will serve many fewer families with a given budget. No credible evidence shows that any type of unit-based assistance is as cost-effective as recipient-based vouchers in any market conditions or for any special groups. Therefore, many eligible families and the taxpayers who want to help them will gain if recipient-based assistance replaces unit-based assistance.

The magnitude of the gain from shifting from unit-based to recipient-based rental assistance would be substantial. Even the smallest estimates of the excess costs of unit-based assistance imply that shifting ten families from unit-based to recipient-based assistance would enable us to serve two additional families. Since the federal government provides unit-based rental housing assistance to more than 4.5 million families, a total shift from unit-based to recipient-based assistance would enable us to serve at least 900,000 additional families with no additional budget. The most reliable estimates in the literature imply much larger increases in the number of families served. For example, the Abt study of the Section 8 New Construction Program implies that recipient-based vouchers could have provided all of the families who participated in this program with equally good housing for the same rent and served at least 72 percent more families with similar characteristics equally well without any additional budget.[6]

*Recipient-Based Assistance Provides Greater Choice Than Unit-Based Assistance*

Recipient-based assistance has another major advantage over unit-based assistance in addition to providing equally desirable housing at a lower cost. It allows each recipient to occupy a dwelling unit with a combination of characteristics preferred to the specific unit offered under a program of unit-based assistance without affecting adversely taxpayer interests. With recipient-based assistance, a recipient can occupy any unit meeting the program's minimum housing standards.[7] The program's standards reflect the interests of taxpayers who want to help low-

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[6] This is based on results in Wallace et al. (1981).
[7] Recipient-based housing programs often have other standards such as upper limits on the gross rent of the unit occupied. However, this does not change the essence of the argument. Families offered recipient-based assistance

income families with their housing.  Units that meet the program's standards and are affordable to assisted families differ greatly with respect to their characteristics, neighborhood, and location.  Assisted families whose options are the same under a program of recipient-based assistance are not indifferent among the units available to them.  Each family will choose the best available option for its tastes and circumstances.  Since all of these units are adequate as judged by the program's minimum housing standards, restricting their choice further serves no public purpose.  Unit-based assistance forces each family to live in a particular unit in order to receive a subsidy.  So it greatly restricts recipient choice among units meeting minimum housing standards without serving any public purpose.  If the subsidy is the same, it is reasonable to expect recipients of recipient-based assistance to be significantly better off than they would be with unit-based assistance.

### *Unit-Based Assistance Is Not Better than Recipient-Based Assistance in Other Respects*

Cost-effectiveness and recipient choice argue strongly for exclusive reliance on recipient-based housing assistance.  A consideration of other program outcomes does not alter the picture.  Recipient-based and unit-based assistance do not differ greatly with respect to other program outcomes [Olsen, 2003, pp. 399-427], and the differences tend to favor recipient-based assistance.  For example, recipient-based housing assistance has smaller work disincentive effects than unit-based assistance [Olsen et al., forthcoming].

Two main objections have been raised to exclusive reliance on tenant-based assistance.  Specifically, it has been argued that tenant-based assistance will not work in markets with the lowest vacancy rates and construction programs have an advantage compared with tenant-based assistance that offsets their cost-ineffectiveness, namely they promote neighborhood revitalization to a much greater extent.  The available evidence contradicts these beliefs [Olsen, 2004, pp. 21-29].  It shows that recipient-based vouchers can get recipients into adequate housing faster than production programs even in the tightest housing markets, and they are more cost-effective than production programs in all market conditions.  We do not need production programs to increase the supply of adequate housing.  Existing units are upgraded to meet

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have a much wider range of choice among units that are adequate as judged by the program's minimum housing standards.

housing standards in response to recipient-based vouchers. Production programs have not had a perceptibly greater effect on neighborhood revitalization than tenant-based vouchers.

**Theoretical Analysis of Effects of Vouchering Out Unit-Based Housing Assistance**

This section analyzes the effects of vouchering out unit-based housing assistance on recipient consumption patterns and wellbeing. These effects depend on policy choices and certain aspects of reality.

The policy choices considered in this paper are several alternative voucher programs and two options for tenants in subsidized projects who want to remain in their current units. One option for sitting tenants in projects is to pay the same rent for their unit as under the current regime. With this option, project tenants who remain in their units will not receive vouchers. The second option is that current project tenants who want to remain in their unit must pay the market rent of this unit, albeit with the help of a voucher subsidy that does not depend on the desirability of their unit. The primary aspect of reality considered in this paper is whether the market rent of the project unit is greater than, equal to, or less than the voucher's payment standard. The effects of vouchering out unit-based housing assistance also depend on the cost of moving borne by the tenant in a project and whether the tenant prefers its current unit to any unsubsidized unit with the same market rent. To simplify the analysis, I initially assume that moving is costless and that no tenant in a housing project would like to move to an unsubsidized unit with the same market rent as its current unit while continuing to contribute the same amount to rent. Later, I consider how deviations from these assumptions affect the outcomes.

*Budget Spaces with Unit-Based Assistance and Alternative Voucher Programs*
The effects of vouchering out unit-based assistance on a household's consumption patterns and wellbeing depend in part on its budget space with unit-based assistance and with the voucher program used. This section describes the budget spaces involved.

The descriptions of budget spaces in this paper are based on a number of simplifying assumptions. First, earnings are not subject to choice. Second, the households involved spend their entire income in each period. Third, taxes and subsidies (except for housing subsidies) are

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lump-sum. Finally, vouchering out unit-based assistance will have no effect on the prices that sellers charge for goods.

Figure 1 depicts the budget space of a household offered unit-based assistance. The quantity of housing services $Q_H$ is measured along the horizontal axis, the quantity of other goods $Q_X$ along the vertical axis. If the household were to decline the offer of unit-based housing assistance, it could consume any bundle of goods that costs no more than its income $Y$ after payment of taxes and receipt of non-housing subsidies at market prices $P_H$ and $P_X$. These are the points on or below the line segment AB. A household offered unit-based housing assistance is offered a particular unit that provides a particular quantity of housing services $Q_H^G$ on a take-it-or-leave-it basis. To occupy this unit, the household must pay 30 percent of its adjusted income $Y_A$ in rent.[8] By participating in the program of unit-based assistance, the household can consume any bundle on the vertical line segment below G. So the budget space of a household offered unit-based assistance consists of the shaded area plus the line segment GF. Since our analysis is limited to households who live in housing projects, the household under consideration chooses the bundle G and its indifference curve containing this bundle is everywhere above the line segment AB.

This paper analyzes the effects of replacing unit-based assistance with three alternative voucher programs. All allow a recipient to occupy any unit in the private market that meets its restrictions. One restriction that is common to the voucher programs considered is the minimum housing standards of the Section 8 Housing Choice Voucher (HCV) Program.[9] In the diagrams depicting the budget constraints under the voucher programs, the bundles that involve at least $Q_H^{MIN}$ units of housing service satisfy this requirement. The other common feature of the three voucher programs is their maximum subsidy. In all voucher programs, the maximum subsidy $S$

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[8] This has been by far the most common contribution to rent in housing projects for the last twenty years. Until the 1998 Housing Act, the primary exception had been households in Low Income Housing Tax Credit units that do not also receive Section 8 assistance. Their rent does not depend on their income. About 60 percent of the households in tax credit projects are in this category. The 1998 Housing Act allowed public housing authorities to deviate from what had been the standard rule for tenant contribution to rent, but I have seen no evidence on the fraction of public housing tenants who pay rents that differ from the standard rule due to the options allowed. Appendix C analyzes vouchering out tax credit projects without Section 8 assistance. Otherwise, the paper ignores deviations from the standard rule.

[9] It is assumed that all unit-based assistance must satisfy these same minimum standards. In fact, these standards apply to all HUD-administered programs of unit-based assistance, but the Low Income Housing Tax Credit Program has different standards that are arguably lower and essentially not enforced.

is equal to $PS - .3Y_A$, where $PS$ is a payment standard that may differ by location and household composition. Under some of the voucher programs, it is possible to make choices that lead to smaller subsidies, though these choices are inconsistent with rational behavior under the simplifying assumptions involved in the analysis.

Figure 2 depicts a household's budget space under the simplest voucher program considered, namely, a program like the one that operated in the United States between 1983 and 1999. Under this voucher program, the household receives a subsidy $S$ on the condition it occupies a unit meeting the program's minimum housing standards (that is, a unit that provides at least $Q_H^{MIN}$ units of housing service). The shaded area in Figure 2 is the budget space of a household that is offered this type of voucher.

Figure 3 depicts a household's budget space under a somewhat more complicated voucher program. It is the budget space of a household under the current HCV Program after its first year in the program. Under this voucher program, the household gets the maximum subsidy provided that it occupies a unit renting for at least the program's payment standard $PS$. If it occupies a less expensive unit, its subsidy is reduced dollar for dollar. That is, the household is not able to consume more of other goods by occupying a less expensive dwelling unit. The shaded area in Figure 3 is the budget space of a household that is offered this type of voucher.

Figure 4 depicts the third voucher program. It is identical to the HCV Program for new recipients, and it differs from the second in only one respect. Recipients are not allowed to spend more than 40 percent of their adjusted income on housing. This places an upper limit on the market rent of the unit occupied, namely, $PS + .1Y_A$.[10]

In drawing the diagrams in the paper, it is assumed that $P_H Q_H^{MIN} > .3Y_A$. If these two magnitudes were equal or the inequality was in the opposite direction, the diagrams would have a slightly different appearance. However, this would not affect any of the results reported. That is, the qualitative changes in consumption bundles and wellbeing that are consistent with the standard assumptions of the theory of consumer choice combined with the assumption that housing services and other goods are normal goods do not depend on the relative magnitudes of

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[10] A voucher recipient who occupies a unit with a market rent exceeding the payment standard $PS$ receives the maximum subsidy. Their contribution to rent is the excess of the market rent $P_H Q_H$ over this subsidy $PS - .3Y_A$. $P_H Q_H - (PS - .3Y_A) \le .4Y_A$ implies $P_H Q_H \le PS + .1Y_A$.

$P_H Q_H^{MIN}$ and $.3Y_A$.  To see why, suppose initially that $P_H Q_H^{MIN} > .3Y_A$.  For policy options involving either variant of the Housing Choice Voucher Program (Figures 3 and 4), reducing $Q_H^{MIN}$ until the two magnitudes are equal or the inequality is reversed adds to the budget space bundles that would never be chosen.  For policy options involving the original voucher program, reducing $Q_H^{MIN}$ adds bundles that might be chosen, but these bundles are qualitatively similar to bundles already available.  For example, they are bundles on NE in Figure 5A that involve less housing than $PS/P_H$ and $Q_H^G$.

### *Replacing Unit-Based Assistance with the Simplest Voucher Program*

This subsection analyzes the effects of replacing unit-based assistance with the simplest voucher program considered, namely, the voucher program depicted in Figure 2.  This program provides a subsidy $S$ on the condition that the tenant consume at least $Q_H^{MIN}$ units of housing service.  The analysis is conducted for the two alternative policy options for a family in a subsidized project that wants to remain in its current unit, namely, the family can remain in its current unit on the previous terms but does not receive a voucher or the family must pay a market rent in order to stay in this unit with the help of a voucher subsidy.  Table 1 summarizes the results of the analysis of the first scenario, and Table 2 the second.

*Family Can Remain in its Current Unit on the Previous Terms.*  The effects of this policy reform on recipient consumption patterns and wellbeing that are consistent with standard economic assumptions depend upon the relationship between the voucher program's payment standard and the market rent of the project unit.  Consider, first, the case where the voucher program's payment standard exceeds the market rent of the project unit.  Figures 5A-5E depict this possibility for a family living in a housing project.  In these figures, $Q_H^G$ is the quantity of housing service provided by the family's project unit, and $Q_H^{MIN}$ is the quantity of housing service corresponding to the minimum housing standards that apply to all types of assisted housing.  The family's budget space with unit-based assistance consists of the bundles on or below AB and on GF.  Its consumption bundle with unit-based assistance is G, and the indifference curve containing G is everywhere above AB.  Otherwise, the family would have left the project.  With the voucher, its budget frontier is the shaded area.

Figures 5A-5E depict the five qualitative changes in consumption patterns that are consistent with the standard assumptions of the theory of consumer choice and the assumption that both goods are normal (hereafter the standard assumptions): (1) better housing and less other goods, (2) better housing and the same quantity of other goods, (3) better housing and more other goods, (4) equally good housing and more other goods, and (5) worse housing and more other goods. The only possibilities that are ruled out on theoretical grounds in this case are changes that imply that the household would be equally well off or worse off. Since the consumption bundle under unit-based assistance is in the interior of the voucher program's budget space, vouchering out unit-based assistance will increase the family's wellbeing in all cases. The family will move from its project unit.

If the voucher program's payment standard is less than the market rent of the project unit, fewer qualitative outcomes are consistent with the standard assumptions. Figures 6A-6C depict these outcomes. Since the family may choose to remain in its initial unit on the previous terms under this proposed reform, its budget space in each diagram is the shaded area and the line segment GM. The family's consumption bundle with unit-based assistance is G, and the family will continue to consume this bundle if it remains in its current unit. If the indifference curve containing the bundle G is everywhere above the line segment NE as in Figure 6A, the tenant will decline the voucher and remain in its current unit on the previous terms. In this case, the family will experience no change in its consumption bundle or wellbeing.[11] The two other qualitative changes in consumption patterns consistent with the standard assumptions in this case are (1) better housing and less of other goods (Figure 6B) or (2) worse housing and more other goods (Figure 6C). In both of these cases, the family moves from its project unit and is better off. It is easy to confirm that the same qualitative outcomes are possible if the payment standard is equal to the market rent of the project unit.

*Family Must Pay Market Rent for its Current Unit in a Project.* If each family is allowed to remain in its project unit on the previous terms, vouchering out unit-based assistance cannot harm these families, and it will benefit all families that move. Although ethical arguments could be made for grandfathering current occupants of housing projects in this way and this

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[11] Throughout the analysis, it is assumed that vouchering out unit-based assistance will have no effect on the housing provided to occupants of housing projects who remain in their current units. It is assumed that the policy alternative under consideration provides the housing authority or owner of the private project with sufficient subsidy to insure this outcome.

grandfathering may be necessary in order to make the ultimate elimination of unit-based assistance politically feasible, it is instructive to analyze the qualitative outcomes that are consistent with standard theory under a policy regime that requires each family that remains in its current unit to pay the market rent for this unit, albeit with the help of a voucher. This will confirm that vouchering out unit-based assistance without grandfathering current occupants of housing projects might make some of them worse off.

Figure 7A depicts the case where the payment standard exceeds the market rent of the project unit. It is easy to visualize what qualitative outcomes are consistent with standard theory in this case without depicting indifference curves in the diagram.[12] The budget space with unit-based assistance consists of the bundles on and below the line segment AB and the bundles on the vertical line GF. Prior to the reform, the family consumes the bundle G, and its indifference curve containing this bundle is everywhere above the line segment AB. If the family remains in its current unit in the housing project and pays the market rent for this unit, its consumption bundle will be R because the voucher subsidy is sufficiently large to enable the family to consume more of other goods. Under the voucher program being considered, the budget space is the shaded area. Since the indifference curve containing the bundle G is everywhere above AB, vouchering out unit-based assistance will induce the family to choose some bundle on the line segment NE. Any of the choices on NE is consistent with the standard assumptions. So the household may (1) occupy better housing and consume less of other goods, that is a bundle on CE, (2) occupy better housing and consume the same amount of other goods, that is, the bundle C, (3) occupy better housing and consume more of other goods, that is, a bundle on RC, (4) occupy equally good housing and consume more of other goods, that is, the bundle R, or (5) occupy worse housing and consume more of other goods, that is, a bundle on NR. In all cases, the family is better off, though it might move to worse housing.

In the case just analyzed where the payment standard exceeds the market rent of the project unit, the outcomes in terms of consumption patterns and wellbeing are the same when households must pay market rents to stay in their current units as when they could remain in their current units on the previous terms. This is also true if the payment standard is equal to the market rent of the project unit. Figure 7B depicts this case. The budget space with unit-based

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[12] Beyond this point, indifference curves will be described in the text but not depicted in diagrams. Drawing a separate diagram with indifference curves to illustrate each possibility would have required an additional 93, rather than 23, diagrams.

assistance consists of the bundles on and below the line segment AB and the bundles on the vertical line GF. Prior to the reform, the family consumes the bundle G, and its indifference curve containing this bundle is everywhere above the line segment AB. Under the original voucher program, the budget space is the shaded area. If the family remains in its current unit in the housing project and pays the market rent for this unit, its consumption bundle will be G because the voucher subsidy is just sufficient to enable the family to consume the same quantity of other goods as under the previous policy regime. Since the indifference curve containing the bundle G is everywhere above AB, vouchering out unit-based assistance will induce the family to choose some bundle on the line segment NE. So the family may (1) occupy better housing and consume less of other goods, that is a bundle on GE, (2) occupy equally good housing and the same amount of other goods, that is, the bundle G, or (3) occupy worse housing and consume more of other goods, that is, a bundle on NG. If the family chooses the bundle G, it will be equally well off. Otherwise, it will be better off.

If the market rent of the project unit exceeds the payment standard, the qualitative outcomes when families must pay market rents to stay in their project units differ from the outcomes when they could remain in their project units on the previous terms. The qualitative outcomes consistent with the standard assumptions can be visualized by reference to Figure 7C. In this figure, the budget space with unit-based assistance consists of the bundles on and below the line segment AB and the bundles on the vertical line GF. Prior to the reform, the family consumes the bundle G, and its indifference curve containing this bundle is everywhere above the line segment AB. Under the voucher program being considered, the budget space is the shaded area. Since the family cannot continue to occupy its project unit on the previous terms, the bundle G is not feasible for the family in this case. In response to the voucher program with no grandfathering, the family will choose a bundle on the line segment NE.

In this case, nine combinations of qualitative changes in consumption bundles and wellbeing are consistent with the standard assumptions about preferences. Some involve a higher level of wellbeing for the recipient, others a lower level, and still others the same level. To analyze the nine cases, it is convenient to consider separately each of the preceding three possibilities. If the indifference curve containing G dips below the line segment NE, the family will be better off, and it will choose a bundle on NC (that is, worse housing and more other goods) or ME (that is, more housing and less of other goods). If the indifference curve

containing G is tangent to the line segment NE or contains the bundle N or E, the same two qualitative changes in consumption patterns are consistent with theory, but the family's wellbeing would be unaffected by the reform. If the indifference curve containing G is everywhere above the line segment NE, the reform would hurt the family. It could no longer consume the bundle G, and all of the options available under the voucher program are below the indifference curve containing this bundle. In response to the voucher, the family may (1) occupy better housing and consume less of other goods, that is a bundle on ME, (2) occupy equally good housing and consume less of other goods, that is, the bundle M, (3) occupy worse housing and consume less of other goods, that is, a bundle on MC, (4) occupy worse housing and consume the same amount of other goods, that is, the bundle C, or (5) occupy worse housing and consume more of other goods, that is, a bundle on NC.

To summarize the general results for the two policy scenarios considered in this section, if the original voucher program replaces unit-based assistance and the occupants of housing projects are allowed to remain in their project units on the previous terms, none will be hurt by this reform and some, perhaps many, will benefit from it. Some who benefit may occupy worse housing. If the original voucher program replaces unit-based assistance and the occupants of housing projects must pay a market rent to remain in their in their project unit, some occupants of housing projects may be hurt by the reform. However, this can only occur in cases where the market rent of the project unit exceeds the voucher program's payment standard. Independent of the relationship between the market rent of the project unit and the voucher program's payment standard, it is possible that vouchering out unit-based assistance without grandfathering current tenants will result in worse housing for some of these tenants.

### *Replacing Unit-Based Assistance with the HCV Program for Continuing Recipients*

This section analyzes the effects of replacing unit-based assistance with the Housing Choice Voucher Program that applies to recipients after their first year in this program, namely, the voucher program depicted in Figure 3. To focus attention on the most important policy options, the analysis in the body of the paper assumes that each family can remain in its current unit on the previous terms. Appendix A analyzes the effects of replacing unit-based assistance with the HCV for continuing recipients and requiring each family in a project to pay a market rent to

remain in its current unit. Table 3 summarizes the results of the analysis of the policy scenario in this section, and Table 4 the results in Appendix A.

Figure 8A depicts the case where the payment standard exceeds the market rent of the project unit. As before, the budget space with unit-based assistance consists of the bundles on and below the line segment AB and the bundles on the vertical line GF. Prior to the reform, the family consumes the bundle G, and its indifference curve containing this bundle is everywhere above the line segment AB. Under the voucher program, the budget space is the shaded area. Since the indifference curve containing the bundle G is everywhere above AB, vouchering out unit-based assistance will induce the family to choose some bundle on the line segment CE. So the reform will lead the family to occupy better housing and the same quantity of other goods or better housing and more other goods, and the family will be better off.

Figure 8B depicts the case where the market rent of the project unit exceeds the payment standard. As in the previous case, the budget space with unit-based assistance consists of the bundles on and below the line segment AB and the bundles on the vertical line GF. Prior to the reform, the family consumes the bundle G, and its indifference curve containing this bundle is everywhere above the line segment AB. Under this voucher program with the grandfathering of current recipients of unit-based assistance, the budget space consists of bundles in the shaded area or on the line segment GM. If the indifference curve containing the bundle G is everywhere above CE, vouchering out unit-based assistance will have no effect on the family's consumption bundle or wellbeing. The family will remain in its project unit on the previous terms. If the indifference curve containing the bundle G dips below CE, the family will move from its project unit to better housing and consume less of other goods, and it will be better off. It is easy to confirm that the same two qualitative outcomes are consistent with standard theory if the market rent of the project unit is equal to the payment standard.

In short, if the proposed reform uses the HCV for continuing recipients to voucher out unit-based assistance and allows families in housing projects to remain in their units on the previous terms, it will benefit all families that use vouchers to move and have no effect on the wellbeing of other families. Furthermore, all families that move will occupy better housing, and no family will be forced to spend more of its income on housing. It is difficult to imagine a coherent objection to vouchering out unit-based assistance in this way.

*Replacing Unit-Based Assistance with the HCV Program for New Recipients*

This section analyzes the effects of replacing unit-based assistance with the Housing Choice Voucher Program that applies to new recipients, namely, the voucher program depicted in Figure 4. As in the preceding section, I focus attention on the policy option where each family can remain in its current unit on the previous terms. Appendix B analyzes the effects of replacing unit-based assistance with the HCV for new recipients and requiring each family in a project to pay a market rent to remain in its current unit. Table 5 summarizes the results of the analysis of the policy scenario in this section, and Table 6 the results in Appendix B.

Figure 9A depicts the case where the payment standard exceeds the market rent of the project unit. The budget space with unit-based assistance consists of the bundles on and below the line segment AB and the bundles on the vertical line GF. Prior to the reform, the family consumes the bundle G, and its indifference curve containing this bundle is everywhere above the line segment AB. Since the indifference curve containing the bundle G is everywhere above AB, vouchering out unit-based assistance will induce the family to choose some bundle on the line segment CD. So the reform will lead the family to occupy better housing and the same quantity of other goods or better housing and less of other goods, and the family will be better off.

Figure 9B depicts the case where the market rent of the project unit is equal to the payment standard. As in the previous case, the budget space with unit-based assistance consists of the bundles on and below the line segment AB and the bundles on the vertical line CF. Prior to the reform, the family consumes the bundle C, and its indifference curve containing this bundle is everywhere above the line segment AB. Under the voucher program, the budget space consists of bundles in the shaded area. If the indifference curve containing the bundle C is steeper than the line segment CD at the point C, the family will move to better housing, consume less of other goods, and be better off. Otherwise, the family will remain in its project unit and experience no change in its consumption bundle or wellbeing.

It is easy to confirm that the same two qualitative outcomes are consistent with standard theory if the market rent of the project unit exceeds the payment standard by less than 10 percent of adjusted income. Figure 9C depicts the budget spaces in this case. The budget space under unit-based assistance is as before. Under the voucher program, the budget space consists of bundles in the shaded area and the bundles on the vertical line segment GM. The family would

remain in its current unit and be unaffected by the reform, or it would increase its wellbeing by moving to better housing and consuming less of other goods.

If the market rent of the project unit is equal to the payment standard plus 10 percent of adjusted income, the family's budget space under the voucher program consists of all bundles in the shaded area in Figure 9D and the bundles on the vertical line segment GD. If the market rent of the project unit exceeds the payment standard plus 10 percent of adjusted income, its budget space under the voucher program consists of all bundles in the shaded area in Figure 9E and the bundles on the vertical line segment GF. In both cases, the family will remain in its current unit and be unaffected by the reform.

In short, if the proposed reform uses the HCV for new recipients to voucher out unit-based assistance and allows families in housing projects to remain in their units on the previous terms, it will benefit all families that use vouchers to move and have no effect on the wellbeing of other families. Furthermore, all families that move will occupy better housing, and no family will be forced to spend more of its income on housing. In these senses, using the HCV program for new recipients to voucher out unit-based assistance has the same qualitative effects as using the HCV program for continuing recipients. The qualitative difference between the effects of these alternative voucher programs is that the HCV program for new recipients limits to a greater extent the magnitudes of the improvement in housing and reduction in consumption of other goods that can result from vouchering out unit-based assistance.

***Which Relationships between Market Rent and Payment Standard Are Most Likely?***
The preceding analysis indicates that the effects of vouchering out unit-based housing assistance depend importantly on the relationship between the market rent of the project unit and the voucher program's payment standard. Since the voucher program's payment standard is itself a policy option, it is difficult to predict with much confidence what standard will be chosen. This section explores some implications of three alternative levels at which payment standards could be set.

Many discussions of vouchering out unit-based assistance have assumed that the vouchers would be regular Section 8 vouchers. Despite the desirability of a uniform voucher program that offers the same subsidy to all households with the same characteristics, it is entirely possible that the Congress would adopt other payment standards for vouchers used to replace

unit-based assistance. The Section 8 voucher program has a long history of providing vouchers of different amounts to identical households in a given area. This includes allowing housing authorities to approve higher subsidies for a certain fraction of their recipients to enable them to live in more expensive neighborhoods, enhanced vouchers to enable occupants of subsidized housing projects to continue to live in their units at the end of the project's use agreement without spending an excessive fraction of their income on housing, and more generous vouchers to allow the disabled to meet their special needs. The vouchers considered in this paper also serve a special purpose, namely, allowing recipients to occupy housing that is better overall and that has characteristics more in line with recipient preferences without spending more money on housing assistance.

Suppose that payment standards under the voucher program that replaces unit-based assistance are chosen to spend the same amount of public money and serve the same number of households. The simple theory in this paper implies that all recipients will choose a consumption bundle that yields the maximum subsidy $PS - .3Y_A$. Empirical evidence suggests that this has been close to the truth under past voucher programs of the types considered here. Since the mean taxpayer cost under the voucher program would be equal to the mean taxpayer cost under unit-based assistance, it would be close to the truth that

$$\overline{PS} - .3\overline{Y_A} = \overline{TC} - .3\overline{Y_A} \,,$$

where $\overline{TC}$ is the mean total cost of project units excluding administrative cost.[13] So the mean payment standard $\overline{PS}$ is equal to the mean total cost of project units $\overline{TC}$. Due to the cost-ineffectiveness of unit-based assistance, the mean market rent of project-units $\overline{P_H Q_H^G}$ is far below the mean total cost of these units $\overline{TC}$ and hence the payment standard $\overline{PS}$. This strongly suggests that the payment standard will exceed the market rent of the project unit for the overwhelming majority of households living in these units. If the same total amount of taxpayer money were spent on housing assistance but a somewhat lower payment standards were used so that more households could be served, this would still be true. For these policy choices, the

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[13] For simplicity, it is assumed that the per-unit cost of administering recipient-based and unit-based assistance is the same.

relevant analysis of each of the six discrete policy options (three voucher types and two policies concerning the rents to be paid by tenants who want to remain in their project units) is the analysis of the case where the payment standard $PS$ exceeds the market rent of the project unit $P_H Q_H^G$.

Another possibility is that the payment standards of the current Housing Choice Voucher Program would be used to voucher out unit-based assistance. As mentioned above, previous research has shown that the mean market rents of voucher units has been approximately equal to the mean payment standards of voucher programs. Some families with vouchers occupy units renting for less than the relevant payment standard; others occupy units renting for more. However, the means are almost identical. Furthermore, the median market rent of voucher units under the existing voucher program appears to exceed the median market rent of units in HUD-subsidized housing projects, though these differences are not large [Olsen, 2004, Table 6]. So if occupants of housing projects were offered vouchers as generous as current regular vouchers, the majority of these families would be offered a voucher with a payment standard exceeding the market rent of its project unit, though the opposite would surely be true for many families.[14]

Finally, the payment standard for each type of household might be set equal to the mean market rent of the project units occupied by households of this type. In this case, the average quality of the housing occupied by recipients of housing assistance and their average subsidy would be unaffected by the reform. That is,

$$\overline{PS} - .3\overline{Y_A} = \overline{P_H Q_H^G} - .3\overline{Y_A}\,.$$

This alternative would free up considerable money that could be used to reduce taxes or serve additional households. In this case, many households would occupy project units with market rents exceeding the relevant payment standard and many would occupy project units where the opposite is true. So if the payment standards are set at these levels, all of the preceding analyses are relevant.

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[14] This option would reduce the total taxpayer cost because (i) the mean payment standard would be approximately equal to the mean market rent of voucher units, (ii) the mean market rent of voucher units are only slightly greater than the mean market rent of project units, and (iii) the mean total cost of project units greatly exceeds the mean market rent of these units. So the taxpayer cost of serving a particular set of families under this voucher option would be less than under project based assistance even though the average quality of their housing would be greater.

*Relaxing the Simplifying Assumptions*

To simplify the analysis, I initially assumed that moving is costless and that no tenant in a housing project would like to move to an unsubsidized unit with the same market rent as its current unit while continuing to pay the same rent. I now consider how deviations from these assumptions affect the outcomes.

In general, deviations from the simplifying assumptions do not eliminate a qualitative possibility, and they introduce an additional qualitative outcome in some policy scenarios. As long as some tenants will make a particular qualitative choice under the simplifying assumptions, they will make the same qualitative choice for sufficiently small deviations from these assumptions. For example, if some occupants of project units would move to better housing, consume less of other goods, and be better off under the simplifying assumptions, they would have the same qualitative outcome if moving cost were sufficiently small. Small moving costs only affect the magnitudes of the changes in these outcomes. In policy scenarios where some households would remain in their project units in the absence of moving costs, more might remain in the presence of these costs. In policy scenarios where no household would remain in its project unit in the absence of moving costs, some households will remain if moving costs are sufficiently large. Therefore, positive moving costs add to the previously mentioned qualitative outcomes that are consistent with the standard assumptions of the theory of consumer choice.

The consequences of violations of the second simplifying assumption require more explanation. The analysis in this paper is based on two composite commodities, namely, housing services and other goods. To justify an analysis based on these composite commodities rather than the many underlying housing attributes and other individual goods requires the assumption that the household always consumes a bundle of housing attributes that is the household's most preferred bundle among all bundles with the same market value. This assumption is surely violated for almost all households living in housing projects. That is, if these households were allowed to occupy any unit in the private market with the same market rent as their project unit and someone paid their moving expenses, almost all would move to a different unit.

The consequence of this consideration for the preceding analysis is that it overstates the value that occupants of projects place on remaining in their current unit. This is easily seen by reference to Figure 1. The bundle G in this diagram involves a dwelling unit with a market rent

of $P_H Q_H^G$ and expenditure on other goods of $Y - .3Y_A$. The utility associated with this bundle is the utility that the household would achieve if it occupied a dwelling unit with its most preferred combination of attributes among dwelling units with this market rent. A similar remark applies to other goods. The occupants of a housing project that live in a unit with a market rent of $P_H Q_H^G$ and spend $Y - .3Y_A$ on other goods attain a lower level of wellbeing because they consume a less desirable combination of housing attributes.

Under many of the policy scenarios considered in this paper (where a policy scenario includes the level of the payment standard), it would not be rational to remain in the project unit even if it provided the household's optimal combination of housing characteristics given its market rent. These analyses are unaffected by the preceding consideration. Under other policy scenarios, it would be rational to stay in the project unit if it provided the household's optimal combination of housing characteristics. If the deviation from the optimal housing bundle were sufficiently small, the household would still want to remain in its project unit. Otherwise, it would move. If the analysis in this paper indicates that the household would want to move, this household would want to move even if the project unit did not provide the optimal combination of characteristics because the option not chosen is even less desirable than the analysis suggests. So the analysis overstates the number of households that would want to remain in their project units.

**Conclusion**

The most serious shortcoming of the current system of low-income housing assistance in the United States is its excessive reliance on unit-based programs. Evidence indicates that recipient-based housing vouchers provide equally good housing at a much lower total cost than any program of unit-based assistance. Therefore, it would be possible to serve current recipients equally well (that is, provide them with equally good housing for the same rent), serve many additional families, and reduce taxes by shifting resources from unit-based to recipient-based assistance. This would involve disengaging from unit-based assistance to existing apartments as soon as current contractual commitments permit. No other reform of the current system would lead to societal benefits of a similar magnitude.

This paper presents a theoretical analysis of the effects of vouchering out unit-based assistance on the consumption patterns and well being of occupants of housing projects. It shows how these effects depend upon the nature of the recipient-based voucher program, whether the household can remain in its project unit on the previous terms, the market rent of the project unit relative to the voucher's payment standard, and the cost of moving.

The most important general result of the analyses is that it is possible to craft a reform proposal for vouchering out unit-based assistance that will benefit all families that use vouchers to move and have no effect on the wellbeing of other families. Furthermore, all families that move will occupy better housing, and no family will be forced to spend more of its income on housing. It is difficult to imagine a coherent objection to vouchering out unit-based assistance in this way.

**Appendix A**

For the sake of completeness, this appendix analyzes the effect of vouchering out unit-based assistance with the HCV for continuing recipients and requiring tenants to pay the market rent for their project unit if they want to remain in it. Table 4 summarizes the results of this analysis. Figure A1 depicts the case where the payment standard exceeds the market rent of the project unit. The budget space with unit-based assistance consists of the bundles on and below the line segment AB and the bundles on the vertical line GF. Prior to the reform, the family consumes the bundle G, and its indifference curve containing this bundle is everywhere above the line segment AB. Under the voucher program, the budget space is the shaded area. Since the indifference curve containing the bundle G is everywhere above AB, vouchering out unit-based assistance will induce the family to choose some bundle on the line segment CE. So the reform will lead the family to occupy (1) better housing and the same quantity of other goods or (2) better housing and less other goods, and the family will be better off.

Figure A2 depicts the case where the payment standard is equal to the market rent of the project unit. The budget space with unit-based assistance consists of the bundles on and below the line segment AB and the bundles on the vertical line CF. Prior to the reform, the family consumes the bundle C, and its indifference curve containing this bundle is everywhere above the line segment AB. Under the voucher program, the budget space is the shaded area. Since the

indifference curve containing the bundle C is everywhere above AB, vouchering out unit-based assistance will induce the family to choose some bundle on the line segment CE. In this case, the family may remain in its current unit, consume the same bundle of goods, and experience no change in its wellbeing. The only other choice consistent with the standard assumptions is to move to another unit that provides better housing and consume less of other goods. Families that move will be better off.

Figure A3 depicts the case where the market rent of the project unit exceeds the payment standard. The budget space with unit-based assistance consists of the bundles on and below the line segment AB and the bundles on the vertical line GF. Prior to the reform, the family consumes the bundle G, and its indifference curve containing this bundle is everywhere above the line segment AB. Under the voucher program, the budget space is the shaded area. If the family wants to remain in its project unit, it will have to spend more than 30 percent of its adjusted income on housing and consume less of other goods than it would in the absence of the reform. If the family's indifference curve containing G dips below the line segment ME, the reform will benefit the family. It will move from its current unit, occupy better housing, and consume less of other goods. Otherwise, the family will be hurt by the reform, and four qualitative changes in consumption patterns are consistent with standard theory. The family may occupy better housing and consume less other goods (that is, a bundle on ME), it may occupy equally good housing and consume less other goods (that is, the bundle M), it may consume less of both goods (that is, a bundle on CM), or it may occupy worse housing and consume same quantity of other goods (that is, bundle C).

**Appendix B**

This appendix analyzes the effect of vouchering out unit-based assistance with the HCV for new recipients and requiring tenants to pay the market rent of their project unit if they want to remain in it. Table 6 summarizes the results of this analysis. For this combination of policy options, five different relationships between the payment standard and the market rent of the project unit must be considered, and the qualitative outcomes consistent with the standard theory are different in each case. Figures B1-B5 depict these possibilities. In each diagram, the budget space with unit-based assistance consists of the bundles on and below the line segment AB and

the bundles on the vertical line GF.  (In Figure B2, the bundle G is the same as the bundle C.  In Figure B4, the bundle F is the same as the bundle H.)  Prior to the reform, the family consumes the bundle G, and its indifference curve containing this bundle is everywhere above the line segment AB.  Under the voucher program, the budget space is the shaded area.

Figure B1 depicts the case where the payment standard exceeds the market rent of the project unit.  In this case, the reform will lead the family to occupy (1) better housing and the same quantity of other goods or (2) better housing and less other goods, and the family will be better off.

Figure B2 depicts the case where the payment standard is equal to the market rent of the project unit.  In this case, the family may remain in its current unit, consume the same bundle of goods, and experience no change in its wellbeing.  The only other choice consistent with the standard assumptions is to move to another unit that provides better housing and consume less of other goods.  Families that move will be better off.

Figure B3 depicts the case where the market rent of the project unit exceeds the payment standard by less than 10 percent of the occupant's adjusted income.  If the family wants to remain in its project unit, it will have to spend more than 30 percent of its adjusted income on housing and consume less of other goods than it would in the absence of the reform.  If the family's indifference curve containing G dips below the line segment CD, the reform will benefit the family.  It will move from its current unit, occupy better housing, and consume less of other goods.  Otherwise, the family will be hurt by the reform, and four qualitative changes in consumption patterns are consistent with standard theory.  The family may occupy better housing and consume less other goods (that is, a bundle on MD or HB), it may occupy equally good housing and consume less other goods (that is, the bundle M), it may consume less of both goods (that is, a bundle on CM), or it may occupy worse housing and consume same quantity of other goods (that is, bundle C).[15]

Figure B4 depicts the case where the market rent of the project unit exceeds the payment standard by 10 percent of occupant's adjusted income.  In this case, the family will be hurt by the reform, and four qualitative changes in consumption patterns are consistent with standard theory. The family may occupy better housing and consume less other goods (that is, a bundle on HB), it

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[15] If one of the individual's indifference curves is tangent to the line segment HB, the bundle D might be above or below that indifference curve.

may occupy equally good housing and consume less other goods (that is, the bundle D), it may consume less of both goods (that is, a bundle on CD), or it may occupy worse housing and consume same quantity of other goods (that is, bundle C).

Figure B5 depicts the case where the market rent of the project unit exceeds the payment standard by more than 10 percent of occupant's adjusted income. In this case, the family will be hurt by the reform, and four qualitative changes in consumption patterns are consistent with standard theory. The family may occupy better housing and consume less other goods (that is, a bundle on FB), it may occupy equally good housing and consume less other goods (that is, the bundle F), it may consume less of both goods (that is, a bundle on HF or CD), or it may occupy worse housing and consume same quantity of other goods (that is, bundle C).

**Appendix C**

Some low-income housing programs in the United States have charged rents that are independent of the recipient's income for at least some recipients. These tenants almost always pay more than 30 percent of their adjusted income for their apartment. The purpose of this appendix is to analyze the effects of vouchering out unit-based assistance on such tenants.

Among current programs, the most important example is the Low-Income Housing Tax Credit. About 40 percent of all tax credit units receive Section 8 assistance. The occupants of these units pay 30 percent of their adjusted income in rent, and so the earlier analysis applies to them. However, the remaining 60 percent receive subsidies that do not usually require the owner of the project to condition rent on the economic circumstances of tenants.[16] The Tax Credit Program has upper income limits for eligibility and limits on the rents that tenants can be charged.[17] The ceiling rent for families of a particular size is 30 percent of the income limit for families of that size in its locality. Therefore, if owners are able to charge ceiling rents for their units, only tenants with incomes at the upper income limit for eligibility pay 30 percent of their income in rent. All others pay more than 30 percent. Since the analysis up to this point assumes

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[16] The overwhelming majority of tax credit projects receive subsidies from multiple sources.

[17] Almost all developers of tax credit projects choose an option that restricts the occupancy of tax credit units to tenants with incomes below limits based on 60 percent of the local median. The four-person limit is 60 percent of the local median income for families of all sizes. The income limits for families of other sizes are obtained by multiplying the four-person limit by nationally uniform constants. For example, this constant is 0.70 for a single person and 1.16 for a family of six.

that tenants in housing projects pay 30 percent of adjusted income in rent, this requires a modification of this analysis.

Figures C1 through C5 depict the budget constraints under unit-based assistance where tenants pay more than 30 percent of adjusted income in rent and under a policy alternative where these tenants are offered a HCV for continuing recipients and current recipients of unit-based assistance can remain in their units on the previous terms. In these figures, TR is the tenant rent in project unit. Otherwise, the symbols in these figures have the same interpretation as in the previous figures. The budget space with unit-based assistance consists of the bundles on and below the line segment AB and the bundles on the vertical line GF. Prior to the reform, the family consumes the bundle G, and its indifference curve containing this bundle is everywhere above the line segment AB. Under the voucher program with grandfathering of current recipients of unit-based assistance, the budget space is the shaded area and the bundles on the vertical line GF.

Table 7 summarizes the results of the analysis for this combination of policy options. The qualitative outcomes that are consistent with standard theory in this case depend upon the relationship between the market rent of the project unit and the parameters of the voucher program. If $P_H Q_H^G < PS$ (Figure C1), the reform will lead the family to choose (1) better housing and more other goods, (2) better housing and the same quantity of other goods, or (3) better housing and less of other goods. In this case, the family will move and be better off. If $P_H Q_H^G = PS$ (Figure C2), the reform will lead the family to choose (1) equally good housing and more other goods, (2) better housing and more other goods, (3) better housing and the same quantity of other goods, or (4) better housing and less of other goods. As in the preceding case, the family will move and be better off. If $PS < P_H Q_H^G < PS + TR - .3Y_A$ (Figure C3), any qualitative change in the consumption bundle that is consistent with an increase in the family's wellbeing is consistent with the standard assumptions. That is, the family might choose (1) worse housing and more other goods, (2) equally good housing and more other goods, (3) better housing and more other goods, (4) better housing and the same quantity of other goods, or (5) better housing and less of other goods. As before, the family will move and be better off. In the remaining two cases, the family might remain in its current unit and be unaffected by the reform. Otherwise, the family will move and benefit from the reform. If $P_H Q_H^G = PS + TR - .3Y_A$ (Figure

C4), the family will remain in its current unit if its indifference curve containing the bundle G is tangent to the line segment CE. Otherwise, it will choose a bundle involving worse housing and more other goods or better housing and less other goods. If $P_H Q_H^G > PS + TR - .3Y_A$ (Figure C5), the family will remain in its current unit if its indifference curve containing the bundle G is everywhere above the line segment CE or tangent to it. Otherwise, it will choose a bundle involving worse housing and more other goods or better housing and less other goods.

In short, if current occupants of housing projects are allowed to remain in their current units on the previous terms, vouchering out unit-based assistance will have no effect on their wellbeing, or it will benefit them. The qualitative changes in consumption patterns that are consistent with the standard assumptions of the theory of consumer choice depend upon the relationship between the market rent of the project unit and the parameters of the voucher program. Any qualitative change in the consumption bundle that is consistent with an increase in the family's wellbeing or no change in wellbeing is consistent with the standard assumptions for some relationship between the market rent of the project unit and the parameters of the voucher program.

If the family must pay the market rent of the project unit in order to continue to live in it, the analysis of the cases depicted in Figures C1-C4 is unaffected because the family's consumption bundle in the absence of reform is attainable with the voucher. Only the analysis of the case where the market rent of the project unit exceeds the payment standard by more than the difference between tenant rent TR and 30 percent of the family's adjusted income requires modification. Without grandfathering current occupants of projects, the bundles on the line segment GM in Figure C5 are not feasible under the reform. If the family's indifference curve containing the bundle G is everywhere above the line segment CE, the reform will hurt the family. In this case, the family may occupy better housing and consume less other goods (that is, a bundle on ME), it may occupy equally good housing and consume less other goods (that is, the bundle M), it may consume less of both goods (that is, a bundle on RM), it may occupy worse housing and consume same quantity of other goods (that is, bundle R), or it may occupy worse housing and consume more other goods (that is, a bundle on CR). If the family's indifference curve containing the bundle G is tangent to the line segment CE, the family's wellbeing will be unaffected by the reform, but it will (1) occupy better housing and consume less other goods or (2) occupy worse housing and more other goods. If the family's indifference curve containing

the bundle G dips below the line segment CE, the family will benefit from the reforms, and it will (1) occupy better housing and consume less other goods or (2) occupy worse housing and more other goods.

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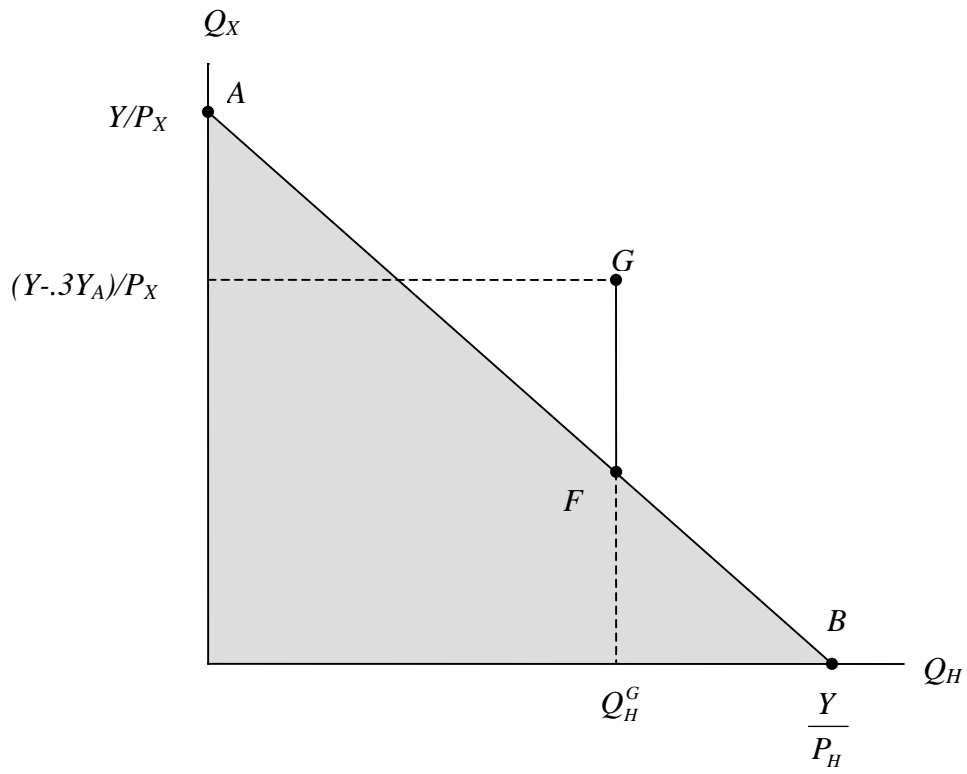
**Figure 1 – Budget space with unit-based assistance**

$Q_X$

$(Y+S)/P_X$

$A$     $N$

$Y/P_X$

$J$

$B$     $E$

$Q_H$

$Q_H^{MIN}$

$\dfrac{Y}{P_H}$   $\dfrac{Y+S}{P_H}$
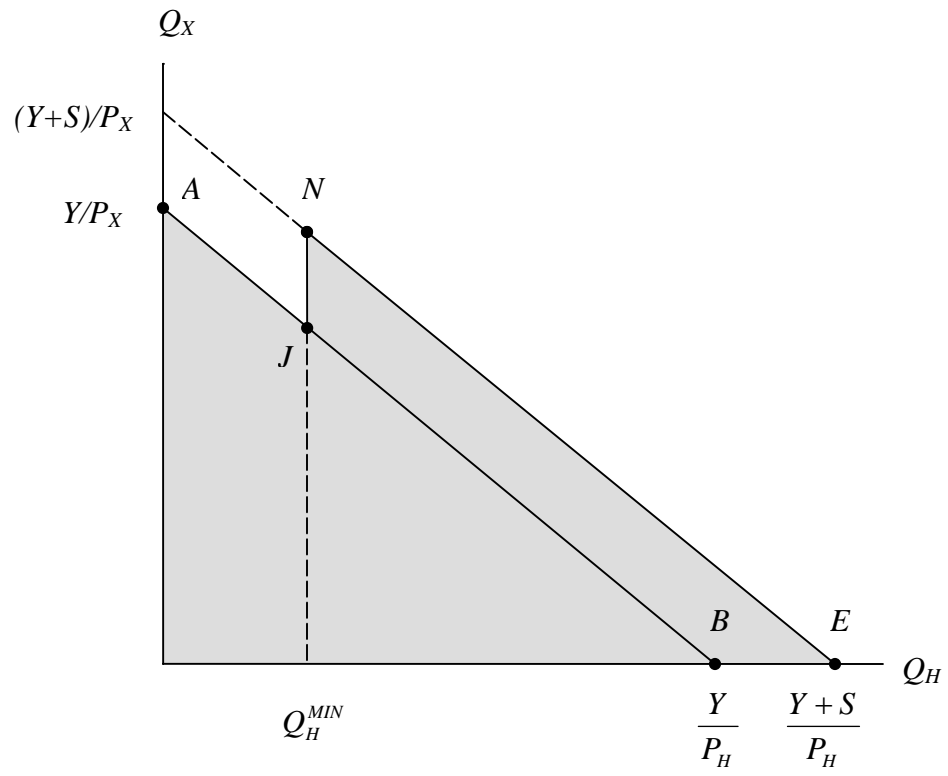
**Figure 2 – Budget space with original voucher program**

$Q_X$

$Y/P_X$   A

K    C

$(Y-.3Y_A)/P_X$

J

B    E

$Q_H$

$Q_H^{MIN}$   $\dfrac{PS}{P_H}$     $\dfrac{Y}{P_H}$   $\dfrac{Y+S}{P_H}$
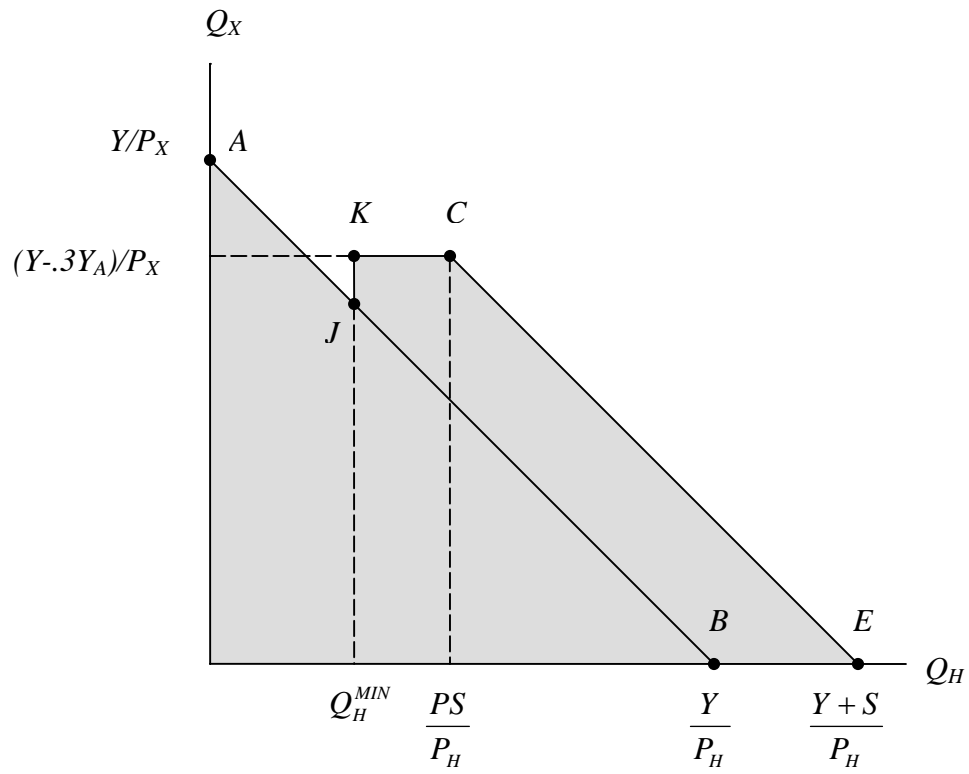
**Figure 3 – Budget space with HCV Program for continuing recipients**

$Q_X$

$(Y+S)/P_X$

$Y/P_X$    A

$(Y-.3Y_A)/P_X$    K    C

$(Y-.4Y_A)/P_X$    D    J

H

B    E

$Q_H$

$Q_H^{MIN}$    $\dfrac{PS}{P_H}$    $\dfrac{PS+.1Y_A}{P_H}$    $\dfrac{Y}{P_H}$    $\dfrac{Y+S}{P_H}$
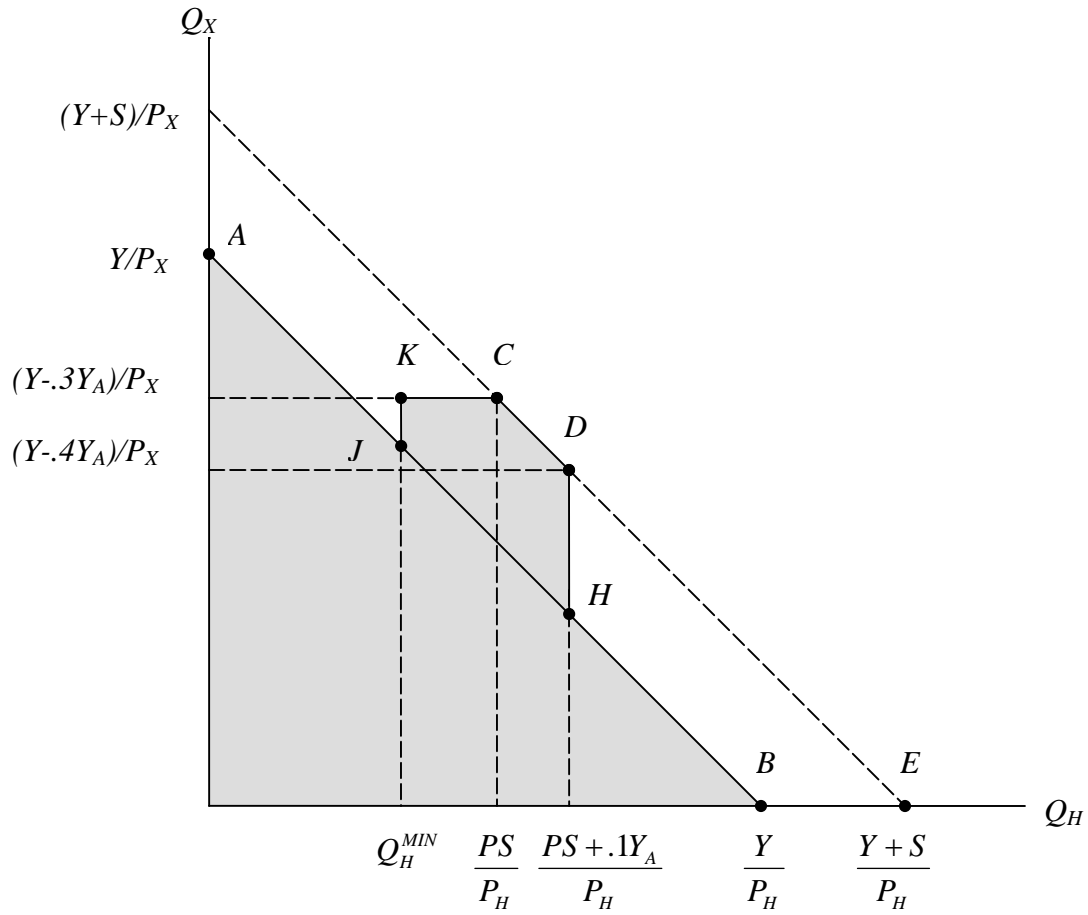
**Figure 4 – Budget space with HCV Program for new recipients**
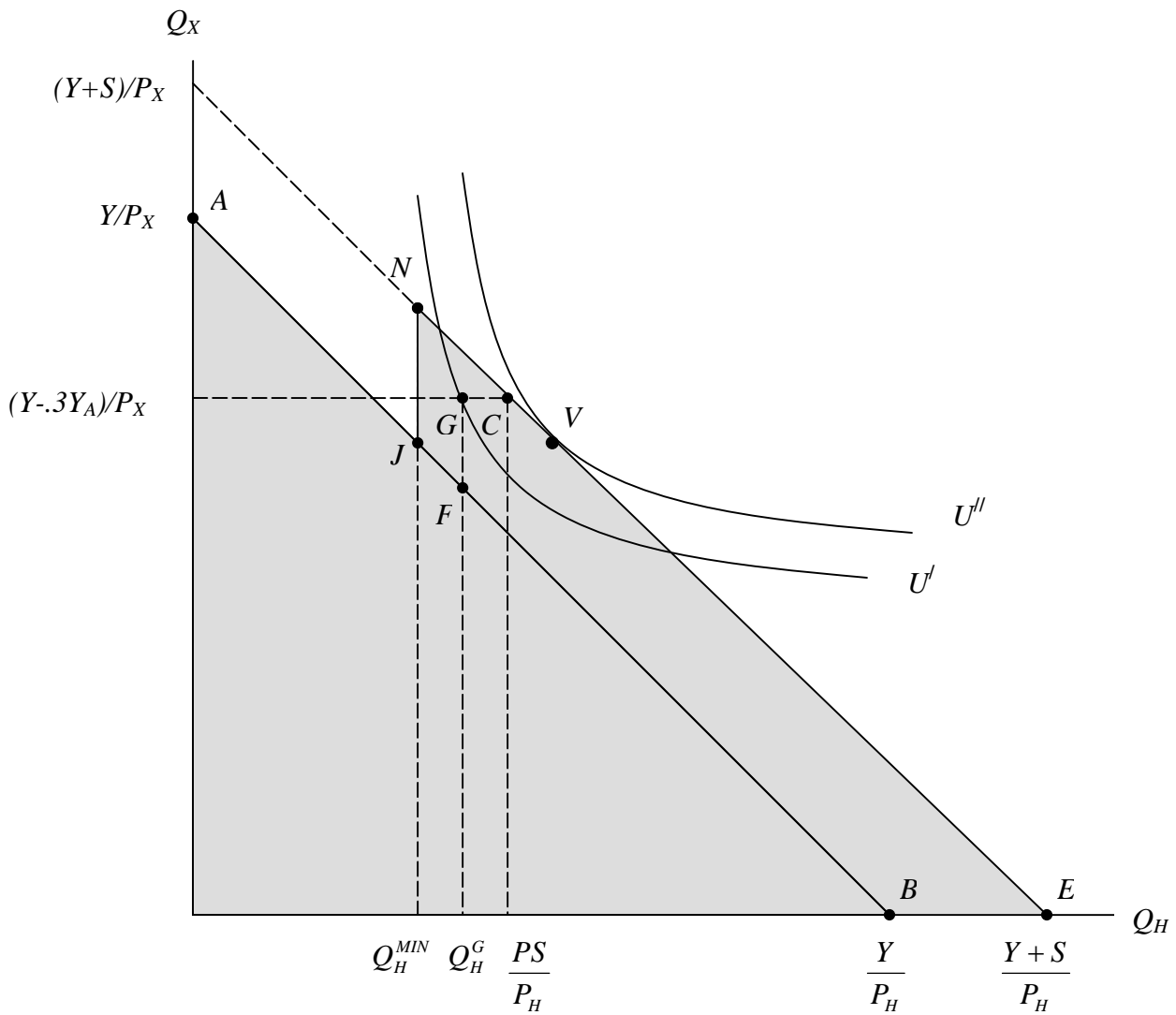
**Figure 5A – If the payment standard exceeds the market rent of the project unit, replacing unit-based assistance with original voucher program while grandfathering current occupants of projects might lead to better housing, less other goods and higher wellbeing**
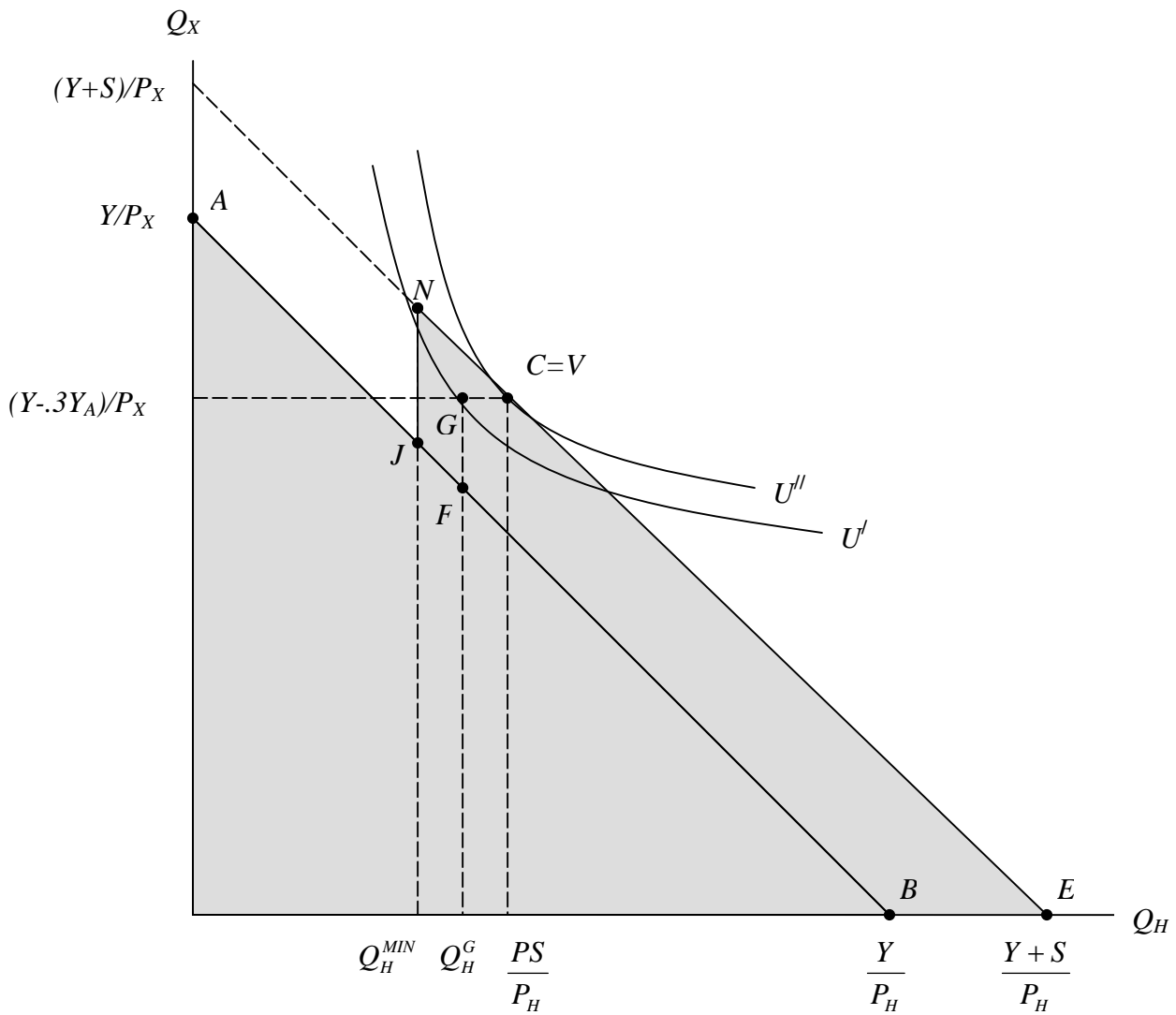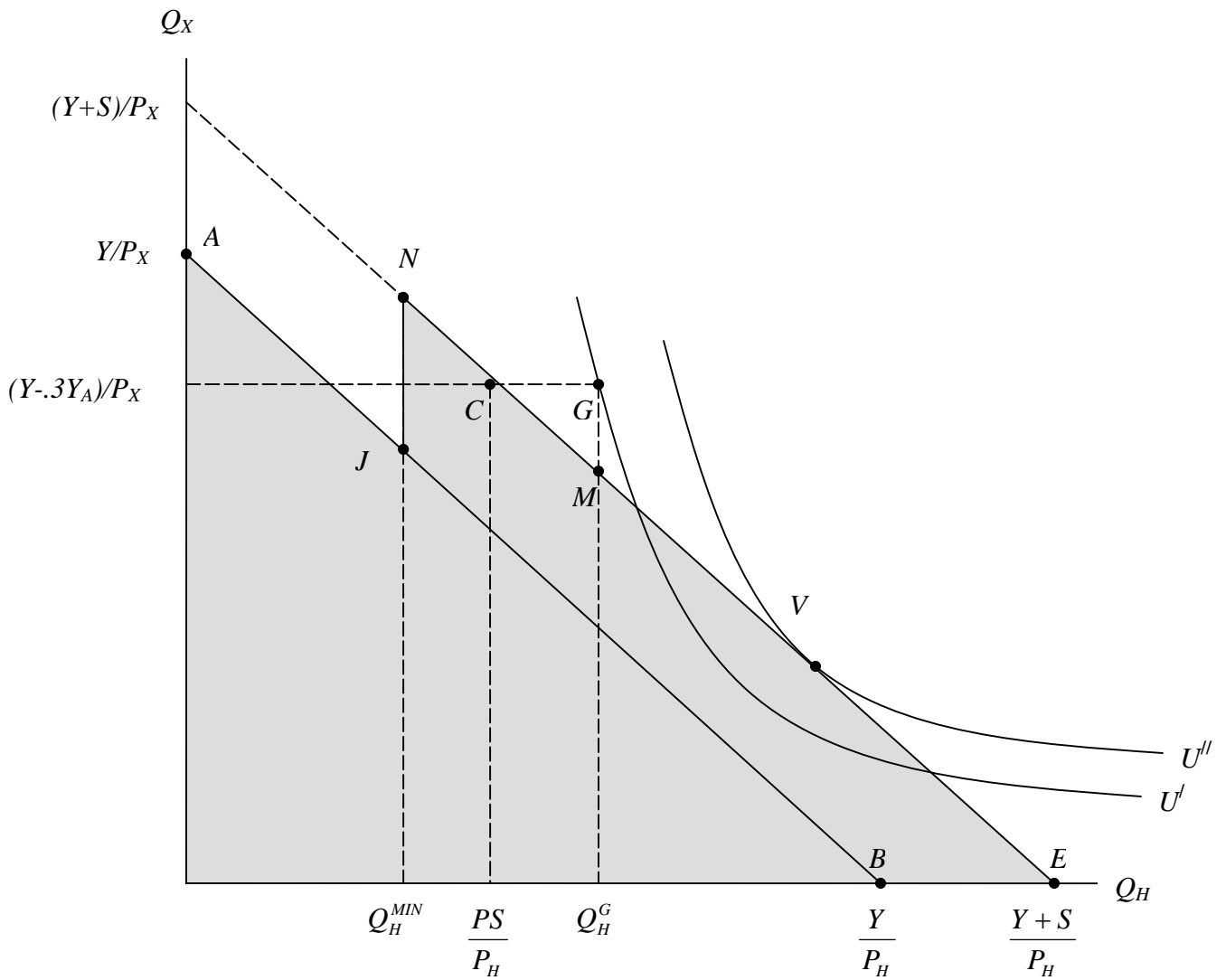
**Figure 5B – If the payment standard exceeds the market rent of the project unit, replacing unit-based assistance with original voucher program while grandfathering current occupants of projects might lead to better housing, the same other goods and higher wellbeing**

Figure axes and labels:

$Q_X$

$(Y+S)/P_X$

$Y/P_X$ — $A$

$N$

$V$ $C$

$(Y-.3Y_A)/P_X$

$G$

$J$

$F$

$U''$

$U'$

$B$ $E$

$Q_H$

$Q_H^{MIN}$ $Q_H^G$ $\dfrac{PS}{P_H}$ $\dfrac{Y}{P_H}$ $\dfrac{Y+S}{P_H}$
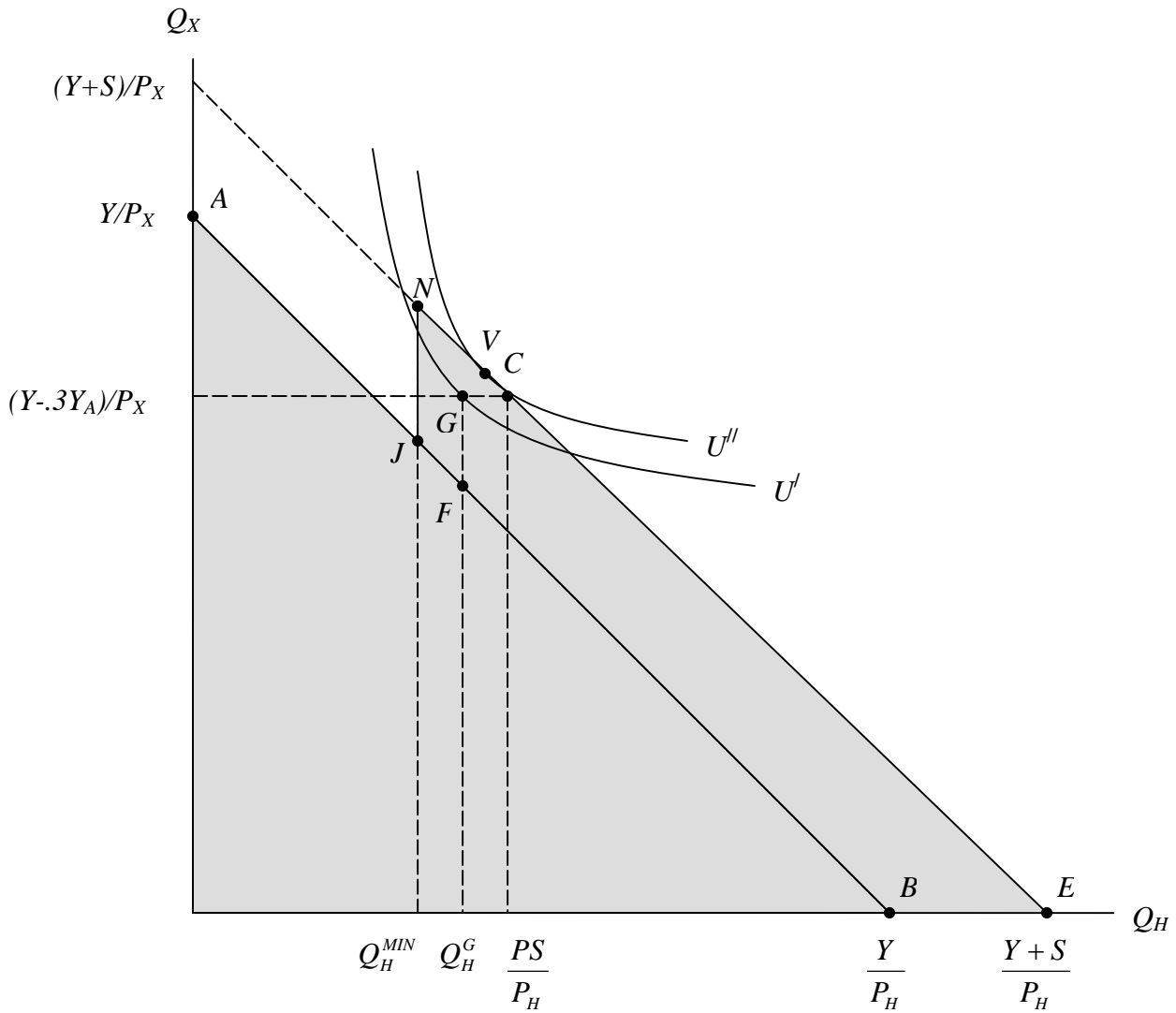
**Figure 5C – If the payment standard exceeds the market rent of the project unit, replacing unit-based assistance with original voucher program while grandfathering current occupants of projects might lead to better housing, more other goods and higher wellbeing**
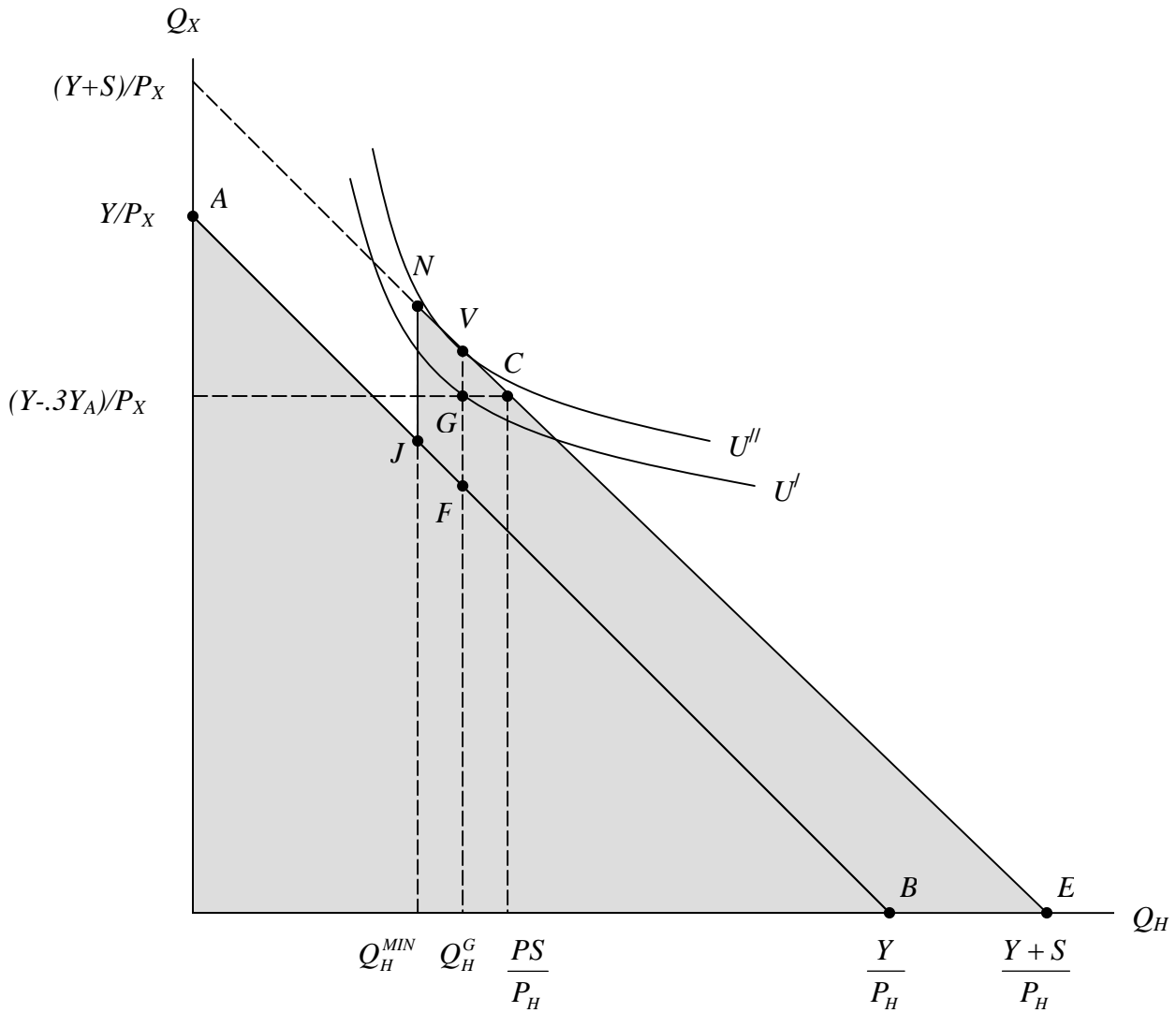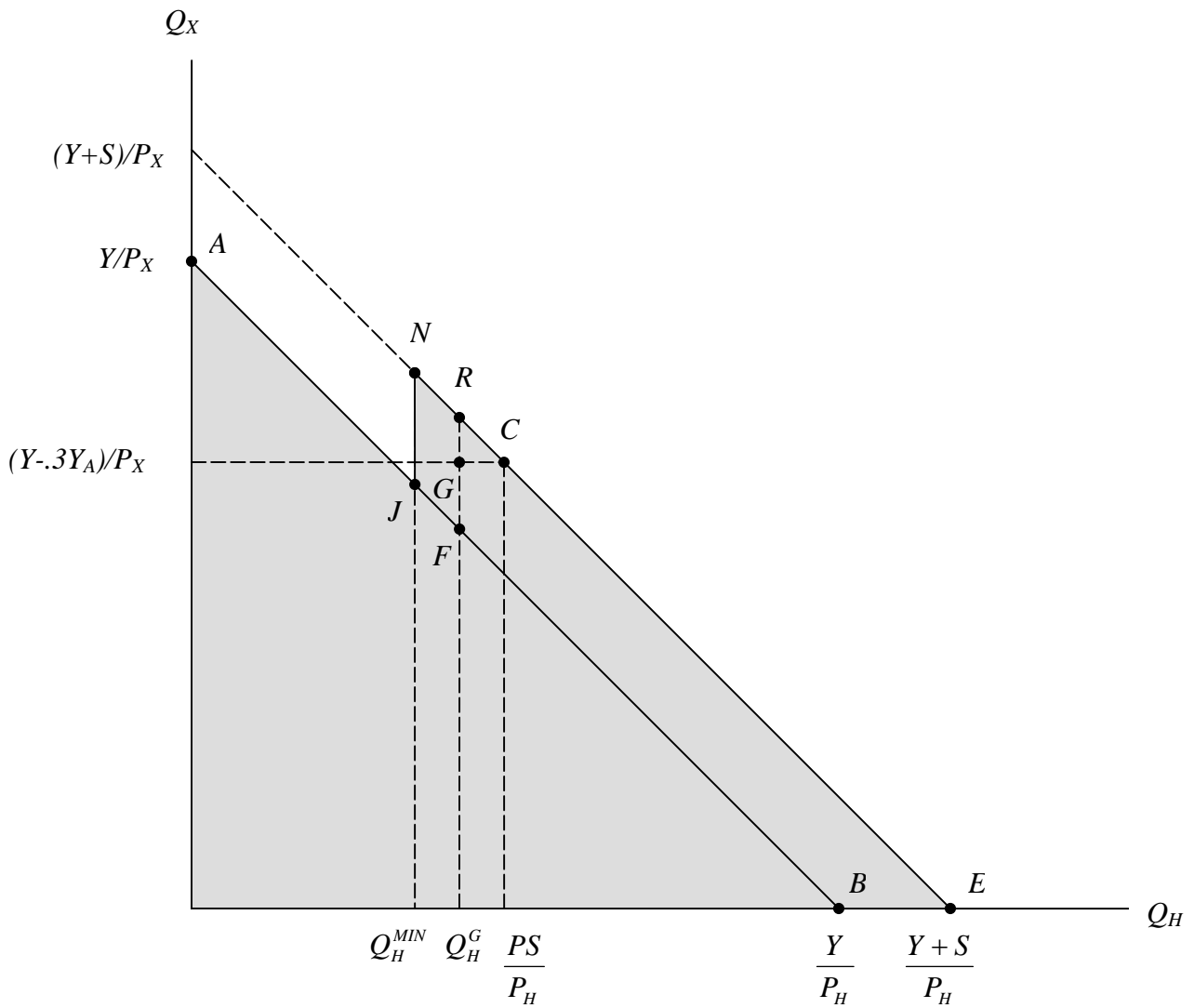
**Figure 5D – If the payment standard exceeds the market rent of the project unit, replacing unit-based assistance with original voucher program while grandfathering current occupants of projects might lead to equally good housing, more other goods and higher wellbeing**

$Q_X$

$(Y+S)/P_X$

$Y/P_X$    A

           N   V

$(Y-.3Y_A)/P_X$             C

          G

       J            $U''$

           F           $U'$

                             B       E

                                                 $Q_H$

$Q_H^{MIN}$   $Q_H^G$   $\dfrac{PS}{P_H}$        $\dfrac{Y}{P_H}$    $\dfrac{Y+S}{P_H}$
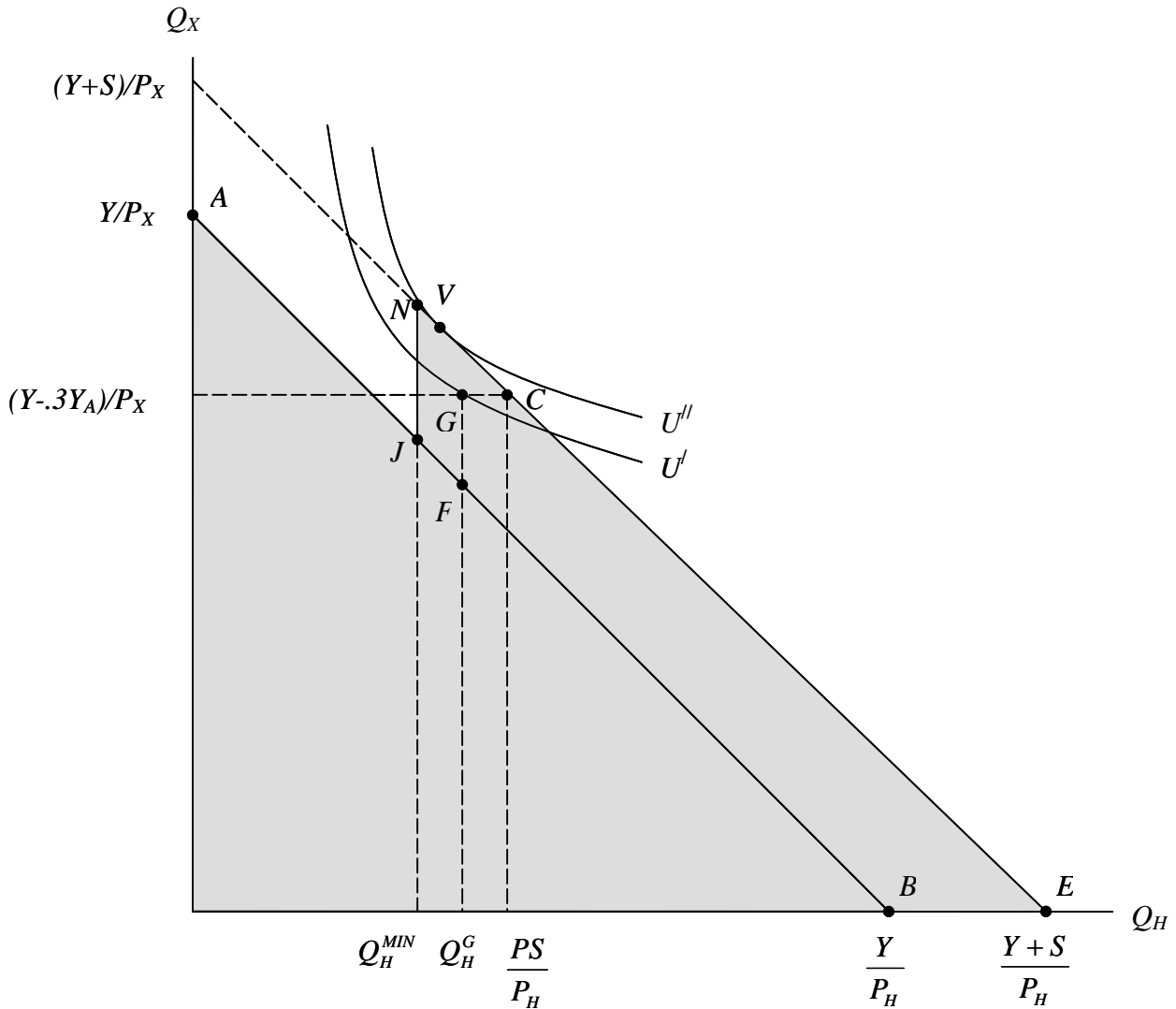
**Figure 5E – If the payment standard exceeds the market rent of the project unit, replacing unit-based assistance with original voucher program while grandfathering current occupants of projects might lead to worse housing, more other goods and higher wellbeing**
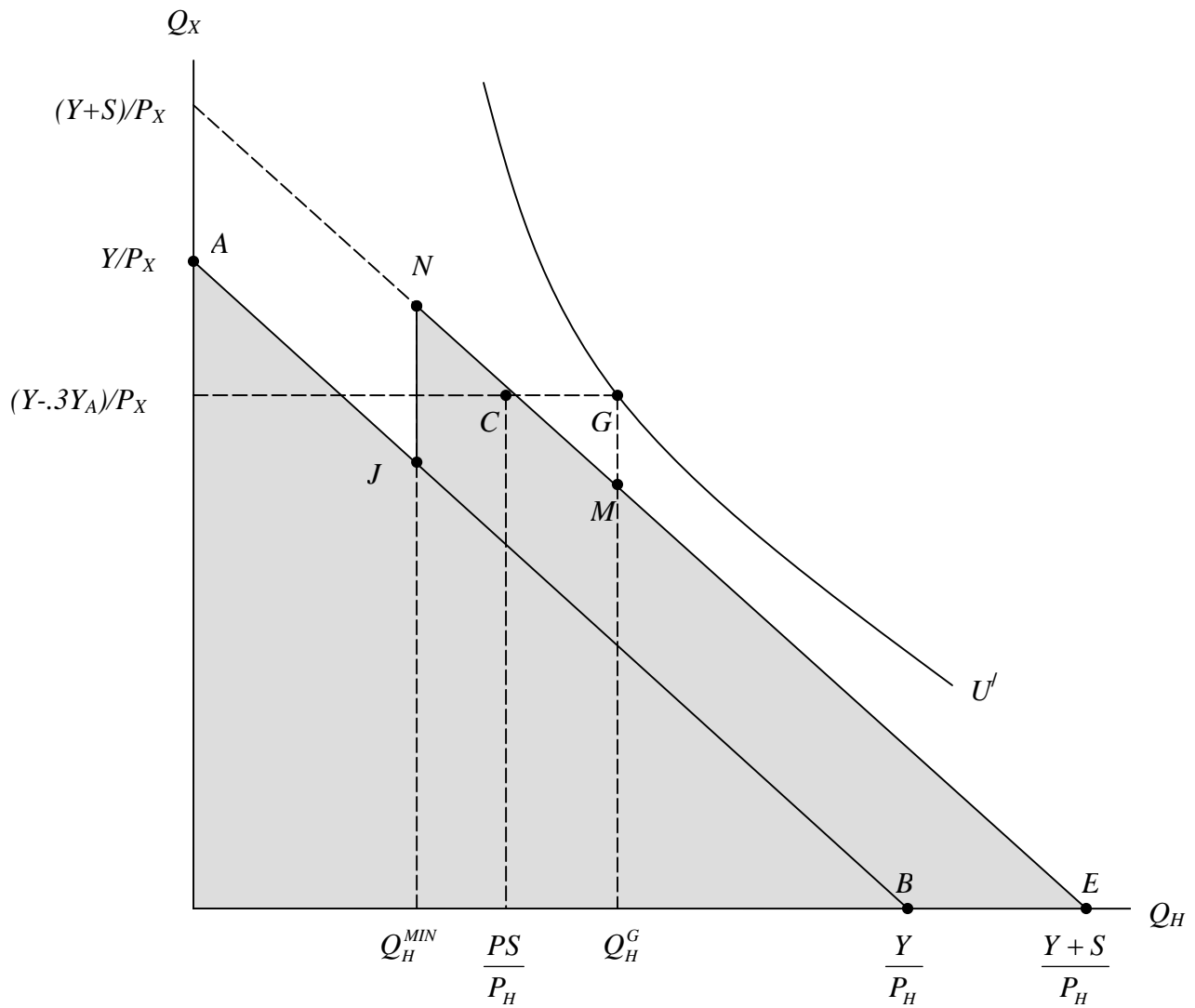
**Figure 6A – If the market rent of the project unit exceeds the payment standard, replacing unit-based assistance with original voucher program while grandfathering current occupants of projects might lead to no change in consumption pattern or wellbeing**

**Figure 6B – If the market rent of the project unit exceeds the payment standard, replacing unit-based assistance with original voucher program while grandfathering current occupants of projects might lead to better housing, less other goods and higher wellbeing**
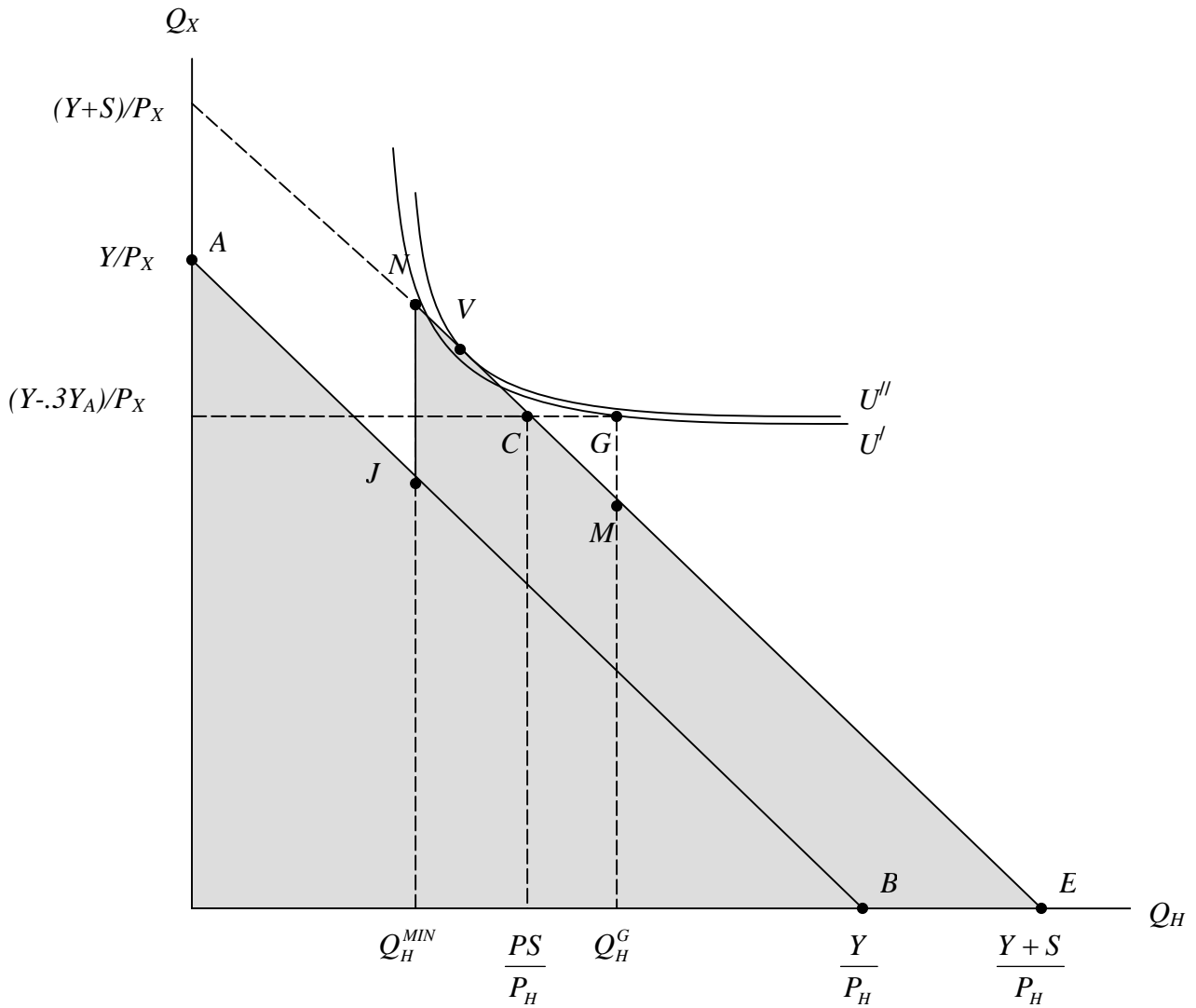
**Figure 6C – If the market rent of the project unit exceeds the payment standard, replacing unit-based assistance with original voucher program while grandfathering current occupants of projects might lead to worse housing, more other goods and higher wellbeing**

**Figure 7A – Budget spaces for analysis of replacing unit-based assistance with original voucher program without grandfathering current occupants of projects in the case where the payment standard exceeds the market rent of the project unit**
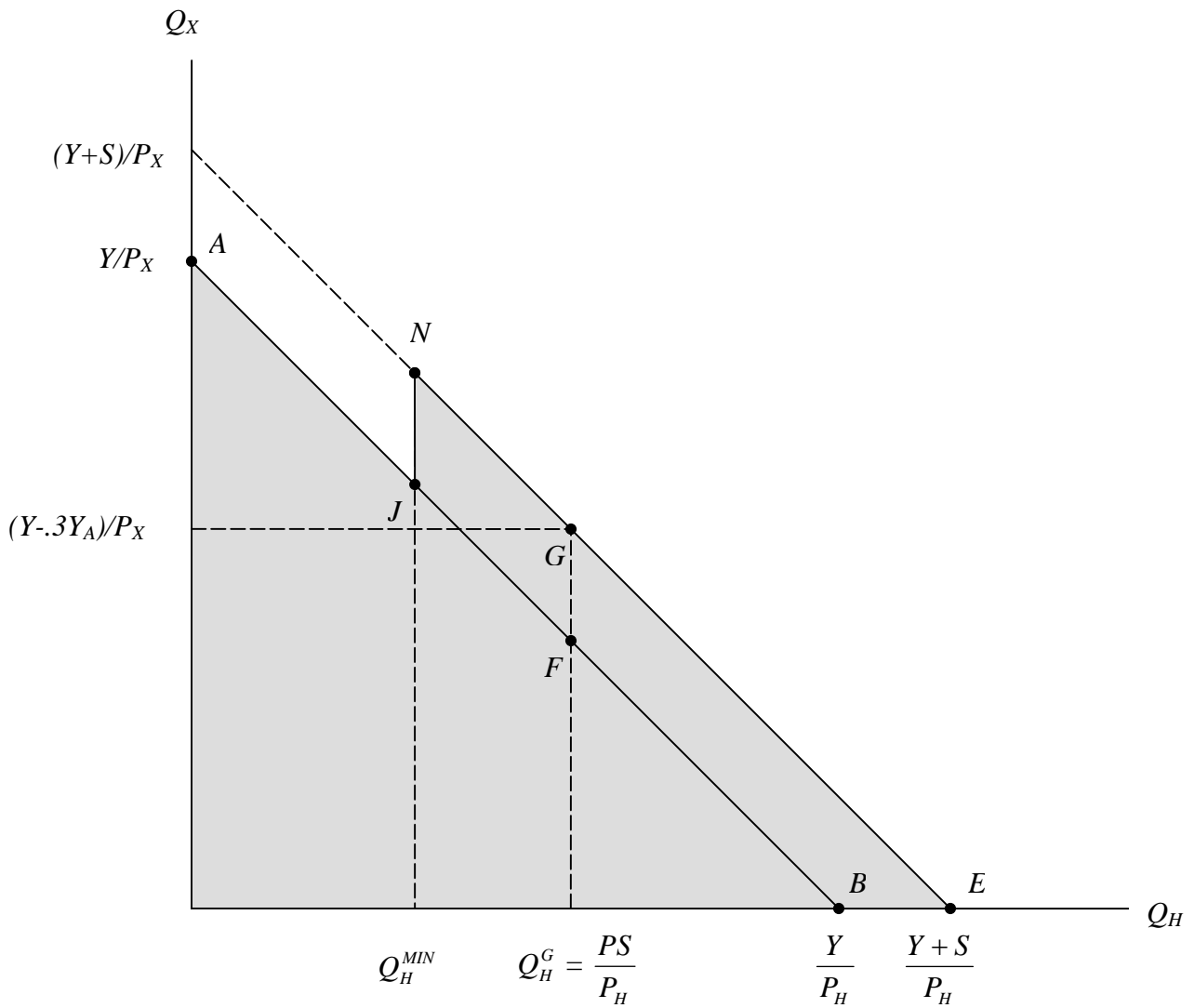
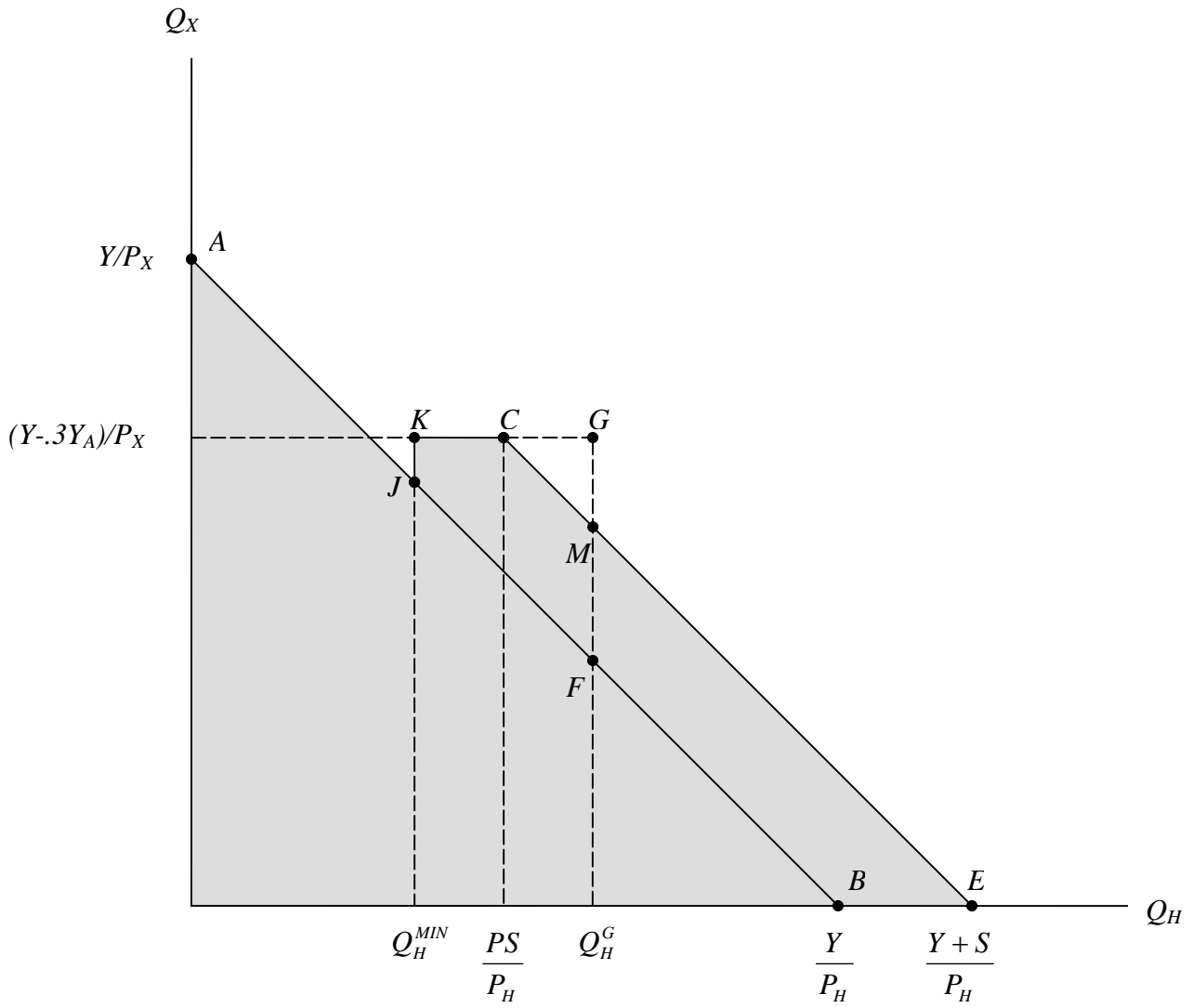**Figure 7B – Budget spaces for analysis of replacing unit-based assistance with original voucher program without grandfathering current occupants of projects in the case where the payment standard is equal to the market rent of the project unit**

$Q_X$

$(Y+S)/P_X$

$Y/P_X$    A

N

$(Y-.3Y_A)/P_X$

J

C    G

M

F

B    E

$Q_H$

$Q_H^{MIN}$    $\dfrac{PS}{P_H}$    $Q_H^{G}$    $\dfrac{Y}{P_H}$    $\dfrac{Y+S}{P_H}$
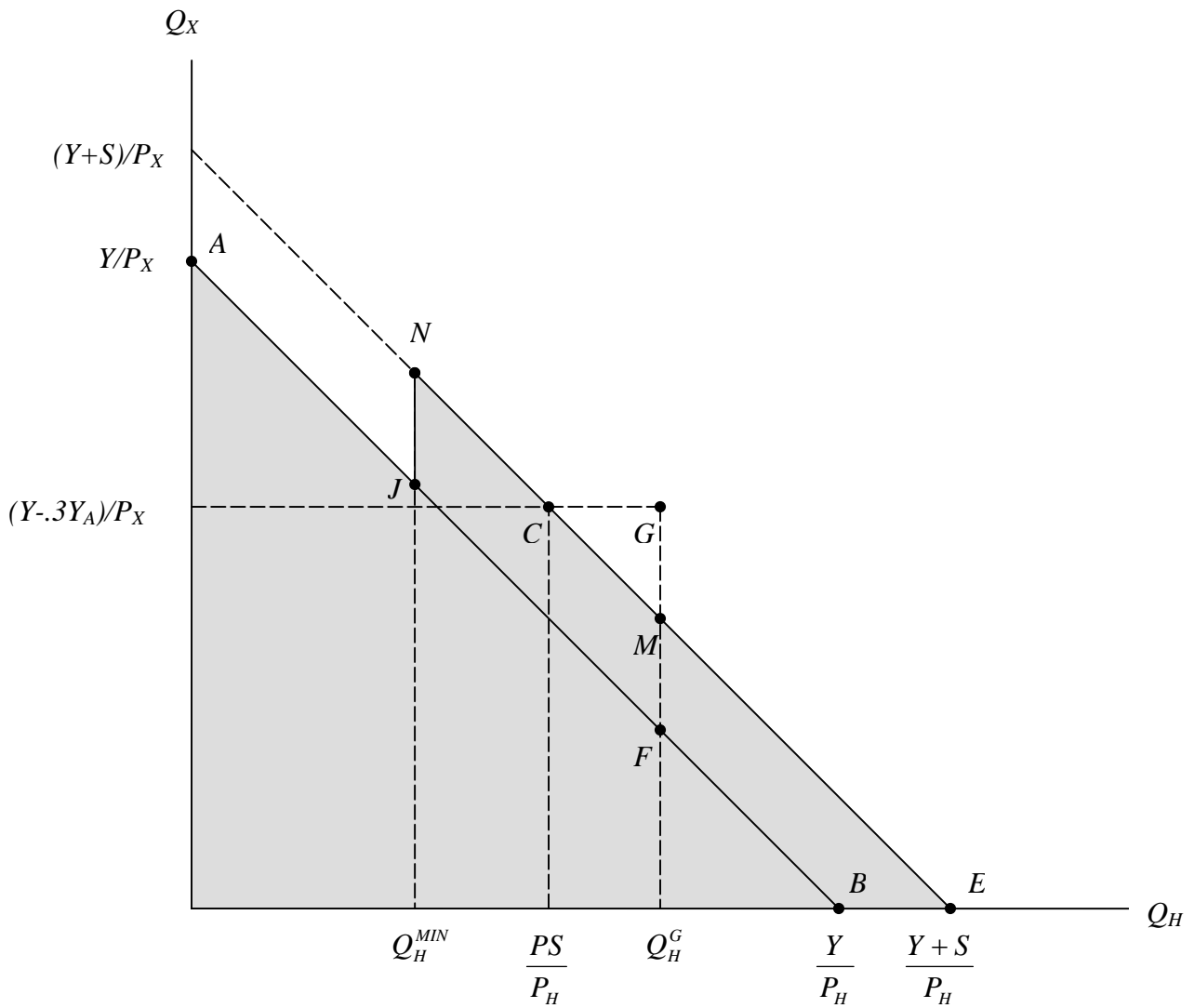
**Figure 7C – Budget spaces for analysis of replacing unit-based
assistance with original voucher program without grandfathering
current occupants of projects in the case where the market rent of the
project unit exceeds the payment standard**
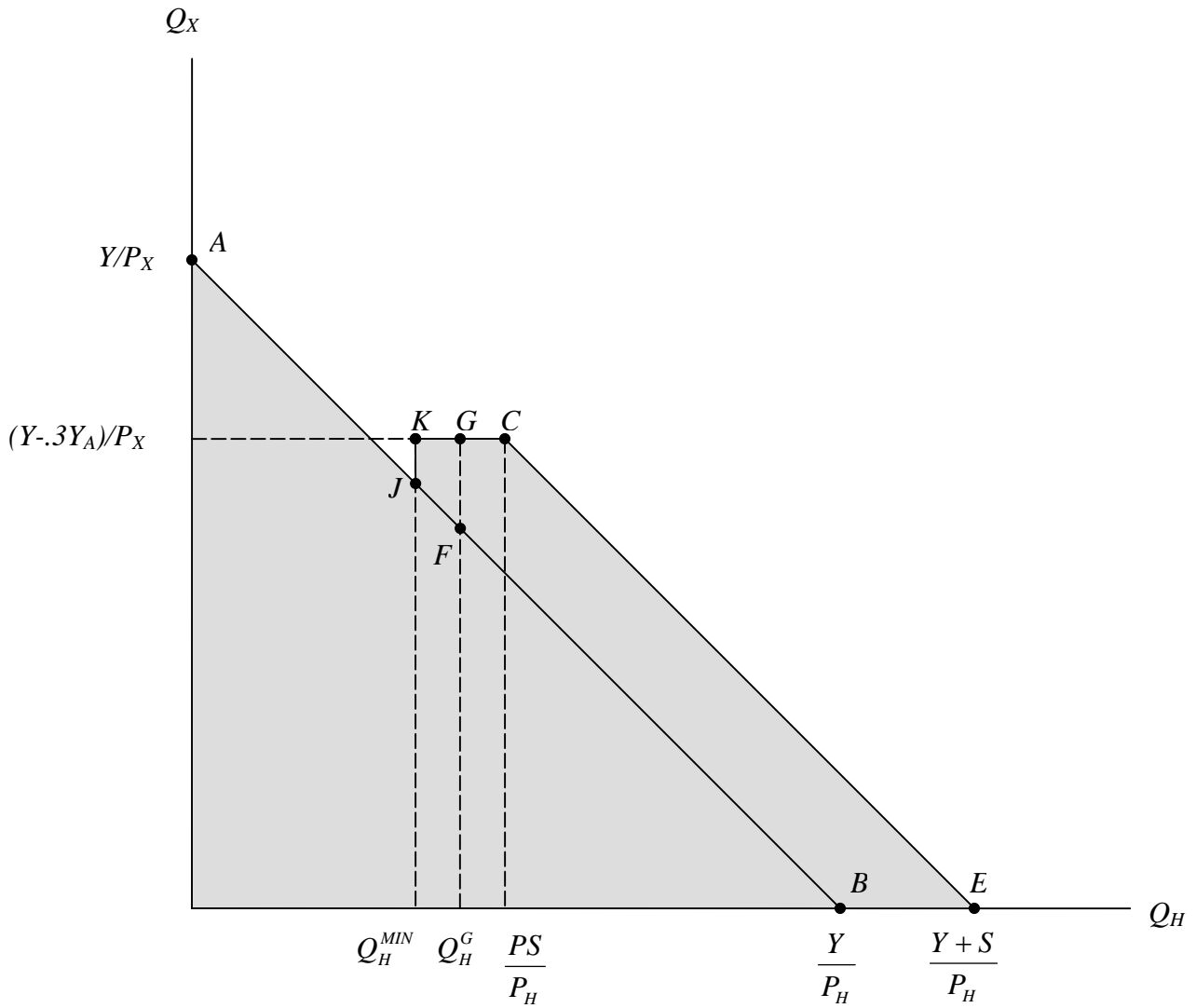
**Figure 8A – Budget spaces for analysis of replacing unit-based assistance with HCV program for continuing recipients while grandfathering current occupants of projects in the case where the payment standard exceeds the market rent of the project unit**

**Figure 8B – Budget spaces for analysis of replacing unit-based assistance with HCV program for continuing recipients while grandfathering current occupants of projects in the case where the market rent of the project unit exceeds the payment standard**
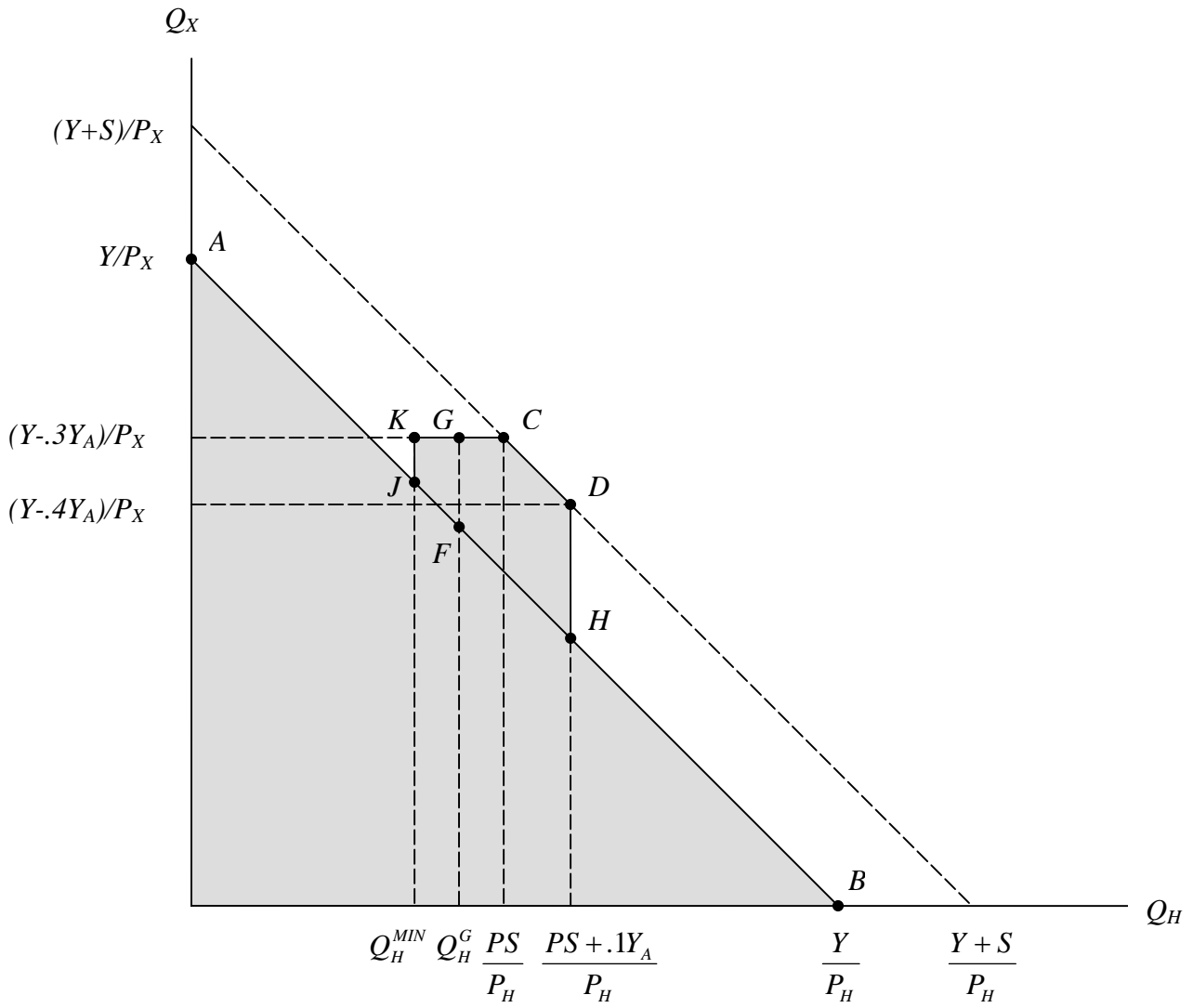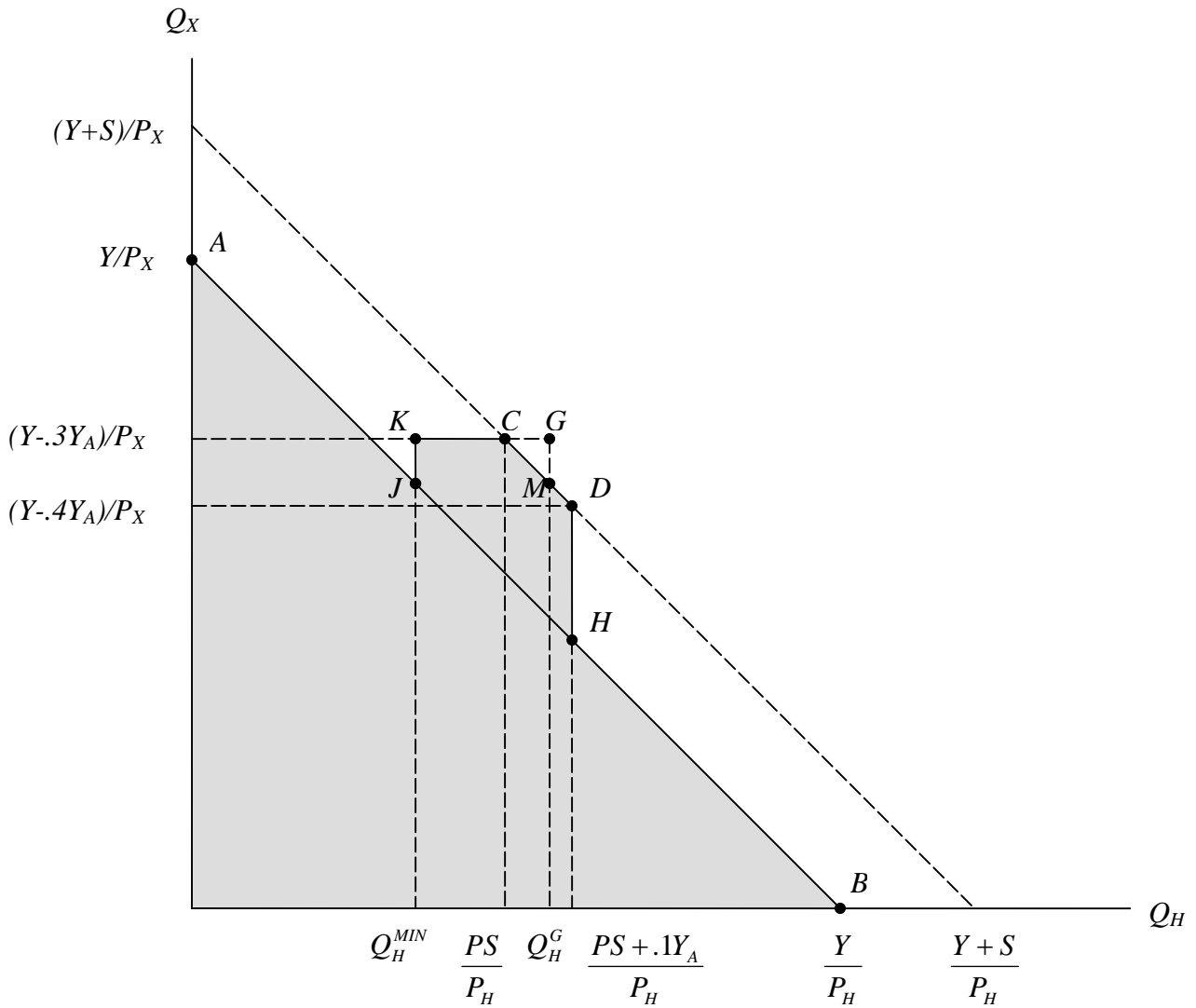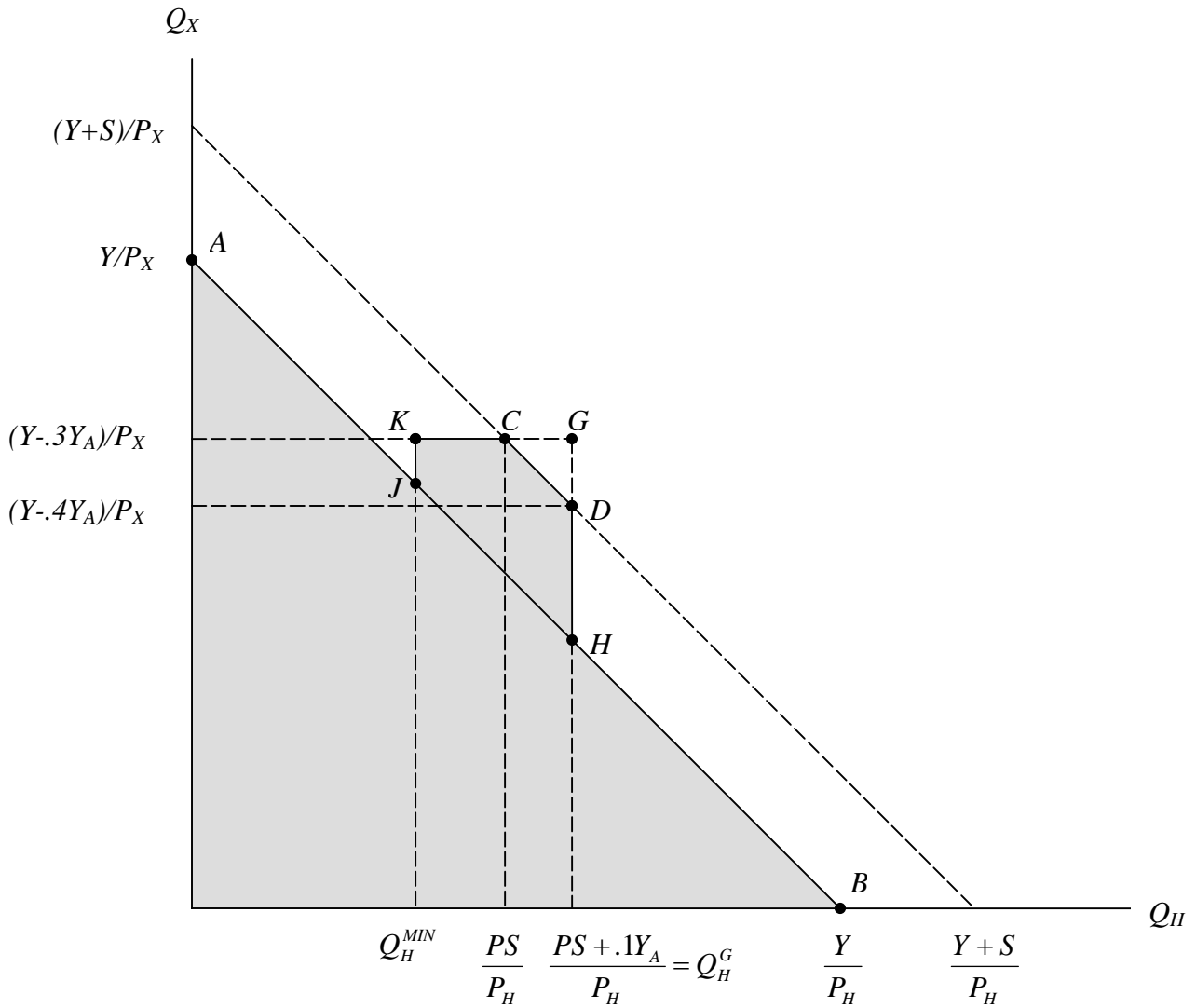
**Figure 9A – Replacing unit-based assistance with HCV program for new recipients with grandfathering of occupants of subsidized projects when the market rent of the project unit exceeds the payment standard**
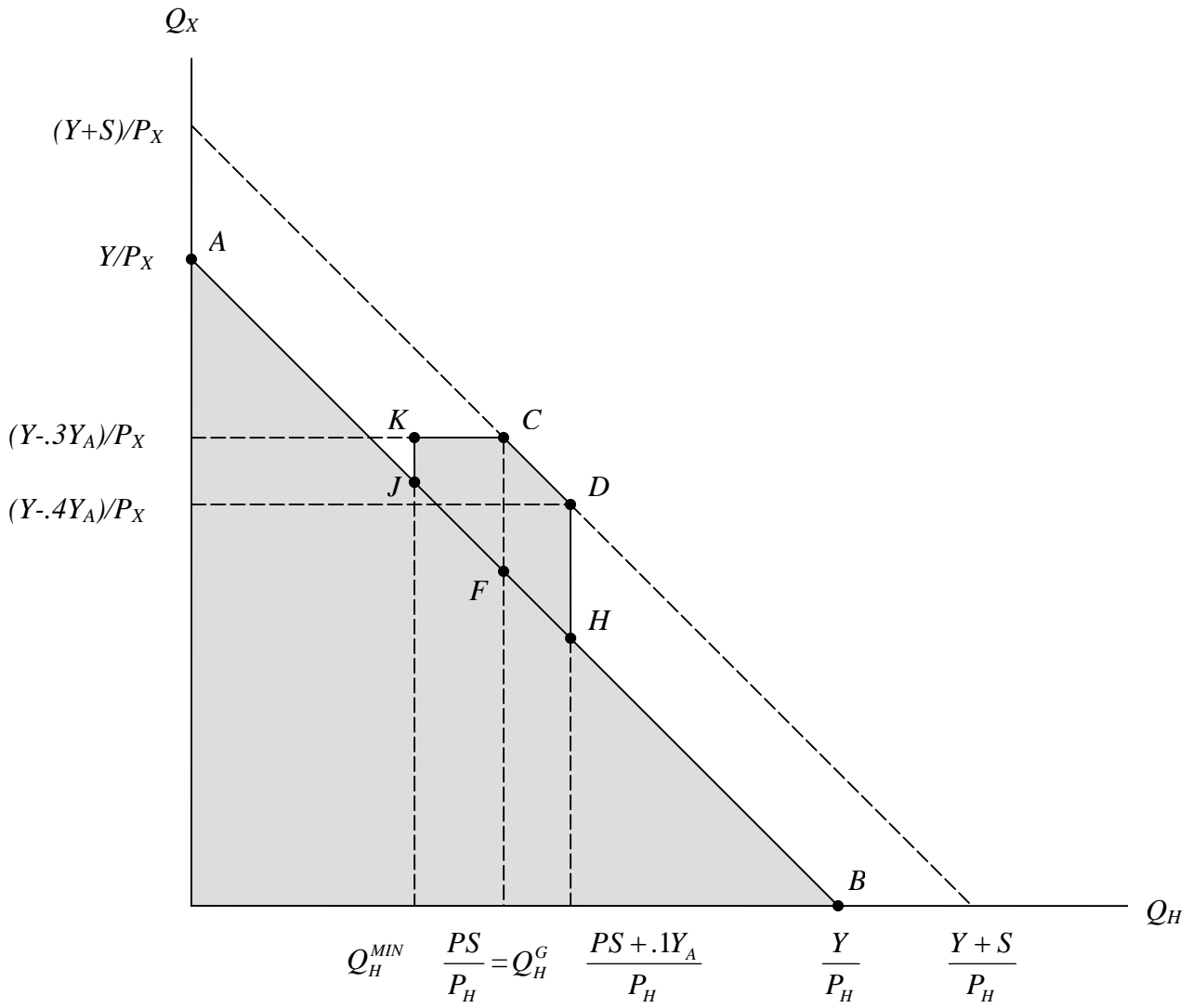
**Figure 9B – Replacing unit-based assistance with HCV program for new recipients with grandfathering of occupants of subsidized projects when the payment standard is equal to the market rent of the project unit**
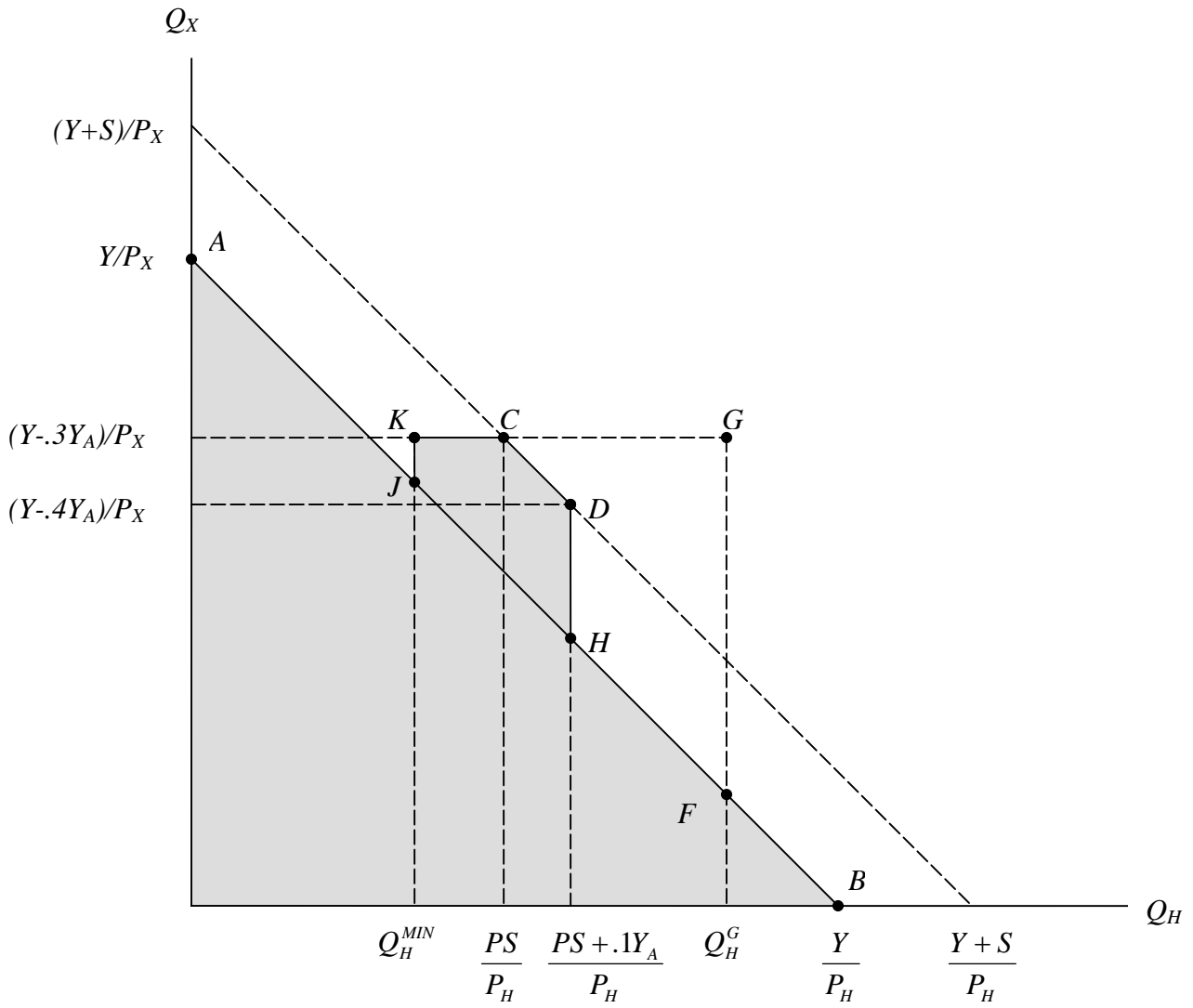
**Figure 9C – Replacing unit-based assistance with HCV program for new recipients with grandfathering of occupants of subsidized projects when the market rent of the project unit exceeds the payment standard by less than ten percent of adjusted income**

**Figure 9D – Replacing unit-based assistance with HCV program for new recipients with grandfathering of occupants of subsidized projects when the market rent of the project unit exceeds the payment standard by ten percent of adjusted income**

**Figure 9E – Replacing unit-based assistance with HCV program for new recipients with grandfathering of occupants of subsidized projects when the market rent of the project unit exceeds the payment standard by more than ten percent of adjusted income**
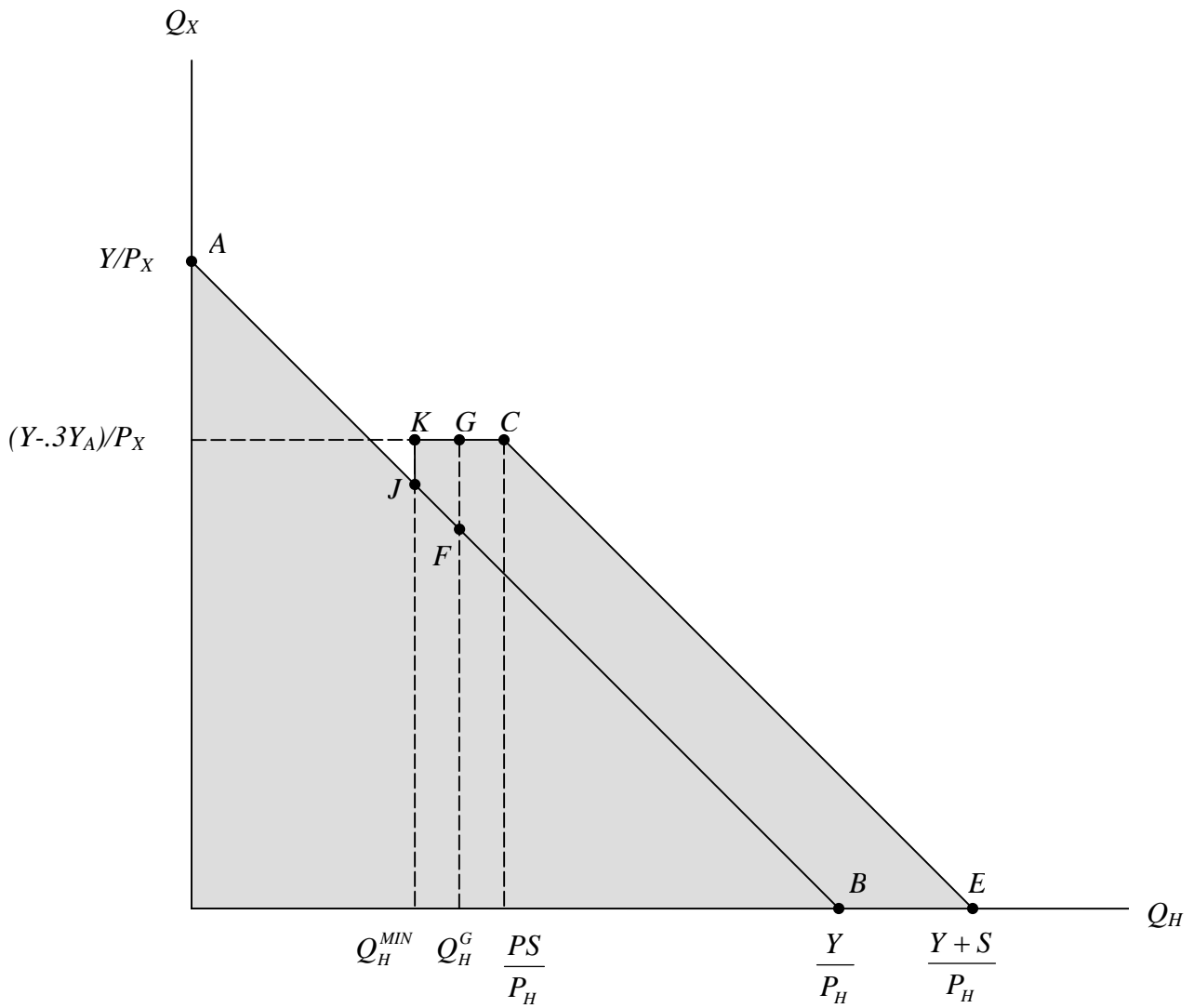
**Figure A1 – Replacing unit-based assistance with HCV program for continuing recipients without grandfathering current occupants of projects when the payment standard exceeds the market rent of the project unit**
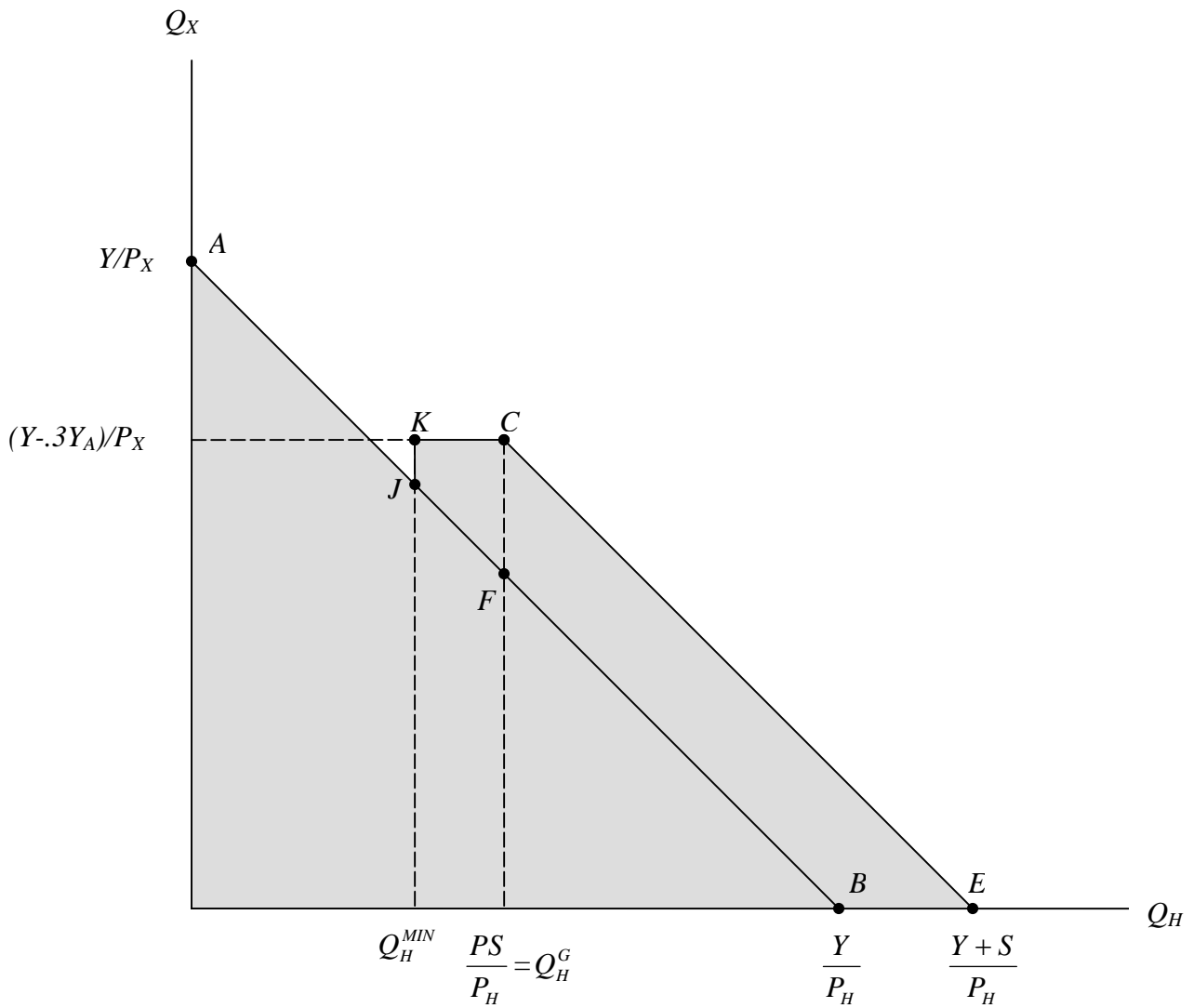
**Figure A2 – Replacing unit-based assistance with HCV program for continuing recipients without grandfathering current occupants of projects when the payment standard is equal to the market rent of the project unit**
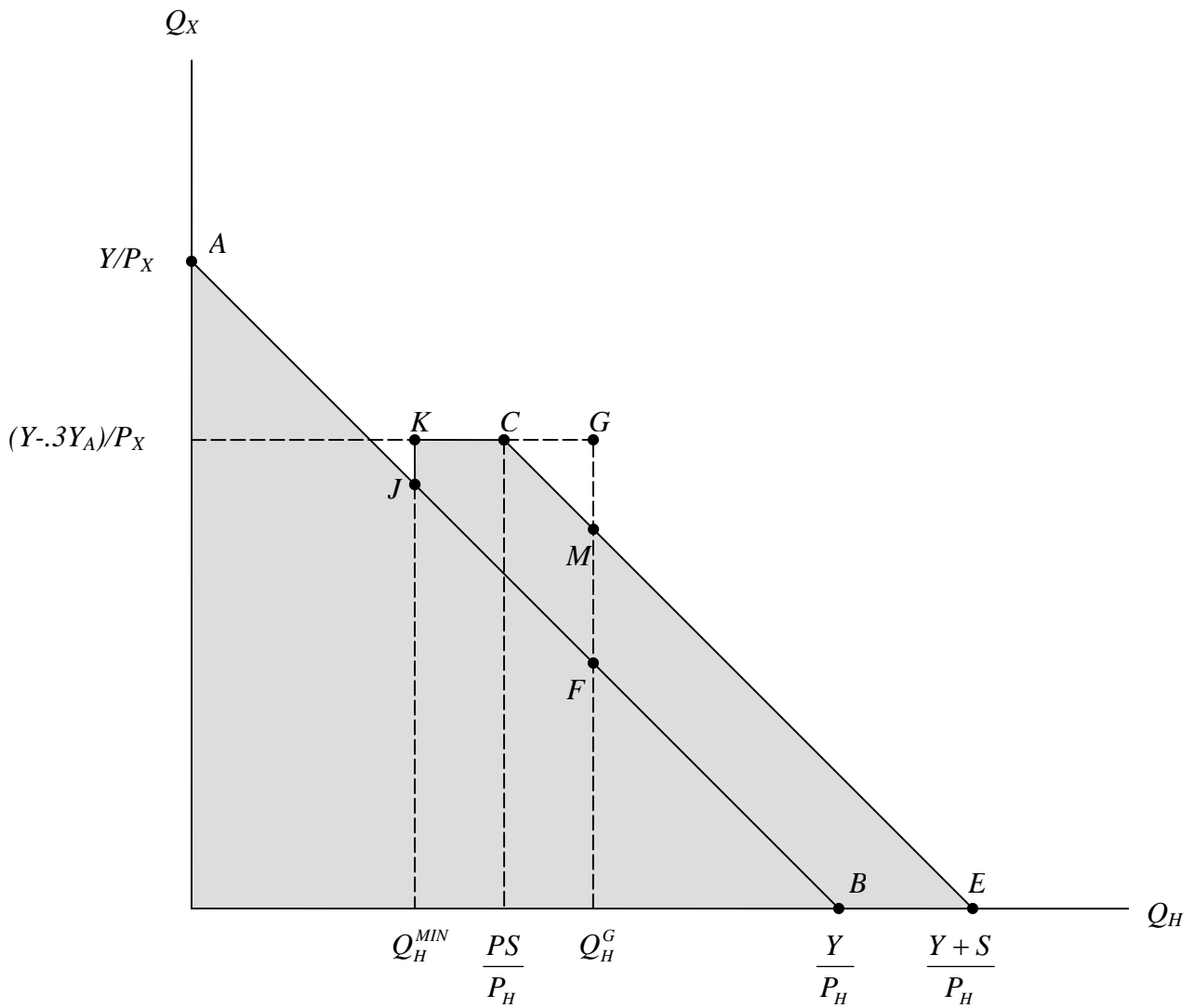
**Figure A3 – Replacing unit-based assistance with HCV program for continuing recipients without grandfathering current occupants of projects when the market rent of the project unit exceeds the payment standard**

$Q_X$

$(Y+S)/P_X$

$Y/P_X$   $A$

$(Y-.3Y_A)/P_X$   $K$   $G$   $C$

$(Y-.4Y_A)/P_X$   $J$   $D$

$F$

$H$

$B$   $E$

$Q_H$

$$Q_H^{MIN} \quad Q_H^{G} \quad \frac{PS}{P_H} \quad \frac{PS+.1Y_A}{P_H} \quad \frac{Y}{P_H} \quad \frac{Y+S}{P_H}$$
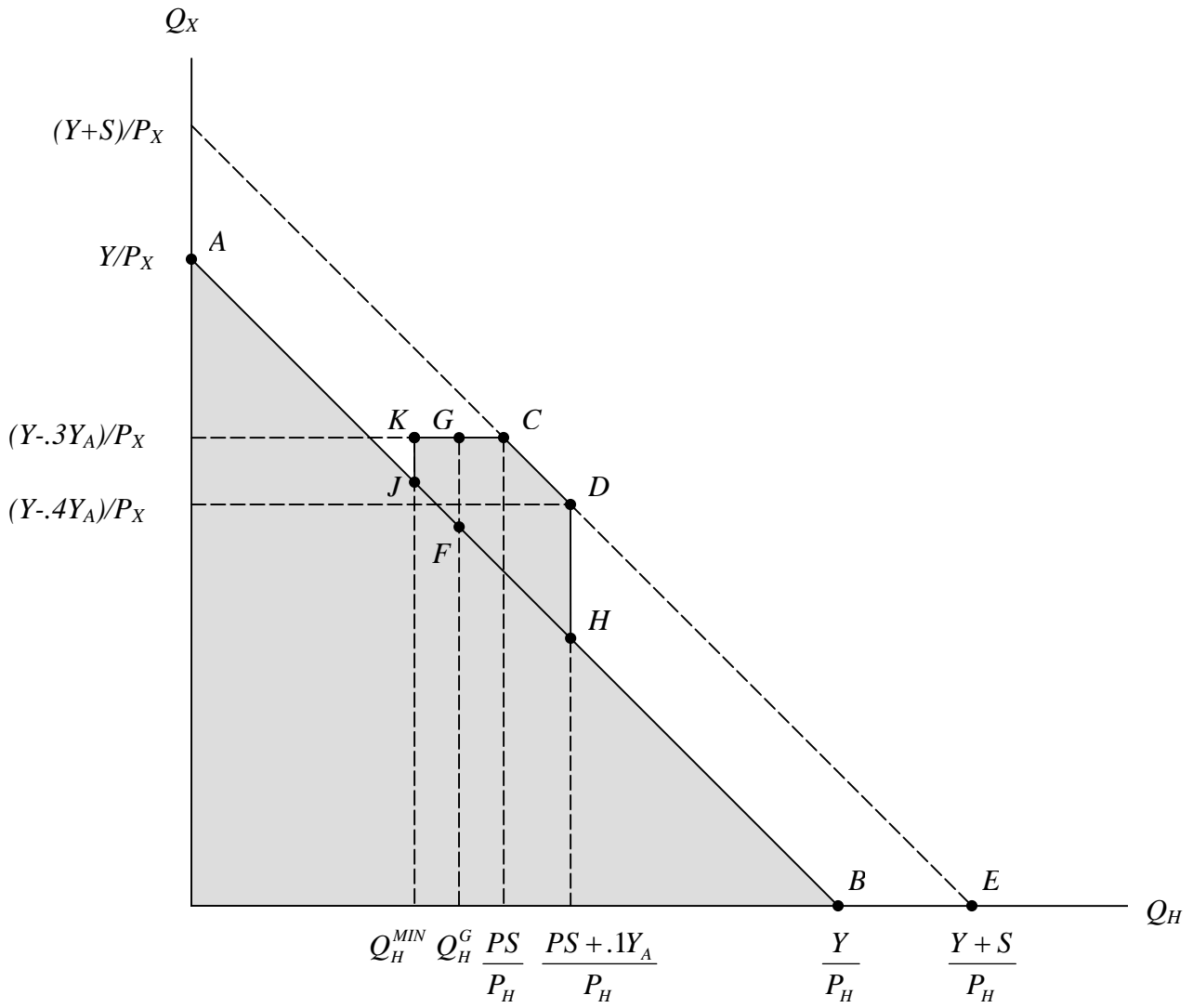
**Figure B1 – Replacing unit-based assistance with HCV program for new recipients without grandfathering current occupants of projects when the payment standard exceeds the market rent of the project unit**
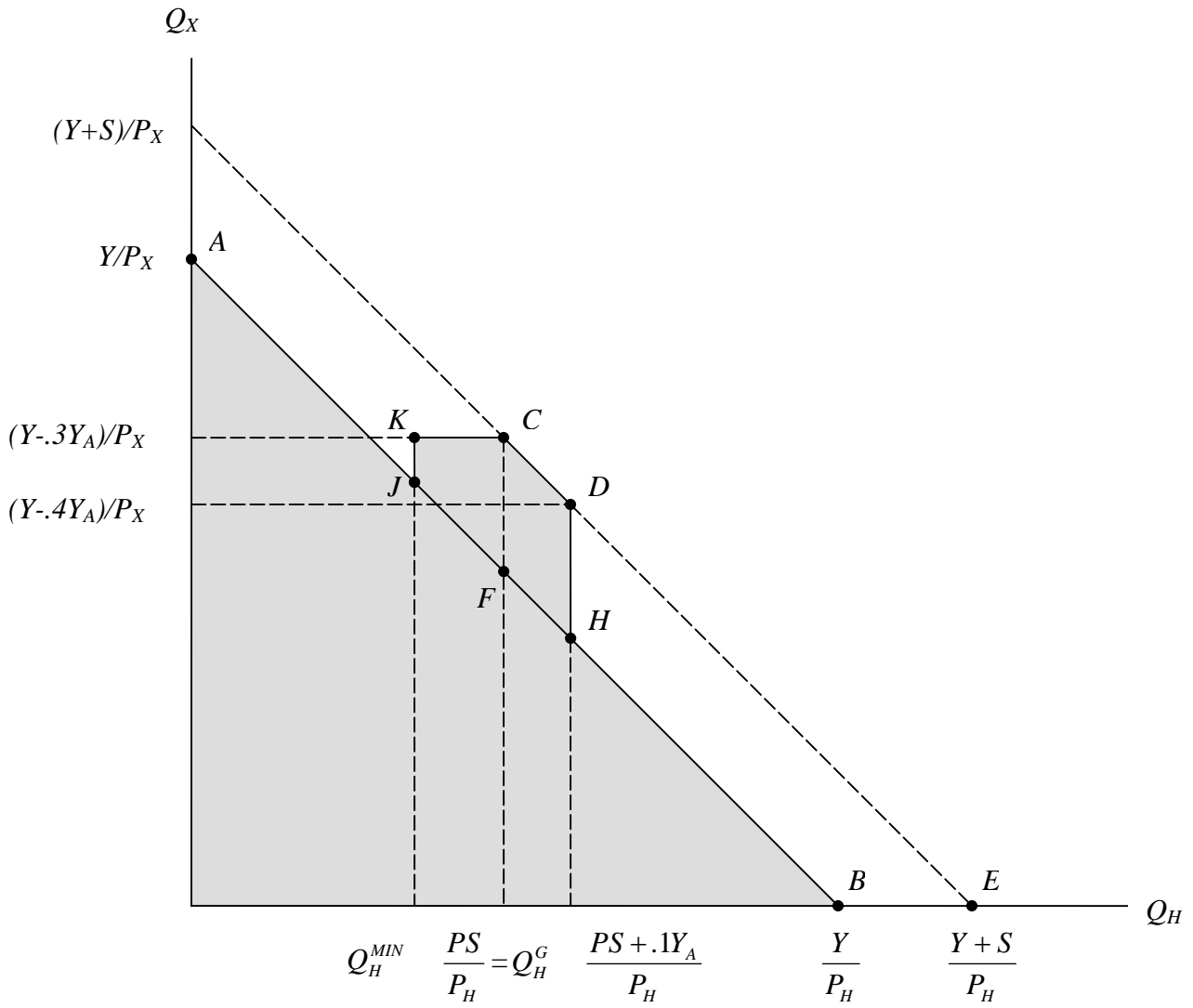
**Figure B2 – Replacing unit-based assistance with HCV program for new recipients without grandfathering current occupants of projects when the payment standard is equal to the market rent of the project unit**
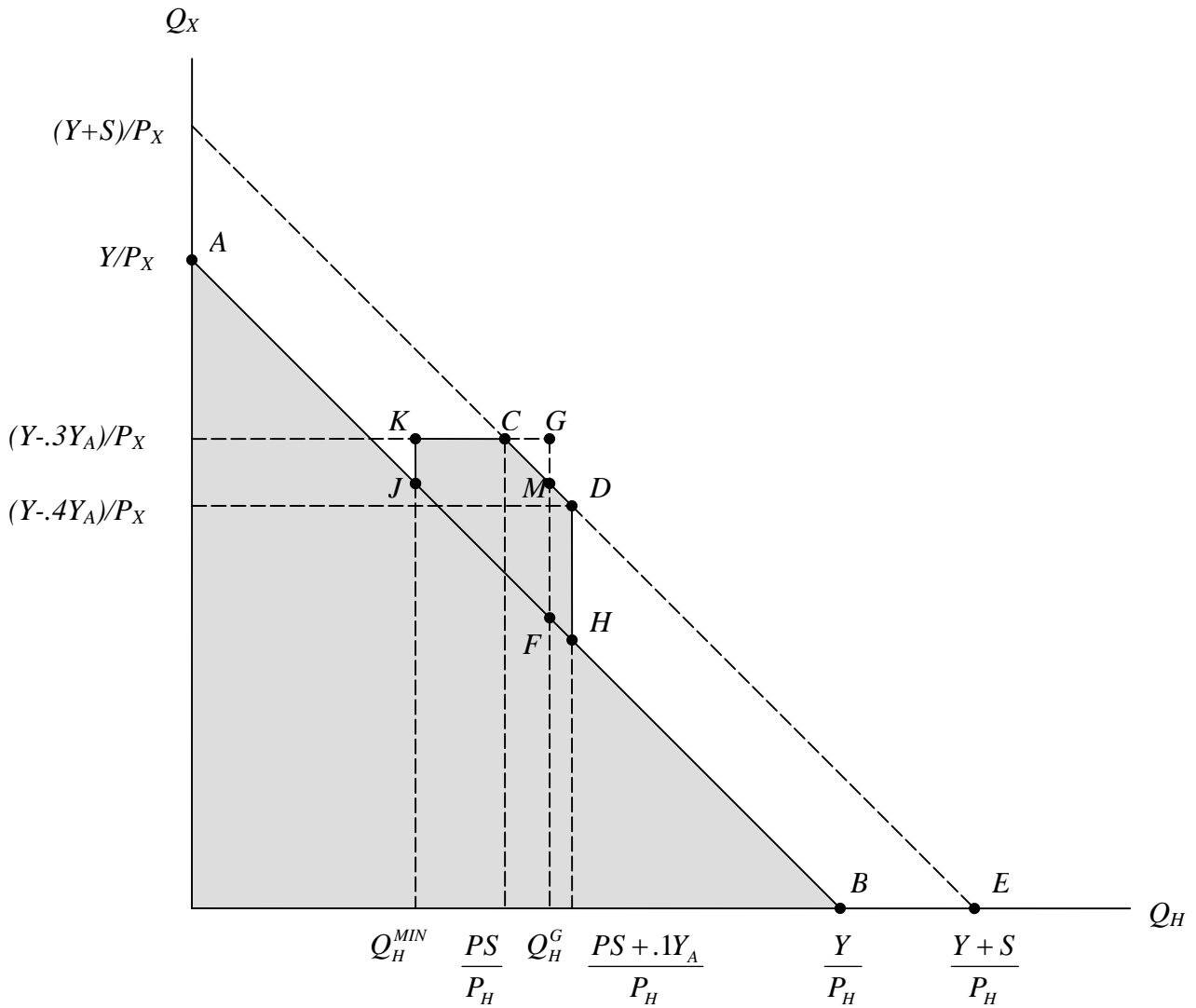
**Figure B3 – Replacing unit-based assistance with HCV program for new recipients without grandfathering current occupants of projects when the market rent of the project unit exceeds the payment standard by less than ten percent of adjusted income**

**Figure B4 – Replacing unit-based assistance with HCV program for new recipients without grandfathering current occupants of projects when the market rent of the project unit exceeds the payment standard by ten percent of adjusted income**
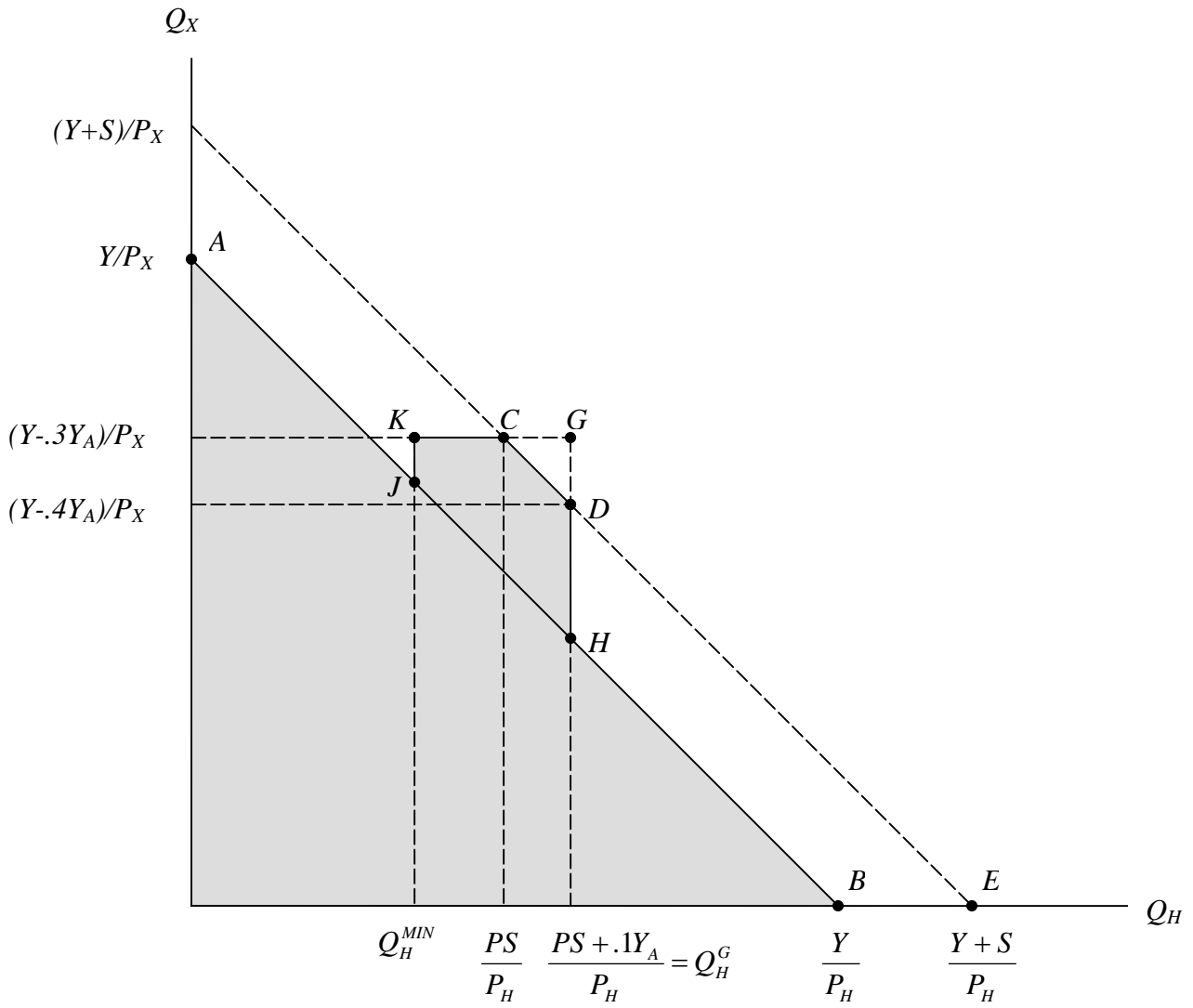
**Figure B5 – Replacing unit-based assistance with HCV program for new recipients without grandfathering current occupants of projects when the market rent of the project unit exceeds the payment standard by more than ten percent of adjusted income**
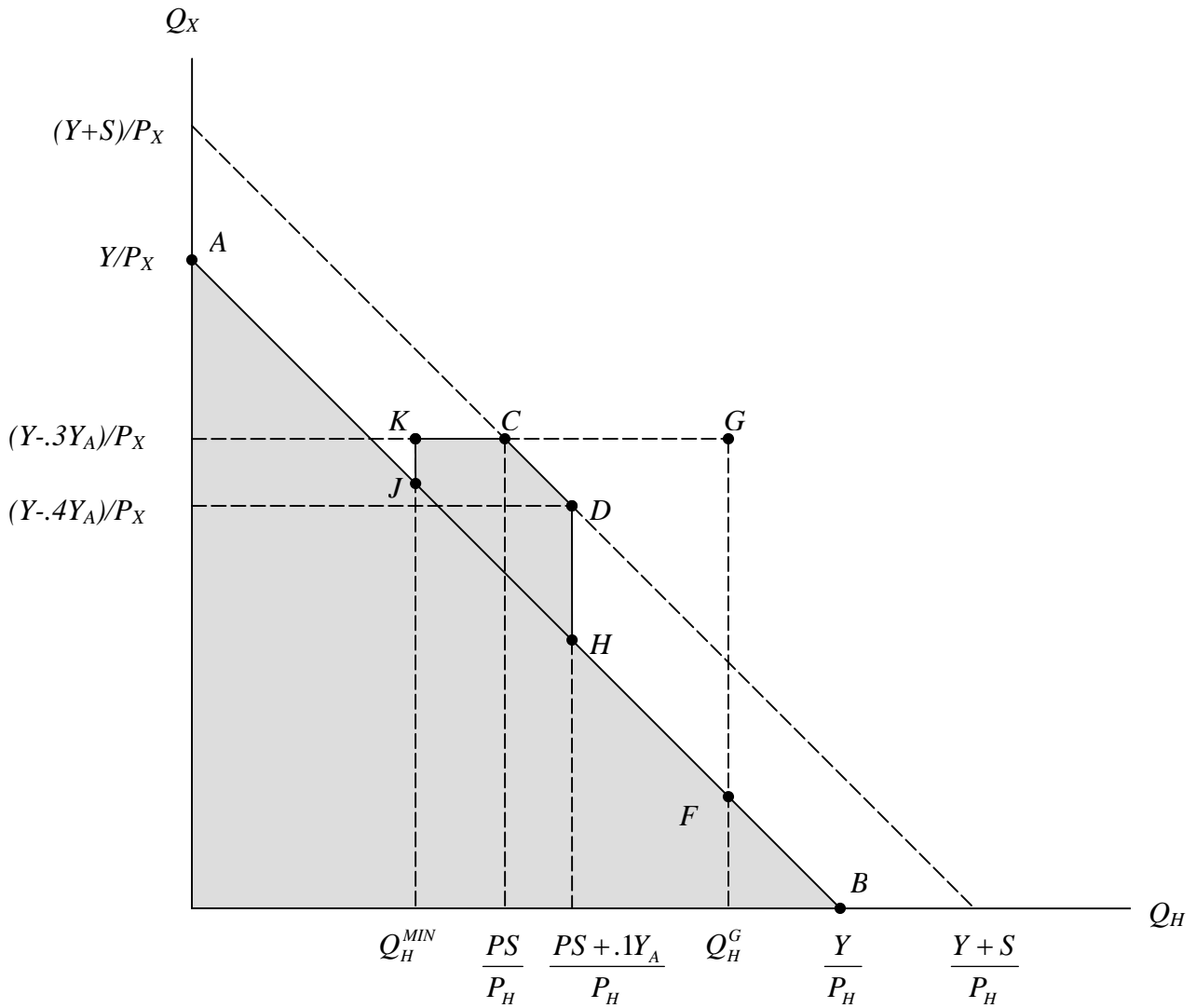
**Figure C1 – Replacing LIHTC with HCV program for continuing recipients with grandfathering current occupants of projects when the payment standard exceeds the market rent of the project unit**

**Figure C2 – Replacing LIHTC with HCV program for continuing recipients with grandfathering current occupants of projects when the payment standard is equal to the market rent of the project unit**
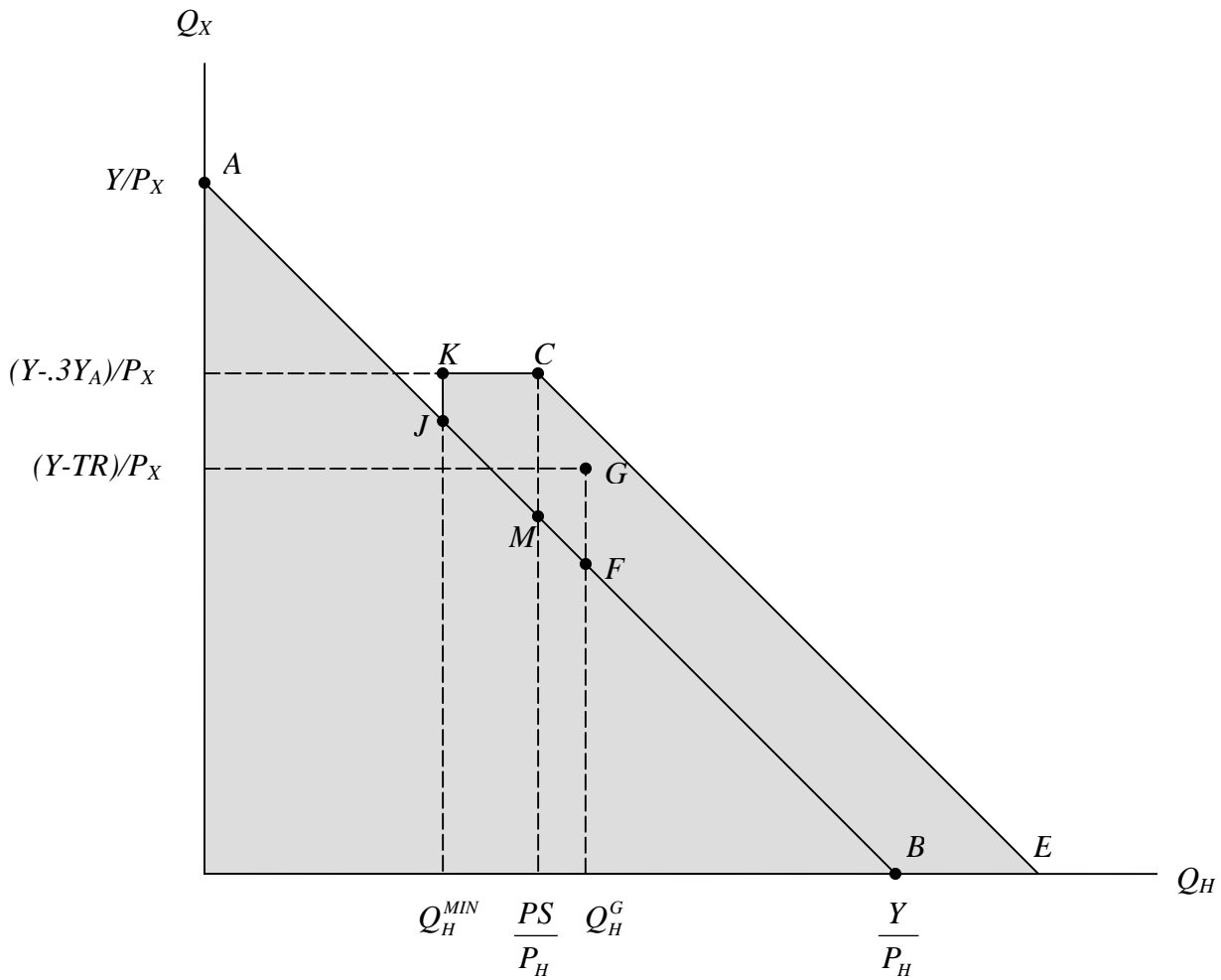
**Figure C3 – Replacing LIHTC with HCV program for continuing recipients with grandfathering current occupants of projects when the market rent of project unit exceeds the payment standard by less than TR–.3Y$_A$**
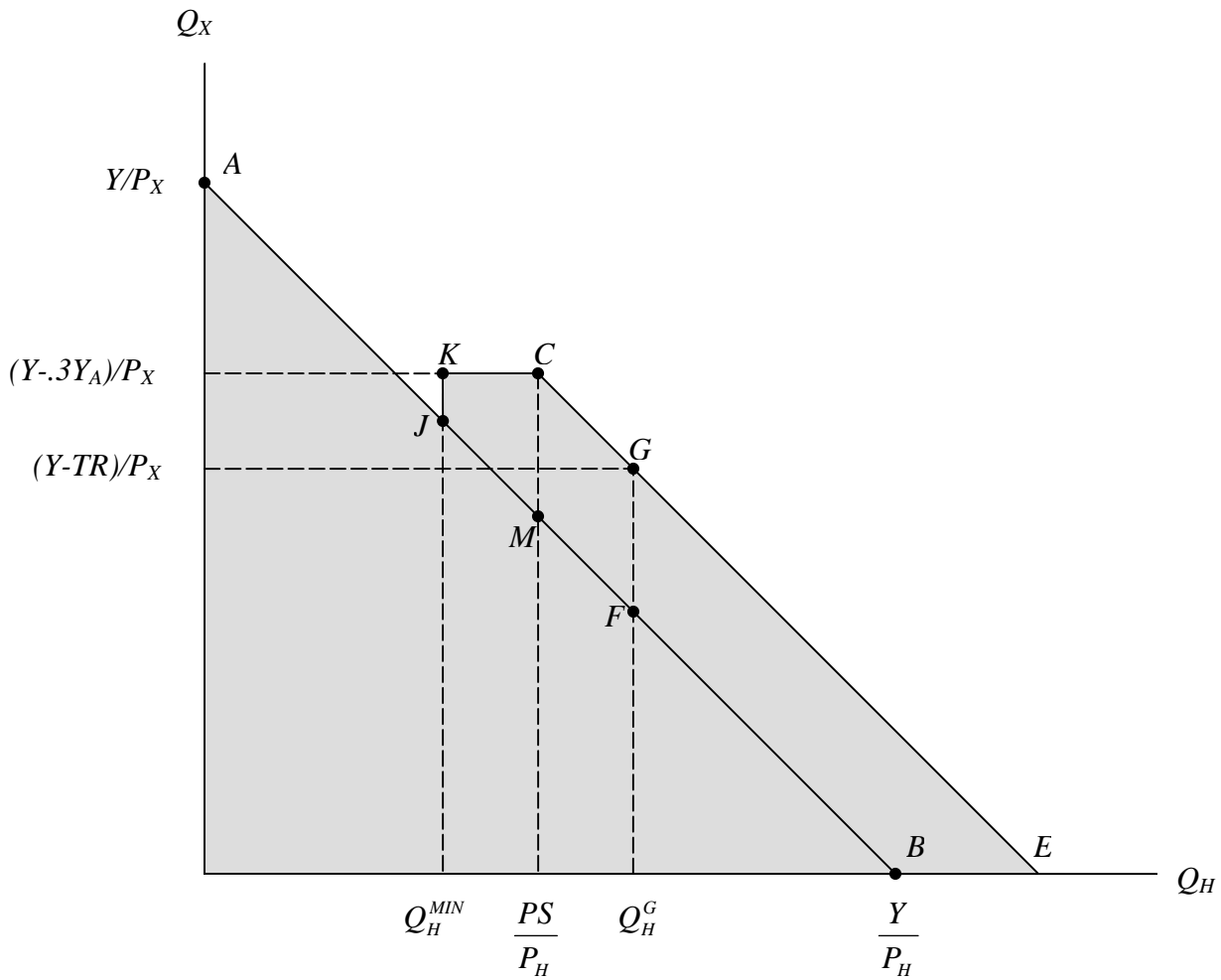
**Figure C4 – Replacing LIHTC with HCV program for continuing recipients with grandfathering current occupants of projects when the market rent of project unit exceeds the payment standard by TR–.3Y$_A$**
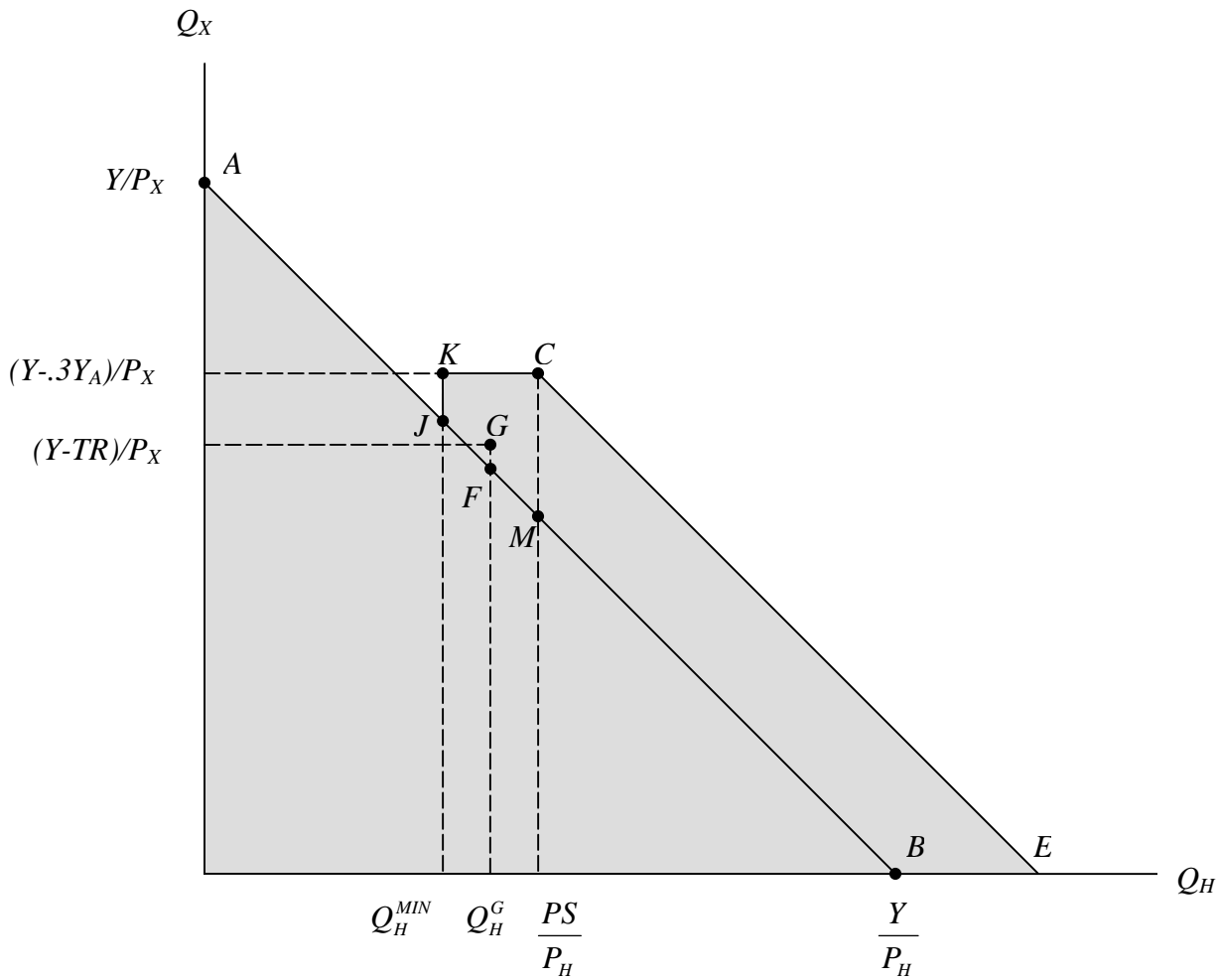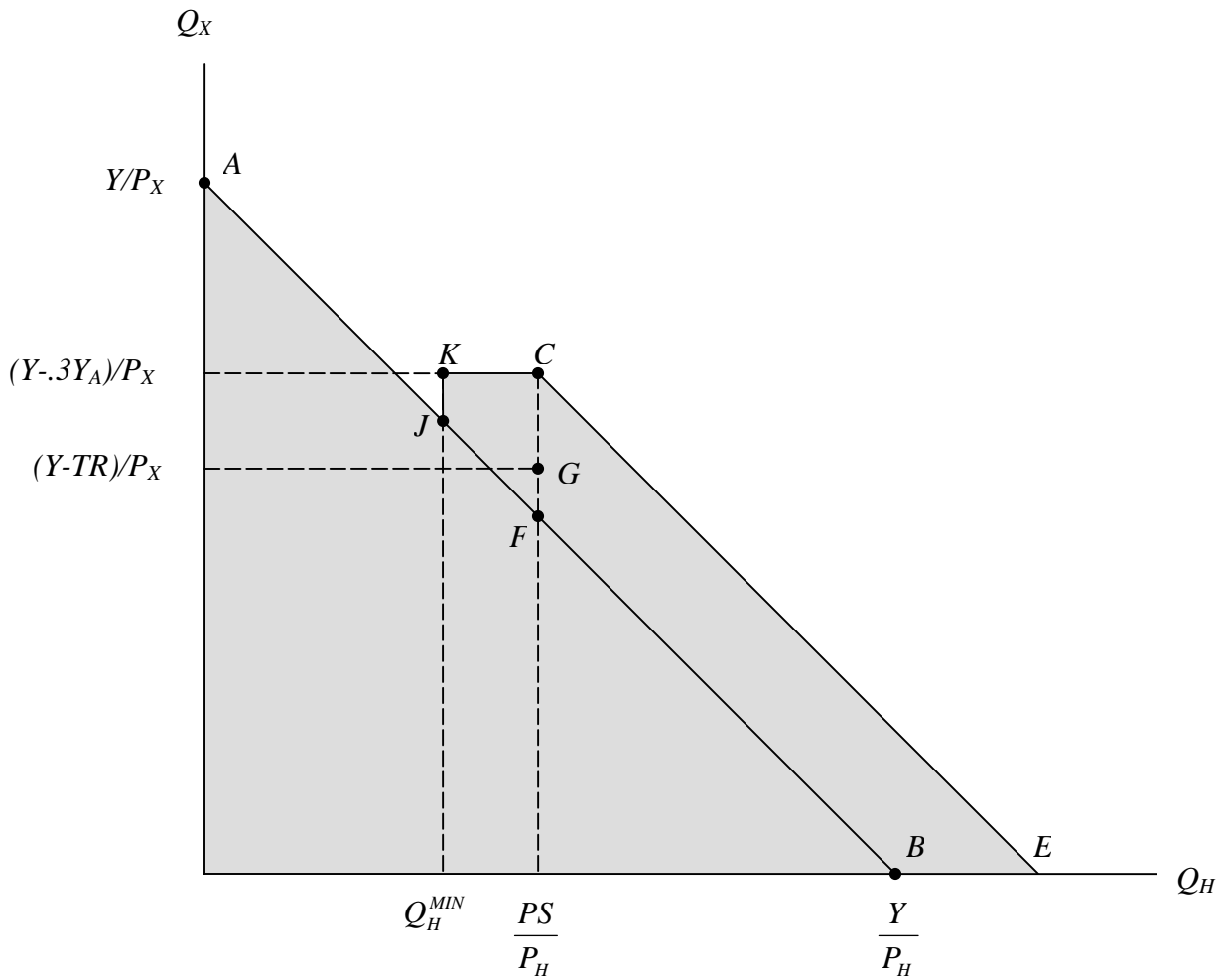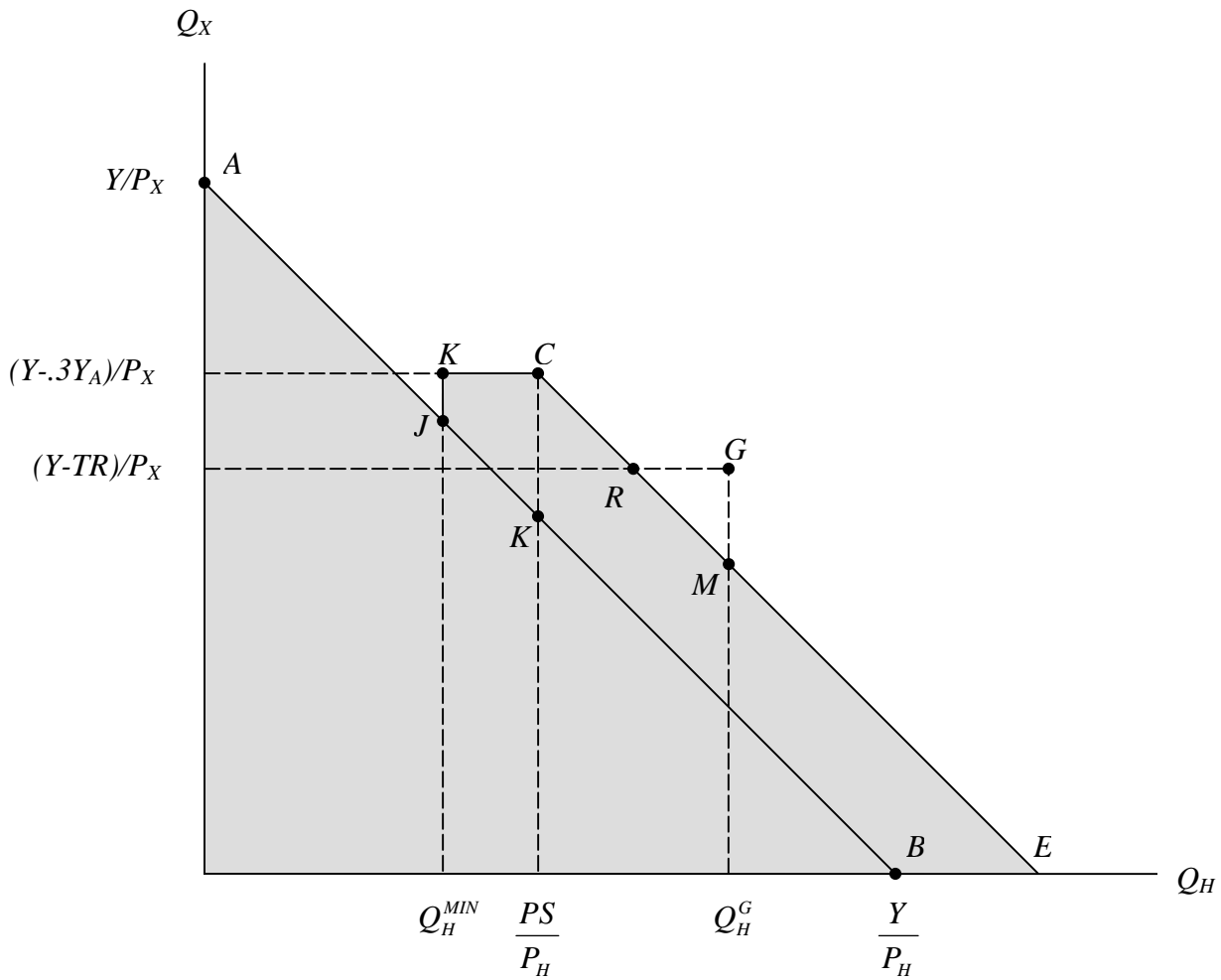
**Figure C5 – Replacing LIHTC with HCV program for continuing recipients with grandfathering current occupants of projects when the market rent of project unit exceeds the payment standard by more than TR–.3Y$_A$**

**Table 1**

Original Voucher Program and Family Can Remain on Previous Terms

| | $Q_H$ | $Q_X$ | $U$ |
|---|---|---|---|
| $P_H Q_H^G < PS$ | + | − | + |
| | + | *0* | + |
| | + | + | + |
| | *0* | + | + |
| | − | + | + |
| | | | |
| $P_H Q_H^G \geq PS$ | *0* | *0* | *0* |
| | + | − | + |
| | − | + | + |

**Table 2**

Original Voucher Program and Family Must Pay Market Rent for Current Unit

|  | $Q_H$ | $Q_X$ | $U$ |
|---|:---:|:---:|:---:|
| $P_H Q_H^G < PS$ | + | − | + |
|  | + | 0 | + |
|  | + | + | + |
|  | 0 | + | + |
|  | − | + | + |
|  |  |  |  |
| $P_H Q_H^G = PS$ | + | − | + |
|  | 0 | 0 | 0 |
|  | − | + | + |
|  |  |  |  |
| $P_H Q_H^G > PS$ | + | − | + |
|  | + | − | 0 |
|  | + | − | − |
|  | 0 | − | − |
|  | − | − | − |
|  | − | 0 | − |
|  | − | + | − |
|  | − | + | + |
|  | − | + | 0 |

**Table 3**

HCV for Continuing Recipients and Family Can Remain on Previous Terms

|  | $Q_H$ | $Q_X$ | $U$ |
|---|---|---|---|
| $P_H Q_H^G < PS$ | + | 0 | + |
|  | + | – | + |
| $P_H Q_H^G \geq PS$ | 0 | 0 | 0 |
|  | + | – | + |

**Table 4**

HCV for Continuing Recipients and Family Must Pay Market Rent for Current Unit

| | $Q_H$ | $Q_X$ | $U$ |
|---|:---:|:---:|:---:|
| $P_H Q_H^G < PS$ | + | *0* | + |
| | + | – | + |
| $P_H Q_H^G = PS$ | *0* | *0* | *0* |
| | + | – | + |
| $P_H Q_H^G > PS$ | + | – | + |
| | + | – | *0* |
| | + | – | – |
| | *0* | – | – |
| | – | – | – |
| | – | *0* | – |

**Table 5**

HCV for New Recipients and Family Can Remain on the Previous Terms

| | $Q_H$ | $Q_X$ | $U$ |
|---|---|---|---|
| $P_H Q_H^G < PS$ | + | 0 | + |
| | + | − | + |
| $PS \le P_H Q_H^G < PS + .1Y_A$ | 0 | 0 | 0 |
| | + | − | + |
| $P_H Q_H^G \ge PS + .1Y_A$ | 0 | 0 | 0 |

**Table 6**

HCV for New Recipients and Family Must Pay Market Rent for Current Unit

| | $Q_H$ | $Q_X$ | $U$ |
|---|---|---|---|
| $P_H Q_H^G < PS$ | + | 0 | + |
| | + | − | + |
| $P_H Q_H^G = PS$ | 0 | 0 | 0 |
| | + | − | + |
| $PS < P_H Q_H^G < PS + .1Y_A$ | + | − | + |
| | + | − | − |
| | 0 | − | − |
| | − | − | − |
| | − | 0 | − |
| $P_H Q_H^G \geq PS + .1Y_A$ | + | − | − |
| | 0 | − | − |
| | − | − | − |
| | − | 0 | − |

**Table 7**

HCV for Continuing Recipient and Family Can Remain on Previous Terms
When Tenant Rent Exceeds 30 Percent of Adjusted Income

| | $Q_H$ | $Q_X$ | $U$ |
|---|---|---|---|
| $P_H Q_H^G < PS$ | + | − | + |
| | + | *0* | + |
| | + | + | + |
| | | | |
| $P_H Q_H^G = PS$ | + | − | + |
| | + | *0* | + |
| | + | + | + |
| | *0* | + | + |
| | | | |
| $PS < P_H Q_H^G < PS + TR - .3Y_A$ | + | − | + |
| | + | *0* | + |
| | + | + | + |
| | *0* | + | + |
| | − | + | + |
| | | | |
| $P_H Q_H^G = PS + TR - .3Y_A$ | + | − | + |
| | *0* | *0* | *0* |
| | − | + | + |
| | | | |
| $P_H Q_H^G > PS + TR - .3Y_A$ | + | − | + |
| | *0* | *0* | *0* |
| | − | + | + |

**Table 8**

HCV for Continuing Recipient and Family Must Pay Market Rent for Current
Unit When Tenant Rent Exceeds 30 Percent of Adjusted Income

|  | $Q_H$ | $Q_X$ | $U$ |
|---|:---:|:---:|:---:|
| $P_H Q_H^G < PS$ | + | − | + |
|  | + | *0* | + |
|  | + | + | + |
| $P_H Q_H^G = PS$ | + | − | + |
|  | + | *0* | + |
|  | + | + | + |
|  | *0* | + | + |
| $PS < P_H Q_H^G < PS + TR - .3Y_A$ | + | − | + |
|  | + | *0* | + |
|  | + | + | + |
|  | *0* | + | + |
|  | − | + | + |
| $P_H Q_H^G = PS + TR - .3Y_A$ | + | − | + |
|  | *0* | *0* | *0* |
|  | − | + | + |
| $P_H Q_H^G > PS + TR - .3Y_A$ | + | − | − |
|  | *0* | − | − |
|  | − | − | − |
|  | − | *0* | − |
|  | − | + | − |
|  | + | − | *0* |
|  | − | + | *0* |
|  | + | − | + |
|  | − | + | + |