Implications of Various Transfer and Cap Policies in the Halibut Charter Fishery

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Individual quota systems of one form or another have been implemented in over 60 different fisheries worldwide according to a recent inventory (OECD, 1997). Each program has been responsive to different concerns expressed by stakeholders during design phases and, as a result, there are many different "experiments" to examine. Many programs have transfer and/or cap policies in some form or another. It is probably not an exaggeration to say that most of these restrictions on trades in quotas or leases have been implemented in response to fears that an unrestricted program will change the status quo too dramatically or too rapidly. These fears are understandable in light of the very different incentives generated by quota systems compared with regulated open access. At the same time, simple economic theory can tell us something about the likely directions of change under various restrictions, so that policies need not be designed as if we are in the dark.

This report discusses some of the implications of various transfer and cap policies that might be implemented in the Alaskan charter halibut sector. Our focus is on the broad implications of general classes of policies, particularly the transfer and cap policies under consideration by the Council. The options under consideration by the North Pacific Council are numerous, and the lists have been suggested and modified by various members of both the charter and commercial halibut industries in numerous meetings. Most options embody existing experience with the commercial program and informed speculation about possible impacts of a charter sector program. While the specific transfer and cap options under consideration by the Council are numerous, within each issue grouping, the options are essentially variations on a theme. For example, the transfer policies possible include options ranging from complete prohibition of transfers, to complete freedom to transfer at will, with options in between involving partial restrictions. Rather than examine each specific option in repetitive detail, we discuss the major economic efficiency issues and probable distributional impacts to the various stakeholders of the class of options, inclusively. For example, we discuss the benefits and costs of freely transferable of quota within the charter sector, and contrast the impacts with complete prohibition of transfers. Variants of these polar cases obviously have impacts that fall within the extremes.

The bulk of our discussion is focused on the primary and secondary stakeholders associated with the commercial charter halibut industry. The important primary stakeholder groups are those associated with the "first round" or "direct" effects of policy. These include the charter operators who would be granted quota, charter anglers who would be guided by quota holders, commercial harvesters of halibut, and consumers of commercial halibut. We would expect that the economic efficiency impacts on the charter operators and commercial halibut harvesters would be reflected in producer surplus or profit changes. These, in turn, would be associated with changes in inputs used, products and services sold, and changes in the efficiency with which the halibut resource is used by the charter sector. Efficiency impacts on the consumers in the system (charter anglers and commercial halibut consumers) would be reflected in changes in market prices and quantities sold in each sector, which in turn would have some impacts on consumer surplus. Important secondary stakeholders who might be impacted by "second round" or "indirect" effects of a quota program include unguided anglers, custom processors and other businesses linked to recreational fishing, and commercial processors and other businesses linked to commercial fishing. These groups would be likely to experience second round or indirect effects associated with policy changes, measurable in producer surplus and profit changes to businesses, and possibly consumer surplus changes experienced by unguided anglers.

In terms of numbers of stakeholders, the largest group likely to be impacted by quota programs are recreational anglers who use charter services.[1] Sports fishing is a significant contributor to the State's economy and both resident and non-residents are served by the existing sports charter industry. To put the scale of sports fishing in perspective, recent Alaska Department of Fish and Game (ADFG) data suggest that nearly a half million sports anglers fished in Alaska in 1997, divided almost equally between resident and non-resident anglers.[2] Seventy percent of Alaskan households have at least one sport angler. Between 1993 and 1997, the number of resident angler licenses reported the ADFG has remained constant while the number of non-resident angling permits increased about 25%. Most of the sports fishing activity occurs in Southcentral Alaska, concentrated around the Kenai peninsula, Homer, and Seward, followed by the Juneau and Prince of Wales Island areas in Southeast Alaska. Sportsfishing generates substantial values to anglers who experience enjoyment from the activity in excess of what they actually pay in expenditures to have the experience. Studies conducted in Alaska by the Institute for Social and Economic Research suggest that sportsfishing generated a total 1993 economic value to Alaska of about $700 million dollars, divided roughly between consumer surplus (25%), trip-related direct expenditures (25%), and indirect and other expenditures for sports fishing (50%).

While salmon is the most popular fish targeted in Alaska by both resident and non-resident sports anglers, halibut is also important. ISER studies show that 25% of visiting

[1] The proposed charter IFQ program is somewhat unique among quota programs since quota would be allocated to charter vessels owners rather than the individuals who are actually licensed to harvest the fish (the anglers). In virtually all other programs, individuals who engage in the harvesting are granted the quota.

[2] These data and the other overview statistics are from Haley, S. et.al. (1999).

sports angler trips targeted halibut in 1993. We can determine the approximate scale of the sports charter industry targeting halibut by working backward from halibut removal data. Recent data show removals by the charter industry in Area 2C of close to 1 million pounds, and over 3 million pounds landed by the charter industry in Area 3A.[3] Assuming roughly one landed fish per trip and 20 pounds per fish, these number suggest a total number of angler day trips of about 200,000 annually. First round fishing related expenditures by these anglers average about $100 per day for residents and $150 per day for non-residents. If a reasonable estimate of consumer surplus is roughly $100 per day for both types of anglers, the net economic value of halibut charter sports fishing is $20,000,000 per year. In addition, direct fishing-related expenditures of close to $25,000,000 are incurred annually, with an additional amount of second round indirect expenditures flowing into local economies. These numbers are illustrative rather than exact, but they are reasonable gauges of the scale of importance of the industry.

ISSUE 5: Transferability of QS (permanent) and IFQs (on annual basis [leasing]).

Option 1: Nature of Charter Quota Share

1. Leasable
2. Non-leasable

Suboption 1A: allow grandfather provisions to initial recipients to use hired skippers similar to the halibut/sablefish IFQ program

Option 1 Discussion

What are the implications of restrictions on quota holders' abilities to lease or otherwise contract out their share holdings on a short-term basis? In this discussion of Option 1, we will presume that the question is whether leasing among charter quota holders **within** the charter sector should be allowed (and discuss leasing **between** charter and commercial sectors below). The most restrictive version of the non-leasing policy would be one in which only quota share owners would be allowed to use their quota to land charter-caught halibut. This would be implemented and enforced by requiring that the quota owner be aboard and present to sign landings tickets for any halibut landed against quota. The less extreme no-leasing suboption would allow existing quota share owners to lease quota to designated hired skippers, mirroring the provisions in place between 1995 and 1998 in the commercial halibut fishery (and since eliminated). This would allow, for example, charter companies that owned several vessels to operate them and land quota by transferring landings ticket signatory authority to employees. Lastly, a policy that allowed unrestricted leasing would grant quota owners the right to transfer, on a yearly basis, all or part of their quota to other eligible charter vessel operators, without limitations such as requiring the owner to be on board to land against quota shares. This policy is not under consideration at present; instead the Council is considering either

[3] Data on total removals from Addendum to the GHL Analysis, pg. 13. Data on average landings per trip and size from Lee et. al. (2000).

prohibiting leasing or allowing leasing arrangements by quota owners who used hired skippers in the past. Regardless of which of these is adopted, it will be possible for quota owners to engage in de facto leasing, by allowing others to utilize the IFQs associated with quota shares, but only if the actual owner is aboard. This allows some limited short term transfers of rights, but at a high cost, and hence these arrangements are not quite the same as unrestricted leasing. In the sections that follow, we discuss the broad advantages of relatively unencumbered leasing and contrast these with the costs as envisioned by managers and industry.

A. Gains from Mutual Trade

Some insight into the advantages of allowing unrestricted leasing/renting can be gained by asking the same question about other productive assets such as land. For example, what are the advantages to allowing the owner of a piece of farmland to freely rent it or sharecrop it to willing tenants? Are there any good reasons to inhibit the free operation of this or other kinds of rental or lease markets? Most economists would argue that the very fact that landlords and tenants do enter into voluntary arrangements including sharecropping, renting and leasing is prima facie evidence that both parties gain from the institutional option. Restricting voluntary market arrangements would involve foregoing these real private values, and the issue is whether there are externalities or income distribution consequences that are significant enough to prohibit mutually beneficial exchange.

To the person owning the land who chooses to rent it out, being able to rent presumably generates a higher short-term return than own-production might.[4] Similarly, the person renting the land must find it advantageous compared with alternatives that include borrowing to purchase land. These circumstances of potential mutual gain can occur in many settings because productive assets are not necessarily distributed to individuals who can make the best productive use of them at each point in time. Since a lease is simply a legal instrument that allows transfer of use rights over the short term, leasing allows a temporary reallocation of the use rights of productive assets from those who place relatively lower values on the rights to those that place relatively more value on them. These differences in relative values often reflect real differences in the ability to generate profits from rights. In addition, they sometimes simply reflect differences in the strength of individual preferences for the lifestyle and other non-pecuniary benefits associated with direct use of the asset.

B. Transition Flexibility Benefits

Over the long run, when an owner-user cannot produce returns comparable to alternative owners, there are incentives to permanently transfer the asset to more productive users. For various reasons, however, permanent purchases and sales of productive assets like land take place sluggishly, particularly in comparison with financial assets such as equities and bonds. During the transitional period before which permanent transfers are

[4] We use "return" in a broad sense here, in that it may include both financial return and personal satisfaction (or dissatisfaction) associated with use of the asset.

completed, the ability to transfer use rights temporarily generates flexibility and allows assets to be distributed to highest and best uses before actual ownership is transferred. Under these circumstances, prohibiting rental, lease, and share arrangements would freeze the use of asset, tying use strictly to ownership, and reducing private and social returns from the asset. In extreme cases (e.g. a disabled or infirm owner), disallowing temporary transfers of use rights might involve loss of all of the productive values of the asset for a period.

C. Permanent Production Flexibility Benefits

Aside from these gains that emerge by temporarily reallocating productive assets to best uses during transition to permanent reallocation, there are other gains generated by lease markets that operate continuously among permanent owners. For example, even land owners who are full-time bona fide farmers intending to farm over the long haul may have need, on a temporary basis, to utilize more land or to release use of temporarily excessive land. Illness, or injury, or temporary and unusual demands on time may give rise to a circumstance in which a farmer would benefit by temporarily renting or sharecropping some of his land. Similarly, other farmers may have need for temporary additions to their own holding, opening up the possibility of mutually beneficial leasing or rental or sharecropping arrangements. The point is that the vagaries of personal and productive circumstances give rise, even when land is permanently allocated reasonably efficiently, to situations in which temporary transfer of rights of use will increase the overall benefits produced by resources. In these circumstances, economists would argue that allowing short-term transfers creates efficiency gains that are tangible and real benefits to society.

D. Charter Fleet Transition Benefits

The relevance of these general points to the halibut charter case should be clear. It is likely that any quota scheme adopted in the Alaskan sports charter industry will disperse ownership of initial quota holdings over a broader group than necessary for optimal configuration of the industry. This is an inevitable outcome of a cutoff qualification date that has allowed (even encouraged) late entry and speculation in charter fishing in order to accumulate catch records. While some grantees of quota will hold more than they want to hold in the long run, it is likely that most will hold less than might be feasible for viable business operations in the long run. It is likely that many grantees of initial quota allocations will not have real interests in long-term participation in the industry per se. Prohibiting the flexibility allowed by leasing under these circumstances would thus freeze an initial quota distribution pattern that is far from the configuration that will maximize benefits to individuals, the industry, the State of Alaska, or the nation over the long run.

Over the long run, an initial allocation pattern that is inefficient cannot be sustained and some consolidation and reconfiguration into economically viable units will inevitably occur. To the extent that reconfiguration into viable units takes time, the prohibition of leasing would force operation of the industry to be carried out, at least until permanent

reallocation was completed, under sub-optimal scale, by a large number of part-time, inefficient operators. The costs imposed by an inflexible system that disallows low cost short term transfers of production rights would emerge from too many boats, operating at low capacity rates, imposing excessive congestion and perhaps local depletion effects on one another. In addition, we would expect that the large number of submarginal operators might engage in cutthroat price competition that would drive prices down to variable costs in the short run before reconfiguration was completed.[5] This would potentially increase the consumer surplus enjoyed by anglers, but the inelasticity of demand suggests that these gains and the gains from expanding the market might be relatively small.[6]

E. Charter Fleet Production Flexibility Benefits

Aside from these costs associated with inhibiting an orderly and rapid reconfiguration of quota among long term users during a transition period, there are other reasons related to short term use that favor allowing low cost leasing arrangements. Even if quota shares were in a long-term position of allocation among holders at scales that allow viable economic businesses, there would still be short-term needs to trade, lease, and rent quota to address short-term exigencies. Being able to lease generates production flexibility to both parties in a mutually beneficial arrangement, by allowing reallocation of quota when needed due to unforeseen events (such as weather, injuries or sickness, abundance shifts). These kinds of transfer benefits due to unforeseen circumstances within particular seasons are bound to be reasonably significant in the charter industry. In addition, once quotas are in place, it is virtually guaranteed that the complete allocation of quota will not be taken unless there is some flexible way to "mop up" remaining unutilized quota at the end of the season. This can be done by allowing between season carryover, but allowing leasing would smooth the use of existing allocated quota in each year.

F. Information Benefits

In addition to the transition benefits associated with being able to reconfigure productive quota rights immediately, and the short-term exigency benefits of allowing temporary trading among owners due to exigencies, there is another important information benefit associated with allowing lease markets to develop. That benefit emerges because lease

[5] The preconditions for this are: 1) trades between commercial and recreational sectors are disallowed; 2) the TAC for the recreational sector is binding; and 3), there is a large amount of excess capacity in the charter industry that cannot be sustained in the long run. In this case, quota holders who were exiting would drive trip prices down to variable costs, since they would no longer be looking to recover full costs and remain in the charter business over the long run. This would persist until the quota holdings were reconfigured into units that were viable as long term entities.

[6] We are making the assumption that charter halibut demand is inelastic, and that assumption is based on the report by Lee et. al. in Appendix 1 of the Addendum to the Public Review Draft of the Halibut Charter GHL Analysis (February 1, 2000). This study by Lee et.al. is of the Kenai Penensula sports charter fishery and it is probably reasonable to believe these results can be transferred to other Area 3A subareas. The Kenai charter industry serves resident anglers with many substitutes as well as non-residents, some of whom come exclusively to fish in Alaska and others of whom fish as parts of multiple-destination trips. Without doing further similar analysis of other areas, it cannot be definitively concluded that anglers elsewhere value attributes similarly or represent similar cross-sections of the market.

prices and permanent quota prices are inextricably linked, in the sense that lease prices "inform" permanent quota markets about the long-term value of a quota. This occurs because a competitive market for leases will generate lease prices that reflect the **current** marginal profitability of quota allocated to a sector. Current lease prices in the commercial halibut sector of a dollar per pound reflect the fact that an extra pound of halibut is "worth" a dollar to lessees, in the sense that they must be expecting to earn at least a dollar, in the current year, after selling the halibut caught and paying marginal expenses. In a similar fashion, a competitive market for permanent quota will generate quota transfer prices that reflect the expected present value of that extra unit to **future** production. A good rule of thumb is that, under stable conditions, the lease price [$P_L(t)$] reflects expected current marginal profits, and the quota transfer price [$P_Q(t)$] will be a multiple the lease price so that [$P_Q(t)$]= k[$P_L(t)$]. The multiple k reflects the discount rate r for a comparably risky investment so that k=(1/r). Current lease price/transfer prices reported for Alaskan commercial halibut suggest multiples in the range of 6-8, suggesting implied discount rates of 12-15%. The important point is that lease prices reflect information about current expectations of profitability, and transfer prices reflect information about future profitability. When current conditions are expected to prevail in the future, we would expect transfer prices to be "informed" by lease prices and the two would be closely linked.[7]

G. New Asset Markets and the Value of Information

This information value of lease markets is important because in the first few years in which a quota market is operating, all participants do not have experience about how much quota rights "ought" to command in the market. Under these circumstances, permanent transactions will take place at prices that are not necessarily close to long-term market clearing prices. The uninformed will sell at bargain prices that they later regret, others will hold assets that they would like to divest, some will pay inflated prices that they also regret, and those most familiar with financial markets (rather than those most able to earn highest returns to the quota) will gain advantage over the ill-informed. Transactions taking place under these circumstances will mainly represent transfer

[7] The two prices are linked as a simple multiple when economic and policy circumstances are expected to be stable over the future. If costs or prices or the TAC or other circumstances are expected to change, the quota transfer price will reflect the anticipation of these changes, perhaps before they actually change. When conditions are expected to change favorably, transfer prices will rise in anticipation of those changes, creating capital gains in the transfer prices. The simple multiple link will be broken under these situations of expected change. Generally, we expect that a well-functioning asset market will produce lease and transfer prices satisfying: $E[P_Q(t+1)]-P_Q(t)=rP_Q(t)-P_L(t)$. The right hand side now represents expected capital gains in transfer prices between this and the next period. Note that when conditions are stable, these are zero and the simple multiple relationship between transfer and lease prices holds. However, if (for example) market prices for halibut are expected to rise in the future, the relationship between lease and quota transfer prices will be such that current quota prices are a multiple of the sum of current lease prices plus expected short term capital gains. Thus when conditions are expected to get better, quota prices exceed the average multiple and when they are expected to get worse, the multiple is smaller. In an important sense, this is similar to the observation that price/earnings ratios are high when the stock market expects rosy futures, and low when it expects a downturn. It also means that since rights holders stand to suffer capital losses due to unwise or unsustainable policies, that a stronger onus is on managers to promote value generating and stable policies.

payments and hence have effects on income distribution. They also generate some dead-weight loss, but perhaps more importantly they will generate resentment against quota systems by the disenfranchised. Interestingly, this is exactly why, during the implementation of the British Columbia commercial halibut quota system, industry representatives prohibited permanent **transfers** for the first few years while encouraging leasing. In particular, industry representatives were concerned that those without familiarity with a rights based system might sell out prematurely or at unfairly low prices because of their ignorance of the true market value of the permits. By allowing a lease market to develop and operate for a few years, prospective sellers and buyers were able to gauge a fair sale price for permanent quota by observing lease prices.

H. Prohibiting Leasing

What arguments can be put forth in favor of prohibition of leasing? The few fisheries that do restrict leasing (and Alaska's commercial halibut system stands out as one) do so over fears of the "absentee landlord" syndrome. This issue has repeatedly arisen in most fisheries that have implemented quota, limited entry permits, or other forms of property rights around the world. In a significant number of limited entry programs, for example, limited entry permits and vessels must be "bundled" and sold together. One of the first programs, British Columbia's salmon limited entry permit system (adopted in 1967) prohibited selling a limited entry permit alone in order to block individuals from owning permits without vessels. The main fear was that "outsiders" who were not bona fide fishermen might end up accumulating permits. In the British Columbia case, the fishing industry feared that "doctors and lawyers" would be favored by tax laws and would end up owning salmon quota and leasing it to bona fide fishermen. These same concerns led to existing restrictions on leasing in Alaska's commercial halibut system.

An important point of perspective is that most mature markets that have a long history of property rights, ownership, and exchange generally encourage rather than inhibit leasing (or renting) of productive assets. As discussed above, the freedom to shift rights of use among users with different short term needs generates benefits to both owners and lessees faced with different short term needs due to imperfect planning and unforeseen events. These kinds of benefits are likely to be substantial in the halibut sports charter industry, particularly if the program is successfully implemented and enforced. Restrictions on leasing (such as allowing leasing but only if the actual owner is aboard) effectively impose a transactions cost on the use of short term rights transfers among willing traders. It is likely that the gains associated with short term production flexibility and with transition flexibility will be relatively large and will, as a consequence, leave intact the fundamental incentives for short term arrangements and trades among participants. But the costs imposed by the restrictions proposed will also be considerable, and they will certainly inhibit some trades and opportunities for mutual gain that might otherwise be consummated. These costs will ultimately be borne by quota holders whose quota values will be held down by restrictions on transfers.

I. The Absentee Landlord Issue

Since there will be some significant cost paid by quota holders who are not allowed to engage in short term transfers freely and at low cost, the questions arises: what is the corresponding benefit? How likely is the problem of absentee landlords? This is a difficult to predict before a program is implemented and hence we have to look to other similar examples and to basic economic theory for guidance. What we do know from history is that most mature markets that involve productive assets ultimately allow leasing and short term contracting. In fact, it is difficult to think of many property rights systems in place around the world that prohibit short term leasing and only allow permanent long term transfers in order to eliminate absentee landlords. This widespread tolerance of leasing suggests one of two general possibilities. The first is that, while there may be absentee landlords owning and leasing out property rights in some systems, the benefits associated with short term production flexibility are seen by most participants as outweighing any of the social costs associated with absenteeism. The second possibility is that basic incentives in most systems fundamentally work against absentee landlords. This seems particularly likely when the productive use of the asset requires specialized skills. For example, in most commercial fisheries, specific knowledge of the habits and abundance of fish in different places at different times of the season is accumulated over years of fishing experience. A skipper/owner with such skills will, in principle, always be able to bid quota away from an absentee landlord who tries to operate a vessel from afar, because the skilled skipper/owner will be able to earn higher returns than the absentee owner. Thus an important point is that if industry-specific skills are important in the sports charter industry, then over the long run, these assets are less likely to gravitate to "outsiders" but instead likely to remain in the hands of "insiders". What kinds of specialized skills are likely to be important in the sports charter business? Some may actually favor absentee owners. For example, tour vessel companies may have superior marketing, and packaging and bundling skills that better serve the market niche associated with their primary business. On the other hand, fish-finding skills are clearly as important to many successful charter operations as they are to commercial fishing operations. The ISER recreation studies mentioned above, for example, suggest that the most important reason expressed for choosing particular sites by both residents and non-residents is "good chance to catch fish". To the extent that this is the case, and to the extent that sports charter operators can capitalize on word-of-mouth marketing or other means of highlighting catch rates, on-board skills may be the most critical specialized skill for producing the most value out of quota.

This fundamental uncertainty about the likelihood of absenteeism is likely to play a large role influencing the extent to which leasing or other short term rights transfers are made low cost or high cost. Unlike our centuries of experience with land institutions, rights-based systems in fisheries are new institutions, and managers and fishermen have not had much experience or chance to understand how they might operate under unfettered use. Experience with quota systems has shown that incentives, technology, inputs, and product configuration change under adoption of rights-based systems, often dramatically.[8] Hence it is not surprising that fears of radical change might leave

[8] For example, in the Australian Bluefin Tuna fishery, quotas caused fishermen to stop fishing immature small tuna (for canned markets) altogether and switch to larger older tuna for lucrative sashimi markets. In New Zealand, the red snapper fishery converted from one prosecuted with mixed trawl gear to one

participants uncertain about the wisdom of allowing the flexibility provided by leasing and other contractual arrangements. In many systems that have bundled permits and vessels in order to inhibit trades, the industry and regulators have eventually abandoned the program as the fears of absentee ownership have failed to materialize and/or the value of short term transfers have become apparent. In the end, the question is properly framed as one that compares the potential costs (and likelihood) of absentee ownership against the benefits of a very flexible system of production rights. [9] In this case, it is relatively easy to elucidate the benefits of flexibility but more difficult to precisely articulate the costs.

J. Enforcement Problems

It is also worth mentioning that attempting to prohibit or make costly short term (or, for that matter, long term) transactions such as leases is difficult to enforce in practice. It is envisioned that one way to prevent absentee landlords is to enforce the clause that the quota owner must be on board to legally land fish under the quota. This will in turn be either cheap to enforce or very costly in direct proportion to the fundamental forces driving the need to make short term transfers. If quota holders need and stand to benefit dramatically from being able to make short term transfers, then they will find ways to do that and to minimize the transactions costs. The history of enforcement is replete with examples of the ingenuity brought to the task of thwarting costly restrictions and regulations that inhibit otherwise sensible gains from mutual trade. If it turns out that the industry needs cheap and easily consummated short term transfers of rights, then prohibiting them (or making them costly with cumbersome restrictions) will require a considerable amount of enforcement effort. In contrast, enforcement will be easy and cheap precisely if there are no substantial benefits to short term trades.

K. Impacts on Angler Surplus

The most important impact of a quota system on recreational anglers would be the generation of benefits associated with "rationalization" or the change in incentives to maximize quota values. In a system with a binding TAC constraint, charter owners would reduce costs under a quota system, generating more producer surplus for

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prosecuted with long line, again in order to target the lucrative Japanese trade in live fish. In British Columbia, processing and marketing switched from high volume, low value added frozen operations to high value added fresh niche marketing conducted by smaller operations scattered over wider geographic expanses. In New Zealand, quota holders in the dredge scallop fishery operate their own commercial spat enhancement cooperative, paid for by quota holders. Fishermen involved in New Zealand's rock lobster, paua, and snapper fisheries have implemented self-funded enforcement and stock assessment programs, operating in addition to, and complementary with, government programs. (Wilen and Homans, (1997), Casey et. al. (1995), Major (1997), Branson (1997).

[9] This is how the issue is summarized up by a fishing industry representative [Branson (1997)] in New Zealand: "the ability to buy, sell, exchange, and trade quotas has naturally resulted in some redistribution of fishing effort. . .Over time, a number of fishers have sold their quota and left the fisheries for pastures green. . .whereas original fishers may have had a reasonably consistent fishing pattern, exploiting on a regular basis their preferred and established fishing grounds, current quota holders are more likely to allocated their quota into areas of more favorable catch by the simple expedient of making contract fishing arrangements with alternative fishers".

themselves which would be capitalized into quota prices. In addition, however, we would expect innovations in products and services marketed that would maximize the value-added of quota held. These kinds of innovations would tap different market niches by offering a new range of trips, better tailored to potential market demand. For example, new markets might be developed attracting catch and release anglers associated with tour vessels. These would require only minimal quotas (for fatally hooked fish, for example), and they might be offered at attractively low prices. Or, markets in which fishermen are charged according pricing schemes that reflect fish harvested might be developed. Importantly, under open access (and with a binding TAC constraint) these kinds of markets might be submarginal to an industry with input distortions and overcapitalization influenced by a race to harvest. Whatever the configuration of changes in output configuration, the overall impact can be looked at as a shifting out of the demand curve, signifying higher willingness to pay for given numbers of trips. The area under the new aggregate demand curve would be a measure of surplus changes associated with the quota program overall. Allowing freely and low cost short term leasing and transfer options would add aggregate angler surplus at the margin to the system as a whole. This would be achieved by reallocation of quota from low willingness to pay users to high willingness to pay users and thus would involve some distributional consequences. It is difficult to be more precise about where quota would gravitate to and from, however, without being able to predict the kinds of product changes that are likely.

Option 2: Transfer of QS (permanent) and/or IFQs (leasing):

1. prohibit transfers between charter and commercial sectors
2. allow transfers between charter and commercial sectors
   A. 1-yr. One way transfer from commercial to charter
   B. 3-yr. One way transfer from commercial to charter
   C. two-way (between commercial and charter sectors)

suboptions under 2:

i. designate QS pool into two classes for transfer from charter to commercial sector: transferable (25%) and non-transferable (75%) pools on an individual's basis

ii. cap the percentage of annual IFQ transfer (de facto leasing) between sectors not to exceed 25% of total IFQs per year from charter to commercial

iii. on percentage of annual QS transfers between sectors not to exceed 25% of total QS and a range of between 0-10% of QS per year from charter to commercial

iv. a range of 0-10% leasing of charter IFQ to charter from charter for the first 3 years

Option 2 Discussion

We consider Option 2 and the various suboptions to be associated with the issue of restricting the flow of either temporary or permanent quota **between** the charter and commercial sectors. In contrast, Option 1 policies we presume to be associated with transfers **within** the charter sector. Using a similar argument as discussed above, many would argue that the free flow of quota across sectors would produce the highest overall values from the halibut resource as a whole. In other words, with unrestricted transfers possible between the commercial and charter sectors, we would expect quota to gravitate into the sector that is willing and able to pay the highest price. The sector able to pay the highest price would, in principle, also be the one generating the highest rents and hence the highest efficiency benefits from the resource.

Arguments against allowing free transfer across sectors involve distributional concerns. For example, we might decide that access to the resource is more important than trying to extract the highest value from the resource. In the charter halibut case, proponents of restrictions that inhibit transfers from the charter sector to the commercial sector are fearful that such transfers would be likely, and that as a consequence, sports anglers' access to the resource would be restricted. Other proponents of restrictions believe that transfers are more likely to occur from the commercial sector into the charter sector. For these stakeholders, access by the commercial interests is threatened by free and low cost transfers. In the final analysis, we need to know something about the likely direction of transfers and the factors determining which sector would be likely to express "excess demand". This is a complicated question, because it depends upon the relative contribution that halibut quota per se makes to the values generated by each sector. In addition, the answer may differ as the TAC rises and falls due to environmental and biological perturbations. It is important to note, however, that transfers between sectors, regardless of direction, would ultimately be limited in scale. This is because there are countervailing forces set in motion that operate as transfers take place across sectors. In particular, as quota is transferred out of one sector, the marginal value of remaining quota in that sector would be expected to rise. Similarly, there would be diminishing returns to added quota in the receiving sector, and marginal willingness to pay would ultimately fall as quota increased. These forces operate to restrict the ultimate flow of quota so that it would be unlikely, even in the most unrestricted circumstances, for one sector to be able to "buy out" the other sector.

A. Inter-sector Trades: Short Run

At the same time, as the discussion about production flexibility above suggests, there are clearly mutually beneficial trades possible between sectors that a strict focus on economic efficiency ought to explore. What would we expect to happen under more or less free flow of quota between sectors? This is difficult to precisely predict at this point, because it is not clear how the introduction of quota into the halibut charter sector will affect its structure in the long run. Nevertheless, we can speculate about where the pressures are likely to be at the beginning of the implementation of such a program. Some pertinent information is given by lease prices for commercially caught Alaskan halibut, recently averaging roughly a dollar per pound. One way to examine the issue of the likely direction of flow is to ask: how likely is it that a charter vessel might find it profitable to

purchase a marginal fish from the commercial sector under current conditions? At an average size per fish harvested of 20 pounds, and an average charter vessel harvest (take) rate close to 1 fish per person/trip, the marginal quota lease cost to the charter sector to take one more client as a result of traded quota would be about $20.[10] At present, halibut charter trips cost non-resident anglers about $100-125 in direct charter boat fees, another $50 in miscellaneous expenses, and this is in an open access setting in which the halibut "input" is free. [11] In the very short run, since the charter sector has been operating as an open access sector, the marginal quota value is close to zero and there is not likely to be strong pressures to buy quota from the charter sector.

B. Inter-sector Trades: Post Charter Quota Program

Over the longer run, the issue is less clear, however. The big advantage of a quota system is that the conferring of property rights gives individual operators incentives to increase the value added per pound of quota used. The charter industry has historically operated under conditions of open access. These conditions have influenced the kinds of packages offered to anglers, the kinds of non-price competition among charter operators, the nature of the typical fishing trip, catch and release rates, and the whole spectrum of attributes of the service sold and the cost of producing it.[12] What we can say is that is it is likely, **under initial conditions**, that the incentives to transfer large amounts of quota from the commercial to the charter fleet are not significant.[13] The need for quota by the

[10] Note that we need to separate catch and harvest (take) statistics here. The Lee et. al study (2000) shows an average catch rate of about 1.74 for an average Kenai halibut-only trip, with 0.79 kept and 0.94 released. Average weight per trip (for exclusive and combo trips) is about 37 pounds, presumably total weight of fish caught, giving us an average weight of about 21 pounds per fish caught. We would expect a tendency to keep the larger fish caught, hence an estimate of 20 pounds per person trip seems reasonable.

[11] Also from the Lee et.al. study (2000). Note that these calculations are intended to be less for precise prediction and more for illustrative purposes.

[12] Most importantly, the essential resource services have been supplied free of charge to industry users. The main resource service here is the flow (harvest) from the stock. In addition, the abundance per se provides production services by making high catch rates possible. Other things equal, we would expect overuse of a free inputs. The fact that there is no charge to remove halibut from the stock would most likely be manifested in too many vessels operating at less than full capacity over the season. We might also expect localized over fishing, so that vessels must travel farther in order to access higher abundance and catch rates. This might lead to overcapitalization (vessels built to travel faster to distant locations), excessive search and fish finding costs, etc.

[13] This conclusion also is predicated on the assumption that the TAC will remain as it is currently, which is relatively large for both commercial and sports sectors. We would expect that the TAC would fluctuate in the future, however, and this would tighten the constraint and raise the marginal value of quota in each sector. As the TAC is reduced, the commercial sector will experience rising wholesale prices, which will, in turn, raise the marginal willingness to pay for quota in that sector. Analysis by Hermann (2000) and others suggests that exvessel halibut demand is price elastic. Hence a given percentage decline in TAC to the commercial sector will generate a less than proportional rise in exvessel prices. To a reasonably approximation, if quota prices are proportional to exvessel prices, we would predict a less than proportional rise in commercial halibut quota prices for a given percentage reduction in commercial TAC. On the charter side the issue is less clear. We do not know how a tightening constraint on the charter industry would impact marginal willingness to pay for quota. We do know that most anglers currently take about one fish per trip and hook about two fish. Hence it would be possible, in the face of a reduced TAC, for the industry to reduce trips in proportion to the TAC reduction, but it is not clear how much trip prices would have to rise to do this. For tourists, the marginal cost of a halibut charter trip is small compared with total

charter sector is trip-demand limited, and the current infrastructure has more or less expanded to the point where there isn't much additional profit to be gained by having marginal fish allocated to the charter sector.

On the other hand, **under future conditions**, after the quota system is implemented, charter operators will be under self-generated incentives to explore opportunities to generate more profit out of each unit of quota held. In commercial fisheries this incentive to generate profits has resulted in three kinds of changes. First, it has led to consolidation and reconfiguration of quota to those most able to generate value. Second, it has led to changes in production processes in order to save costs. And third, it has led to changes in the product sold, toward higher value-added products with different attributes.[14] We can expect that introduction of a quota system into the charter industry would have similar impacts. In the long run, we would anticipate quota to agglomerate in units that minimized costs of operation. This would likely include matching vessel size, firm capacity, and utilization rates to different markets in different geographic regions. For example, in regions dependent upon walk-on trips associated with tour boats and other local tourist business, we might expect quota to be held be entities that can take advantage of "economies of scope", or the bundling of several tourist services handled by a centralized staff. That might mean quotas used by multi-service and multi-client tour companies whose principle business is activities other than halibut charter trips. The kinds of trips that might best suite this market could be half-day trips, specializing in giving amateur anglers the change to hook and release a fish, perhaps more than actually harvesting a fish. These would be offered at prices and with attributes that successfully compete with other bundled side excursion day-trip options available to tourists, such as helicopter rides to glaciers, historical tours, or whale watching trips. In other areas where more serious anglers come for the high quality of fishing almost exclusively, we might find different single fishing specialist owner/operators serving different exclusively fishing markets, from the highly skilled to the unskilled, from the urban non-resident to the Alaskan resident. Some skilled angler specialist operators might offer trips to fishermen interested in hooking and releasing fish, whereas others may offer trips to (for

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travel costs to Alaska and hence their demand may be relatively inelastic. For residents who mainly fish to fill their freezers, the marginal cost of a trip is higher as a proportion of the cost of acquiring the fish and hence their demand may be relatively more elastic. If total charter trip demand is inelastic, a proportional TAC reduction that is matched by a proportional trip reduction will generate more than proportionate changes in trip prices. If a similar relationship holds between trip prices and quota demand prices, a reduced TAC for the recreational sector may cause its marginal willingness to pay to rise faster than is the case for the commercial industry. Thus under these circumstances, when the total TAC fell, quota would flow from commercial to recreational and perhaps vice versa for TAC rises. Without further exploration of the demand for charter halibut trips, however, this is mostly speculative and a confident prediction would require knowing something about the demand for halibut charter trips and the manner in which that depended upon landed halibut.

[14] Note that these kinds of changes are undertaken after quotas have been introduced because they all add value to quota held by quota holders. Without quotas, under regulated open access with a binding TAC constraint, the insecure property right to harvest leads fishers to invest in means to capture a larger share of the resource. This is generally manifested in vessels that are built to travel fast to distant areas and hold large volumes to compete in short derby fisheries. We also see redundant labor hired as backup during short seasons, lack of care in storing and on-board fish processing, bottlenecks in processing plants, and generally lower valued end products associated with lower quality raw inputs. Granting secure rights shifts focus from maximizing volume to maximizing value per unit of quota.

example Alaska residents) interested in filling their freezers with fish. All of these reconfigurations would be expected to reduce the initial excess capacity, tailor existing capacity to different markets, and lower the capital cost associated with charter fishing. Second, we would expect charter operators to change behavior in ways that reduced variable operating costs. Quotas could conceivably reduce travel and searching time and other variable input-affecting decisions, thus reducing variable costs. Finally, we would expect that changes would take place in the kinds of products, services, and trip attributes offered. Again, we might expect product differentiation that was better tailored to different markets. For example, certain operators might target only Alaskan residents or avid non-resident fishing by offering specialist trips in parts of the season and in geographic areas in which CPUE was highest (or fish size was largest, or some other attribute of "quality" fishing most attractive to avid fishermen).[15]

C. Short- and Long-Term Trade Flows

These kinds of short- and long-term changes can be seen in Figure 1. In the upper diagram, the current pre-quota equilibrium is depicted by charter trip demand and supply curves D_0 and S_0. These depict an industry in an open access equilibrium, at which point the price of trips is determined by market demand for to portfolio of existing trip services and the costs of producing those services. This produces a market clearing price for trips of P_0, at which point T_0 trips are demanded each season. This equilibrium is characterized by one in which a critical input, namely the halibut resource, is priced effectively at zero. In the lower panel we depict this by drawing a quota demand curve. In the open access equilibrium, we would expect that the marginal willingness to pay for quota is zero.

Without further changes in the structure of the halibut industry, we would expect that free and open transfer between the charter and commercial sectors would probably lead to a short-term transfer to the commercial sector. This is shown hypothetically by a reduction in charter quota used from q_0 to q_1, with the flow determined by the one dollar per pound price presumed to be the current (marginal) willingness to pay of the commercial sector. If temporary transfers only were allowed, the commercial sector would lease quota as shown away from the charter sector. This would reduce the number of trips conducted in the charter sector from T_0 to T_1 initially. Note that this reduction might be quantitatively large or small; the diagram is merely illustrative and not intended to suggest any particular quantitative anticipated result. The price per trip would rise to P_1 and the difference between the market price and the new marginal cost per trip would be the implicit value of the quota used to support the new trip demand. Note that these transfers would reduce angler welfare by an amount associated with dead-weight loss triangle

[15] Some of these attributes of the service supplied and the production process generating the services already exist. But there would be enhanced incentives to alter services, create new market niches, and save production costs under a quota system. Importantly, however, the quota must be binding to generate new values. It would be possible to implement a non-binding quota program that granted much more quota than has historically been utilized and that prohibited inter-sector trades. In this case, the marginal value of the last unit held would be zero until demand growth caught up with the large supply granted via the quota system. Alternatively, a quota that was generous under conditions of abundant biomass and high TACs could become binding as the TAC was reduced due to abundance declines.

above P_0. If permanent transfer were made, the quota transfer would simply be made at transfer prices rather than at lease prices and the welfare impacts would be identical to the case where leasing only is allowed. Those who sold quota would thus get a multiple of the lease price, say 6-8$ per pound rather than the lease price.

Overall, then, the implication of allowing transfers between sectors would be at least **temporary** pressures to shift quota, most likely from charter to commercial sectors. Figure 1 shows the primary short-term impetus for changes, expressed in terms of temporary equilibria. It is important to point out, however, that whether these changes actually materialize will depend upon how fast the charter industry reconfigures under the quota system. As pointed out above, adoption of a quota system will almost instantly generate incentives to create new value per unit of quota held by the charter industry. These changes will include consolidation of suboptimal holdings, shifts between geographic areas, reduction in fixed capital and variable inputs, and changes in the mix of products and services offered. The net result of these changes can be depicted qualitatively in Figure 2. In this diagram, quota consolidation and input reduction are shown as reducing the marginal costs from S_0 to S_1 (supply curve) for quality constant trips, whereas the demand shift from D_0 to D_1 represents creation of new market niches and other services on the output side.[16] Together these changes induced by the new incentives provided by a quota system raise the marginal value of quota, depicted by a shift in the quota demand curve from Q_0 to Q_1.

In summary, it is likely that within a very short time of implementation, the incentives for value-added creation would increase the value of quota devoted to the charter sector as depicted in Figure 2. It is not clear exactly how fast the actual production and market changes in the charter sector would occur, but market for permanent transfers would almost immediately capitalize initial expectations about those values into quota transfer prices. At the same time, lease prices would be determined in a contemporaneous lease market, reflecting the transferability rules in place and the degree to which willingness to pay outside the sector was permitted to affect short-term allocations. A prohibition on within-sector transfers would leave the halibut charter sector operating as discussed above under Option 1. The impacts of allowing transfers between the charter and commercial sector would depend importantly on the values generated by rationalizing and transforming the charter sector after quotas. This is very difficult to forecast at this

[16] It is worth emphasizing again that the preconditions for this kind of new value creation include a constraint that is binding. With high TACs in the commercial halibut industry and non-binding allocations to the sports charter sector, the marginal value of additional allocation is close to zero. We would expect nevertheless that charter companies have configured the services they offer and the means of production in a manner influenced by the fact that the resource is provided free. Generally this would imply some overcapitalization and input distortion. If the TAC is reduced in this setting to the point where the marginal value of the sports charter allocation is positive, we would expect the emergence of a race to catch fish in the charter sector. This would particularly be the case if the reduced TAC was enforced by a reduction in the charter season length. In contrast, under a quota system, if the TAC is reduced (or if inter-sector trade is allowed) enough to generate a positive shadow price, the tightening constraint will be mitigated by attempts to generate more value per unit quota held. The changes mentioned above are illustrative of the kinds of changes we might expect. These are only illustrative however, and experience with commercial fisheries has revealed that there are always surprises and unanticipated changes that develop as incentives switch from a quantity or share maximizing system to one that maximizes value per unit quota held.

point because the history of quota implementation in other fisheries has shown that there are almost always surprises in the sense of unanticipated effects. Of major importance is whether there would be enough value-added generated to justify the charter sector being able to bid quota away from the commercial fishery. In Figure 2 we have drawn the new post-quota program quota demand curve in a manner depicting higher marginal values of P_Q (at the original allocation) than the commercial marginal values (here assumed to be $1.00). If this were indeed the case, we would expect that the pressure would be for the charter sector to want to lease and/or buy quota from the commercial sector. This is an empirical question that is difficult to answer at this point, however, since it is not clear how quotas will change value-added incentives in the charter sector.

D. Impacts on Angler Surplus

A main reason why transfers between sectors might be promoted is that it would allow quota to gravitate to highest economic uses as reflected in willingness to pay. As we have discussed above, the direction of flow is not easy to predict and it is likely to change as the TAC is adjusted upward and downward in any case. For example, with the generous TACs in place currently, it seems likely that the charter sector would not place a high value on quota at the margin, and hence any transfers under current condition would flow from the charter to the commercial sector. With excess charter quota supply, this would not result in any substantial loss of consumer surplus but a gain in overall efficiency as quota was put to financial use in the commercial sector. On the other hand, with a much tighter constraint associated with a lower TAC, the marginal value of quota to the charter sector would rise, and conceivably to a point that could induce transfers from the commercial sector. In this case, a policy that allowed transfers would not only increase aggregate economic efficiency from the resource, but it would increase the surplus enjoyed by anglers who would have been constrained under a system without transfers. This would come about with some corresponding change in consumer surplus enjoyed by consumers of commercial-caught halibut.

Option 3: Block Restrictions

1. any initially issued (ie. unblocked) charter QS once transferred to commercial sector shall be:
   A. blocked
   B. blocked up to the limits of the commercial sweep-up and block limits
2. allow splitting of commercial blocks to transfer a smaller piece to the charter sector
3. allow splitting of commercial blocks once transferred to the charter sector

Option 3 Discussion

Block restrictions are an unusual restriction among the quota programs that have been implemented around the world. It is safe to say that few other programs have elected

designs that bind up the ability to reconfigure and repackage quota by locking in original allocations. The reason is simple: most view the very advantage of quota systems to be the incentives provided to reconfigure wasteful open access allocations into more efficient allocations suited to generating the maximum value from the resource. There are exceptions to this rule. For example, the British Columbia commercial halibut program used a form of block restriction during the early transition phase, but for different reasons. In the B.C. case, each person's initial allocation was divided into two blocks that could be leased (but not sold) for the first few years. Individuals could increase their short-term halibut use rights by leasing blocks from other willing lessors, but only up to two blocks. Blocking in the B.C. case was thus used to slow consolidation and excessive aggregation of quota, during the "burn-in" phase in which participants were learning about the operations of the quota market.

In the Alaska case, blocking was introduced to maintain a quota market for smaller part-time operators. The thinking was that it was desirable to leave much of the many small initial allocations available to the part-timers to which they were allocated. This was implemented by leaving all initial allocations of quota less than 20,000 pounds in the original non-severable blocks. Individuals can hold up to two blocks in any area, and "sweep-up" provisions were made to permanently reaggregate up to two original allocations of less than 3,000 pound into new subsequently non-severable blocks. It was anticipated that these blocking restrictions would thus make more quota supply available to small quota entities, and reduce the quota transfer prices by restricting their values.

Recent examinations of the quota market suggest that blocking restrictions have had important impacts on the market for quotas in the commercial sector. The Dinneford et.al. study shows quite clearly that blocking affected quota transactions prices significantly. Unblocked transfers in Area 2C in 1998 cleared for $10.62 per pound, whereas blocked transfers cleared for $9.72, $9.35, and $8.52 in large, medium, and small blocks respectively.[17] These price differentials are large, but not surprising given the high proportion of the total potential market that has been allocated into the blocked categories. For example, in Areas 2C and 3B, close to 70% of the quota is blocked, whereas in Area 3A about 35% is blocked. There are several ways to look at the economic efficiency implications of these blocking restrictions. In an important sense, the difference between blocked and unblocked prices represent the cost, to Alaska, the nation, and the current owners of quota, of locking in the original inefficient quota allocations rather than allowing efficient reconfiguration. Another way to look at these price differences is as the value of the subsidy provided to the group of small-holder and part-time operators who are encouraged to operate at inefficient scales and input levels. Presuming an average difference of 1 dollar per pound of permanent IFQ, and an average TAC of 55 million pounds, the efficiency costs of these restrictions are roughly $55,000,000 in present value terms.

How would various block restriction options affect the charter and commercial sectors? Basically, this question cannot be answered without knowing what direction quota are

[17] These prices (reported in Dinneford et. al., 1998) are for transfers made within the 35-60 foot vessel class, in Area 2C, in the first quarter of 1998.

likely to flow. As discussed above, whether quota that is transferable between sectors is likely to flow from commercial to charter or vice versa depends largely on the (as yet unknown) kinds of changes that will occur in services offered, costs of operation, and quota holding among charter vessels after quotas are introduced. This is a huge unknown, but it is summarized in the basic question: after quotas are introduced into the charter sector, will charter quota holders/vessel owners be capable of paying the net commercial value for a marginal landed fish? The answer is likely to be yes, at the margin. At the same time, it is unlikely that the amount of potentially transferable quota will be large. This is because the demand for quota is ultimately limited by the market for guided sports halibut trips. And the market for sports trips, in turn, is one in which the Alaskan charter industry competes with a range of other opportunities for tourist dollars and time.

This being said, whether block restrictions are worth imposing on either sector depends whether the presumed values of these restrictions are worth the significant transactions and enforcement costs of implementing them. Sub-option 1 above restricts quota transferred into the charter sector to be of the size associated with the "blocks" being transferred out of the sports sector. First of all, it is important to note that this policy will be irrelevant if quota tend to flow from commercial to sports. On the other hand, if a commercial market for sports quota develops, then it is possible that the relative value in the commercial sector will exceed the sports value at all block levels under some TAC conditions. Then the efficiency implications of the block restrictions are fairly clear. They will be the difference between the quota price that might emerge without any block restrictions and the actual price that does emerge with them. For example, suppose that a "small" charter quota is transferred in blocked form to the commercial sector in Area 2C at a price of $8.52. Then the efficiency costs of the block restrictions would be something in the range of $2.00 per pound, or the difference between the unblocked price the and the blocked price.[18] Note too that the impacts on charter sector anglers would depend upon direction of flow and the manner in which that was inhibited by block or other restrictions. With a binding TAC, flows of quota out of the charter sector would be achieved at the expense of consumer surplus enjoyed by charter anglers, since the extra quota would be freed by reducing the number of trips and raising price per trip.

Note that block restrictions in the commercial sector may also completely inhibit trades that would otherwise occur between willing buyers and sellers in the two sectors. For example, suppose that an initial holder of quota in the charter sector is granted a small amount, say 3,000 pounds. Suppose further that the quota, in its highest and best use in the charter sector, is only worth about $9.00 per pound. Then the block restrictions would require the charter owner to sell only into the small block market, where restrictions keep prices low at $8.52 per pound, below his willingness to sell. On the other hand, free transfer would generate a price of $10.62 per pound. There would be efficiency losses in both sectors associated with the fact that a mutually beneficial trade can be made, but is blocked by trade restrictions. These possibilities are depicted in

[18] This can only be approximated because freeing the whole market from block restrictions would raise blocked prices and lower unblocked prices. The eventual free market price is probably reasonably approximated by the weighted average of blocked and unblocked prices.

Figure 3 where back-to-back marginal willingness to pay diagrams are presented. This depicts the initial allocation in the charter sector to be such that, after quota implementation, the marginal value of another unit of permanent quota is $9.00 per pound. On the left-hand diagram, there are two marginal willingness to pay curves representing commercial quota demand curves for unblocked (U) quota and blocked quota in small (S) blocks. As this is drawn, the proviso that transferred quota must be blocked results in no market developing and no trades consummated. This is because the willingness of commercial buyers to pay for small blocked quota is only $8.52, whereas charter owners value their marginal quota at $9.00. On the other hand, a rule that allowed transferred quota to remain unblocked would result in a shift into the unblocked commercial market since there are gains from trade between that market and the charter sector.

Suboptions 2 and 3 above would be irrelevant if the tendency were for quota to flow into the commercial sector. If trade flows the other way, however, these policies could have an impact on relative economic efficiency. Suboption 2 allows splitting of commercial blocks into smaller units that can be transferred to the charter sector. This option would actually encourage smaller blocked units to be put up for sale rather than unbundling of larger units. This option would have a marginal effect on the commercial quota market, by making fewer larger blocked units available and more relatively smaller blocked units available for sale in the commercial market, after the quota were shifted to the charter sector. This option can also be examined with Figure 3 as follows. The WTP_U is a willingness to pay curve but it is also a willingness to sell curve (as is the case with WTP_S). Under the circumstances drawn, small block holders would be willing, at the margin, to give up commercial blocks for $8.52 per pound, making trade to the charter sector feasible since they are willing to pay $9.00. On the other hand, at $10.62, unblocked quota is too valuable in the commercial sector to sell to the charter sector. Hence we would see flow from small block holders whose market prices are lower than the charter sector willingness to pay. This would generate an efficiency benefit over the whole system associated with being able to shift quota between sectors. We would expect these effects to be small. Suboption 3 allows blocked quota to be split once in the charter sector, but sold out of the commercial sector in original blocks. This option would have the effect of enhancing the current markets for (the cheaper) small blocked quota in the commercial sector similar to what is depicted in Figure 3 for suboption 2. Presuming a charter quota value that makes transfers worthwhile, the most significant pressures would occur in the lower-priced blocks, since the arbitrage gains are largest there. In principle, this policy would enhance the prices obtained by sellers of commercial quota to the level reflecting the charter sector's willingness to pay. For example, if the charter sector can afford to pay $9.00 per pound, then they would buy that quota from sellers of small and medium blocks willing to part with quota at prices less than that. This would, in principle, flatten the current price profile by block size. Again, however, it is likely that this would only occur if demand in the charter sector were strong enough to induce significant quota transfers. It is our expectation that this is unlikely, due to the fact that the charter sector is not significantly limited by current quota allocations.

Option 4: Vessel Class Restrictions

1. from A,B,C and/or D commercial vessel category sizes to charter sector
   - A. leasable
   - B. non-leasable
2. from charter to commercial:
   - A. D category only
   - B. C and D category only
   - C. B,C, and D category
3. initial transfer from undesignated charter to a particular commercial category locks in at that commercial category

Option 4 Discussion

The impact of vessel class restrictions again depends upon the direction of quota flow. If quota ends up flowing from the commercial to the charter sectors, suboption 1 comes into play, otherwise 2 and 3 could be operative. Suppose first that quota is transferred out of the commercial sector. The implications of suboption 1 are similar in spirit to the analysis we discuss above regarding the implications of blocking. In particular, consider system in which quota can be either leased or permanently transferred, from any or all of the vessel size classes A,B,C, and D. As we discussed under option 2, the advantage of allowing both leasing and transfers across sectors is that quota will then gravitate to highest and best uses in terms of economic returns. This would occur with some relocation, of course, and some might object to the distributional consequences of the change in activity and access as a result of transfers. Our best guess is that these would not be significant because we believe that there is limited absorption capacity possible in the charter sector. If this is the case, allowing free flow of quota will cause self-limiting counter-forces that will choke off quota flow. For example, if it is correct that the charter industry is essentially trip-demand driven in a competitive tourist market, the actual marginal value of extra quota to the sector will diminish rapidly as extra quota is added. Thus the (initially) higher prices attracting quota to the charter sector would drop relatively rapidly with the first transfers, and there would no longer be incentives for further transfers.

During the transfer phase, however, the market for either leasable or permanently transferable quota would be one in which quota would gravitate from low-valued markets into the charter sector. The additional quota would increase the number of trips offered and reduce the price per trip, generating additional angler consumer surplus. From the Dinneford et. al results, quota allocated to 35-60 foot vessels seems to command the highest prices, whereas quota held by vessels of GT60 feet seems lowest valued. This relationship generally holds across blocked and unblocked prices and at different sized blocks also. This tells us that a system without restrictions on the commercial source would probably wind up with sales coming first from small block owners in the vessel size classes of 60 feet and above and the freezer vessels. Again, to the extent that these are relatively lower-valued sectors, transfers would generate economic efficiency benefits by reallocating to low (large vessel, small unit, blocked) sources to high valued (charter)

uses. These transfers would flatten the quota price differences between size classes and between block size classes somewhat, depending upon the scale of transfers.

Our discussion of the difference between leasable and non-leasable options above carries over to these policy options. There are good reasons to allow leasing (reallocation flexibility in transition to new configuration, short-term production flexibility gains, information gains). Furthermore, if policy is going to allow permanent transfers, it seems sensible to allow leasing also. Alternatively, the British Columbia model of using the lease-only option before permanent transfers are allowed would allow market participants (and regulators) to feel out the direction of likely changes once transfers were allowed to be permanent.

Suboptions 2 and 3 would be operative if the value of quota in a reconfigured charter sector was generally not as high quota in certain sectors of the commercial sector. In this case, quota would be purchased from charter grantees by commercial fishermen and impacts would depend upon the nature of restrictions on purchases. Any restrictions to particular vessel categories would have efficiency reducing impacts compared with the alternative of allowing quota to flow to highest and best use. Since vessel size classes C and D appear willing to pay the most for quota, we would expect that most transfers would take place between charter holders and owners in these classes. The general rule of thumb would be that the less restricted the transfer options, the more total quota would flow into the commercial sector. Hence a policy that allowed all charter quota to end up as unblocked and transferable across classes would generate the highest transfer prices and the most quota transferred. In particular, we would expect all vessel classes and all ranges of block markets above the willingness to pay of the charter sector to bid for quota. The strongest demand and hence components likely to first receive quota would be 35-60 foot vessels buying unblocked quota. These points can be seen in Figure 4, which depicts quota demand by vessel size class, with willingness to pay highest for C class vessels and lower for D class vessels. As we have drawn Figure 4, the charter willingness to sell is at $11.22 per pound. Thus a restriction that allows trades between the charter and C sector would generate trades, since their willingness to pay is greater than the willingness to sell of the charter sector. On the other hand, a policy that restricted trades to those only between the charter and D class vessels would effectively not operate under the conditions shown. In terms of the 3 possibilities listed under suboption 2 above, there will probably be little difference between the option that allows trades to vessel classes C and D, and the option that allows it to C, D, and B. This is because B vessels have lower willingness to pay that either of the other two, and supply of transfers would probably be choked off before trades to B vessels became feasible. Restricting trades to D class vessels would limit the transfer amounts and the transfer prices compared with the option including C class vessels. For example, in the case in Figure 4, restricting trades to D classes only would result in no trading opportunities. It bears emphasizing that the demand curves (and the associated supply curves which are determined by the TAC decisions) depicted in the Figures are snapshots in time pertaining to certain wholesale market and abundance conditions. Any changes in market conditions would shift all the quota demand curves in the commercial sector and any

changes in abundance that affected TAC allocations would also change the willingness to pay of various sectors at the margin.

Suboption 3 will, in principle, restrict the total flow of transfers to the commercial sector, and reduce the price received by charter vessel quota holders. This is because **any** restriction on trades reduces both the market clearing price and the quantity traded. In this case, quota would still flow to the sector and market class willing to pay the highest prices, which are vessel classes C in unblocked form. One point that has not been addressed by these options is the fact that quota will also gravitate out of the charter sector (if it is to gravitate at all) to the geographic sector willing and able to pay the highest prices. Hence if policy makers are bent on reducing the flow of quota once transferred to the commercial sector, attention ought to be paid to the spatial price difference, which are every bit as important as determinants of transfers as the block restrictions and vessel size class restrictions.

Option 5: One transfer of QS/IFQ each year between sectors for each QS holder

Limiting the absolute number of transactions per year (to a single transaction or any other number) would clearly be an efficiency-reducing restriction. As discussed under Option 2, there are various reasons for wanting the flexibility of lease and/or permanent transfers. Some of these reasons involve the need for short-term transfers to meet short-term production exigencies. This flexibility would be hampered by limiting the number of transactions per year allowed, and it is not clear what might be gained, unless a slowing of the process is desired.

Option 6: Minimum size of transfer is range of 20-75 fish

A minimum transfer rule might be enacted in order to save on administrative and transactions costs. We have not seen a discussion of the administrative paper-chase system to be set up for the charter sector and hence it is not clear whether requiring minimum transfers would save costs. There is somewhat of a conflict between costs that need to be incurred to obtain the different kinds of gains from trade in quota. From the perspective of tracking long-term permanent transfers, administrative costs would certainly be lower if transfers were made infrequently and in large blocks. And it is likely that these are the kinds of changes that would typically characterize permanent transfers. On the other hand, the gains associated with allowing quota holders to transfer temporary short term quota amounts to meet short term production needs obviously would be higher if the units were highly indivisible. It is easy to see, for example, charter quota holders needing to transfer 5-10 fish to cover the last few days of a season. Again, the general rule holds here: any restrictions that block free trade in quota (whether on a short- or long-term basis) reduce the potential values that the quota system makes possible.

ISSUE 7: Caps

Option 1: No caps-free transferability

Option 2: ownership caps of ¼, ½, and 1% of combined QS units in Area 2C and i/1, ½ and 1% of combined QS units in Area 3A and grandfather initial issues at their initial allocation

Ownership caps have been implemented in virtually all limited entry and quota systems worldwide. Limits on the fraction of quota that ought to be held by one person or entity are driven by both ideas of "fairness" and by fears of the consequences of unfettered trade. Many are skeptical that natural resources ought to be "owned" in the first place. To the extent that skeptics can be convinced to buy into the idea at all, they often also insist on the proviso that initial (and subsequent) distribution be "fair". This translates into design features that equalize initial distributions and restrictions on reallocation, including ownership caps. The fear that motivates the implementation of ownership caps is generally the fear that "big business" interests will end up owning rights. Opponents of quota plans often cite fears that fisheries will end up "controlled" by large multinational conglomerates. The often unstated assumptions behind these fears are that large holders might not act with the interests of local communities in mind, or that they might monopolize the market for the quota-managed fishery, or that they might, by virtue of mere size, influence the management toward higher exploitation rates. Whatever the clarity of the vision about these outcomes or the likelihood that the scenarios might materialize, fears of agglomeration have driven the design of most programs, and as a consequence, most programs have ownership caps.

What are the advantages of caps of different sizes? If one is concerned about fairness issues such as equalizing the allocation and distribution of quota holding, then caps are one more restriction on trades that may or may not constrain actual behavior. Whether caps are needed or not depends upon the fundamental incentives to agglomerate in the first place. Agglomeration of quota in the hands of one entity has the potential to confer certain economic advantages. One example already mentioned is the possibility that charter quota held by tour companies might be used more effectively by bundling charter trips with other services provided by the company. Hence there might be economies of scope, which are savings in administrative and other marketing costs associated with a single entity providing multiple services. There might also be economies of scale associated with holding large amounts of quota, or savings in production inputs associated with large-scale use of quota. It is more difficult to think of how these might materialize since successful charter operations are likely to be dependent upon local knowledge and other specialized inputs associated with a skipper or skipper/owner.

There are thus two questions that bear on the issue of whether there might be a tendency for quota to agglomerate and hence whether ownership caps would even be necessary. One is, what are the economic gains associated with holding larger rather than smaller units of quota held? The second is, at what point are these gains counteracted by certain diseconomies associated with trying to manage large rather than small holdings? These are, again, largely empirical issues and they cannot really be addressed without knowing something about how the charter sector will ultimately transform itself under quotas. These same issues have repeatedly been raised in the farming sector as analysts and policymakers have watched trends in the consolidation of farm holdings. Over the past

50 years there have actually been movements toward consolidation of farmland in corporate hands and movements back to individual owners of smaller holdings. As it turns out, the same opposing forces are at work in the agglomeration of farm assets. There are probably some economies of scale and scope to holding large amounts of farmland under one ownership umbrella. For example, access to capital and to markets might be easier with larger scale. Fixed costs of administration might also fall to a point with size. On the other hand, in an era where specialty marketing is growing, squeezing the most profit out of land may require the detailed and specialized knowledge that an owner has of his own assets. In this case, large scale would be a competitive disadvantage, and we might see trend toward disinvestment in large corporate entities.

We would anticipate similar push and pull in the charter sector. And it also might be the case that different markets in different regions might need different scales to generate the most value from the resource. But without further understanding of the kinds of changes in services and production likely to emerge with quotas, it is difficult to say whether caps will either be binding (necessary) or not. It is conceivable that the largest ownership blocks under current circumstances might actually be too large for the future charter industry under quotas. In this case, ownership caps based on current holdings might never come into play. It is also conceivable that current holdings might be too small for some markets and regions to operate most efficiently. In this case, imposing ownership caps that are binding would have efficiency costs. It would thus be a political issue of whether the economic losses associated with any binding ownership caps are sufficiently compensated by equity or other concerns over agglomeration.

Concluding Thoughts

In all of the discussion over quota design for the charter industry, there is considerable tension between economic efficiency-generating design options and restrictions and provisos designed to prevent change that is anticipated to be either too rapid or too radical. For the charter halibut industry, one motive for even considering quotas is to reduce the uncertainty over future allocations to the sector as a whole. If that is the main purpose of introducing quotas, a program design with restrictions that freeze the industry close to the status quo may satisfy most participants. Nevertheless, the main economic benefit of adopting a quota system in the charter sector could be the incentives it will give charter quota owners to maximize the value of quota held. If there is one single constant across all programs implemented to date around the world, it is that quotas generate new and generally profound changes in methods of doing business. These changes are the result of abandonment of the wasteful activities associated with the open access race for fish, and the substitution of activities reflecting value-added and stewardship. A quota system adopted by the Alaskan charter industry can be expected to generate substantial and largely unpredictable changes as quota owners search for new ways to maximize the profits associated with quota rights.

The simple way to look at the suite of transfer restrictions discussed above is to consider each a potentially binding (effective) barrier to completely free and unfettered trade. It is

a fundamental characteristic of any quota system that the less constrained a system is, the more quota will gravitate to high valued uses and the more overall value will be created by the resource devoted to the sector. Conversely, any restrictions on trade that effectively inhibit some quota from seeking highest and most valued uses will impose a cost. This cost will be borne directly by those who are granted quota in that their quota will not attain a market value that is as high as it might be without restrictions in place. Importantly, the cost is borne mainly be those in "protected" sectors and groups. For example, as we discussed above, the cost of blocked transfers in the commercial sector is probably close to 55 million dollars. This is the amount by which quota held by individuals in the small holder, blocked transfer categories is discounted vis a vis what it would sell for in an unblocked market. It also represents the potential value attributable to the halibut resource that is foregone by Alaska and the nation in order to keep a diverse fleet of small holder, part-time fishermen.

In considering potential restrictions on transfers that might be imposed on the charter sector, careful attention needs to be paid to whether the industry and attendant secondary industries wish to forego similar efficiency benefits in order to attain similar objectives that have influenced design of the commercial sector system. For example, is it desirable to inhibit leasing or other short-term transfers of use rights by adding transfer restrictions that make trade costly? It is our sense that the benefits of being able to transfer quota within the charter sector on a short term basis are particularly significant economically. As we discussed, it is likely that the initial halibut charter quota allocation will be diffused across a large number of grantees, many of whom will choose to exit the industry within a few years of the quota program beginnings. Prohibiting leasing clouds the information that might be accumulated by prospective buyers and sellers about a fair price for permanent transfers during the early phases of the program. This is in addition to the important benefits of being able to temporarily adjust quota holdings to meet short-term needs. Over the longer run, participants need the security to invest in value-producing new markets and service provision that permanent transfers promise. The British Columbia model was an interesting compromise that allowed temporary transfers during the first couple of years and then opened up the system to permanent transfers.

With respect to restrictions on transfers between sectors, there is understandably more concern about the implications of completely free transfers. The biggest unknown in all of the policy analysis is what configuration the charter sector will assume in response to quota allocations. The kinds of changes in services, in capacity utilization, and in variable input use in response to secure property are likely to be significant, particularly as the TAC constraints actually become binding. The magnitude of the new values generated will determine the pressure to either sell quota to the commercial sector or buy it from the sector. In an important sense, the implications of restrictions on between-sector trade are tied to restrictions in within-sector trade. If the charter sector adopts regulations and restrictions that inhibit the generation of the potential values that are likely to emerge with unfettered quota markets, those restrictions will at the same time enhance the likelihood that quota will be under pressure to flow from the charter to the commercial sector. At the same time, the layers of existing restrictions in the charter

sector insulate the charter sector currently by ensuring that the willingness to pay in that sector is less strong than it might be under free trade.

In this system of layers of restrictions on trade in the commercial sector, the design of rules for between sector trade will effectively determine the groups within which trade occurs. The general rule of thumb, however, is that quota will flow to the sectors that have the highest effective willingness to pay. As we have shown, under current restrictions in the commercial sector, this implies vessel classes C and D generally, and quota flowing into unblocked markets if permitted. It is also another rule of thumb that restrictions will reduce willingness to pay and hence determine the strength of the relative flow of quota. We would suggest caution, however, in giving these qualitative predictions too much focus. We do not expect pressures for large amounts of quota to flow (in either direction) between the sectors because of the nature of the charter industry and because of the countervailing forces that operate to equilibrate quota prices as transfers are made. As stressed above, the industry is essentially trip-demand limited, and having the use rights to harvest more fish probably has limited value at present. At the same time, it is unclear what a reorganization associated with secure property rights might generate, and it is conceivable that the industry might go through modest expansion or contraction. To the extent that it is desirable to capture the values from between-sector trade, consideration might be given to leaving mechanisms for modest amounts of trade open. Similar principles regarding the desirability of leasing hold with respect to between sector trade; it might be important to allow leasing at some scale in order to monitor the nature of the market pressures for long term transfers.

With respect to cap provisions, it is difficult to know whether there are even economic forces promoting agglomeration at this stage. We suspect that the part of the industry that serves elastic markets such as the tour boat industry may exhibit economies of scope and perhaps economies of scale. Other areas such as Kenai and Homer that serve more skilled angler markets may be optimal at smaller scales. It is thus difficult to predict the direction of the dominant forces. Capping ownership at levels below the economic scale necessary to maximize benefits will forego efficiency gains. On the other hand, the agglomeration issue is so politically charged that those benefits may not be worth pursuing in the larger arena. In the end, the cap issue is probably more an income distribution issue than an efficiency question and hence there is little that economic analysis can add to the question.

Finally, it should be emphasized that another important benefit of an IFQ system is that it eliminates some of the tension, conflict, and transactions cost associated with allocation decisions. By allowing quota to flow between and among participants in a manner determined by mutually agreeable market trades, fishery managers can remove themselves from some of the contentious allocation disputes that consume so much of their time and energy. The cost of this, of course, is that an initial time, energy, and political investment must be made up front in getting the initial allocations and rule of the game established. But in the long term, a well-designed quota system more or less automatically resolves much of the dispute and eliminates the rancor that consumes

modern managers faced with using limited micro-management allocation instruments to address conservation, economic efficiency, and distributional concerns simultaneously.

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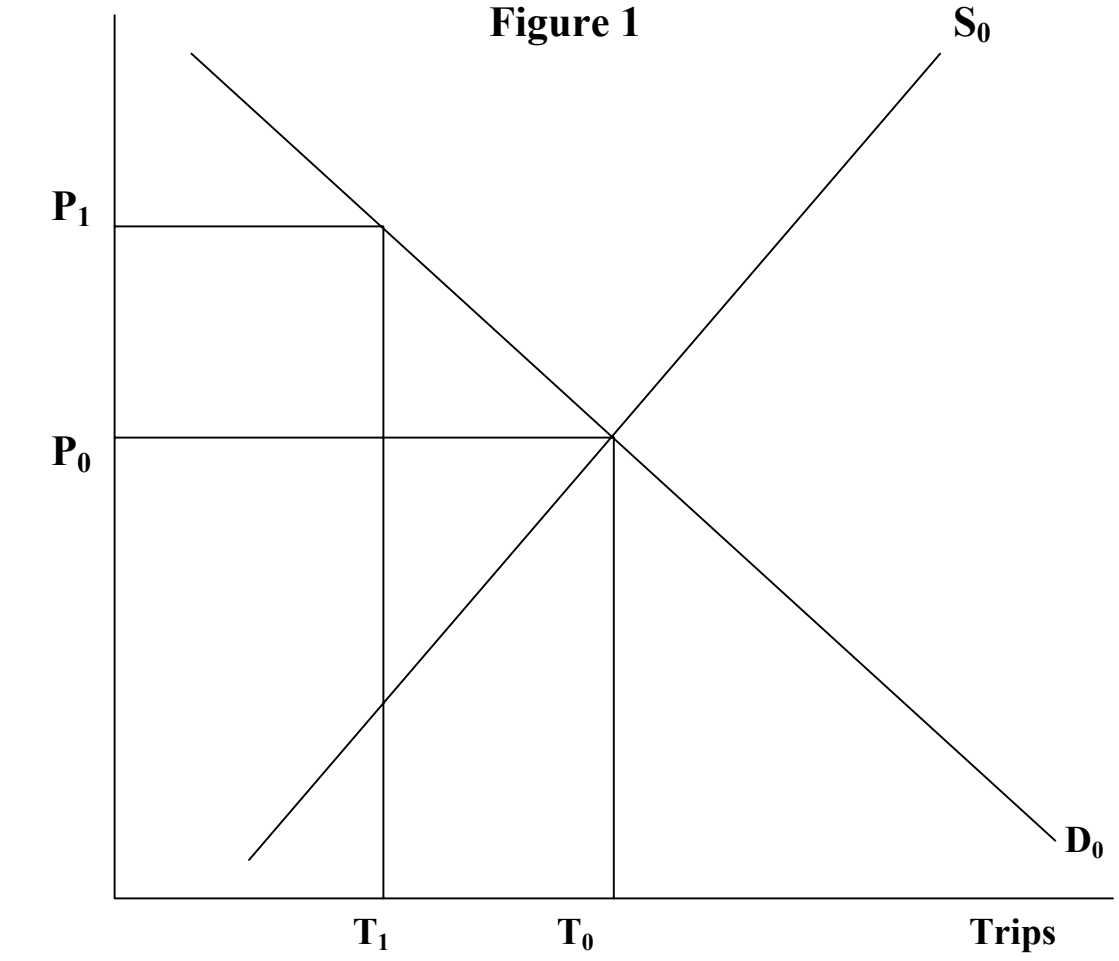
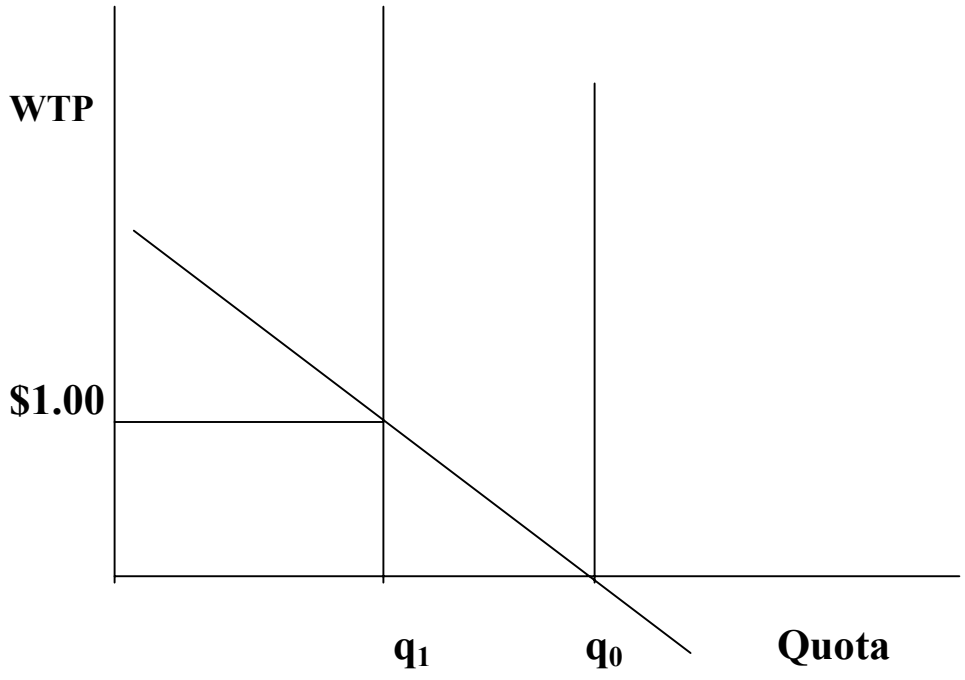
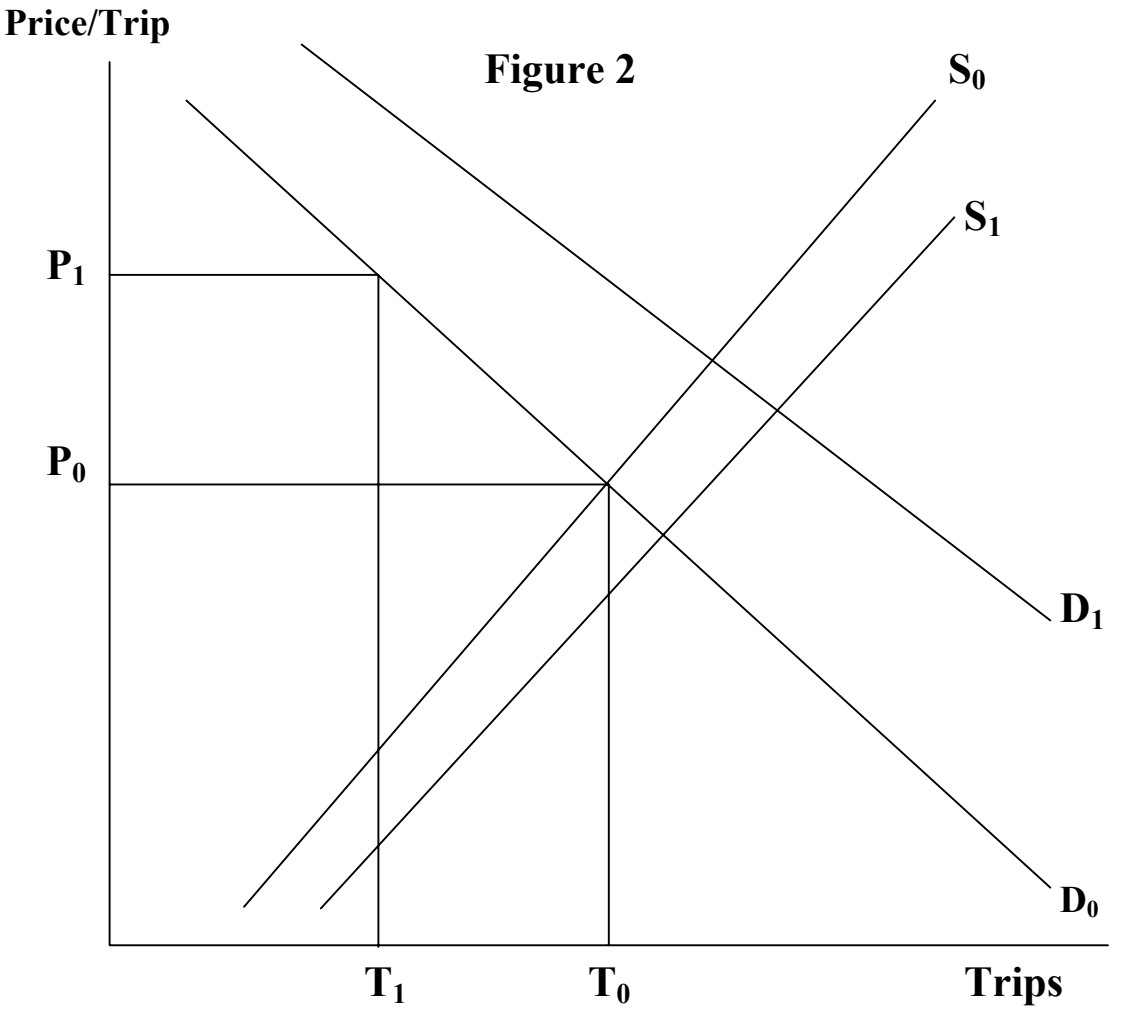
Figure 1



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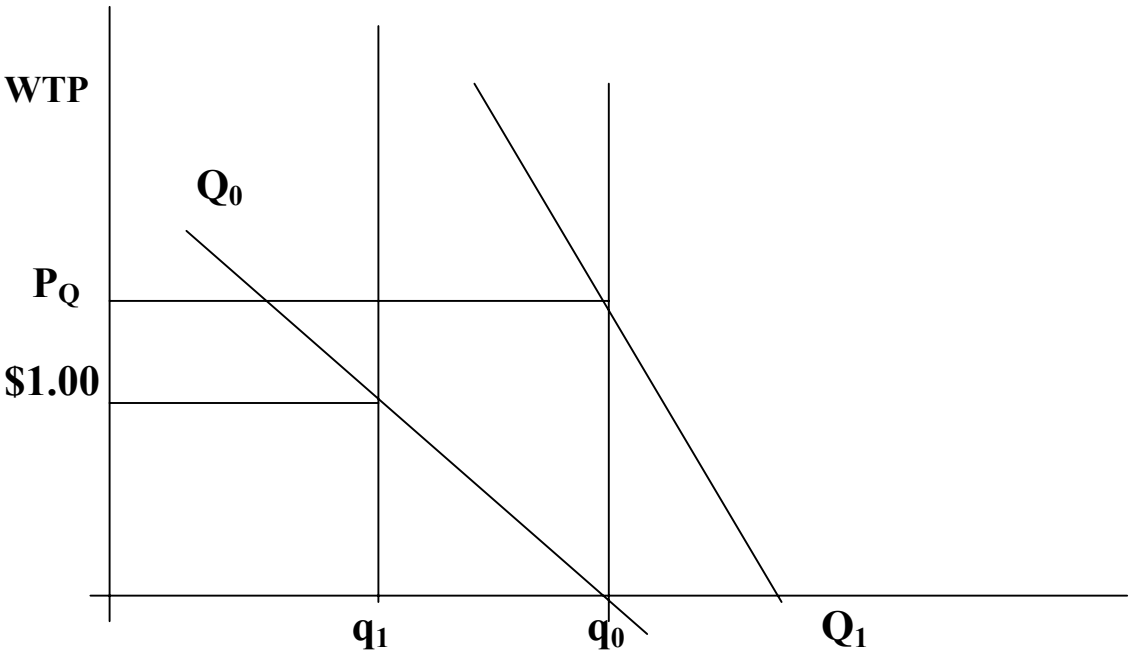
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Figure 3

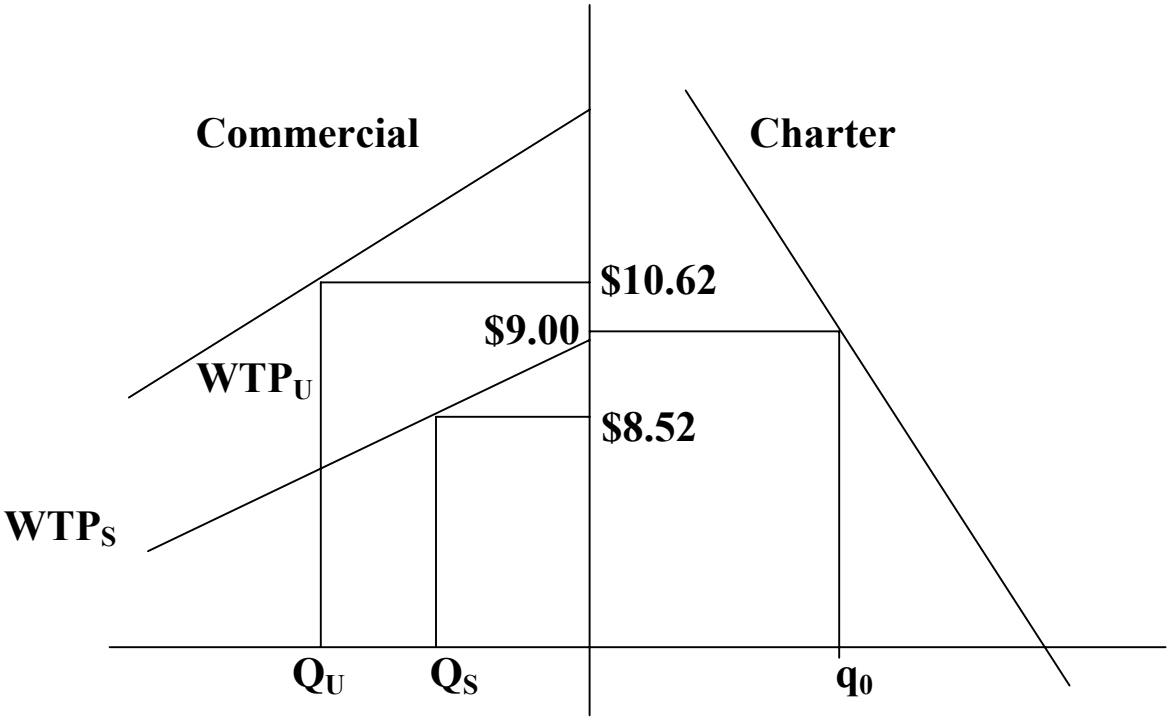

Figure 4