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Cost-Sharing and Pharmaceutical Utilisation in Russia: Evidence from a Household Survey

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DISCUSSION PAPER 155

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SUMMARY

The Russian pharmaceutical sector is currently undergoing reform of the procurement, distribution and financing of medical drugs. As part of this process it is felt that there should be some form of cost sharing between consumers and the government, in the belief that this will deliver socially optimal usage of pharmaceuticals and help promote better health.

Government policy must be directed at designing an equitable and affordable system of cost-sharing with patients, and this paper aims to assist this process. The economic theory of co-payments is described and common forms of co-payment policy for pharmaceuticals in operation in different countries are reviewed.

Empirical estimates of the impact of economic incentives, and in particular exemptions, have been hampered by the lack of up to date and reliable data in Russia. The paper addresses the impact of exemption status, and other socio-economic variables, on pharmaceutical use in Russia. Estimates are derived from a survey of over 4000 households conducted in 1996 in three oblasts: Tula, Pskov and Penza.

We found considerable variation among oblasts in the proportion of households reporting prescription use in the month prior to the interview. 53% of households in Tula said they had a prescription compared to only 9% of those in Penza. A considerable number of households reported spending on drugs, ranging from 50% of households in Tula to 75% of those in Pskov. Moreover, when pharmaceutical spending was incurred, amounts paid were substantial, ranging from 18% of household income in Pskov to 59% in Penza. It is unlikely that such expense can be borne in the long term, and there is a strong imperative for some form of government intervention to ensure health care is generally affordable.

We used multiple regression analysis to explore the factors influencing pharmaceutical utilisation and expenditure. Separate results for a zero-inflated negbin model of utilisation of prescriptions and for a two-part model of the overall level of household expenditure on pharmaceuticals are presented. Full exemption from prescription charges is shown to increase the utilisation of prescription items and reduce the probability of the households incurring drug expenditure. Results are comparable to those obtained from studies in other countries.

Using the elasticities derived from our analyses it has been possible to calculate the policy implications of introducing different rates of co-payments. As the use of pharmaceuticals is relatively inelastic, the introduction of some form of cost sharing is unlikely to have dramatic impact on prescription utilisation or expenditure.

CONTENTS

I INTRODUCTION

The Russian pharmaceutical sector is currently undergoing reform of the procurement, distribution and financing of medical drugs. The political imperatives underpinning these changes are wide ranging, and include the desire to protect local industry while benefiting from higher quality or less expensive imports. It is also felt that there should be some form of cost sharing between consumers and the government, in the belief that this will deliver socially optimal usage of pharmaceuticals and help control disease.

Routine official statistics on drug use in the Russian Federation are unavailable, and data collected prior to the collapse of the Soviet Union can no longer be used for predictive purposes. The former centralised health system, offering universal free care, has disintegrated and the local production and distribution of pharmaceuticals has all but collapsed. While attempts are made to preserve the principle of free universal access, in reality patients are having to pay an increasing proportion of their medical and pharmaceutical costs, and are facing greater problems in securing medication. Hospitals rely increasingly on humanitarian aid for supplies of drugs, and patients are often forced to secure a full range of medication, including antibiotics and anaesthetics, prior to hospital admission.

Traditionally certain categories of the population have been exempted from pharmaceutical charges. Exemption categories are now no longer standard across the Federation: the universality of exemption status proclaimed in December 1992 (Decree 970) was largely overturned in July 1994 (Decree 890) which gave oblasts (regional governments) considerable autonomy in deciding eligibility for exemption, the list of exempt items, and reimbursement levels. The introduction of Compulsory Health Insurance has further eroded the principles of solidarity. Nor are entitlements widely publicised, particularly if oblast governments cannot afford to honour them and, even if patients are aware of their exemption status, claiming the reimbursement for which they are eligible is problematic. The household survey used in this study suggests that many are not aware of their exemption status and some are denied the right to purchase preparations against an exempt prescription.

Future government policy is likely to be directed at designing an equitable and affordable system of cost-sharing with patients, and this paper aims to assist this process. The following section outlines the economic theory underpinning co-payments, including discussion of the impact of cost-sharing on consumer decisions and government revenues.

The remainder of the paper addresses the impact of exemption status, and other socio-economic variables, on pharmaceutical use in Russia. Estimates are derived from a survey of over 4,000 households conducted in Russia in 1996. The data and sample are described in Section III. Separate models for the utilisation of prescriptions and for the overall level of household expenditure on pharmaceuticals are presented in Section IV. The analysis generates price and income elasticites of the demand for pharmaceuticals, which can be used to calculate the impact of different levels of co-payment. The policy implications of this are drawn out in Section V, while concluding comments are made in Section VI.

II ECONOMIC THEORY OF CO-PAYMENTS

The aim of co-payments

Some degree of governmental intervention is generally thought necessary in the financing and/or provision of health care services. The main justification for intervention is that there are several characteristics which cause the health care market to fail to deliver a socially optimal distribution of health care. These factors include uncertainty on the part of patients about their need for health care as well as its potential benefits, and asymmetric information between providers and consumers.

Furthermore, health care is often viewed as a special commodity in the sense that provision of basic health care is regarded as a human right in many countries. This stems from the ideas that health care is a necessary prerequisite for ensuring good health and that maintaining the health of the population is both a social and private responsibility. This argument is reinforced by the fact that there are externalities in the health care market. This suggests that the provision of health care benefits both the individual recipient and the population more generally. This is evident in programmes of vaccination, for example.

As a result of these factors, societies aim to achieve both equitable and efficient allocation of health care resources. Most countries have established public schemes in order to reduce or remove financial barriers which restrict access to health care. In practical terms, either governmental or social reimbursement schemes are implemented for health care.

Despite this, some rationing system for health care is required as societal resources are scarce. Most countries impose some form of financial burden on patients in an effort to share the cost of health care with the government. This form of cost sharing is referred to as a **co-payment**.

The fundamental justification for co-payments is to counter moral hazard. In a perfectly competitive market, the consumption of health care is determined by the socially optimal point where the marginal cost to providers is equal to the marginal benefit for consumers, depicted as Q_0 in figure 1. However, if consumers know their payment for health care will be fully

reimbursed, they consume health care to the point where their marginal benefit becomes zero as depicted by Q_f in the figure. Since the marginal cost exceeds the marginal benefit, society incurs a dead weight loss measured by the area $E_0E_fQ_f$. The objective of the co-payment is to reduce consumption towards the social optimal consumption level, Q_0.

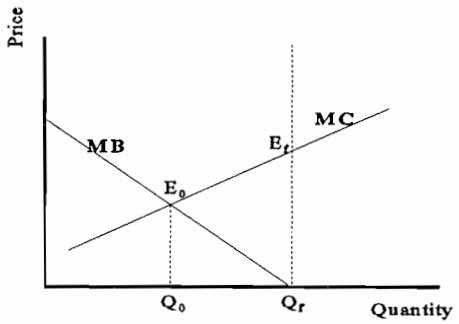

Figure 1

In policy terms, co-payments are often viewed as means of raising revenue. This is achieved in two ways. Firstly, funding bodies can earn money directly from patients through user charges. Secondly, co-payments might reduce use of inappropriate or ineffective health care, and encourage a more cost-effective use of health care.

Negative effects of co-payments

It should be noted that co-payments may have harmful effects. First, since the need for health care is uncertain, introducing consumer payments for pharmaceuticals increases financial risk and this may reduce social welfare. Secondly, co-payments are a 'tax on the sick' in the sense that they tend to fall on those who are already disadvantaged by sickness. This aspect may be undesirable for social or ethical reasons. Thirdly, payments tend to represent a greater burden for the poor, unless their level is income related. Finally, co-payments may have an adverse effect on people's health status if they reduce necessary use of pharmaceuticals.

Effect of co-payments on individual demand

Co-insurance

The introduction of a co-payment shifts the demand curve for pharmaceuticals. Figure 2 shows an individual's demand for pharmaceuticals. The demand curve with no insurance (equivalent to 100% co-insurance) is depicted as D1. If the individual has insurance in which she pays 50% of the price of pharmaceuticals in the form of a co-payment the quantity demanded is determined by

the quantity demanded at half the actual price. The new demand curve with 50% co-insurance is shown as D2. In the extreme case of zero-coinsurance, that is full cover insurance, the demand curve becomes vertical as shown by D3. In this case, demand is totally inelastic as consumers are immune to price changes. In summary, as co-insurance increases, the demand curve rotates anti-clockwise around the horizontal intercept. In other words, co-insurance makes demand more price elastic, in comparison with full cover insurance. State subsidies are equivalent to insurance.

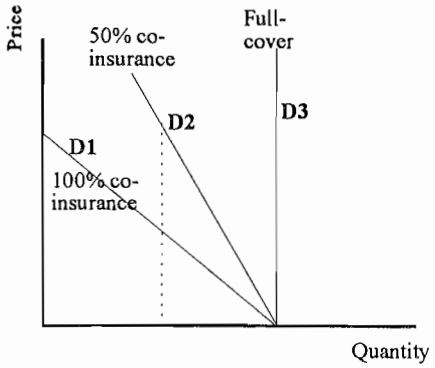

Figure 2

It should be noted that this change of the elasticity does not imply that individuals change their real demand for pharmaceuticals. If quantity demanded is plotted with respect to **net price**, which is the amount of money the individual should pay for pharmaceuticals from her pocket (eg. $0.5P_p$ for 50% co-insurance), the demand curve would be the same as that under no insurance. In this case the price elasticity doesn't change. The price elasticity that measures the effect of the **net price** on demand is termed the **real price elasticity**. As the real price elasticity is masked by insurance, what we observe directly is the effect of the apparent price on demand. We refer to this as the **observable price elasticity**. The observable price elasticity is useful to estimate the impact of apparent price changes on quantity demanded which we shall calculate in the Russian context in a later section.

Fixed prescription charge

There exist forms of co-payment other than co-insurance. One is to apply a fixed charge for each prescription, irrespective of the price of pharmaceuticals, such as in the UK. Under this scheme, patients may choose to purchase substitutes for prescription pharmaceuticals, such as over the counter (OTC) drugs, when the price of the

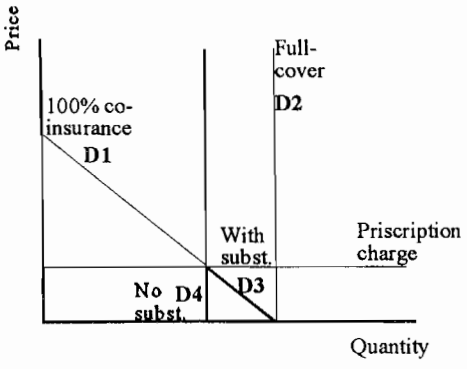

Figure 3

substitutes is lower than the prescription charge. If the price of the substitutes exceeds the prescription charge, patients will purchase prescription items, making demand totally inelastic with respect to the price. Accordingly, the demand curved is kinked, shown as D3 in figure 3.

However, when there are no substitutes for prescription drugs (for example, when drugs are only obtainable on prescription ie. not available OTC) demand will become completely inelastic at any price. The quantity demanded is determined by the quantity demanded at the price of the prescription charge on the real demand curve for no insurance. Therefore, the demand curve, shown as D4, becomes vertical as that for full cover insurance, but shifted inwards.

Under the scheme of a fixed prescription charge, the observable price elasticity is zero over the range where price is higher than the prescription charge. The real price elasticity is more important in assessing the quantity demanded, as the quantity is determined by the prescription charge, which is virtually the net price of drugs. The real demand curve can be obtained by plotting the quantity demanded with respect to various prescription charges.

Reference pricing

Another common policy option is reference pricing. Under this scheme, the government determines the maximum price that the state is prepared to reimburse consumers. If the price charged by the pharmacist exceeds this reference price, consumers pay the excess. In this case, the quantity demanded is inelastic and equivalent to that for zero price within the range where the price is lower than the reference price. When the actual price exceeds the reference price, the demand curve becomes parallel to that when there is no insurance. The demand curve is kinked as shown as D2 in figure 4. The observable price elasticity equals zero up to the reference price, then becomes larger but still less than the real price elasticity. This means that demand is totally inelastic until the price reaches the reference price, then become elastic but still less elastic than the case of no insurance.

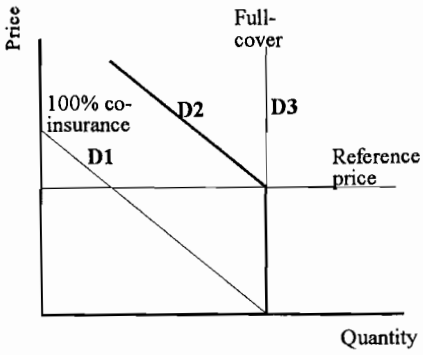

Figure 4

III HOUSEHOLD SURVEY: DATA AND SAMPLE

To gain an understanding of current pharmaceutical use and to assist in formulating public policy in Russia a household survey was conducted in three oblasts: Pskov, Tula and Penza which have populations of 0.8, 1.8 and 1.5 million respectively. The survey was administered during June through August 1996 after piloting (in Moscow and the rural area of Kaluga) in May 1996.

Households were selected randomly, with local interviewers (the majority of whom were medical students) asked to follow pre-determined instructions from a starting address; showing which route to take and how many houses to omit after an interview had been conducted before knocking on another door (the random walk method). Face to face structured interviews were held with the nominated (usually female) member of the household, who was asked to provide information on behalf of other members of the household (the largest household in the survey included nine members). Interviews lasted for around an hour and detailed information was collected on a range of demographic, socio-economic and health related topics.

Data for a total of 4,137 household interviews are available, of which 1,460 were conducted in Tula, 1,166 in Pskov and 1,511 in Penza. 84% of interviews were conducted with women. Table 1 shows selected descriptive details of the households in the survey. Little is known about non-respondents, although the pilot suggested that non-response was higher in the urban area than the rural site, and among the elderly, the young, those living alone and the unemployed.

Respondents were asked how many prescriptions and over the counter drugs had been procured by members of the family and how much the household had spent on pharmaceuticals in the month prior to the interview. Superficially there appear to be marked differences in the average number of prescription items and drug expenditure across the three oblasts (Table 1). In Tula, households had an average of 2.3 prescriptions compared to 1.1 in Pskov and only 0.4 in Penza. Only 9.8% of households reported having a prescription in Penza compared to 52.7% of households in Tula (Table 2). The differences among all three oblasts were found significant in bivariate analysis ($p<0.001$, Tukey Honestly Significant Difference (HSD)).

Households in Penza also incurred greater expenditure on pharmaceuticals than did households in the other two oblasts ($p<0.001$, Tukey HSD), with the average household spending 70 thousand roubles in the month prior to the interview compared to 32 thousand and 39 thousand in Tula and Pskov respectively. Some of the difference may relate to data entry errors in Penza, where there is evidence both of case duplication and a greater frequency of incorrect values for some variables. As an example of the latter possibility, Table 2 shows details of expenditure on drugs as a proportion of income. On average, households spent 23% of their monthly income on drugs, but there is a considerable difference between Penza (40%) and the other two oblasts. It is not immediately apparent where the differences lie, as they remain when considering only households recording positive expenditure but separating these according to whether they spent more or less than their reported income on drugs. However, households reporting drug expenditure in excess of income may be indicative of data error, and their prevalence is considerably higher in Penza, where 134 households spent more, than in the other oblasts where only 12 and 15 households did so. For this reason, and to allow for the heterogeneity of their populations, the three oblasts are analysed separately.

Table 1: Household characteristics

	Oblast	**Tula**		**Pskov**		**Penza**		**Pooled**	
Variable	Description	mean	SE	mean	SE	mean	SE	mean	SE
PX	Household's previous month's number of prescriptions	2.302	0.101	1.107	0.052	0.434	0.055	1.283	0.045
OTC	Household's previous month's number of OTC items	1.203	0.069	1.371	0.050	1.251	0.087	1.268	0.043
DRUGSPND	Household's previous month's drug expenditure (roubles)[1]	31,660	2,456	39,167	1,618	70,406	3,334	47,870	1,582
INCOME	Monthly household income (roubles)[1]	358,984	7,646	345,286	5,330	254,876	5,988	317,260	3,855
NUMBHS	Household size	2.807	0.029	2.581	0.033	2.649	0.029	2.686	0.017
AGEOT5	Number in household aged less than 5	0.077	0.008	0.099	0.009	0.101	0.008	0.092	0.005
AGE6T18	Number in household aged 6 to 18	0.507	0.019	0.438	0.020	0.536	0.019	0.498	0.011
AGE19T59	Number in household aged 19 to 59	1.835	0.026	1.714	0.029	1.905	0.023	1.826	0.015
AGE60UP	Number in household older than 60	0.413	0.018	0.356	0.019	0.154	0.012	0.302	0.009
HGOOD	Number in household claiming good or very good health	1.203	0.034	1.184	0.036	1.158	0.033	1.181	0.020
HFAIR	Number in household claiming fair health	1.185	0.029	1.055	0.030	1.194	0.029	1.152	0.017
HPOOR	Number in household claiming poor health	0.366	0.017	0.306	0.016	0.246	0.014	0.305	0.009
HVEPOOR	Number in household claiming very poor health	0.051	0.007	0.036	0.006	0.031	0.004	0.039	0.003
ILLYES	Number in household with long term illness	1.406	0.027	1.232	0.027	1.097	0.028	1.244	0.016
DUMUNIV	Number in household educated up to university	0.712	0.025	0.786	0.028	0.531	0.021	0.667	0.014
DUMTECH	Number in household educated up to technical	0.849	0.024	0.606	0.024	0.886	0.023	0.794	0.014
EXEM100	Number in household with full exemptions	2.023	0.040	0.120	0.011	0.152	0.014	0.803	0.210
EXEMS100	Number in household with full exemption for some drugs	0.074	0.011	0.116	0.011	0.044	0.006	0.075	0.005
EXEM50	Number in household with 50% exemptions	0.029	0.005	0.021	0.004	0.011	0.003	0.020	0.002
EXEMS50	Number in household with 50% or lower for some drugs	0.006	0.003	0.031	0.006	0.030	0.005	0.022	0.003
OBLAST1	Tula oblast								
OBLAST2	Pskov oblast								

[1] *Households missing expenditure or income data are assumed to have values of zero. Households recording positive income but less than 1000 roubles excluded.*

Table 2: ***Household pharmaceutical utilisation and expenditure***

	Tula		Pskov		Penza		Pooled	
Households reporting positive utilisation of prescriptions	52.7%		41.6%		9.8%		33.9%	
Households reporting positive utilisation of OTC drugs	36.9%		55.3%		28.7%		39.1%	
Households reporting positive drug expenditure	49.7%		75.3%		65.3%		62.6%	
Expenditure on drugs as a proportion of income [1] :	n	%	n	%	n	%	n	%
all households	1458	16.8	1166	14.9	1499	39.9	4123	23.1
households reporting positive expenditure only	705	19.9	875	18.1	975	59.1	2555	34.3
households reporting positive expenditure less than income	690	16.0	859	15.6	836	28.2	2385	20.1
households spending in excess of income	12	225.8	15	156.2	134	250.6	161	239.9
households spending in excess of income but less than 600% more	11	162.4	15	156.2	124	181.6	150	177.6

1 *All figures exclude households reporting income between zero and 1000 roubles (n = 14)*

IV THE MODELS AND RESULTS

All data are analysed at household level, in the belief that this is a more appropriate decision making unit than the individual family members. This recognises that decisions for some members of the household are made by other members (e.g. parents acting on behalf of their children), that some medications may be purchased for the entire household, and that income is generally used to support more than merely the wage earner. In interpreting the results, the implication is that coefficients for most variables relate to the effect of a change in the number of people in the household displaying the characteristic in question.

We undertook separate analyses to explain the utilisation of prescriptions and expenditure on pharmaceuticals. For each dependant variable, the data are characterised by a large proportion of households which did not report utilisation or spending on drugs during the month prior to the interview. As such we have used zero-inflated and two part-models to explore the factors influencing pharmaceutical utilisation and expenditure (see e.g., Grootendorst 1995; Leibowitz *et al* 1985; Manning *et al* 1987).

Prescription items

Following Grootendorst (1995), we have employed a two part model to explore factors thought to influence whether any and, if any, how many prescription items are used. This is akin to Zweifel's (1981) principal agent model which categorises the decision making process into two stages, in which the initial (contact) decision is made by the individual (or, in this case, the household), and decisions about the amount (frequency) of consumption are made, at least in part, by a health professional.

The dependent variable is the number of prescriptions the household has received over the previous month. This is an integer count and can be modelled by Poisson regression and related models. The basic Poisson model is compared to the negative binomial (negbin) model, to allow for overdispersion due to individual heterogeneity. As a large proportion of households did not report any utilisation a zero-inflated negbin is used to allow for excess zeros (see Grootendorst 1995; Greene 1994).

The Poisson model is nested within the negbin, but the standard negbin and the zero-inflated models are non-nested. We use the Vuong statistic to discriminate between the two specifications (Vuong 1989; Grootendorst 1995); a value of the statistic greater than 1.96 favours the zero-inflated model. For all three oblasts the zero-inflated negbin specification is favoured over the Poisson and negbin specifications (Table 3).

Table 3: Zero inflated negative binomial model of prescriptions

	Tula		**Pskov**		**Penza**		**Pooled**	
Variable	β	t-ratio	β	t-ratio	β	t-ratio	β	t-ratio
Constant	0.779	3.475	-0.219	-2.009	-0.531	-2.072	-0.553	-5.965
NUMBHS	-0.077	-1.797	-0.037	-1.609	- 0.026	- 0.635	- 0.062	- 3.281
AGEOT5	0.022	0.221	-0.065	-1.183	0.076	0.665	0.042	0.902
AGE6T18	-0.104	-1.924	0.015	0.509	0.092	1.421	0.032	1.313
AGE60UP	0.090	1.770	0.059	1.433	0.276	1.989	0.214	6.214
HPOOR	0.229	4.535	0.113	2.472	0.049	0.674	0.157	4.877
HVEPOOR	0.462	5.079	0.263	1.806	0.447	1.759	0.553	6.279
ILLYES	0.150	4.135	0.188	4.814	0.082	1.631	0.145	8.131
DUMUNIV	-0.079	-1.904	0.047	2.302	0.053	1.177	0.039	2.062
DUMTECH	-0.023	-0.518	0.015	0.665	- 0.015	- 0.384	0.008	0.431
EXEM100	0.180	6.331	0.289	2.955	0.362	2.425	0.201	10.647
EXEMS100	0.089	1.195	0.389	2.914	0.429	1.777	0.257	4.263
EXEM50	0.147	1.633	0.079	0.543	0.309	0.470	0.230	2.178
EXEMS50	0.049	0.118	-0.117	-1.313	-0.229	-1.101	- 0.173	-1.752
LOGINCOME	-0.003	-0.045	0.038	1.306	0.045	0.939	0.037	1.521
OBLAST1							0.521	9.704
OBLAST2							0.490	9.798
α (overdispersion)	0.488	11.542	0.852	10.564	5.362	6.348	1.576	25.478
τ (zero-inflation)	-0.362	-7.807	-5.008	-3.343	-2.504	-2.005	-2.408	-8.589
Log-likelihood		-2662.951		- 1514.389		- 750.087		- 5073.295
Vuong statistic		11.155		7.241		6.364		12.504

The results from the estimation of the number of prescription items using the zero-inflated negbin model are shown in Table 3. The differences observed among oblasts in the bivariate analysis remain apparent in the multivariate analysis. The likelihood ratio test for the restrictions implied by the pooled model is 291.74, indicating a clear rejection.

There is evidence of an increase in utilisation resulting from full exemption status. In Tula and Pskov, an additional member of the household with full exemptions increases the number of prescriptions by around 20% and 34% respectively (calculated by using the exponential of the coefficient on full exemptions: eg *exp*(0.180) in Tula). In Penza, full exemption status is estimated

to increase utilisation by 44%. The implied arc price elasticities, of between -0.2 and -0.44, are broadly consistent with findings obtained in studies outside Russia. These include studies of micro-data, such as the RAND Health Insurance Experiment (Leibowitz et al 1995; Manning et al 1987) and studies of time series data on prescriptions in the UK (Ryan and Birch 1988; O'Brien 1989; Hughes and McGuire 1995). The estimated effects of the other exemption categories are generally positive, but most are not statistically significant.

Differences in institutional factors may be important. Russia has a poorly developed system of primary care and it may be difficult to get prescriptions in the first place. The higher number of prescription items in Tula is significantly influenced by full exemption status, and this may act as an important factor in gaining access to care. For other members of the community, access may be more difficult. Anecdotal evidence suggests pharmacists determine their own dispensing policies, and these may not correspond to the exemption status of consumers (Thompson 1996). Pharmacists face considerable uncertainty about whether or when they will receive payment for exempted prescriptions, and this may make them reluctant to honour exemption status. Pharmacies have problems acquiring medications, and prescribed drugs may be unavailable or in short supply. In such cases, pharmacists may decide to ration existing stocks either to the most needy (which may correspond to exemption status) or to those most able to pay.

The results suggest that households in all three oblasts will have more prescriptions if they have more people reporting poor health or long standing illness, although the estimate is not statistically significant for Penza. For example, in Tula an additional member of the household reporting poor health status will increase the number of prescriptions by 26%. An additional member of the household educated up to university level was associated with an 8% decrease in the number of prescriptions in Tula, which accords with Grossman's (1972) predictions that higher education reduces the demand for health care, as it contributes to more efficient production of health. However, the direction of the influence of education is subject to controversy: others suggest a positive sign (e.g. Wagstaff 1986), as observed in Pskov. While not significant (with the exception of university education in Pskov), there is no consistency in the signs for these variables in the three oblasts. There is no evidence of a significant income effect on the receipt of prescriptions.

Pharmaceutical expenditure

Bivariate analysis suggested considerable variation in drug expenditure across oblasts, with expenditure significantly higher in Penza. There are also differences in the proportion of the households reporting expenditure, varying from 50% in Tula to 75% in Pskov (Table 2). A two-part model is used first to explore expenditure *per se* and then the level of spending.

The probability of drug purchase is modelled using a probit model, while the level of drug spending is estimated using OLS regression on the logarithm of expenditure (Leibowitz *et al* 1985). The possibility of item specific sample selection bias is explored, to ascertain whether responses to the question on drug expenditure are systematically related to unobserved variables. If so, this would imply biased estimates of the coefficients (Heckman 1979). It is well known that, in general, the two-part model is not nested by the sample selectivity model. However it is nested under the additional assumptions of bivariate normality of the disturbances and linearity of the regression functions (Manski 1993). In Table 4 LAMBDA is a test for selection bias; given by the t-ratio on the inverse Mills ratio from the Heckman two step estimator.

For each oblast, the first column of Table 4 shows the estimates of the probit model to predict the probability of reporting positive drug expenditure. In both Pskov and Penza, an increase in the number of older family members is a significant positive influence on the probability of spending, and the direction (if not significance) is the same in Tula. The influence of self reported health status is more difficult to interpret across oblasts, the number in poor health significantly increases the probability in Pskov and Penza, but the number in very poor health is not significant. Long standing illness is positively and significantly related to the probability of expenditure. An increase in the number of family members eligible for full exemption reduces the probability of incurring drug expenditure. This reduction applies also for those with full exemptions for selected drugs, with the exception of Penza where the influence is positive. The pattern for other categories of exemption is ambiguous, although the estimates are generally negative for Tula and Pskov. Moreover, while consistently having a positive sign, household income is not a significant predictor of the probability of incurring expenditure.

The columns headed OLS for each oblast in Table 4 show the results of the OLS regression for the level of expenditure. Logarithmic transformation of the drug expenditure and income data produced a distribution displaying greater evidence of normality compared to a simple linear model.

Drug expenditure is positively related to the number of family members with a poor or very poor health status or suffering long term illness, and to income. These findings are consistent across oblasts, although the income effect is poorly determined for Penza. The proportionate changes in income producing a 10% change in expenditure are 2.1%, 1.5% and 0.2% in Tula, Pskov and Penza respectively (although in Penza the influence is not significant). Lower rates of expenditure can be expected if there are increases in the number of family members aged 6 to 18 (with the exception of Penza). Education status is not a significant predicator of the level of expenditure.

No clear pattern is evident with respect to exemption status. The effect of full exemptions is most apparent in explaining the probability of expenditure rather than its level. While an additional member of the household with full exemption status increases pharmaceutical utilisation, they appear to reduce the level of household expenditure on drugs, except in Penza.

Table 4: Two part model for drug expenditure

Variable	Tula				Pskov				Penza				Pooled			
	Probit	t-ratio	OLS	t-ratio	Probit	t-ratio	OLS	t-ratio	Probit	t-ratio	OLS	t-ratio	Probit	t-ratio	OLS	t-ratio
Constant	0.065	0.243	0.109	0.421	-0.412	-1.279	0.125	0.449	-0.146	-0.706	1.434	6.096	-0.150	-1.142	1.012	6.928
NUMBHS	0.167	2.921	0.112	1.396	0.142	2.105	0.100	2.017	-0.001	-0.011	-0.062	-1.343	0.070	2.194	0.045	1.399
AGEOT5	0.147	1.080	-0.251	-1.775	0.030	0.184	-0.033	-0.285	0.074	0.618	-0.108	-0.872	0.089	1.148	- 0.106	-1.426
AGE6T18	0.119	1.632	-0.237	-2.067	-0.218	-2.362	-0.161	-2.329	0.050	0.715	0.016	0.235	-0.004	-0.094	- 0.118	-2.512
AGE60UP	0.078	1.260	-0.030	-0.483	0.264	2.674	0.006	0.117	0.289	2.700	0.133	1.543	0.141	3.248	0.019	0.513
HPOOR	0.054	0.853	0.214	3.733	0.262	2.481	0.281	4.934	0.171	2.140	0.307	4.465	0.111	2.580	0.278	7.794
HVEPOOR	-0.081	-0.561	0.385	2.074	0.117	0.480	0.458	3.215	0.177	0.726	0.757	3.455	- 0.013	-0.128	0.554	5.141
ILLYES	0.116	2.927	0.130	2.546	0.441	7.470	0.147	3.234	0.228	6.153	0.173	4.621	0.221	9.134	0.154	6.056
DUMUNIV	-0.042	-0.885	0.030	0.543	-0.066	-1.155	0.068	1.674	0.070	1.304	0.077	1.594	-0.008	-0.261	0.066	2.490
DUMTECH	0.135	2.823	-0.041	-0.652	0.024	0.370	0.031	0.660	0.024	0.481	-0.015	-0.323	0.059	1.986	- 0.012	-0.400
EXEM100	-0.452	-13.38	-0.038	-1.098	-0.488	-3.741	-0.044	-0.518	-0.166	-2.652	0.163	2.430	- 0.332	-14.035	- 0.011	-0.425
EXEMS100	-0.178	-2.188	-0.055	-0.733	-0.524	-3.808	-0.279	-3.215	0.479	2.192	-0.033	-0.252	-0.089	-1.437	- 0.140	-2.447
EXEM50	0.383	1.677	0.006	0.035	no	variation	0.422	2.508	0.872	1.634	0.273	0.979	0.654	3.273	0.177	1.542
EXEMS50	-0.851	-1.901	-0.638	-1.342	-0.099	-0.466	-0.061	-0.511	0.803	2.183	0.165	0.960	0.122	0.865	0.013	0.117
LOGINCOME	0.020	0.277	0.215	3.316	0.111	1.243	0.147	1.910	0.075	1.244	0.015	0.226	0.063	1.589	0.116	2.854
OBLAST1													-0.020	-0.292	-0.635	-10.001
OBLAST2													0.148	2.591	- 0.649	-12.801
Log-likelihood	- 848.235				- 571.826				- 818.825				- 2298.131			
χ^2	254.039				132.923				116.560				587.682			
McFadden R^2	0.130				0.104				0.066				0.113			
Ramsey RESET (t)	0.832		- 0.919		0.140		- 0.030		- 0.954		- 2.414		3.265		- 0.903	
LAMBDA (t)			- 1.053				- 0.328				- 1.232				- 0.532	
Breusch-Pagan ($\chi 2$)			82.882				22.692				31.504				102.557	
Adj-R^2			0.083				0.098				0.105				0.138	
F statistic			5.600				7.810				9.190				26.510	

V POLICY IMPLICATIONS

We have been able to demonstrate that part of the explanation for the observed differences in utilisation and expenditure across oblasts relates to differences in exemption policies in each region. In Pskov and Penza, 79% and 85% of households reported that no family member was eligible for pharmaceutical exemption, compared to only 20% of households in Tula, where an average of 2.2 family members qualified for full exemptions. Official figures also suggest that the proportion of people eligible for pharmaceutical exemptions varies considerably in each oblast: 34% of those in St Petersburg (which is near Pskov) are exempt, and only 17% of those in Penza. In Tula, 18 of the 23 rayons (districts) are officially classified as Chernobyl affected areas, and 50% of the population are estimated to fulfil the criterion for full exemption on the basis of environmental contamination (Thompson, 1996).

Full exemption status significantly increases the utilisation of prescription items, reduces the probability of the households incurring drug expenditure and reduces their level of drug expenditure. Full exemption for selected drugs also significantly reduces the probability of incurring expenditure, other than in Penza (where the reverse is the case). The effect of other exemption categories on utilisation and expenditure appears not to be significant, suggesting that they do not influence consumer choices. However, caution should be exercised in drawing such a conclusion, because, firstly, few members qualified for such exemptions, making the estimates less robust, and, secondly, it is possible that these exemptions are not honoured in practice.

Nevertheless, the discrepancy in utilisation and expenditure between the fully exempt and the remainder of the population may not be entirely equitable, particularly in light of evidence of high levels of expenditure among a large proportion of households. Policy might be directed at reducing these discrepancies by redistributing resources from those qualifying for full exemptions to other members of the population. One way to achieve this is to redefine eligibility criteria, as has been the predominant strategy employed in Russia to date. The disadvantages of this approach are the 'all or nothing' implications and the continued protection from price signals by those remaining fully exempt, which encourages over-consumption.

An alternative would be to replace full exemptions with some form of cost sharing for all members of the population, either on the basis of percentage contribution related to the price of pharmaceuticals (as in Japan) or a fixed charge per prescription (as in the UK and Australia) or per prescription item (as in some Health Maintenance Organisations in the USA). Estimation of the impact on utilisation and expenditure using our data must be based on the assumption that the arc price elasticities generated for the fully exempt population are generalisable to the whole sample, as we are not confident that the coefficient estimates for the other categories are accurate, given the concerns raised above about whether exemptions are honoured.

Using the elasticities observed for the fully exempt population, it is estimated that if a 5% co-payment were introduced in Tula, there would be a 0.9% reduction in prescription use (ie -0.18 * 5, see Table 3 for elasticity estimate) among those currently reporting positive utilisation. Figures for each oblast at different rates of co-payment are shown in Table 5.

Table 5: Reduction in prescription use (%)

Oblast **Price Elasticity**	**Tula** 0.18	**Pskov** 0.34	**Penza** 0.44
Co-payment rate (%)			
5	0.9	1.7	2.2
25	4.5	8.5	11.0
50	9.0	17.0	22.0
75	13.5	25.5	33.0
95	17.1	32.3	41.8
100	18.0	34.0	44.0

In order to calculate the full effect on utilisation and personal expenditure it is necessary to be scale up the results to include exempt non-users and the non-exempt population. Table 6 shows the results of doing this for prescription use for each of the three oblasts. The exercise relies on the assumption that the elasticities observed for those with full exemptions can be applied to the entire population (given the concerns about the reliability of other co-payment rates). The variation among oblasts in the observed elasticities for the fully exempt population provides a form of sensitivity analysis for considering the impact of different policy options.

The figures in Table 6 are derived by multiplying the proportion of people within each exemption category by the percentage change in price (ie co-payment rate) for the relevant price elasticity for the oblast, as calculated for Table 5. The overall percentage change in the population's use of prescription drugs is given by the sum of these figures.

We have performed two simple simulations of policy change. The first policy option is the introduction of a 5% co-payment rate for those currently fully exempt for all drugs. The second simulation retains this price increase for the fully exempt population, but also introduces a 95% co-payment for the non-exempt population, in effect reducing the cost to such people.

Table 6: Policy simulations

Oblast (price elasticity)	**% of Population**	**Policy 1**		**Policy 2**	
		% Change in Price	**Weighted % Change in Utilisation**	**% Change in Price**	**Weighted % Change in Utilisation**
Tula (0.18)					
exem100	0.72	5	-0.65	5	-0.65
exems100	0.03	0	0	0	0
exem50	0.01	0	0	0	0
exems50	0.00	0	0	0	0
no exemptions	0.24	0	0	-5	0.22
Total Effect			**-0.65**		**-0.43**
Pskov (0.34)					
exem100	0.05	5	-0.09	5	-0.09
exems100	0.04	0	0	0	0
exem50	0.01	0	0	0	0
exems50	0.01	0	0	0	0
no exemptions	0.89	0	0	-5	1.51
Total Effect			**-0.09**		**1.42**
Penza (0.44)					
exem100	0.06	5	-0.13	5	-0.13
exems100	0.02	0	0	0	0
exem50	0.00	0	0	0	0
exems50	0.01	0	0	0	0
no exemptions	0.91	0	0	-5	2.00
Total Effect			**-0.13**		**1.87**

The introduction of a 5% co-payment for those currently fully exempt would be expected to reduce prescription use in Tula by 0.65%. If the price faced by those currently paying the full cost were reduced following the introduction of a 95% copayment, along with a 5% co-payment for the fully exempt, the net effect would be to reduce prescription use in Tula by 0.43%. In the other two oblasts, where the proportion of the fully exempt individuals in the population is considerably smaller, the net effect of the second policy option is to increase utilisation.

It is difficult to estimate the full financial implications of these policy changes. The first policy would be expected to raise public revenue as long as it is not outweighed by the cost of collection, which is unlikely as payment could be made directly to the dispensing pharmacists. As information is available only on personal expenditure, with the current public contribution unknown, it is not possible to estimate the amount of revenue that could be raised in this way.

As the effect of a 5% co-payment on utilisation is minimal, the adverse health effects may also prove minimal. However, the health consequences of introducing this form of co-payment policy cannot be determined as the impact will depend on the extent to which reduced utilisation is for inappropriate rather than beneficial drugs. Given the current levels of inappropriate utilisation currently prevalent in Russia (Harper 1996), the health consequences of reduced utilisation may actually be positive.

VI DISCUSSION AND CONCLUSIONS

The evidence suggests that the health system in Russia no longer offers universal access according to equal need. This principle of solidarity has been sacrificed in the pursuit of deregulation, in the hope that this will promote increased competition and efficient behaviour. In the short term, however, it appears that deregulation has introduced cost escalation and failed to eliminate inappropriate prescribing (it has been claimed that 40% of the top fifty best selling domestically produced drugs, and 50% of the top fifty best selling imports have either no proven clinical benefit, unacceptable toxicity or more effective alternatives (Harper 1996)). Patients now bear an increased burden of the costs of care, and some families incur considerable expense in procuring pharmaceuticals, spending a fifth of their income on drugs (even after excluding Penza, drug costs amount to 16% of income). It is unclear whether such expense can be borne by patients in the long term.

Comparison with other countries of the proportion of income spent on drugs suggests spending is much higher in Russia than elsewhere. High proportions might be related to data error, particularly in Penza. However, it is reassuring that results in Tula and Pskov are broadly similar (in almost all respects). The advantage of presenting separate results from each oblast is that results from Tula and Pskov are not contaminated by possible data problems in Penza.

An alternative explanation for high proportionate spending is that there was a systematic misinterpretation of the question. Feedback from the pilot suggests that some households reported expenditure from the month they last spent on drugs, partly because of unavailability of medications when required. This will inflate estimates of both utilisation and expenditure, but it cannot be verified to what extent this occurs. Nevertheless, there are good reasons to believe that proportionate expenditure on pharmaceuticals is actually higher in Russia. For one thing, reported disposable income may be lower than in other countries because many people in Russia still benefit from subsidised rents or rates, and this 'social payment' is reflected in lower earnings than might otherwise be expected.

Further, the disintegration of the public health system has contributed to an increased cost burden on patients. Evidence from other former Soviet countries suggest medical expenses are high as

a proportion of income. For example, Abel-Smith and Falkingham (1995) report that in Kyrgyzstan:

> "The total costs of one episode of ill health for one household member exceeded the monthly income for the whole household in one of five cases ... The biggest item for private payments is drugs" (pp.2-3).

Higher utilisation of prescriptions is in evidence in Tula and Pskov compared to Penza, over and above what would be expected on the basis of self reported health status, exemption coverage and income. The opposite is true for expenditure. It is unlikely that the variation can be explained by differences in drug prices between the oblasts. A separate survey, undertaken as part of the EU TACIS project, of 67 pharmacies in the three oblasts revealed no significant price differences for a sample of 28 of the most common drugs. Also the household survey revealed that only 55% of households in Tula had decided not to purchase medicine because of its price compared to 68% and 72% of households in Pskov and Penza. Similarly, when asked about difficulties in obtaining medication, only 40% of households in Tula cited the medicine being too expensive as a problem compared to 74% and 71% in the other oblasts.

However, availability of medication was a more common constraint: 69% of households in Tula said medicine was unavailable when required, compared to 47% of households in Pskov and 30% of those in Penza. This difference between Tula and the other two oblasts may be explained by the restrictive drug reimbursement list operating in Tula. Differences in utilisation may relate to differences in prescribing behaviour among doctors, dispensing behaviour among pharmacists, or local government policy regarding honouring exemption status, which may be a function of the per capita size of the oblast health budget.

If these discepancies are to be resolved, a co-ordinated national policy which ensures efficient utilisation of and equitable access to pharmaceuticals is required. Policy has focussed on the role of cost sharing between consumers and the government, in the belief that this will deliver socially optimal usage of pharmaceuticals and help control disease. However, empirical estimates of the impact of economic incentives, and in particular exemptions, have been hampered by the lack of up to date and reliable data.

We have been able to analyse locally derived information on prescription use and pharmaceutical expenditure to assist with the formualtion of public policy toward pharmaceutical reimbursement in Russia. The clearest evidence of the impact of the current system of exemptions is for full exemption status, which is shown to increase the utilisation of prescription items and reduce the probability of the households incurring drug expenditure. On the basis of this analysis we have recommended that the system of full exemptions to selected groups of the population be replaced by a scheme in which all members of the population face some form of co-payment.

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