Economics of Transition
Volume 11 (3) 2003, 411–434

Market integration in Russia during the transformation years*

Konstantin Gluschenko
Institute of Economics and Industrial Engineering, Siberian Branch of the Russian Academy of Sciences Laventieva pr. 17, 630090 Novosibirsk, Russia. Tel: +7(3832)302548. E-mail: glu@nsu.ru

Abstract

A cross-sectional relationship among Russian regions between price dispersion and per capita income dispersion is used to measure the degree of integration between regional commodity markets. The sequence of cross-sectional estimations for each month of the period spanning 1992 through 2000 provides the temporal pattern of market integration in Russia, yielding an integration trajectory. The regional fragmentation of the national market increased during the early years of transition but integration has subsequently tended to improve notwithstanding occasional deviations from this trend.

JEL classifications: P22, R10, R15.
Keywords: Market integration, law of one price, price dispersion, Russian regions.

* This work was supported by the Research Support Scheme of the Open Society Support Foundation, grant No.: 618/2000. The author is grateful to Dan Berkowitz, Michael Beenstock, and Mark Schaffer for helpful discussions, and to two anonymous referees for their comments.

1. Introduction

The spatial behaviour of prices in Russia has been changing dramatically during the course of transition. After the price-liberalization shock of January 1992, prices diverged sharply across regions of the country, indicating progressive regional fragmentation of the national market (see, e.g., Koen and Phillips, 1992). But in due course they started to move in the opposite direction. Based on price data for 1994, de Masi and Koen (1996) found the Russian market to be weakly integrated; yet the degree of integration seemed to them to have increased since 1992. In a more recent paper, Koen and de Masi (1997) state that price convergence across regions within a country over time is one of the stylized facts observed in most transition economies.

Nevertheless, the pattern is rather erratic, as there is abundant evidence that powerful forces have been counteracting market integration – in particular, regional protectionism. Therefore, the trend is not clear-cut. The aim of this paper is to clarify how fast and how far the process of market integration has moved in Russia during the 1990s.

For this purpose, a cross-sectional relationship between commodity price dispersion and demand dispersion (proxied by per capita income dispersion) across Russian regions is used. If the law of one price holds, i.e., if the market is integrated, then the price in any given region should depend on overall demand in the national market rather than on local demand. Hence, controlling for transportation costs (proxied by inter-regional distances), this relationship should be statistically insignificant. Otherwise the strength of the relationship indicates the extent of deviation of the national market from complete integration. Running cross-sectional estimations for each available time point, an integration trajectory (i.e., a time series of the integration measure) is obtained, thus providing the temporal pattern of market integration. The cost of a uniform basket of basic food goods is used as a commodity price index. The data cover 74 regions in Russia, and span the period February 1992 up to December 2000 at a monthly frequency.

The results suggest that the regional fragmentation of the Russian market increased sharply during the early years of transition, but that subsequently – since about the end of 1994 – integration has tended to improve. However, the trajectory is a bumpy one, with occasional departures from the trend towards integration. This is consistent with the irregular profile documented by Berkowitz and DeJong (2001) that is based on a rather different methodology. Difficult-to-access regions markedly contribute to the overall disconnectedness of regional markets; controlling for these regions, the integration trend becomes clearer. Surprisingly, the European part of Russia (excluding its northern territories) turns out to be less integrated than Siberia and the Far East (excluding difficult-to-access regions).

The issue of market integration in contemporary Russia has been the subject of a number of studies. Gardner and Brooks (1994), de Masi and Koen (1996), and Goodwin *et al.* (1999) examined the early stage of transition. They found large price

differences across locations that could not be transportation costs. However, they also found some evidence that these differences tended to decrease. Over a longer time span, results by Berkowitz *et al.* (1998) indicate poor market integration as well, yet they are somewhat better. More recently, Berkowitz and DeJong (1999) found a culprit explaining market fragmentation, the so-called Red Belt (a group of anti-reform regions). Gluschenko (2001a, 2002b) analysed cointegration and threshold relationships for location pairs; the first study covered regions of Western Siberia in 1994–98, and the second all of Russia, for the 1994–2001 period, with regions aggregated to economic territories (*ekonomicheskiy rayon*). The pattern was mixed: both integrated and non-integrated location pairs were found, suggesting that market integration is far from complete.

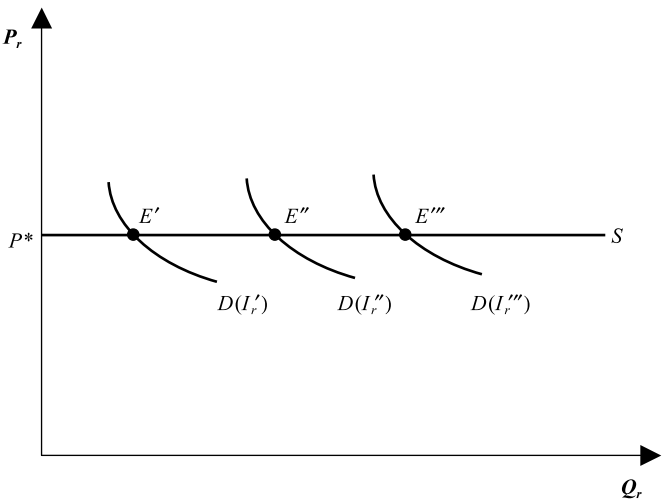
The above papers use methodologies that are applied to markets in advanced market economies (see, e.g., Parsley and Wei, 1996; Engel and Rogers, 1996; and Obstfeld and Taylor, 1997). A feature of these methodologies is that they yield estimates which average, in some sense, the price behaviour over the entire period rather than depict the path of integration. This is of little importance if the case at hand is a stable economy, where the nature of price behaviour does not change much over time. But in a transition economy, such changes are to be expected and *are an important measure of the transition process itself*. This paper focuses on the evolution of Russia's market integration rather than on its 'temporally aggregated' state.

2. Measuring market integration

The law of one price implies that in a perfectly integrated economy, the regional price of a (tradable) good is determined in the national market, and not by local demand. If the quantity demanded in the region increases or decreases (due to, e.g., changes in regional per capita income), then arbitrageurs adjust the quantity supplied by moving the good to or from the region. This implies that the supply curve is perfectly elastic, $p_r(q_r) = p^*$ (= const), where p_r is the price of the good in region r, q_r is the quantity supplied, and p^* is the national-market price, i.e., just the 'one price'.

More formally, assume that apart from the price, income per capita, i_r, is the only determinant of demand, $q_r = D(p_r, i_r)$, and let $q_r = S(p_r)$ be the supply function. The equilibrium condition $D(p_r, i_r) - S(p_r) = 0$ yields the regional price p_r; hence, $p_r = f(i_r)$. For convenience, the logarithmic representation is hereafter used, capital letters denoting logarithms of relevant variables, e.g., $P_r = \ln p_r$. It is easily shown – assuming the existence of the equilibrium – that $dP_r/dI_r = -\varepsilon_I/(\varepsilon_D - \varepsilon_S)$, where ε_I is the income elasticity of demand, and ε_D and ε_S are the price elasticities of demand and supply, respectively. Thus, provided that the good is a normal one ($\varepsilon_I > 0$), $dP_r/dI_r \geq 0$. It is reasonable to think of ε_I and ε_D as being finite. Then dP_r/dI_r is positive with finite ε_S, and tends to zero as ε_S goes to infinity. Hence, with a

Figure 1. Local-market equilibria in the perfectly integrated economy



perfectly elastic supply, $dP_r/dI_r = 0$ holds, indicating the independence of the regional price on income. Figure 1 provides an illustration (where $I_r' < I_r'' < I_r'''$), clearly demonstrating that demand shifts driven by income effects have no effect on the regional equilibrium price.

For the supply curve to remain perfectly elastic with demand shifts, each region r should be small, so that its demand does not impact the overall price P^*. However, this does not imply that the local quantity demanded is negligibly smaller than the overall demand, Q; in fact, a weaker condition suffices: $|\Delta Q_r| = |Q_r(I_r') - Q_r(I_r'')| \ll Q$. In words, it is changes in the quantity demanded that should be small through a possible range of regional income variations rather than the quantity itself.

The above-mentioned function $f(i_r)$ can be represented as ki_r^β (assuming that the income elasticity of demand is constant); then

$$P_r = K + \beta I_r. \tag{1}$$

Since $\beta = dP_r/dI_r$, $\beta = 0$ should hold, provided that the market is integrated. Or, in econometric terms, allowing for random disturbances in the right-hand side of (1), β should be statistically insignificant. Subtracting equation (1) for some region s from that for r, the relationship rearranges to an equation in terms of percentage differentials ($P_{rs} \equiv P_r - P_s = \ln(p_r/p_s)$; similarly for income):

$$P_{rs} = \beta I_{rs}. \tag{2}$$

In this equation, the equality of β to zero becomes quite obvious, as it should be $P_{rs} = 0$ under the law of one price.

Hence, relationship (1) or (2) can be used as a cross-sectional test for the law of one price. If $\beta = 0$ holds over a set $\{r\}$ (or a pairwise set $\{(r, s)\}$), then the relevant market can be deemed as integrated. A non-zero value of β (as shown above, β should be positive in such a case) is a sign that regional markets are not perfectly integrated. Being the elasticity of price dispersion vis-à-vis income dispersion in (2), the magnitude of β can be used as a measure of the degree of market integration: the higher β, the weaker integration (thus, in fact, β measures market fragmentation).[1]

In essence, the right-hand side of (2) evaluates the overall extent of barriers to trade between regions r and s. Let C_{rs} represent the cost to move a unit of the good from s to r ($C_{rs} \equiv \ln(1 + c_{rs})$, c_{rs} being arbitrage transaction costs expressed as a percentage of p_r). Then $P_r = P_s + C_{rs}$, and $P_{rs} = C_{rs}$.[2] Assume that some components of C_{rs} are quantifiable, thus providing an (unknown) portion $q \leq 1$ of the overall value of transaction costs. If the right-hand side of (2) is augmented for qC_{rs}, the value of β decreases, since $(1 - q)C_{rs} = \beta I_{rs}$ with this. In the case that transaction costs are fully identified, i.e., $q = 1$, we get $\beta = 0$.

This provides a helpful framework for analysing the importance of various trading frictions. But one of them, the segmentation of markets by physical distance, is to be taken into account in all instances. Perfect integration is not observed in the real world: e.g., Engel and Rogers (1996) as well as Parsley and Wei (1996) find price dispersion among US cities to depend strongly on distance. Thus, a more realistic benchmark of integration should be used, allowing for 'natural', irremovable impediments to inter-regional trade such as physical distance.[3] That is, an economy is deemed to be integrated if there are no 'artificial' impediments. Thus, the degree of integration, β, will be measured with arbitrage transaction costs reduced by transportation costs.

By assuming transportation costs to be log-linear function of distance, $C_{rs}^{(T)} = \alpha + \gamma L_{rs}$, the following equation is arrived at:

$$P_{rs} = \alpha + \beta I_{rs} + \gamma L_{rs}, \tag{3}$$

where $L_{rs} \equiv \ln l_{rs}$; l_{rs} is distance separating r and s. If arbitrage transaction costs are nothing but costs of shipping goods, i.e., $C_{rs} = C_{rs}^{(T)}$, then it will be $\beta = 0$ (since

[1] Note that $\beta = 0$ is a necessary condition for the law of one price to hold, but not a sufficient one. There may be forces causing regional prices to diverge regardless of local demand, notably region-specific sale taxes.

[2] In fact, $|P_{rs}| = C_{rs}$. Notation for this general case would become more involved. However, such a complication is unnecessary. Since $P_{rs} = -P_{sr}$, it always is possible to rearrange the indices in such a way as to make P_{rs} non-negative. Therefore, lest to complicate notation, the condition $P_{rs} \geq 0$ is implied to hold throughout the paper.

[3] In the case of Russia, there is one more 'natural' impediment, namely, difficult access to a number of regions; see the next section.

C_{rs} is fully captured by the distance variable), and the market is recognized as integrated. To put it differently, this means that the entire price dispersion P_{rs} is caused exclusively by transportation costs.

The 'artificial' barriers increase C_{rs} above transportation costs, causing β to be non-zero, which indicates market fragmentation. There are many such barriers in Russia. For instance, exportation of subsidized foods has been restricted in a number of regions at times; aiming to protect local producers, some regional governments have been blocking entry into markets of their regions. (However, such restrictions are not absolute and can be directly expressed in terms of arbitrage transaction costs as the costs needed for cutting through bureaucratic red tape.) One more example of the 'artificial' barrier is organized crime: extortionary rent collected by gangs while moving goods between regions contributes to inter-regional cost as well.

Transportation costs increase with distance, which suggests that the longer distance between r and s, the more difference in prices between them. Hence, γ is expected to be positive. However, it can be zero (statistically insignificant) as well. This is the case when the contribution of transportation costs to the price of a good is minor (in particular, provided that shipping distances are short), or when these costs are included in the wholesale price ('f.o.b. destination'). Thus, the sign of γ does not take part in the inference regarding market integration, merely evidencing whether transportation costs matter or not for a given good and/or region sample (except the pathological case of significantly negative γ, indicating that the market is most probably disintegrated). So, the market is deemed to be integrated if $\beta = 0$ and $\gamma > 0$, or $\beta = 0$ and $\gamma = 0$. When $\beta > 0$ and $\gamma > 0$, or $\beta > 0$ and $\gamma = 0$, the market is thought of as being fragmented to the extent measured by the value of β.

A caveat is that the price differential, P_{rs}, may pick up, along with the effect of impediments to trade, variations in income-dependent costs of the non-traded component of the good, namely, marketing and distribution costs. Since these services are highly labour-intensive, their costs depend strongly on local wages in retail trade, and these wages, in turn, may be highly correlated with local per capita income. Then β would capture a mixture of both effects. There are two possible ways to deal with this problem. The first is to interpret the difference in distribution costs as an additional indication of imperfect integration. In fact, this means extending the notion of market integration. That is, β will measure not only integration of the commodity market as such, but also integration of the market for distribution services and that of the retail-trade labour market.[4] The second way is to explicitly take into account differences in distribution costs, supplementing the right-hand side of (3) with a relevant variable, or subtracting these costs from the raw prices used to calculate P_{rs}.

[4] Such a generalization is quite meaningful, since distribution costs may not all be location-specific. For example, this is the case when there are nation-wide department store chains and corporations' distribution networks.

Unfortunately, the latter way is not easy to follow, as statistical data on distribution costs or retail-wholesale margins are rather poor (not only in Russia, in other countries as well). That is why the first approach is used in this paper. Fortunately, the effect of non-tradable inputs is not fundamental (at least, for Russia) as shown below in a comparison of estimations with and without distribution costs that are available on a yearly basis.

3. Data and econometrics

The price index used for the statistical analysis is the cost of the basket of 25 basic food goods defined as the standard by the Russian statistical agency, Goskomstat, between January 1997 and June 2000. This basket covers about one-third of foodstuffs involved in the Russian consumer price index (CPI); but unlike the CPI, it has constant weights across regions and time. The basket represented the food constituent of the subsistence minimum (since July 2000, a new composition has been used). It includes: rye-and-white bread, white bread, flour, rice, millet, vermicelli, potatoes, cabbages, carrots, onions, apples, sugar, beef, poultry, boiled sausages, boiled-and-smoked sausages, frozen fish, milk, sour cream, butter, curd, cheese, eggs, margarine, and vegetable oil (Goskomstat, 1996a).

Sometimes, the opinion is advanced that regional Goskomstat offices might have erred, under pressure of local politicians, on one or another side (depending on a specific interest of a given local authority) when reporting the cost of the basket. However, this is not the case. The reason is that the same prices used to calculate the cost of the staples basket are employed in computing CPIs both on the regional and national levels. Thus, a distortion of prices for staples would inevitably distort CPIs (as well as a number of other widely-published price indicators). As far as is known, regional Goskomstat offices may be guilty of mistakes in measuring prices, but not of falsifications. My private interviews with a number of regional Goskomstat officials corroborate this. They assert that they have never been influenced by regional politicians to 'improve' prices; on the contrary, local authorities have a stake in providing unbiased information on prices in their region. In any case, political considerations concerning the cost of the staples basket are contradictory: underreporting might deceive the electorate, but overstating would provide reasons for asking the federal government for more transfers. Such contradictions may stop politicians from forcing statisticians to distort prices. So, the cost of the 25-item basket can be believed to be every bit as reliable as the Russian price statistics in general.

The data are monthly, spanning 107 months, from February 1992 up to December 2000. (Unfortunately, data are lacking for December 1991 and January 1992, the period of switching from planned to market pricing.) The costs of the 25-item basket were obtained directly from Goskomstat, which computed the index for 1992–96 at the request of the author. (Between July and December 2000, Goskomstat

continued to compute this index though it no longer published it). Incomes data are drawn from the monthly statistical bulletin '*Social and Economic Situation of Russia*' for 1992–2000. The price data are collected in capital cities of the Russian regions while the income data are representative of the entire region.

The sample covers 74 of Russia's 89 regions. Data are lacking for 10 autonomous *okrugs*, the Chechen Republic, the Republic of Ingushetia, and the Jewish Autonomous Oblast. Two other regions are omitted. Moscow and St. Petersburg are 'city-regions' and capitals of the surrounding Moscow and Leningrad Oblasts. Only these 'city-regions' are present in the sample, while the relevant surrounding *oblasts* are not. Distances are mostly by rail except for a few for regions having no railway communication (in which case highway, river or sea distance is used).[5]

To estimate market integration at a time point (month) t, an econometric version of equation (3) is used,

$$P_{rs}(t) = \alpha(t) + \beta(t)I_{rs}(t) + \gamma(t)L_{rs} + \varepsilon_{rs}(t), \quad (r, s) \in \Pi \subset \{1, \ldots, N\}^2, \tag{4}$$

where $\varepsilon_{rs}(t)$ is an error term, and N is the number of regions. Regression (4) is estimated over a set Π such that $r \neq s$, and if $(r, s) \in \Pi$ then $(s, r) \notin \Pi$ (since both region pairs provide the same information).

Equation (4) is a cross-sectional regression. Running it sequentially for each available point in time, a time series of the integration measure is obtained, $\beta(t)$ for t = 1992:02, . . . , 2000:12, which provides the pattern of changes in integration during the period under consideration.

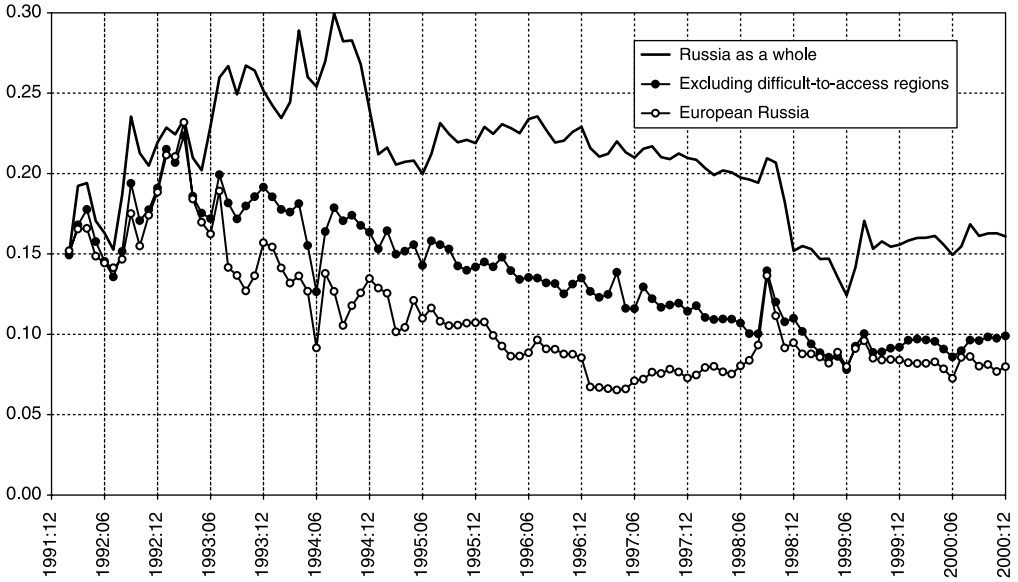
The basic spatial sample, hereafter referred to as 'Russia as a whole', yields 2,701 (= 74 × 73/2) region pairs. In addition, estimations are run over two subsamples (using dummies affecting both intercept and slopes).

One subsample represents Russia excluding difficult-to-access regions. This sample includes 69 regions; excluded are the Murmansk Oblast, the Republic of Sakha (Yakutia), the Sakhalin Oblast, the Magadan Oblast, and the Kamchatka Oblast. They are remote regions lacking (except the Murmansk Oblast) railway and highway communication with other regions. In these regions, arbitrage can hardly be bilateral since goods are imported only. Obviously, difficult access to a number of regions reduces the integration of the national market; eliminating such regions is equivalent to controlling for this 'natural' impediment to integration.

Another subsample, containing 51 regions, represents the European part of Russia excluding its northern territories; it is hereafter referred to as simply 'European Russia'. Since the transport infrastructure is more developed in this part of the country, and distances are shorter, one might *a priori* expect European Russia to be more integrated than the remainder of the country. Therefore it is interesting to verify whether such a belief is true.

[5] The distance matrix was compiled by Alexei Abramov, Novosibirsk State University.

Figure 2. Standard deviations of the price differential



There are missing observations in the time series used. These gaps are most pronounced during 1992–94. For some months, data are lacking for up to 15 regions, reducing 1.6-fold the number of region pairs. To fill the gaps, missing prices are approximated, using the food component of the regional monthly CPIs. The interpolated value of $p_r(t)$ is the arithmetic mean of the nearest known preceding price inflated to the required time point, t, and the nearest known succeeding price deflated to t.[6]

4. Temporal pattern of integration

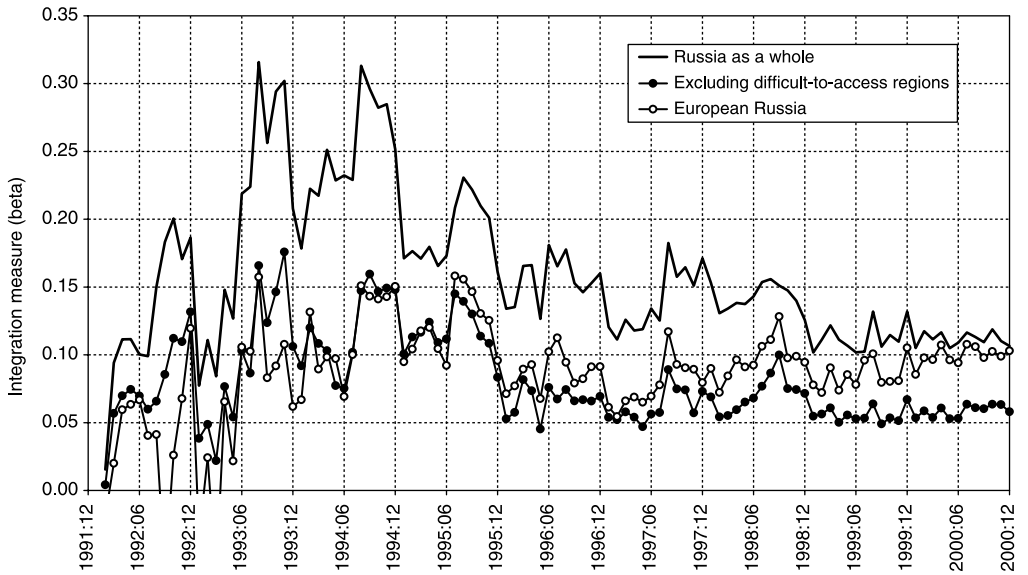
The results are presented graphically.[7] First it is useful to look at the evolution of inter-regional price dispersion. Figure 2 plots standard deviations over region pairs of the price differential for each point in time, $\sigma(t) = \sigma(P_{rs}(t))$, and for the three

[6] Let prices at $t - m$ and $t + n$ be known, and $\pi_r(\tau) = \bar{p}_r(\tau)/\bar{p}_r(\tau - 1)$ be the food CPI for month τ in region r (where $\bar{p}_r(\cdot)$ is the overall level of prices for foodstuffs). Then the interpolated price is computed as

$$p_r(t) = \frac{1}{2}\left(p_r(t-m)\cdot\pi_r(t-m+1)\cdot\pi_r(t-m+2)\cdot\ldots\cdot\pi_r(t) + \frac{p_r(t+n)}{\pi_r(t+n)\cdot\pi_r(t+n-1)\cdot\ldots\cdot\pi_r(t+1)} \right).$$

[7] The working paper, Gluschenko (2002c), provides some numerical results as well as additional plots.

Figure 3. Integration trajectories



samples. This figure illustrates that the inter-regional dispersion of prices rose during the early years of the transition, and that it subsequently almost continuously declined. Price dispersion in European Russia is almost always less than in the other two samples. This seemingly corroborates the hypothesis of better integration in this part of the country.

Turning to the regression results, Figure 3 shows estimated $\beta(t)$ for the three samples. For Russia as a whole, all estimates of β and γ are highly statistically significant, at the 0.1 percent level (but three ones significant at 1 percent). Except for 1992:02, where β is insignificant, β for Russia excluding difficult-to-access regions is significant at the 0.1 percent level as well (but 1993:03 with the 5-percent one). There are three points in time where distance is insignificant over this sample (1992:02, 1992:03 and 1992:07). The remaining estimates of γ are significant at the 0.1 percent level except for the three with 5 percent significance and one (1992:02) with 10 percent significance. For European Russia, there are four insignificant estimates of β in the initial period (in 1992:02, 1992:03, 1993:02, and 1993:05), while four estimates are negative (in 1992:02, 1992:09, 1993:01, and 1993:03), and of these three are significant. Most remaining estimates of β are significant at the 0.1 percent level. As for the coefficient on distance, it is rather small for European Russia, and not infrequently insignificant. Of all the 107 estimates of γ, 30 are insignificant, 9 are significant at the 10 percent level, 12 are significant at the 5 percent level, and the rest are significant at the 1 percent level (mostly, at the 0.1 percent level).

Interestingly, beginning in 1998:12, distance becomes almost always insignificant in European Russia. It is only in 1999:03 and 1999:04, that significantly negative γs occur (at the 5 percent level). However, taking into account their very small (absolute) values, they can be assigned to a chance cause.

There are only two cases when both β and γ are insignificant (as well as the F-statistic): 1992:02 in Russia excluding difficult-to-access regions, and 1993:02 in European Russia. Moreover, the F-test suggests that β and γ are jointly insignificant in the previous period (1993:01), while β is significant (at the 5 percent level) with the wrong sign. However, as discussed below, these cases occurring in the early period of liberalized pricing, cannot be thought of as signs of perfect integration. Except for these three, all remaining regressions are significant according to the F-test.

Before interpreting the pattern shown in Figure 3, it is helpful to consider briefly the process of price liberalization in Russia. Up to and including December 1991, most prices in Russia were fixed by centralized pricing. At the beginning of 1992 prices were freed (following the Presidential Decree of December 3, 1991). Owing to shortage of consumer goods, enormous pent-up demand had accumulated by that date. As a result, price liberalization led to the so-called Big Bang: the 3.5-fold rise in consumer prices in one month (food prices rose four-fold). At the same time, regional prices diverged dramatically, as the pent-up demand varied considerably across regions. Yet price liberalization gradually proceeded. For a number of goods, price movements were subject to certain limits which were subsequently widened or removed. In particular, price rises for 6 goods from the 25-item basket were limited to 3 times (for bread of both kinds, milk, curd, and vegetable oil) or to 3.5 times (for sugar); retail mark-ups for these goods were frozen at the pre-liberalization level. In March 1992, regional governments were empowered to abolish these price ceilings (although bread prices remained under federal control till the end of 1993). This gave rise to considerable variation in local price controls and subsidies: while some regional governments continued to maintain price ceilings and subsidies (to varying degrees), others abolished them. The latter group expanded although price controls persisted for a long time: in the last region (the Ulyanovsk Oblast), they were not abolished until the beginning of 2001.

As Figure 3 shows, during the early years following price liberalization, the fragmentation of the Russian market increased sharply. In fact, the market was changing into a collection of loosely bound regional markets. However, caution is required in the interpretation of results for the very initial part of that period, the first few months of 1992. It is unlikely that the rise of β at that time reflects a lessening of market integration. To judge from the value of β, the Russian market was almost 'perfectly integrated' at the starting point of the time series, February 1992. But turning back to Figure 2, we see that the inter-regional dispersion of prices was not so low in the first months of 1992. Nevertheless, the regression results indicate weak (or no) dependence of price dispersion on distance in these

months. Hence, the law of one price hardly held, even when controlling for transportation costs. It seems likely that this is just the case mentioned in footnote 1, where price dispersion is caused mostly by various accidental factors, and so violation of the law cannot be captured or is understated by the regression.

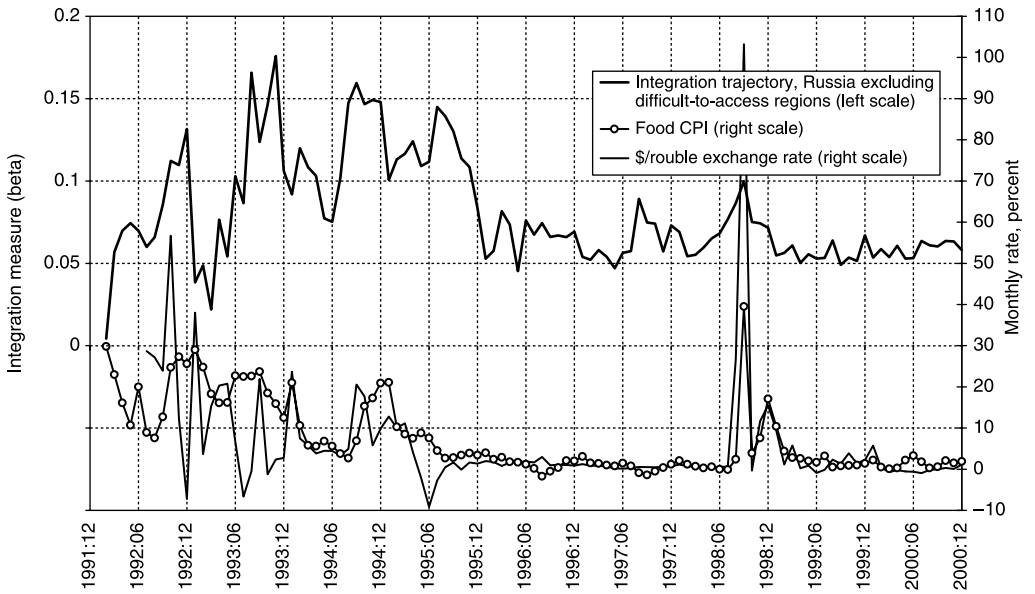
In all likelihood, there were two main reasons for such behaviour of prices. First, neither producers nor wholesale and retail traders initially had experience pricing on their own, and this may have resulted in a weak linkage between prices and demand. Second, savings forced by the pent-up demand came to the consumer market beginning in January 1992, thus weakening the dependence of demand on current incomes. And most probably, the fast rise of β – strengthening dependence of prices on local demand – in the early months of the market reforms was induced by the adaptation of sellers to market pricing,[8] which became wider in scope, as well as by the dishoarding and depreciation of the forced savings. But the possibility of such local demand dependence results from the weakness of inter-regional trade relations, which allows price disparities to persist.

Thus the beginning of the integration trajectories provides only partial evidence that the degree of integration of the Russian market was low at that time. Moving further and further away from the starting point, the value of β should have been being progressively more determined by the magnitude of impediments to inter-regional trade, while the transitory component conditioned by the switching from planned to market pricing was gradually decreasing in importance. There is no way, however, to measure how long this component persisted and how much it contributed to the value of β at particular points in time. Based upon my personal observations of the reality of that time, its role seems to have become of little importance by the end of 1992, or, at the latest, by mid-1993. (As for the forced savings, their effect was very short, since a portion of them was spent in the first months of 1992, and the rest was depreciated rapidly, ten-fold by the second half of the year.)

It is reasonable, therefore, to interpret subsequent values of β as indicators of regional economic isolation. In the early years of the transition, there were only embryos of market institutions, hence the prerequisites for inter-regional arbitrage were simply lacking. The overwhelming share of both retail and wholesale trade still remained state-run, and so the stimuli and possibilities for arbitrage did not exist. Some individuals and very small private firms did practice spatial commodity arbitrage but their contribution to the total volume of trade was minor. Trade flows between regions were chaotic, accidental bargains prevailing (the more so as information on arbitrage opportunities was almost entirely lacking). Regional authorities were contributing strongly to the economic separation of regions, by trying to cushion price shocks in their own regions. In particular, they erected trade barriers, restricting exportation of subsidized agricultural and food products.

[8] In essence, this was the process of the tâtonnement combined with the self-learning of market agents.

Figure 4. Integration vs. inflation and the rouble exchange rate



Numerous regional 'food security' programmes (that is, the self-provision of a given region with foodstuffs) were developed in the early years of the reforms, so pushing regions towards autarky.

In the second half of 1992, β (as well as $\sigma(t)$) increased sharply again. In addition to the above-mentioned transitory component, this might be a consequence of transferring the authority for price controls to the regional level in March of that year: according to Frenkel (1997), many regional governments abolished price controls for staples at the end of the first half of 1992. Two time intervals – roughly the first halves of 1993 and 1994 – of a sufficient improvement in integration are seen in the early years of transition. They roughly correspond to the intervals when food price inflation fell dramatically; some changes in integration in those years might be attributed to variations in speed of change in the US dollar/rouble exchange rate (see Figure 4). However, the relation between changes in integration and changes in food price inflation is far from unambiguous (the more so for the dollar/rouble exchange rate). Besides, it is unclear what is the cause and what is the effect – whether inflation affects integration or vice versa.

Segmentation of the Russian market peaked in 1993–94. By 1994 the foundations of market institutions in the Russian consumer market were coming into being: wholesale and retail trade were being privatized, the number of private trade start-ups was increasing, and 'market mentality' was strengthening. Alongside this, arbitrage activity was broadening. As a result, market integration started

to improve from the end of 1994, and this continued throughout the remainder of the period under consideration.

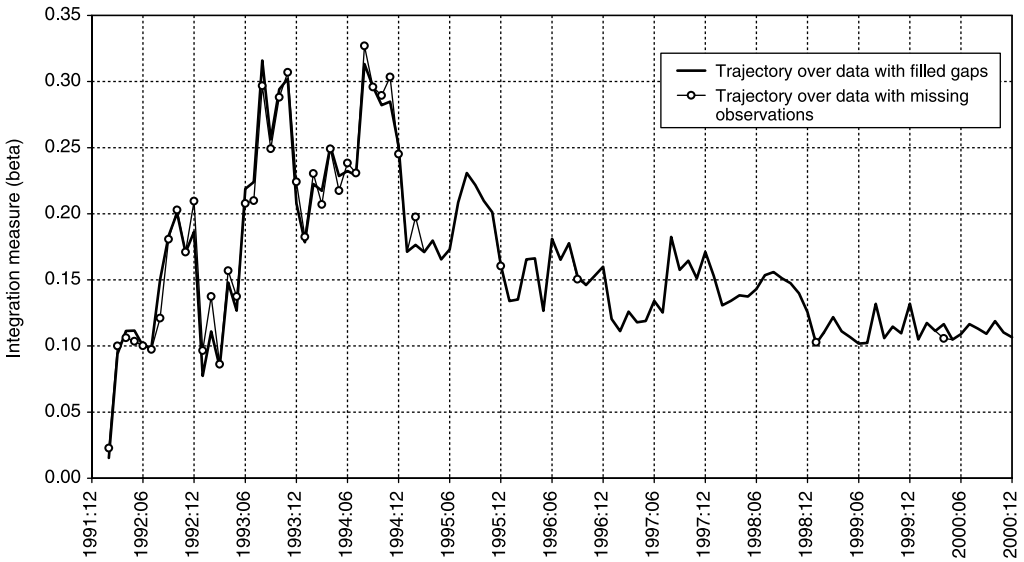
However, occasional departures from this trend occurred. In the second half of 1995, a new wave of inter-regional trade barriers in all likelihood caused the observed breakdown in integration. This wave was induced by the federal fuel-crediting programme for agricultural firms. To guarantee the repayment of such credits, regional governments restricted exportation of agricultural products until producers repaid the credits (Serova, 2000). Another spike was caused by the financial crisis in August 1998. Interestingly, this peak is clear on the trajectories for Russia excluding difficult-to-access regions and European Russia, but appears only slightly on the trajectory for Russia as a whole. An explanation is that the crisis price shock in the difficult-to-access regions was time-lagged, thus narrowing price gaps between these regions and the rest of the country and smoothing the peak on the trajectory.

From comparison of the integration trajectories for Russia with and without difficult-to-access regions, it is apparent that these latter regions account for a significant share of the overall disconnectedness of regional markets in Russia. Controlling for them, the value of β is approximately halved. Due to the existence of regions that are difficult to access, complete countrywide market integration should not be expected in the foreseeable future. Hence, this geographical feature of the country should be taken into account while comparing integration in Russia with that in established market economies. (Alaska and Hawaii, however, may play a similar role in the US.)

Another comparison involves Russia excluding difficult-to-access regions and the European part of the country excluding the northern territories. As mentioned above, European Russia might be expected to be more integrated. But surprisingly, this is not the case. From the second half of 1995, values of β are permanently higher here than in Russia excluding difficult-to-excess regions. In 2000, they are almost twice as high which is very close to the value for Russia as a whole. This implies that the market of European Russia is less integrated than the market of Siberia and the Far East excluding Yakutia, Sakhalin, Kamchatka, and the Magadan Oblast (hereafter referred to as 'Asian Russia'). Indeed, unreported estimates of β for Asian Russia are almost all insignificant since December 1998, suggesting that this part of the national market is close to completely integrated. Taking into consideration the long distances between regions and the relatively poor transport infrastructure there, this result is quite unexpected.

The explanations are as follows. A major cause of weak market integration in European Russia is the Moscow market. There is abundant evidence that sellers from other regions have no freedom of entry into this market; almost insurmountable barriers are erected in Moscow both by local 'mafias' and by the Moscow government (see, e.g., Berkowitz *et al.*, 1998 and Serova, 2000). Controlling for this factor, values of β fall dramatically while values of γ rise (indicating that transportation costs do matter in European Russia). For example, β decreases 1.3 to 2.6 times

Figure 5. Impact of filling the data gaps on the trajectory for Russia as a whole



in 2000, and γ increases 1.3 up to 8 times.[9] Nevertheless, βs do not become insignificant, still exceeding those for Asian Russia. This suggests that the contribution of distance to price dispersion predominates in Asian Russia, whereas the role of 'artificial' impediments to arbitrage is more important in European Russia. A reason for this seems to be an administrative-territorial division of the European part of Russia which is much more atomistic than that of the Asian part: while about 3 million square kilometres are divided among 51 regions of the European Russia sample, there are only 16 regions over the area of about 5 million square kilometres in Asian Russia. And the more numerous regional governments and borders are, the more opportunities exist for the occurrence of many and varied barriers to inter-regional trade.

As pointed out in Section 3, a portion of the price data consists of approximated values. To verify how much this affects the behaviour of the trajectories, regression (4) was also estimated over the source dataset with gaps. This only marginally affected the results, and by and large the trajectories remained the same (Figure 5).

[9] This might seem to be due to the violation of the smallness condition by Moscow. However, it is not. Indeed, the quantity demanded in Moscow is not small, varying in 1998 from 4 percent (for potatoes) to 11.8 percent (for meat) of that in the whole of European Russia. But the maximum change in Moscow's demand equals 8.7 percent for year (meat, 1992 vs. 1993), hence, about 1 percent of the total European Russia's demand. (Data from Goskomstat (1999) are used for these evaluations.)

In addition to the CPI-based method of restoring missing observations, linear interpolation was also tried. This method also produced no marked changes.

5. Role of the non-traded component

Another pending question is that of the part played by the non-tradable component of goods in the integration measure β. Data on regional wholesale prices for individual goods (and the cost of the 25-item basket) as well as on the structure of individual retail prices are not available. However, the Russian statistical publications provide aggregated trade indicators which can be used as proxies. These are trading costs relative to retail sales, and the net revenue calculated as the difference between sale proceeds and the purchase value of goods; the indicators are computed over large and medium-sized shops by region. A caveat is that these indicators are averages over all sold consumer goods, whereas their values for the staples basket used may not be the same as for other goods. Both the indicators were tried, the first as a proxy of distribution costs, and the second as a proxy of the retail-wholesale margin, yielding similar results. Only the former is considered below, and is denoted d_r. The sources of the data are Goskomstat (1996b) and Goskomstat (1998). The data for 1992 and 1998–2000 are lacking; values of d_r for 1997 are extended to 1998–2000.[10]

Taking into account (percentage) distribution costs, the spatial equilibrium condition becomes:

$$p_r(1 - d_r) = p_s(1 - d_s)(1 + c_{rs}). \tag{5}$$

Recall that c_{rs} is percentage arbitrage transaction costs; for simplicity, the mark-ups in r and s are assumed to be equal.[11] Hence, the right-hand side of (3) and (4) should be supplemented with the variable $D_{rs} = \ln((1 - d_s)/(1 - d_r))$, which represents the distribution costs dispersion among regions (in the form of the percentage differential). Theoretically, the coefficient on this variable must equal 1. However, as a mere proxy is used instead of the true value of D_{rs}, the coefficient on it may significantly deviate from the theoretical value. Thus, the only thing to be expected is the positive sign of the coefficient.

Since only yearly data on distribution costs are available, the other variables are averaged over each year (for 1992, over its 11 available months). Despite high and variable inflation during the early years of transition, this averaging is reasonable,

[10] For these years, Goskomstat of Russia published both indicators in monetary terms only, without providing retail sales in large and medium-sized shops.

[11] Using the retail-wholesale margin proxy, differences in both distribution costs and mark-ups are captured. However, as mentioned, this does not yield significant changes in the results.

Table 1. Impact of distribution costs on estimates of the integration measure

Year	Variable	Russia as a whole		Excluding difficult-to-access regions		European Russia	
		Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
1992	Income	0.142***		0.078***		0.034***	
		(0.008)		(0.008)		(0.013)	
	Distance	0.031***	NA	0.012***	NA	0.015***	NA
		(0.003)		(0.003)		(0.005)	
1993	Income	0.203***	0.171***	0.087***	0.084***	0.065***	0.067***
		(0.010)	(0.010)	(0.009)	(0.009)	(0.015)	(0.015)
	Distance	0.077***	0.064***	0.050***	0.047***	0.010	0.009
		(0.004)	(0.004)	(0.004)	(0.004)	(0.007)	(0.007)
	DC		0.364***		0.120***		0.101
			(0.034)		(0.039)		(0.082)
1994	Income	0.265***	0.242***	0.124***	0.121***	0.130***	0.133***
		(0.009)	(0.009)	(0.007)	(0.007)	(0.009)	(0.009)
	Distance	0.123***	0.109***	0.077***	0.072***	0.024***	0.024***
		(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
	DC		0.250***		0.138***		0.107***
			(0.017)		(0.023)		(0.035)
1995	Income	0.201***	0.175***	0.125***	0.122***	0.135***	0.134***
		(0.007)	(0.006)	(0.006)	(0.006)	(0.007)	(0.007)
	Distance	0.110***	0.080***	0.073***	0.065***	0.013***	0.013***
		(0.003)	(0.003)	(0.003)	(0.003)	(0.004)	(0.004)
	DC		0.501***		0.230***		−0.051
			(0.025)		(0.029)		(0.045)
1996	Income	0.166***	0.145***	0.075***	0.076***	0.096***	0.111***
		(0.008)	(0.007)	(0.005)	(0.006)	(0.005)	(0.006)
	Distance	0.131***	0.097***	0.077***	0.068***	0.008**	0.006**
		(0.004)	(0.004)	(0.003)	(0.003)	(0.003)	(0.003)
	DC		0.510***		0.196***		0.185***
			(0.026)		(0.021)		(0.025)
1997	Income	0.148***	0.141***	0.066***	0.074***	0.085***	0.094***
		(0.007)	(0.007)	(0.005)	(0.005)	(0.004)	(0.005)
	Distance	0.137***	0.097***	0.079***	0.065***	0.008***	0.007***
		(0.003)	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)
	DC		0.484***		0.241***		0.121***
			(0.019)		(0.017)		(0.020)

Table 1 (cont). Impact of distribution costs on estimates of the integration measure

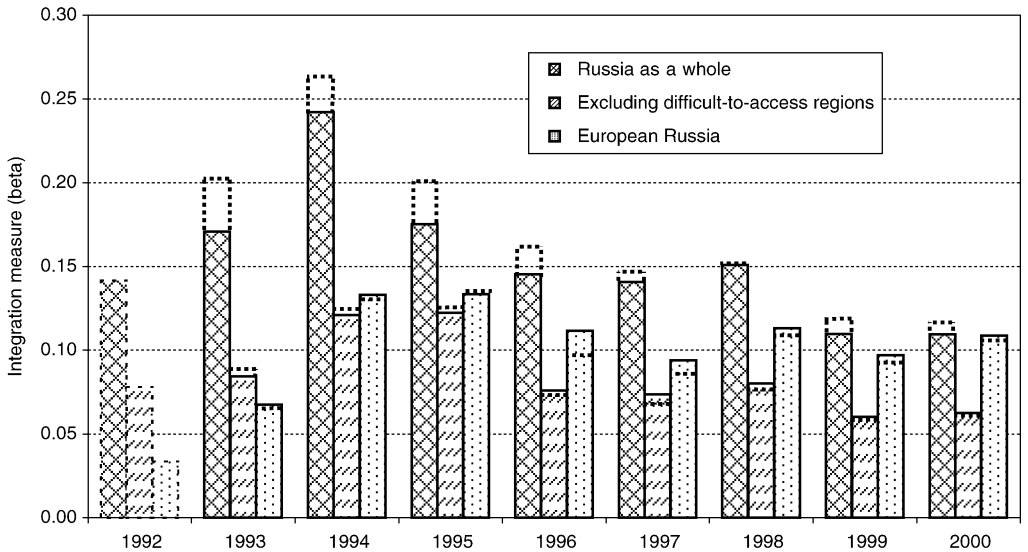
Year	Variable	Russia as a whole		Excluding difficult-to-access regions		European Russia	
		Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
1998	Income	0.152***	0.151***	0.076***	0.080***	0.108***	0.113***
		(0.007)	(0.006)	(0.005)	(0.005)	(0.005)	(0.005)
	Distance	0.106***	0.074***	0.046***	0.040***	0.007**	0.006**
		(0.003)	(0.003)	(0.002)	(0.003)	(0.003)	(0.003)
	DC		0.384***		0.107***		0.073***
			(0.019)		(0.016)		(0.025)
1999	Income	0.119***	0.110***	0.059***	0.060***	0.093***	0.097***
		(0.005)	(0.005)	(0.004)	(0.005)	(0.005)	(0.005)
	Distance	0.065***	0.046***	0.018***	0.016***	−0.006*	−0.005*
		(0.003)	(0.003)	(0.002)	(0.002)	(0.003)	(0.003)
	DC		0.260***		0.056***		0.061**
			(0.014)		(0.013)		(0.027)
2000	Income	0.116***	0.110***	0.061***	0.062***	0.106***	0.109***
		(0.005)	(0.005)	(0.004)	(0.004)	(0.004)	(0.005)
	Distance	0.088***	0.069***	0.037***	0.034***	−0.001	−0.001
		(0.003)	(0.003)	(0.002)	(0.002)	(0.003)	(0.003)
	DC		0.246***		0.060***		0.044**
			(0.014)		(0.013)		(0.021)

***Notes*:** DC = distribution costs differential. The White heteroscedastic-consistent errors are in parentheses; ***, **, and * denote significance at the 1, 5 and 10 percent levels.

as the relative (region-to-region) prices are dealt with, and not their absolute values. For verification, monthly βs plotted in Figure 3 were averaged in the same manner; the behaviour of the averaged βs turned out to be similar to that of βs estimated on yearly basis (which is illustrated by Figure 6 below). Table 1 sets out estimation results without and with distribution costs being taken into account. For brevity, the income differential is referred to as simply 'Income'; Model 1 means specification (4), and Model 2 means equation (4) supplemented with variable $D_{rs}(t)$, t indexing years.

With the exception of two instances, distribution costs are statistically significant and have the expected positive sign. However, the comparison of the results for Model 1 and Model 2 suggests that changes in the estimates of the integration measure caused by the inclusion of distribution costs are rather small.

Figure 6. 'Aggregated' integration trajectories



Note: The dashed lines mark the levels of β obtained without regard for distribution costs.

The coefficients on income in each pair of the models have overlapping 95 percent confidence intervals (except for Russia as a whole in 1995, where this is the 90 percent interval), thus indicating that the difference between βs is hardly significant. The standard errors of β remain almost the same. Hence it may be believed that the regressors **I** and **D** are near to orthogonal, and that the omission of **D** biases the estimation of the regression variance only slightly.

Figure 6 provides a pictorial rendition of changes in the integration measure when distribution costs are taken into account. (Comparing the 'aggregated' trajectories produced by Model 1 with the continuous trajectories in Figure 3, we see that the temporal averaging does not distort the general evolution pattern; losing details, the 'aggregated' trajectories retain the main features of the evolution of market integration. This may be thought of as one more verification of reasonability of the temporal averaging.)

Dealing with Russia as a whole, the inclusion of distribution costs lowers β, as would be expected. But this is not always the case with the next sample, Russia excluding difficult-to-access regions: beginning in 1996, β increases in Model 2 as compared to Model 1. The more so, when the case at hand is European Russia: the only instance of decreasing β in Model 2 is observed here. The effect of distribution costs on the coefficient on distance is stronger. For Russia as a whole, the 95 percent (as well as the 90 percent) confidence intervals of γ do not overlap. However,

they do for the other two samples. Values of γ nearly always fall after inserting distribution costs (though sometimes they remain unchanged in European Russia).

To judge the importance of distribution costs as compared to income and distance in production of price dispersion, the contribution of each variable's average to the average price dispersion is used. As seen from (2) and (3), the intercept in regression (4) is nothing but a scaling multiplier for distance. Hence, the contribution of distance is $(\hat{\alpha} + \hat{\gamma}\bar{L})/\bar{P}$; for the other two variables, it is simply $\hat{\beta}\bar{I}/\bar{P}$ and $\hat{\delta}\bar{D}/\bar{P}$, where $\hat{\delta}$ is the estimated coefficient on the distribution costs differential. Table 2 reports these contributions rounded off to integer percents.

As figures from Table 2 suggest, the overwhelming share of price dispersion owes its origin to distance. Along with this, the economic significance of other impediments to arbitrage represented by the effect of income dispersion is high enough. This variable accounts for 10 to 20 percent of the average price dispersion (sometimes even for more). Finally, the contribution of the distribution costs dispersion is considerable over Russia as a whole; it markedly falls when the difficult-to-access regions are controlled for, and becomes practically insignificant in European Russia. Comparing results for Model 1 with those for Model 2, we notice that the contribution of distribution costs reduces that of distance, while the contribution of income dispersion is little changed.

The explanation may be the expensiveness of marketing and distribution services in the remote, difficult-to-access regions. As the distances to them are long too, this causes a (spurious?) correlation between distribution costs and distance. To a lesser degree the same is valid for Russia excluding difficult-to-access regions, since there are Siberian and Far-Eastern regions in the sample.

Thus, the difference in distribution costs is responsible for some share of price dispersion. However – with some reservations relating to the caveat mentioned at the beginning of this section – it may be concluded that in the absence of a relevant variable in the regression, most of the effect of distribution costs is picked up by the distance variable, thereby preventing a marked bias of β. Hence, it is possible to dispense with taking distribution costs into account (at least, while analysing the Russian market), although some minor details of the qualitative pattern of the price behaviour may be lost.

6. A comparison

It is interesting to compare the above results with those obtained using a different methodology. Berkowitz and DeJong (2001) have examined market integration in Russia, based on the same sample of 74 regions and the same price index as in this study.

The intuition behind their work is as follows. Price dispersion is assumed to fluctuate within bounds dictated by arbitrage costs, $-C_{rs} \le P_{rs}(t) \le C_{rs}$. Hence, its temporal volatility calculated as the standard deviation of $P_{rs}(t)$ over a sub-period

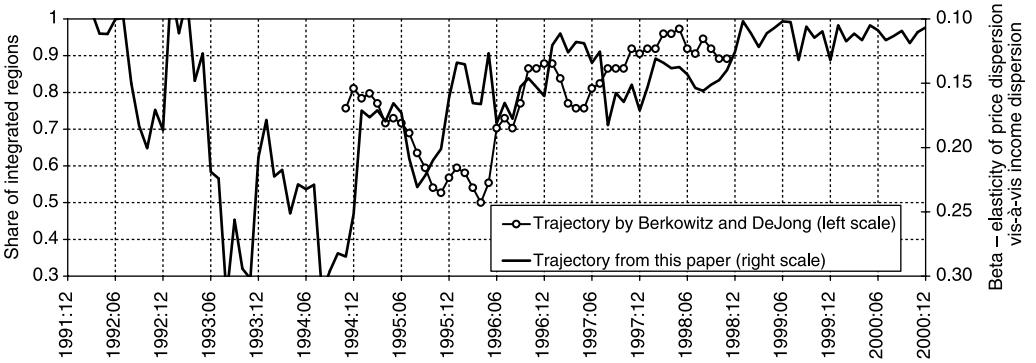
Table 2. Contribution of variables to average price dispersion, percent

Year	Variable	Russia as a whole		Excluding difficult-to-access regions		European Russia	
		Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
1992	Income	16	NA	7	NA	1	NA
	Distance	84		93		99	
1993	Income	21	18	7	7	3	3
	Distance	79	75	93	91	97	97
	DC		7		2		0
1994	Income	32	29	14	14	15	15
	Distance	68	64	86	83	85	85
	DC		7		3		0
1995	Income	27	23	17	16	19	19
	Distance	73	66	83	81	81	81
	DC		11		3		0
1996	Income	20	18	9	9	14	16
	Distance	80	64	91	85	86	83
	DC		18		6		1
1997	Income	19	18	9	10	17	18
	Distance	81	62	91	81	83	83
	DC		20		9		–1
1998	Income	22	22	12	13	20	21
	Distance	78	62	88	83	80	80
	DC		16		4		–1
1999	Income	21	19	10	10	18	18
	Distance	79	69	90	88	82	83
	DC		12		2		–1
2000	Income	20	19	11	11	24	25
	Distance	80	69	89	87	76	75
	DC		12		2		0

***Note*:** DC = distribution costs differential.

$t - n, \ldots, t + n$, $\sigma_{rs}(t)$, should be a function of C_{rs} (implicitly assuming C_{rs} to be near-constant during the sub-period). In turn, if a market is integrated then arbitrage costs are nothing but transportation costs; thus, $\sigma_{rs}(t)$ should be an increasing function of distance. Based on this, region r is deemed to be integrated during a given sub-period when the coefficient on distance in the test regression of $\sigma_{rs}(t)$ on L_{rs}

Figure 7. comparison of integration trajectories with different integration measures



(across s) is positive and statistically significant. The extent of market integration is measured as the percentage of integrated regions. Shifting t – the median date of the twelve-month sub-period, $2n = 12$ – by monthly steps, an integration trajectory is obtained.

Figure 7 provides a comparison of the Berkowitz–DeJong integration trajectory with the trajectory for Russia as a whole from Figure 3 of this paper. The scale for the latter is inverted (since β and the percentage of integrated regions change in opposite directions).

The trajectories are fairly similar, with broadly simultaneous turning points. The Berkowitz–DeJong trajectory, however, is somewhat ambiguously related to the time scale. First, being the sixth month within a twelve-month interval over which price volatility is calculated, their time point is not the exact median date; the seventh month could be equally well taken as a representative of the time interval. Second, the Berkowitz–DeJong integration measure picks up the behaviour of prices not only at a given point in time, but in its 5–6-month neighbourhood as well. And this may cause a shift of a captured change in integration – as compared with the trajectory of β – in either direction (probably, by one to three months). Taking this into account, the trajectories may be thought of as being in close agreement with one another.

Besides the cost of the food basket, Berkowitz and DeJong (2001) use one more price indicator, namely, a regional CPI. The associated integration trajectory differs considerably from that based on the basket-cost data, indicating less integration. There are two possible reasons for this. The first is noted by the authors themselves: the general CPI covers services, which distorts dispersion of prices for tradable commodities. The second reason relates to the insufficient reliability of the Russian regional CPIs. As found by Gluschenko (2001b), they are severely biased with respect to spatial price indices, overstating inter-regional differences.

7. Conclusions

Using data across 74 Russian regions from the onset of mass price liberalization to recent years, changes in the degree of market integration in Russia during this period are evaluated. The pattern obtained is consistent with results obtained by Berkowitz and DeJong (2001), who use a different methodology. This pattern is rather encouraging. After a period of growing disconnectedness, market integration has tended to improve, though with sporadic deviations from this general trend.

As the dependence of regional prices on local demand still persists, the Russian market cannot be deemed as being completely integrated even at present. However, the question of how far the market is from complete integration still remains open. The results suggest that a 1 percent change in local per capita incomes induced a 0.05 to 0.1 percent change in price dispersion in 2000. But is this much or little? On the other hand, the issue of what degree of market integration is really achievable is vague as well. In the absence of a better reference point, judgments are based on the theoretical standard of a zero value of β. But such a comparison may be too severe for the Russian market, overstating its shortcomings.

In fact, there is evidence that even advanced market economies do not match this theoretical standard, in other words, that they are not completely integrated. For example, Morgan (1998) estimates that the range of food price differences across the Euro-zone countries – the ratio of highest to lowest prices – is 1 to 1.45. A similar pattern is peculiar to the USA, usually thought of as a highly integrated economy. The ACCRA (2000) cost-of-living index for the fourth quarter of 2000 indicates that the cost of groceries varies across US cities (excluding Alaska and New York City) from 0.82 of the national average in Jackson, Mississippi, to 1.26 in San Diego, California (a ratio of 1 to 1.54). Some of the results obtained by Engel and Rogers (1996) can be interpreted as indicating that price dispersion across US cities depends on local demand, as in Russia (Gluschenko 2002a discusses this in more detail).

Hence the degree of integration of the Russian market should be judged by deviations of β not from the theoretical standard but from levels actually achieved in advanced market economies. Besides that, it is unknown whether relatively small fluctuations of the degree of integration (such as in 1999–2000) are a feature of the Russian market or if they are merely random shocks. Applying the methodology put forward here to an advanced market economy would provide a realistic benchmark to judge how far the behaviour of the Russian economy deviates from that of long-standing market economies.

References

ACCRA (2000). *ACCRA Cost of Living Index*, 33(4), pp. 1.1–1.12.

Berkowitz, D., DeJong, D. and Husted, S. (1998). 'Quantifying price liberalization in Russia', *Journal of Comparative Economics*, 26, pp. 735–60.

Berkowitz, D. and DeJong, D. (1999). 'Russia's internal border', *Regional Science and Urban Economics*, 29, pp. 633–49.
Berkowitz, D. and DeJong, D. (2001). 'The evolution of market integration in Russia', *Economics of Transition*, 9(1), pp. 87–104.
De Masi, P. and Koen, V. (1996). 'Relative price convergence in Russia', *IMF Staff Papers*, 43, pp. 97–122.
Engel, C. and Rogers, J. (1996). 'How wide is the border?' *American Economic Review*, 86(5), pp. 1112–1125.
Frenkel, A. (1997). *The Russian Economy in 1992–1997: Trends, Analysis, Forecast*, Moscow: Finstatinform.
Gardner, B. and Brooks, K. (1994). 'Food prices and market integration in Russia: 1992–93', *American Journal of Agricultural Economics*, 76, pp. 641–66.
Gluschenko, K. (2001a). 'Inter-regional variability of inflation rates', *EERC Working Paper No. 99/17*, Moscow, www.eerc.ru/Publications/workpapers/WP_99-17E.pdf.
Gluschenko, K. (2001b). 'Consumer prices in Russia in 1992–2000: Spatial dimension', *Region: Ekonomika i Sotsiologia*, 2, pp. 46–71.
Gluschenko, K. (2002a). 'Common Russian market: Myth rather than reality', *EERC Working Paper No. 01/11*, Moscow, www.eerc.ru/Publications/workpapers/WP_01-11E.pdf.
Gluschenko, K. (2002b). 'Econometric analysis of Russia's internal market integration', *Region: Ekonomika i Sotsiologia*, 3, pp. 67–86.
Gluschenko, K. (2002c). 'Market integration in Russia during the transformation years', *Institute for Advanced Studies, Economic Series No. 116*, Vienna, www.ihs.ac.at/publications/eco/es-116.pdf.
Goodwin, B., Grennes, T. and McCurdy, C. (1999). 'Spatial price dynamics and integration in Russian food markets', *Journal of Policy Reform*, 3(2), pp. 157–93.
Goskomstat of Russia (1996a). *'Methodological Regulations on Statistics'*, Issue 1, Moscow.
Goskomstat of Russia (1996b). *'Trade in Russia'*, Moscow.
Goskomstat of Russia (1998). *'Trade in Russia'*, Moscow.
Goskomstat of Russia (1999). *'Regions of Russia'*, Moscow.
Koen, V. and de Masi, P. (1997). 'Prices in the transition: Ten stylized facts', *IMF Working Paper No. 97/158*, Washington, DC: IMF. www.imf.org/external/pubs/ft/wp/wp97158.pdf.
Koen, V. and Phillips, S. (1992). 'Price liberalization in Russia: The early record', *IMF Working Paper No. 92/92*, Washington, DC: IMF.
Morgan, J. P. (1998). 'Welcome to the EMU', *European Economic Outlook (Special Edition, October/November)*, London: Oct. 30.
Obstfeld, M. and Taylor, A. M. (1997). 'Non-linear aspects of good-market arbitrage and adjustment: Heckscher's commodity points revisited', *Journal of Japanese and International Economies*, 11, pp. 441–79.
Parsley, D. and Wei, S.-J. (1996). 'Convergence to the law of one price without trade barriers or currency fluctuations', *Quarterly Journal of Economics*, 111, pp. 1211–1236.
Serova, E. (2000). *'Russia'*, in Valdes, A. (ed.) *Agricultural Support Policies in Transition Economies*, Washington, DC: World Bank.