Market performance in the grain market of late medieval Western Europe (ca. 1300-1650)

Bas van Leeuwen and Robin Philips

Abstract

Late-medieval Europe was a pre-industrial society caught in apparent economic stagnation, which only started to change from the fifteenth century onwards. One of the factors contributing to the lack of economic growth was the apparent absence of integrated and efficient markets. Yet, recently, Clark (2015) - drawing from datasets on grain prices in ca. 200 locations in Britain - showed that the most important market, for grain, became relatively extensive and efficient from the thirteenth century onwards. This chapter builds upon this line of research, putting this research in an international perspective, by compiling a dataset on market performance of 60 different locations across Europe during 1300-1650. Our results indicate that the European grain market showed indeed gradually increasing performance from the fourteenth century onwards. Yet, substantial regional differences existed, with Northwestern Europe in particular benefitting most from market integration.

1. Introduction

Well-functioning markets, defined as having low price volatility, are often considered to be a crucial precondition for economic growth as they enhance both specialization and innovation (McMillan 2003; Studer 2008; Baumol 2014). This has led to an extensive literature on the impact of markets on economic development (e.g. Jacks, O'Rourke, and Williamson 2010) with periods of fast economic growth arguably being accompanied by rising market performance.

Yet, various authors have placed question marks at the role of grain markets in calculating market performance. First, there are those studies that, following Polanyi (1944; 1957), argued that ancient markets do not function according to standard economic principles. Yet, whereas some have tried to find a middle way by arguing for the existence of market-types between ancient and modern markets (e.g. Bang 2008), other studies have been more favorable towards applying

economic concepts like market performance to history (van der Spek, van Leeuwen, and van Zanden 2014). Besides scholars doubting the existence of market rules, a second group points out that, even in competitive markets, well performing markets might negatively affect growth. For example, Jacks et al. (2010) shows that increased market performance leads to increased economic specialization. This leads in certain regions to the specialization in highly volatile commodity production and, consequently, lower market performance. Likewise, it is argued that, even in well-functioning markets, grain may flow to richer regions thus increasing volatility in the poorer areas (Dijkman and van Leeuwen 2019, 4). Third, yet other authors do not argue for a negative relation but rather claim it is unconnected to growth. For example, Clark (2015) claimed that the effect of market performance on the beginning of sustained economic growth were limited while Bateman (2011) found no evidence of long-run rises in market integration.

2. Historiography

As discussed above, in the various studies markets are seen as, to a certain extent, "integrated", "efficient", or "performing". Yet, whereas the first concept looks at trade, and the second one at information, market performance covers the combined effect of storage, market integration through trade, and better institutions on price volatility (Földvári and van Leeuwen 2014, 19–20). This also implies that, in order to obtain proper estimates of market performance, first unrelated, region-specific, factors such as price rises and cropping structure need removing (Földvári and van Leeuwen 2011). Yet, even with these removed, it still includes income and specialization as time-varying factors driving market performance.

Not only do we find various definitions of well-working markets, also empirical studies have presented widely divergent results so far. Bateman (2011) and Federico (2011) find little evidence for rising market performance in Europe before 1800. Clark (2015) finds high, though stable, market performance up to 1500 in England. Yet, he concludes that, even though in England market performance might be high, institutional and other factors make this not necessarily true for Europe as a whole. For the in-between period, Földvári and van Leeuwen (2011) and Chilosi et al. (2013) find slow, but gradual integration since 1500.

A third factor causing debates in the literature are differences in the causes of increasing market performance they identify. So, is the increase in market integration explained by increasing trade (Jacks 2000), institutions (Clark 2015), or geography (Chilosi et al. 2013), whereas the study of Földvári and van Leeuwen (2011) find evidence for a range of these time-varying factors while they remove the region-specific effects from their analysis.

Taking a more long-term and balanced perspective, van Leeuwen et al. (2014) trace the increasing market integration back to 300 BC. In this perspective, in particular increased yields improved market performance after the 10th century (Persson 1991), whereas a reduction of ca. 20% in transaction and trade costs removed many barriers to trade (Földvári, van Leeuwen, and van Zanden 2011). Yet, during the late-medieval period, trade contacts remained relatively limited for long, which aggravated by urban concentration – increasing trade distance – limited market performance. When after 1500 transaction and transport costs started to decline, the negative effect of urban concentration diminished (see for a similar evolution in Ancient Greece also Pirngruber in this volume).

3. A case study: pre-industrial Europe during 1300-1650

We compile a dataset of grain prices in approx. 60 cities in Austria, France, Germany, Italy, the Low Countries, Spain, and the United Kingdom for the period 1300-1650. For this, we draw on the data of the *Allen-Unger Global Commodity Prices Database* (Allen and Unger 2018). In order to obtain estimates of market performance, we ran a regression, for 50-year periods, on the first difference of the log of the price. In this way, we filtered out both region-specific effects and inflation. We took 1 minus the standard error of the regression as our measure of market performance. That is, the higher the value, the higher market performance.

We report all our observations in Appendix 1. Whilst we can only draw from a limited number of observations in the 1300-1400 period, we have a good sample size for the period of 1400-1650. In Table 1, we report a sample of our dataset, presenting a set of cities for which we have observations consistently throughout the entire 1300-1650 period. A first observation we can make, is that the coefficient of variation declined over time, indicating a strong trend of increasing convergence in the European grain market prices. Here, a small nuance has to be made, given the

drastic decline in the coefficient of variation during 1400-1450 period, which most probably can be attributed to the different sample size in the benchmark years before. As such, our results affirm the findings of Clark (2015), who found a similar evolution in the grain market of pre-industrial England. In addition, as for regional development, we find that, the city of Firenze in Italy ranked consistently lowest in market performance compared to the other cities in Europe. During the fourteenth and fifteenth century, the cities in England ranked the highest in market performance, whereas this title was taken over by the city of Amsterdam during the sixteenth and seventeenth centuries.

< Table 1 about here >

Figure 1 provides a broader view on the regional evolutions of market performance. During the fourteenth century, we notice not only a lower market performance of the Northern Italian cities compared to the cities in England and the Low Countries, but also an increasing divergence between both. During the fifteenth century, this trend of divergence is halted and reversed with a convergence in market performance across the European cities. During this period, we not only notice a high market performance in Exeter, London, and Southern England, but also the city of Valencia. During the sixteenth century and the first half of the seventeenth century, we find a continuation of this process: where the highest market performance can be found in Spain, in the cities of Valencia and Barcelona, both with access to the Mediterranean Sea, they competed with the cities of Northwestern Europe, in particular the Netherlands: Leiden and Amsterdam. Conversely, most of the cities in France, Italy and Germany had a relatively low market performance. So, our estimates are in line with most recent GDP reconstructions, which indicate that economic growth accelerated in Northwestern Europe compared to the rest of Europe, causing an economic divergence between both regions from the late-medieval period onwards (e.g. de Pleijt and van Zanden 2016).

< Figure 1 about here >

As an investigation into the factors that can explain market performance, we perform on our panel dataset – including the estimates of market performance for all years and regions as an independent variable – a fixed effect estimation, by controlling for year-specific effects. We include three explanatory factors. First, we add a spatial lag of the market performance of the cities, by constructing a binary spatial matrix with the distance band set at the smallest maximum distance

between spatial units, in line with the construction of spatial regression estimates of Pisati (2001). In other words: we test whether being located in the vicinity of other cities with a high market performance can increase the high market performance of the city itself. Second, we introduce a proxy for urbanization, by using the estimates of Bosker et al. (2013) for all cities in our dataset, and using a 3,000 population threshold for those cities which could not be found in this database (cities with a population of 5,000 or less were excluded from the dataset of Bosker et al. 2013). Third, to capture the effect of previous trade networks, we use the Roman road network digitized by McCormick et al. (2013), where we use as a proxy the length of the road network in the radius of 100km from the city.

< Table 2 about here >

The results are reported in Table 2. We include all observations in column 1. In addition, to explore changes in the effect of the explanatory variables over time, we perform an OLS including only the benchmark years of 1350-1550 in column 2, and only the benchmark years of 1550-1650 in column 3. For 1350-1550, we find that urbanization has a significant negative effect, indicating that particularly small cities had a high market performance and that larger cities – with high levels of specialization and thus relatively more production in highly volatile goods – faced high volatility in grain prices, hindering their market performance. Furthermore, we find a significant, positive effect of the spatial lag, whereas the density of the roman roads has a low, but significant, negative effect. For 1550-1650, we find that neither urbanization levels nor roman road density has a significant effect, indicating that the aforementioned difference between small and large cities diminished over time. Yet, also, we find a strong significant effect of the spatial lag. Overall, for the 1350-1650 period, we find that only the spatial lag of market performance can significantly explain the level of market performance in the pre-industrial European cities, indicating the role that economic geography can play in explaining these patterns.

4. Conclusion

The notion that rising market performance enhances economic growth has been widely accepted. Yet, recent debates have arisen regarding the strength of market integration over time and its main determinants. In this paper, we aimed to provide an overview of the latest empirical studies on the

pre-industrial period. Overall, these studies affirm the view that the economic performance of pre-industrial societies has been enhanced by market integration, although authors have debated the scale of market performance and the channels through which market integration was enforced.

Using data from the dataset of Allen and Unger (2018), we offer a contribution to this branch of literature, by measuring the strength of market performance in various regions of Northern, Southern and Western Europe during 1350-1650. Our findings reveal a gradual but slow increase of market performance during the studied period, whereas the variation in market performance declined. Breaking down our results on a more regional level, market performance improved less in the Italian city-states, whereas highest values were noted in Northwestern Europe – the Low Countries and England – and the Spanish cities along the Mediterranean Sea. To explore the determinants of market performance in these regions, we tested for three effects: a spatial lag of market performance, the density of roman road network to control for inland trade, and the urbanization level to control for market potential. In particular, our results revealed a strong effect for the spatial lag of market performance, affirming that cities with a surrounding of high market performance also featured on average higher levels of market performance, suggesting for further research the added value that the economic geography literature could play in this line of historiography.

References

Allen, Bob, Unger, Richard. 2018. *The Allen Unger Commodities Dataset*. https://hdl.handle.net/10622/3SV0BO, IISH Data Collection, V1.

Bateman, Victoria N. 2011. "The Evolution of Markets in Early Modern Europe, 1350-1800: A Study of Wheat Prices." *The Economic History Review* 64 (2): 447–71.

Baumol, William J. 2014. *Free-Market Innovation Machine*. Princeton: Princeton University Press.

Bosker, Maarten, Buringh, Eltjo, van Zanden, Jan Luiten. 2013. "From Baghdad to London: Unraveling Urban Development in Europe, the Middle East, and North Africa, 800–1800." *Review of Economics and Statistics,* 95 (4): 1418-1437.

Chilosi, David, Tommy E. Murphy, Roman Studer, and A. Coşkun Tunçer. 2013. "Europe's Many Integrations: Geography and Grain Markets, 1620–1913." *Explorations in Economic History* 50 (1): 46–68. https://doi.org/10.1016/j.eeh.2012.09.002.

Clark, Gregory. 2015. "Markets before Economic Growth: The Grain Market of Medieval England." *Cliometrica* 9 (3): 265–87. https://doi.org/10.1007/s11698-014-0117-7.

De Pleijt, Alexandra and Jan Luiten van Zanden. "Accounting for the "Little Divergence": What drove economic growth in pre-industrial Europe, 1300-1800?" *European Review of Economic History* 20 (4): 387-409.

Dijkman, Jessica, and Bas van Leeuwen. 2019. “Resilience to Famine ca. 600 BC to Present. An Introduction.” In *An Economic History of Famine Resilience*, edited by Jessica Dijkman and Bas van Leeuwen, 1–13. New York and Oxon: Routledge.

Federico, Giovanni. 2011. “When Did European Markets Integrate?” *European Review of Economic History* 15 (1): 93–126. https://doi.org/10.1017/S1361491610000146.

Földvári, Péter, and Bas van Leeuwen. 2011. “What Can Price Volatility Tell Us about Market Efficiency? Conditional Heteroscedasticity in Historical Commodity Price Series.” *Cliometrica* 5 (2): 165–86. https://doi.org/10.1007/s11698-010-0055-y.

Földvári, Peter, and Bas van Leeuwen. 2014. “Market Performance in Early Economies: Concepts and Empirics, with an Application to Babylon.” In *A History of Market Performance: From Ancient Babylonia to the Modern World*, edited by Robartus J. van der Spek, Bas van Leeuwen, and Jan Luiten van Zanden, 19–44. Oxon and New York: Routledge.

Földvári, Peter, Bas van Leeuwen, and Jan Luiten van Zanden. 2011. “Long-Run Patterns in Market Efficiency and the Genesis of the Market Economy: Markets around the Mediterranean from Nebuchadnezzar to Napoleon (580 BC and 1800AD).” 8521. CEPR Discussion Papers. CEPR.

Jacks, David. 2000. “Market Integration in the North and Baltic Seas, 1500-1800.” Economic History Working Paper. London School of Economics and Political Science, Department of Economic History. https://econpapers.repec.org/paper/ehlwpaper/22383.htm.

Jacks, David S., Kevin H. O’Rourke, and Jeffrey G. Williamson. 2010. “Commodity Price Volatility and World Market Integration since 1700.” *The Review of Economics and Statistics* 93 (3): 800–813. https://doi.org/10.1162/REST_a_00091.

Leeuwen, Bas van, Peter Földvári, and Jan Luiten van Zanden. 2014. “Long-Run Market Performance in the Near East, the Mediterranean and Europe from Antiquity to c. AD 1800.” In *A History of Market Performance: From Ancient Babylonia to the Modern World*, edited by Robartus J. van der Spek, Bas van Leeuwen, and Jan Luiten van Zanden, 506–26. Oxon and New York: Routledge.

McCloskey, Donald N., and John Nash. 1984. “Corn at Interest: The Extent and Cost of Grain Storage in Medieval England.” *The American Economic Review* 74 (1): 174–87.

McCormick, Michael, Huang, Guoping, Zambotti, Giovanni, Lavash, Jessica. 2013. "Roman Road Network (version 2008)," *DARMC Scholarly Data Series*, Data Contribution Series #2013-5. DARMC, Center for Geographic Analysis, Harvard University, Cambridge MA 02138.

McMillan, John. 2003. *Reinventing the Bazaar*. New York: W. W. Norton & Company.

Persson, K.G. 1991. “Agrarian Productivity in Medieval Agriculture: Tuscany an the ‘Low Countries.’” In *Land Labour and Livestock: Historical Studies in European Agricultural Productivity*, edited by B. M. S. Campbell and M. Overton, 124–43. Manchester: Manchester University Press.

Pisati, M. (2001). SG162: Tools for spatial data analysis. *Stata Technical Bulletin*, 60, 21 – 37.

Polanyi, Karl. 1944. *The Great Transformation*. Boston: Beacon Press.

———. 1957. “Marketless Trading in Hammurabi’s Time.” In *Trade and Market in the Early Empires. Economies in History and Theor,* edited by Karl Polanyi, C. M. Arensberg, and H. W. Pearson, 12–26. Glencoe, Ill: The Free Press & The Falcon’s Wing Press.

Spek, Robartus J. van der, Bas van Leeuwen, and Jan Luiten van Zanden. 2014. “An Introduction. Markets from Ancient Babylonia to the Modern World.” In *A History of Market Performance: From Ancient Babylonia to the Modern World,* edited by Robartus J. van der Spek, Bas van Leeuwen, and Jan Luiten van Zanden, 1–16. Oxon and New York: Routledge.

Studer, Roman. 2008. “India and the Great Divergence: Assessing the Efficiency of Grain Markets in Eighteenth- and Nineteenth-Century India.” *The Journal of Economic History* 68 (2): 393–437. https://doi.org/10.1017/S0022050708000351.

Table 1. Values market performance for a selection of cities and coefficient of variation

Country	City	1300-1350	1350-1400	1400-1450	1450-1500	1500-1550	1550-1600	1600-1650
France	Douai	0.60	0.75	0.67	0.57	0.64	0.62	0.73
England	Exeter	0.72	0.71	0.73	0.77	0.61	0.58	0.80
	Southern England	0.67	0.74	0.70	0.79	0.68	0.61	0.79
Low Countries	Lier			0.70	0.72	0.73	0.70	0.71
	Amsterdam				0.65	0.76	0.76	0.88
Italy	Firenze	0.44	0.57	0.71	0.73	0.56	0.70	0.71
	Tuscany	0.67	0.62	0.66	0.69	0.61	0.67	0.78
Coefficient of variation		**0.16**	**0.10**	**0.03**	**0.10**	**0.08**	**0.07**	**0.05**

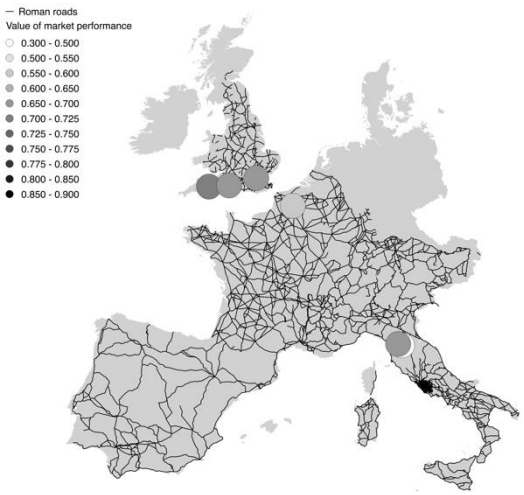
Sources: estimates of market performance based on Allen and Unger (2018). For details on methodology, see text.

Table 2. Fixed-effects estimation to explain market performance

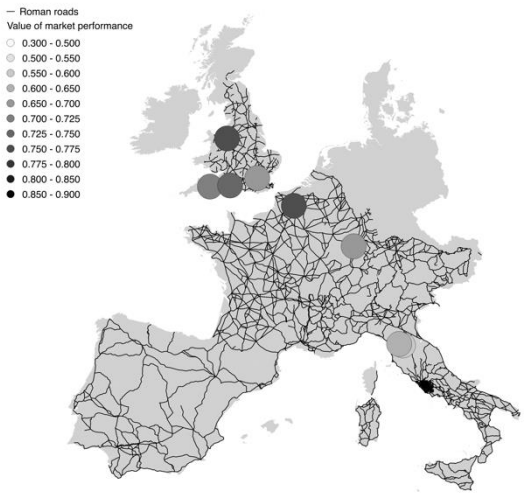
	(1) OLS	(2) OLS	(3) OLS
	all years	1350-1550	1550-1650
	dependent variable: market performance		
W Market performance	0.411***	0.443***	0.368***
	(0.0825)	(0.124)	(0.109)
ln Urbanization level	-0.000341**	-0.000591***	-0.000148
	(0.000141)	(0.000192)	(0.000209)
ln Roman road density	-0.249	-0.254**	-0.216
	(0.261)	(0.122)	(0.277)
Constant	0.425***	0.396***	0.475***
	(0.0597)	(0.0868)	(0.0824)
year-specific effects	yes	yes	yes
Observations	188	89	99
R-squared	0.158	0.259	0.119

Notes: All variables are in logarithm, using ln(x+1), except for values of market performance. The spatial weight matrix (W) of market performance was calculated with the STATA commands for spatial regressions of Pisati (2001), constructing a binary spatial matrix with the distance band set at the smallest maximum distance between spatial units. The asterisks denote significance levels, respectively for *** p<0.01, ** p<0.05, and * p<0.1. **Sources**: see text.

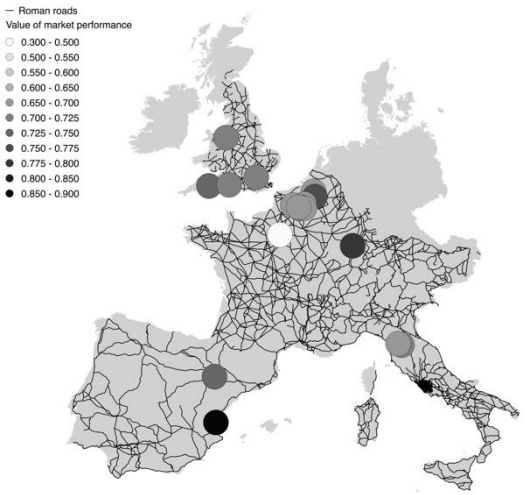
Figure 1. Map of market performance in major European cities during 1350-1600



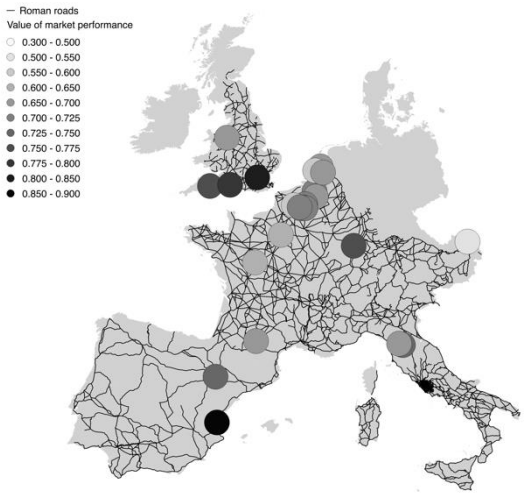
1300-1350



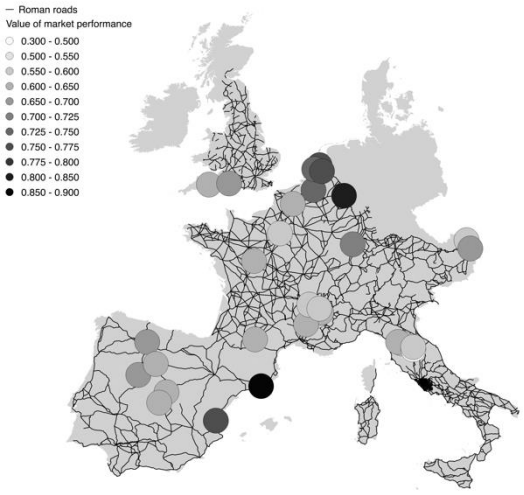
1350-1400



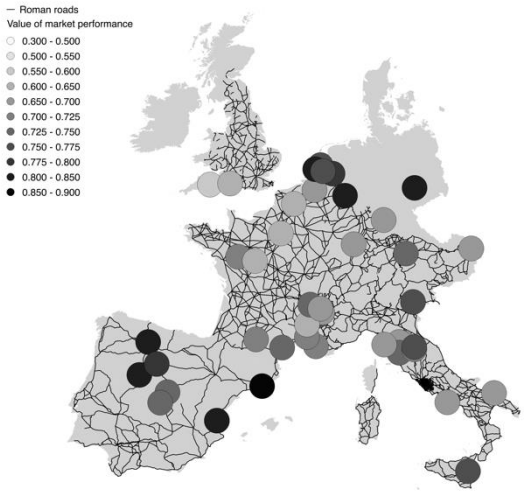
1400-1450



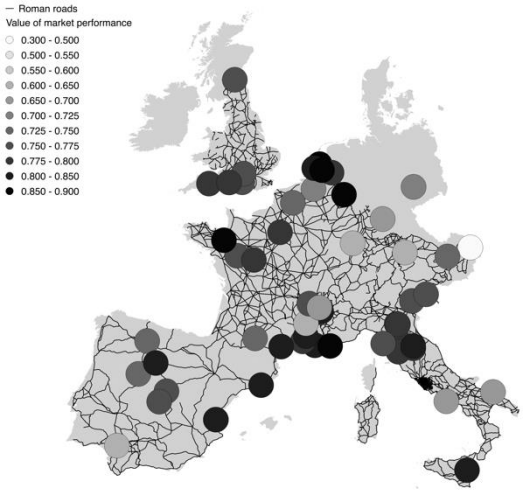
1450-1500



1500-1550



1550-1600



1600-1650

Sources: estimates of market performance based on Allen and Unger (2018). Roman road network derived from McCormick et al. (2013). For details on methodology, see text.

Appendix 1. Estimates of market performance in pre-modern European cities

Country	City	1300-1350	1350-1400	1400-1450	1450-1500	1500-1550	1550-1600	1600-1650
Austria	Stiftkloster Neuberg				0.51	0.56		
Austria	Vienna					0.67	0.69	0.33
France	Aix-en-Provence						0.72	0.83
France	Angers						0.71	0.77
France	Arles							0.8
France	Avignon						0.72	0.83
France	Beziers						0.74	0.82
France	Bavay			0.69	0.71			
France	Die					0.57	0.76	
France	Douai	0.6	0.75	0.67	0.57	0.64	0.62	0.73
France	Draguignan							0.85
France	Grenoble					0.62	0.7	0.82
France	Le Quesnoy			0.71	0.72			
France	Maubeuge			0.67	0.71			
France	Montelimar					0.61	0.62	0.65
France	Paris			0.38	0.64	0.6	0.61	0.78
France	Rennes							0.85
France	Strasbourg		0.7	0.8	0.76	0.72	0.69	0.65
France	Toulouse				0.68	0.65	0.72	0.73
France	Tours				0.65	0.63	0.65	0.8
France	Valence					0.63	0.71	0.86
France	Valenciennes			0.66	0.7			
France	Vienne					0.6	0.73	0.77
France	Voiron					0.6	0.69	0.69
Germany	Cologne					0.81	0.82	0.85
Germany	Leipzig						0.83	0.71
Germany	Munich						0.75	0.64
Germany	Weyer							0.75
Germany	Würzburg						0.68	0.66
Italy	Arezzo					0.5	0.72	0.8
Italy	Bari						0.7	0.66
Italy	Bassano						0.77	0.77
Italy	Bologna							0.8
Italy	Cantania						0.77	0.8
Italy	Firenze	0.44	0.57	0.7	0.73	0.56	0.7	0.71

Italy	Lucca	0.67	0.62	0.66	0.69	0.61	0.67	0.78
Italy	Modena				0.6	0.54	0.77	0.8
Italy	Naples						0.68	0.7
Italy	Pisa						0.69	0.76
Italy	Sansepolcro					0.59	0.76	0.81
Italy	Siena						0.74	0.79
Italy	Udine							0.77
Low Countries	Amsterdam				0.65	0.76	0.76	0.88
Low Countries	Arnhem						0.79	0.8
Low Countries	Leiden				0.59	0.74	0.82	0.81
Low Countries	Lier			0.70	0.72	0.73	0.7	0.71
Low Countries	Louvain			0.76	0.67			
Low Countries	Mons			0.68	0.71			
Low Countries	Utrecht				0.65	0.76	0.76	0.88
Spain	Barcelona					0.88	0.86	0.83
Spain	Leon					0.7	0.82	0.73
Spain	Madrid					0.61	0.75	0.76
Spain	New Castille					0.61	0.75	0.76
Spain	Old Castile					0.7	0.81	0.73
Spain	Seville							0.6
Spain	Valencia			0.84	0.85	0.76	0.83	0.83
Spain	Valladolid					0.64	0.78	0.83
Spain	Zaragoza			0.73	0.74			
United Kingdom	Chester		0.76	0.72	0.66			
United Kingdom	Edinburgh							0.76
United Kingdom	Eton							0.77
United Kingdom	Exeter	0.72	0.71	0.73	0.77	0.61	0.58	0.8
United Kingdom	London	0.68	0.68	0.71	0.81			
United Kingdom	Southern England	0.67	0.74	0.7	0.79	0.68	0.61	0.79
United Kingdom	Winchester							0.76

Sources: estimates of market performance based on Allen and Unger (2018). For details on methodology, see text.